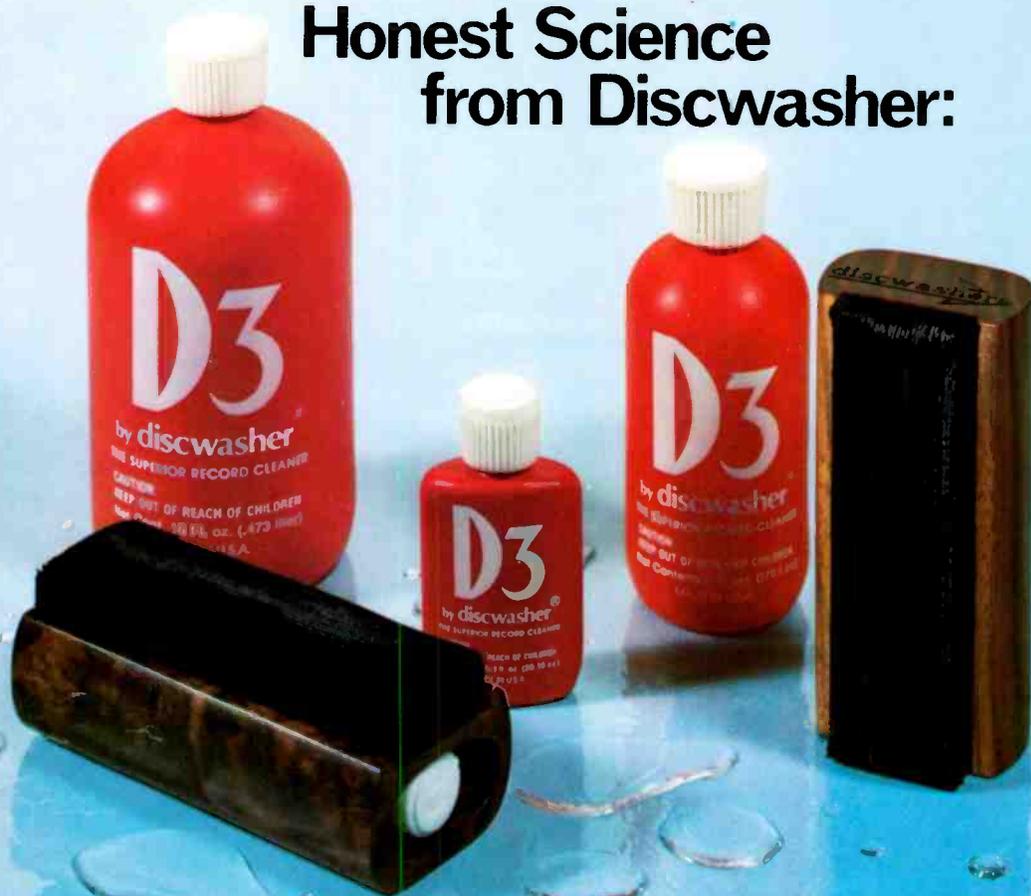


Honest Science from Discwasher:



THOU SHOULDEST NOT BE DECEIVED!

There is no perfect record cleaner, only good science and ongoing research. The laboratories at Discwasher, Inc. have spent more time and money in record care research than possibly anyone else in the world. We will share some of these studies in view of what we feel are dishonest claims from parasitic followers of Discwasher innovation.

A quiet, clean record stays that way because of:

- QUALITY pressing;
- SAFE cleaning activity on both groove walls and channels; and
- REMOVAL OF CONTAMINATION with a non-adhering fluid.

A scientifically correct record cleaner:

- WILL NOT pull stabilizers out of vinyl. These paraffin/lanolin-like molecules are essential for record life and cannot be confused with fingerprint oils. Alcohols and utility “cleaners” remove these stabilizers.
- WILL NOT show dramatic static reduction without “leaving” something conductive on the record surface. Such coatings can be measured in a reduction of dynamics (a cartridge picks up motion the size of a wavelength of light!).
- WILL NOT pull vinyl oxides off by rigorous adhesion. How many layers can you lose?

There is no perfect record cleaner—only a nearly perfect compromise.
It's called the Discwasher Record Cleaning System. Ask for it, and you will not be deceived!

Precision and elegance. The newest Quartz-Servo by Sansui.

Introducing the Sansui SR-838, a luxurious new direct-drive turntable that performs silently with rare and fine precision. Free from howl and feedback, the SR-838 complements the superior tonal quality and the exacting standards of today's most sophisticated component systems.

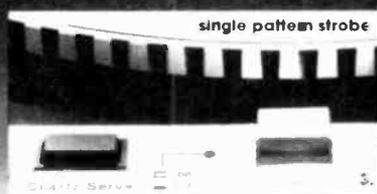
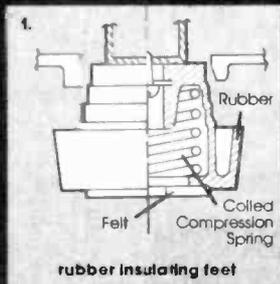
The SR-838 Quartz-Servo delivers reproduction so accurate it may astonish you. With motor speed locked to the precise control of a highly refined quartz crystal, wow and flutter is unusually low, less than 0.025%, and platter speed deviation less than 0.002%. Absolute stability of the single strobe pattern¹ always verifies this platter rotation accuracy.

Sansui engineers have also designed a unique new tonearm for the SR-838. It features a Mass-Concentrated Fulcrum² design, with wide-set pivot points, to suppress unwanted front-back, left-right vibrations. Inside the tubular tonearm is a special resin* that prevents resonance. And the entire unit is firmly mounted on a zinc die-cast base for the most stable performance you can find.

The Sansui SR-838 offers all the performance advantages you'd expect from a superior turntable, plus more. Such as fine pitch control, an electronic brake for speed changes, a skating force canceller, and an oil-damped cueing lever. And the newly designed rubber insulating feet¹ provide superior feedback isolation.

To top it all, the SR-838 is a feast for the eyes as well as the ears. All controls are positioned up front for easy access and operation. And the satiny piano lacquer finish glows with the elegance of simplicity.

See the SR-838, at less than \$390,** including base and dust cover, at your nearest franchised Sansui dealer. Hear it, and you'll discover that advanced technology and precision design do indeed make a difference. All the difference in the world.



SANSUI ELECTRONICS CORP. Woodside New York 11377 • Gardena, California 90247
SANSUI ELECTRIC CO., LTD. Tokyo, Japan • SANSUI ALDICO EUROPE S.A., Antwerp, Belgium • In Canada Electronic Distributors

*Patent pending. **Approximate nationally advertised value. Actual retail price is at the option of individual dealers.

Sansui

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hi-fi/stereo

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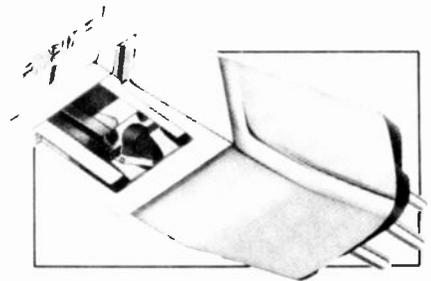
44/SPOTLIGHT ON: BASF PROFESSIONAL I CASSETTE TAPE

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Cover Photo by Neal Slavin

Cover Components:

Rotel's RP-5300 direct-drive turntable.
\$160. Circle No. 149 On Reader Service Card. Audio Technica's AT-20SLa phono pickup with a recommended VTF of 3/4 to 1 1/4 grams.

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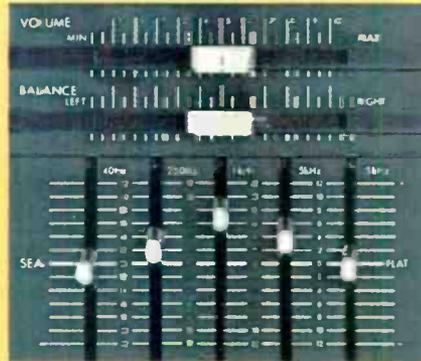
Only three receivers in the world give you master control of the entire music spectrum.

JVC believes that when you buy a full performance stereo receiver you should be able to get full performance from it. Without having to buy expensive add-on accessories.

That's why one of the very special features built into JVC's three new top-of-the-line receivers (JR-S300 II, JR-S400 II, JR-S600 II) is our exclusive SEA five-zone graphic equalizer system. It totally eclipses the capability of conventional bass/midrange/treble tone controls of other receivers. With SEA you're in complete command of every segment of the musical spectrum—from gut bucket bass to coloratura highs. SEA also permits you to custom tailor the sound to the acoustics of any room, and to compensate for the shortcomings of other components in your system.

And if you're a recording buff, you'll appreciate another exclusive JVC professional touch. You can switch the SEA equalizer section into the tape recorder circuit for simultaneous equalization while you're recording.

While these unique features alone set JVC's pace-setting receivers apart from the common herd, we're further insuring top performance with a solid combination of additional features.



Exclusive 5-zone SEA graphic equalizer system for better performance from components and listening room.

JVC

We build in what the others leave out.

And all the power you'll ever need to drive your favorite speakers.

So it's up to you. Which do you prefer? A JVC professional receiver with a built-in SEA graphic equalizer. Or one that leaves it out.

JVC America Company, Division of US JVC Corp., 58-75 Queens Midtown Expressway, Maspeth, N.Y. 11378 (212) 476-8300. Canada: JVC Electronics of Canada, Ltd., Scarborough, Ont

	S600 II	S400 II	S300 II
RMS power/channel, 8 ohms, 20Hz to 20,000Hz	120 W	80 W	50 W
Total harmonic distortion	0.03%	0.08%	0.1%
Approx. retail value	\$660.	\$550.	\$430.

Circle No. 73 On Reader Service Card



dbx 128 tape copies sound better than your records



First, you play your favorite records, tapes or FM broadcasts through the expander section of our Model 128 to restore missing dynamics and reduce noise that's been robbing you of live performance realism.

Then, you preserve the dynamics of this vibrantly enhanced program by copying through the 128 noise reduction section to eliminate tape hiss normally added by copying.

Finally, you play back your taped copy through the decoder of your dbx 128 and hear music with more dynamic range and detail than you've ever heard before off any tape. Sound unbelievable? Well, it was until the dbx 128 came along. But now you can make dynamically enhanced copies that sound better than the originals, with no hiss build-up, on any open-reel, cartridge or cassette recorder.

To learn how, ask the dbxpert at your local dealer for a demonstration of the new dbx 128. For full product information and a list of demonstrating dbx 128 dealers, circle reader service number or contact:

dbx, Incorporated, 71 Chapel Street
Newton, Massachusetts 02195 • (617) 964-3210

dbx

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hi-fi stereo BUYERS' GUIDE

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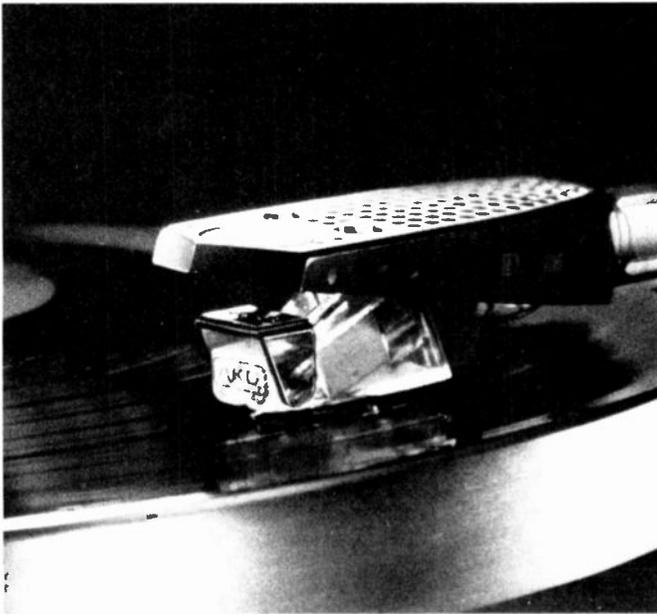
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HI-FI/STEREO BUYERS' GUIDE

*To own the finest
cartridge and
headphone
available today...
is as simple as AKG.*



Start with your records. They are expensive. Treat them to the tender care of an AKG PHONOCARTRIDGE. Its patented Transversal single-point suspension provides greatly reduced mass...thus a minute tracking force. Total performance features such as: low intermodulation distortion, unexcelled transient response, full frequency range and unwavering depth (imagery) perception, place them in a class above other phono cartridges. There's a range to choose from. Then...



finish with your ears. They are discerning and critical, and will eventually drive you to AKG HEADPHONES. Why not now? Each model is bio-acoustically engineered, lightweight, comfortable to wear. Take the K-240. Its combination of microphone derived transducers and "passive" diaphragms produce sound almost indistinguishable from the "real" thing. The K-140 retains some of the K-240 features and at a mid-range price, provides hard-to-beat stereo headphone reproduction. The K-40 is a more economical version of the K-140. Listen to ours...before you purchase anyone else's. At your local AKG dealer.



...the mark of professional quality

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THE LATEST HI-FI COMPONENTS IN OUR... AUDIO SHOWCASE

Head Demagnetizer

TDK Electronics offers a deluxe tape recorder head demagnetizer for "around \$20." The demagnetizer comes in cassette format, with self-contained electronic circuitry powered by a 1.5-volt dry cell battery. Just slip the demagnetizer cassette into a deck, push



Circle No. 109 On Reader Service Card

"play," and within seconds a red Light Emitting Diode (LED) glows to let you know that the deck heads are completely demagnetized. TDK says this invention provides a unique solution to the often difficult job of reaching heads, especially in car stereo units and in portable recorders, for demagnetization with conventional types of demagnetizers.

Direct Drive Logic Turntable

Mitsubishi's second turntable, model DP-EC2, is a logic-controlled direct-drive unit priced at \$400 including dust cover and base. It features auto-



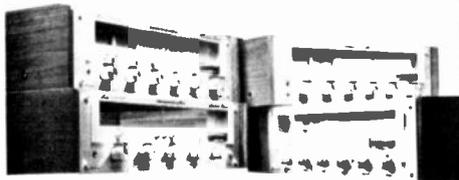
Circle No. 107 On Reader Service Card

matic or manual operation, full automatic logic circuitry, highly sensitive microswitches for all functions, electronic stroboscope that reads speed accurately by means of light-emitting diodes, stainless steel tonearm assembly with butyl rubber in the counterweight for effective damping and improvement

of frequency response, and a one-piece diecast aluminum headshell with a unique sliding mechanism that accepts any cartridge. A high-torque DC servomotor generates a torque of at least 1.2 kg/cm. A high-precision diecast aluminum base suspended on four shock absorbent legs is used to deaden mechanical and acoustical vibrations. A slightly concave platter mat grips records effectively, according to Mitsubishi.

New Look Marantz Receivers

Marantz offers four premium quality AM/FM stereo receivers that now have a "dramatic new professional look," ac-

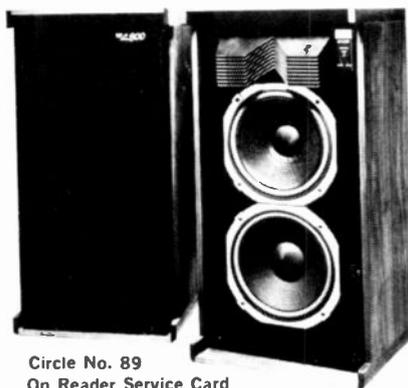


Circle No. 80 On Reader Service Card

ording to the manufacturer. Model 2216B has detented tone controls which allow convenient variation of bass and treble frequencies for flexible tone enhancement, and a phase lock loop multiplex demodulator produces precise stereo separation with lower harmonic distortion and maximum noise rejection. The receiver is rated at 16 watts per channel and has total harmonic distortion of 0.15%. Models 2238B and 2252B are equipped with rear panel receptacles which accept the optional plug-in Marantz DIB-I Dolby FM Decoder. The 2238B offers 38 watts per channel, minimum RMS, and 0.08% THD; model 2252B puts out 52 watts per channel and has a THD of 0.05%. Model 2226B provides 26 watts per channel and has THD of 0.1%. All receivers have frequency ranges from 20 to 20,000 Hz. Prices: 2216B, \$249.95; 2226B, \$309.95; 2238B, \$369.95; 2252B, \$459.95.

Dual-Woofer Speaker System

Sansui's new SP-L800 two-way speaker system employs dual 12-inch woofers



Circle No. 89 On Reader Service Card

augmented by a 2 $\frac{3}{4}$ -inch rear-driven horn tweeter. The woofers have staggered frequency responses so that the bottom of the low frequency range and lower midrange can be covered by separate units to achieve balanced performance at high power inputs, according to Sansui. The rear-driven tweeter crosses over at 1500 Hz. Dispersion to all listening points is obtained with an acoustic lens rotatable over a 120-degree range. The rated maximum input power handling capacity is 300 watts at 8 ohms impedance. Sensitivity is a high 95 dB/W/m and frequency response is put at 30 to 20,000 Hz. The SP-L800 can be used in a conventional one-amplifier hookup, or it can be bi-amped via the separate input terminals that are provided. Approximate advertised value: \$800.

Two Semi-automatic Turntables

Sanyo Electric adds two new semi-automatic turntables to its audio line. Model TP626 offers a belt-drive system, with a 4-pole synchronous motor, for stable speed and reduced motor vi-



Circle No. 111 On Reader Service Card

bration. Other features include a static-balanced tonearm for low noise and "excellent" groove tracking, and a direct-reading stylus pressure counterweight. There's also a heavy aluminum diecast platter for "inertial characteristics" favoring precise rotational speed and viscous damped cueing. Price of the TP626, with hinged dust cover, is under \$90. Model TP727, priced at under \$110, has more advanced features including a DC servo-controlled motor and stroboscope speed control for accurate visual identification to obtain proper speed adjustment. Other features include belt drive, viscous damped cueing, anti-skate control, plug-in cartridge shell and S-shaped tone arm, an overhang control to regulate the exact point where the tone arm touches the record, heavy diecast aluminum platter, hinged dust cover.

Dynamic Speaker

Philips High Fidelity Laboratories offer the company's third dynamic speaker system, model AH475, at a price under \$110. This 8-inch two-way system handles 40 watts RMS, from 40 to 20,000

Only one direct-drive semi-automatic has a concrete advantage.



If you want the precision speed control of direct drive and the convenience of a turntable that shuts itself off, you can choose from many brands.

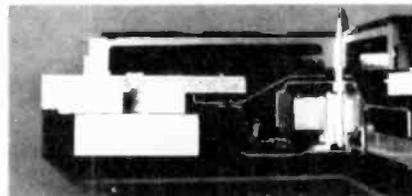
But only the Kenwood KD-3070 has a solid advantage that can really make a difference

Because the turntable base is made with dense resin concrete, it virtually eliminates acoustic feedback.

That means that no matter how loud you play your music, the vibration in the air won't couple vibrations to the tonearm and cause howl.

In fact, while we don't recommend it, you can actually place this turntable on top of a speaker and crank up your volume without causing feedback.

The same thought that goes into creating our resin concrete base goes into the design of our tonearm and turntable controls as well.



Dense resin concrete in base virtually eliminates vibration.

And if that's not enough to convince you, consider this: You can buy the KD-3070 for less than \$175.00.*

That's a concrete advantage, too.

*Nationally advertised value. Actual prices are established by Kenwood dealers. Cartridge optional.



KENWOOD®

For nearest dealer, see your Yellow Pages, or write Kenwood, P.O. Box 6213, Carson, CA 90749



Model AT15Sa/H Dual Magnet Stereo Cartridge pre-mounted in Universal tone arm head shell

To find out how much better our cartridge sounds, play their demonstration record!

There are some very good test and demonstration records available. Some are designed to show off the capabilities of better-than-average cartridges...and reveal the weaknesses of inferior models. We love them all.

Because the tougher the record, the better our Dual Magnet™ cartridges perform. Bring on the most stringent test record you can find. Or a demanding direct-to-disc recording if you will. Choose the

Audio-Technica cartridge that meets your cost and performance objectives. Then listen.

Find out for yourself that when it comes to a duel between our cartridge and theirs...we're ready. Even when *they* choose the weapons!

What you'll hear is the best kind of proof that our Dual Magnet design and uncompromising craftsmanship is one of the most attractive values in high fidelity. For their records...and yours!

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INNOVATION □ PRECISION □ INTEGRITY

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In Canada: Superior Electronics, Inc.

Circle No. 38 On Reader Service Card

AUDIO SHOWCASE

Hz at 8 ohms. Crossover is at 3500 Hz and the unit has a fundamental system resonance of ± 3 Hz. Components consist of a 1-inch dome tweeter and an



Circle No. 84
On Reader
Service Card

8-inch long-throw high-compliance woofer. The walnut grain vinyl wrap enclosure is fitted with a removable decade type grill, and the front panel is finished so that it may be displayed with or without the grill.

Quartz-Locked Direct-Drive Turntable

JVC America has come out with the company's third and "most modestly priced" quartz-locked, direct-drive servo-electronically-controlled turntable and tonearm combination. The QL-7 is



Circle No. 73
On Reader Service Card

priced at under \$300. Specifications for the two-speed turntable include: wow and flutter, less than 0.025% WRMS; S/N ratio, 73 dB (Din B); usable cartridge weight including headshell, 14.5 to 23.5 grams; effective tonearm length, 9.64 inches. Notable features include: electronically activated DC servo motor; oscillator-assisted illuminated stroboscope; exclusive touch sensor speed change/stop controls at the edge to avoid interference with the tonearm; tracing-hold damped tubular tonearm with gimbal suspension having a 0 to 3 gram calibrated tracking force adjustment; adjustable anti-skate control scale coordinated with the stylus

HI-FI/STEREO BUYERS' GUIDE

If you thought
ReVox made just
the world's finest
tape recorders

guess again
... and again.



We also make the world's finest tuners and amplifiers, including this incomparable matched pair of state-of-the-art components. The B760 Digital Frequency Synthesizer FM Stereo Tuner and B750 Integrated Control Amplifier are to separate components what the B77 is to tape recorders; they are simply the best there is.

Willi Studer wouldn't have it any other way.

We urge you to test our claim by visiting your ReVox dealer to compare our B760 and B750 against any other tuner and amplifier regardless of price. If you can find anything that sounds demonstrably superior to this incomparable pair, Herr Studer would like to hear from you.

But first, you'll have to audition these exciting new ReVox components for yourself, so write to us for complete information and the name of your nearest demonstrating dealer.

STUDER REVOX



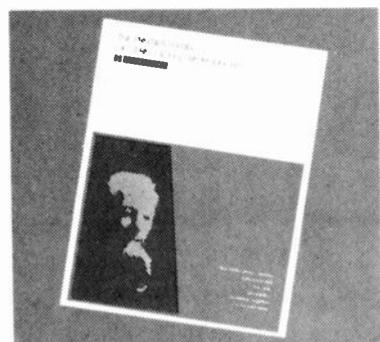
The original manuscript by J. S. Bach shown is reproduced by kind permission of The British Library

The Test of Time.

Critics were most generous in their praise when the Shure V-15 Type III phono cartridge was first introduced. The ultimate test, however, has been time. The engineering innovations, the uniform quality and superb performance of the V-15 Type III have made it the audiophile's choice as the source of sound for the finest music systems both here and abroad.

Consider making the relatively modest investment of a new cartridge to upgrade the performance of your entire hi-fi system.

Shure Brothers Inc.
222 Hartrey Ave., Evanston, IL 60204
In Canada:
A. C. Simmonds & Sons Limited



MANUFACTURERS OF HIGH FIDELITY COMPONENTS
MICROPHONES SOUND SYSTEMS AND RELATED CIRCUITRY

Circle No. 34 On Reader Service Card

AUDIO SHOWCASE

force scale for easy adjustment; counterweight for static balancing of cartridges weighing from 14.5 to 23.5 grams; low capacitance shielded cables for CD-4 cartridges.

DC Stereo Amplifier

Kenwood's KA-8100 integrated DC (Direct Current) amplifier offers a continuous minimum RMS power output of 75 watts per channel into 8 ohms, with no more than 0.03% total harmonic distortion. The "impressive" advantages of a DC amplifier, over conventional AC types, according to Kenwood, include: a linear frequency response from 0 Hz right up to 100 kHz; minimal distortion, particularly in the low frequencies; excellent phase and transient response; reproduction of dynamic sound intensities in proper relationships for good instrument localization. The

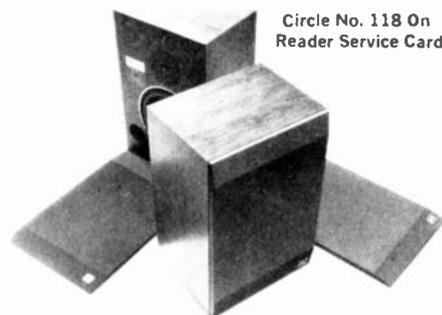


Circle No. 74 On Reader Service Card

KA-8100 utilizes a separate power supply for each channel, employing a large power transformer with two 10,000 μ F electrolytic capacitors in each filter circuit, to assure complete channel separation. A third separate power supply is employed in the preamp stage. A "tape-through" circuit permits tape-to-tape dubbing while another program source is playing. Bass and treble controls have "defeat" controls. Turnover frequencies are at 150 and 400 Hz for bass and 3 kHz and 6 kHz for treble. In addition to two tape decks, the unit has provision for two phonos, auxiliary and tuner inputs, plus outputs for two sets of stereo speaker systems. Nationally advertised value: \$375.

Two-Way Bookshelf Speaker System

James B. Lansing Sound (JBL) says this L40 two-way bookshelf speaker system is the finest two-way speaker it has ever produced. It employs a 10-inch low frequency driver, a 1-inch high frequency hemispherical radiator and a precision-engineered frequency dividing network. The woofer has a 2-inch diameter copper voice coil combined with a 2½-pound low loss Alnico V magnetic assembly. The cone is



Circle No. 118 On Reader Service Card

of a particularly stiff material to prevent irregular cone flexing by strong low frequency transients. To optimize low frequency response, an "acoustic resistance shroud" is used to match the physical parameters of the low frequency driver to the enclosure volume. These parameters are the mass and stiffness of the cone assembly, the suspension resistance and the DC voice coil resistance. The shroud consists of fiberglass (chosen for its fiber diameter and packing density) formed into a basket and held behind the loudspeaker to provide resistive damping without restricting normal cone movement. Price: \$207 each.

Improved PAT-5 Preamplifier

Dynaco claims to have achieved significant improvements in the company's PAT-5 preamplifier. By incorporating a new FET-input operational amplifier, distortion has been reduced to 0.007% or less for both intermodulation and harmonic content, and high level signal-to-noise is said to be 5 dB better. Elec-



Circle No. 37 On Reader Service Card

trolytic capacitors in the audio circuits have been replaced with military grade non-polarized tantalum capacitors to achieve more "natural" and "listenable" sound quality. In the phono equalization network, 2% tolerance dipped mica capacitors replace the 5% polyester capacitors to improve equalization accuracy, phonograph definition and transparency. Specifications: frequency response (high level inputs), 10 to 50,000 Hz \pm 1 dB; magnetic phono hum and noise, 70 dB below a 10-mV input at 1 kHz; high level hum and noise, 90 dB below a 0.5-volt input. Prices of the PAT-5, FET Mark 2 preamplifier: factory wired, \$449.; kit form, \$299.

Deluxe Stereo Compact Music System

Superscope's Imperial C-510 deluxe stereo compact music system features an AM/FM receiver, front-load cas-

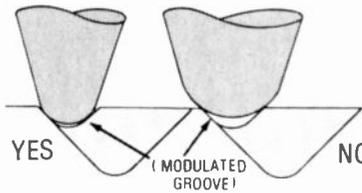
HI-FI/STEREO BUYERS' GUIDE



fact: a stylus tip does not a cartridge make. so why all the fuss?

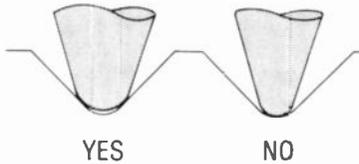
The stylus tip is only part of the complex stylus and cartridge structure, and performs a single function — it positions the entire stylus assembly so that all groove undulations are traced without damaging the record. The production of a top-quality tip calls for exquisite micro-craftsmanship, precision polishing, unwavering uniformity, and exact orientation. *(However, important as it is, an exotic diamond stylus tip configuration simply isn't a cure-all for what might ail an otherwise deficient cartridge, regardless of high-flying claims you may have heard or read.)* Here are the basic criteria a top-quality stylus tip must meet:

IT MUST FIT THE MODULATED GROOVE

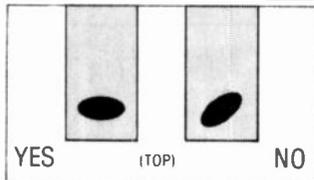
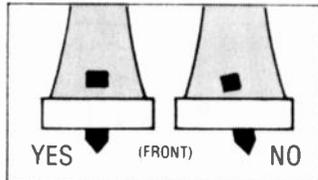


If the tip is shaped so it's oversized at its contact points, it can rise out of the modulated groove (the arrows indicate modulation of one groove wall) and "crest" at the record surface, causing extreme distortion and noise.

IT MUST NOT "BOTTOM" IN THE GROOVE



A slightly-undersized or too-pointed stylus tip may ride the groove bottom, lose contact with the groove walls, mistrack, and generate high noise levels.



IT MUST BE CORRECTLY ORIENTED

Skewed or rotated orientation introduces distortion.



YES

NO

IT MUST BE A GENUINE SHURE STYLUS

For unwavering uniformity, look for the name "Shure" on the grip.

FORM FOLLOWS FUNCTION IN ALL THESE SHURE CONFIGURATIONS AND SIZES:

SPHERICAL



15
15 microns (.0006")



18
18 microns (.0007")

where price is a consideration

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5 x 18 microns (.0002" x .0007")



10 x 18
10 x 18 microns (.0004" x .0007")

for reduced tracing distortion

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required for CD-4; plays all formats

Please send for our "Scientific Study of Competitive Styli" booklet (AL548) explaining the important specifications all Shure styli are required to meet.



High Fidelity Cartridges & Replacement Styli

Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204, In Canada: A. C. Simmonds & Sons Limited
Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

AUDIO SHOWCASE

ette tape recorder, two large external speakers and a BSR automatic record changer. Take it all home for \$249.95. The receiver section includes: 7 watts per channel into 8 ohms, minimum continuous power output from 70 to 20,000 Hz, with no more than 10% THD; phase locked loop circuitry; automatic



Circle No. 95 On Reader Service Card

frequency control; provision for two sets of speakers; slide-rule dial scale; AM/FM signal strength tuning meter. The cassette recorder offers: auto shut-off; push switches for all movements;

separate left and right record level controls and VU meters; record LED indicator; 3-digit tape counter; tape storage tray. Record changer: automatic shut-off; cue control; diamond LP stylus; adjustable tracking force; record size selection; AC synchronous motor. Speakers: acoustic suspension design; 8-inch woofer; 2½-inch tweeter; electrical crossover network.

Integrated Stereo Amplifier

Akai's AM-2400 stereo integrated amplifier offers pure complementary OCL circuitry with wide-range two-stage equalizer to achieve 40 watts per channel continuous power output, minimum RMS at 8 ohms load, from 20 to 20,000 Hz with no more than 0.15% total harmonic distortion. A two-stage direct



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coupled negative feedback equalizer circuit linearizes phono input signals to 180 mV (RMS 1 kHz) and accepts a wide dynamic range of inputs. There's provision for two complete stereo tape systems, and two complete speaker systems with relay protection. Multiple

source inputs include phono, tuner and auxiliary inputs. Other features include: loudness switch for boosting bass and treble response even at low volume; audio mute switch for lowering volume for temporary background listening; bass and treble tone controls plus tone and turnover switches; high- and low-filter switches; stereo balance control; large click-type volume control. Price: about \$185.

New AR Single Play Manual Turntable

Teledyne Acoustic Research offers this AR77-XB single play manual turntable for \$150 without cartridge, or for \$175



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Introducing the Avid Model 80

It's easier to tell you what it won't do.

That's because, for about \$75*, our new Model 80 does almost everything our larger, more expensive systems do. The kind of performance that has made Avid the most talked about line of speakers.

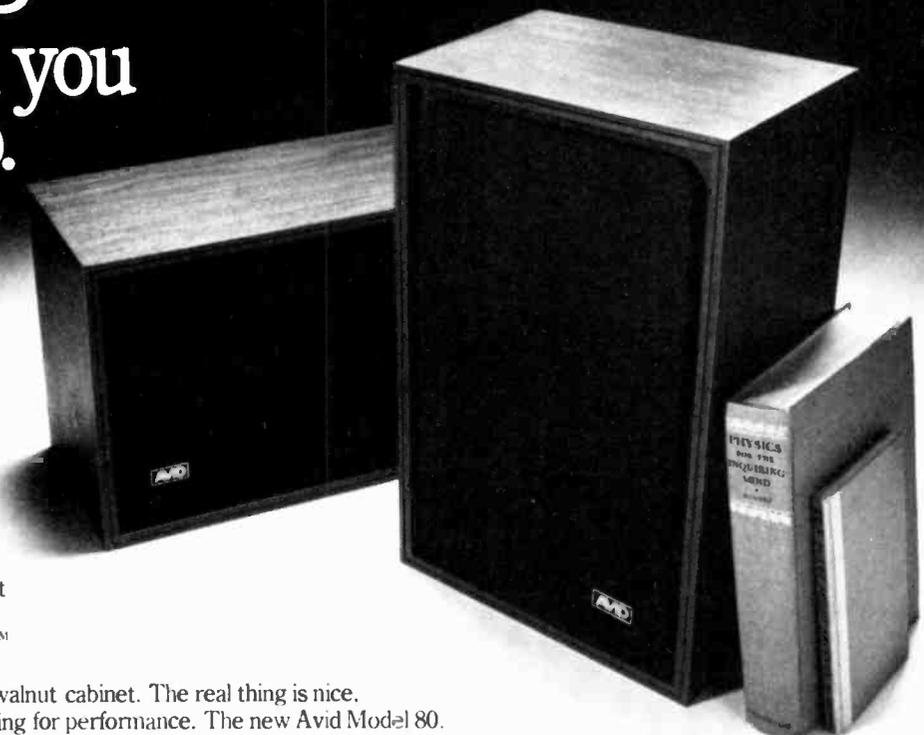
Of course, the Model 80 won't go quite as deep (say, below 50 hertz) as our larger speakers. But you will get clean, low distortion bass, a smooth mid-range and a well-dispersed high end that is truly the equal of many larger, more expensive systems.

The Model 80 doesn't have the extra convenience of a wide-range balance control. But you will get a speaker that has been carefully balanced at the factory by our unique testing program called Q-Span™ that guarantees a perfectly matched pair.

Finally, the Model 80 doesn't have a genuine walnut cabinet. The real thing is nice, but it's also an expensive luxury that really does nothing for performance. The new Avid Model 80. Satisfying performance at a reasonable price. Hear it at your Avid dealer's now.

*Actual prices vary from \$75 to \$80, depending on shipping destination.

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The new Koss PRO/4 Triple A.

We did it again. We took the incredible sound and precision craftsmanship of the Koss PRO/4AA that has long made it the standard of the industry and made it even better. Because the PRO/4 Triple A's extra large voice coil and oversized Triple A diaphragm reproduce a dynamic, full bandwidth Sound of Koss that carries you back to the live performance like nothing you've ever heard before. You remember it all: the expectant hush of the crowd . . . until suddenly . . . the night explodes with the glittering splendor of the all engulfing

performance. You're drawn to the full blown fundamentals and harmonics of each instrument. To the spine-tingling clarity of the lead singer's magical voice. To the rhythmic kick of the drum and the throbbing of the bass.

You see it and hear it all again, yet you're relaxed at home in your own private realm of listening pleasure. The PRO/4 Triple A's extra light construction and unique Pneumalite® suspension dual headband make wearing them as much of a pleasure as listening to them. And all the while, the Triple A's special, human-

engineered, direct-contoured Pneumalite® earcushions create a gentle yet perfect seal for flat, low bass response to below audibility.

It's a whole new experience in stereophone listening. A new performance standard for those who set their standards high. Write c/o Virginia Lamm for our free full-color stereophone catalog. Or better yet, take your favorite records or tapes to your Audio Dealer and listen to them like you've never heard them before . . . live on the new Koss PRO/4 Triple A.

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AUDIO SHOWCASE

if fitted with a Shure M91 ED cartridge. The two-speed turntable has the following specifications: wow and flutter, 0.03% (IEEE weighted); rumble, -65 dB (DIN "B" weighted). The permanent magnet synchronous motor transmits power through an endless belt system. An integral, low-mass tonearm with removable low-mass cartridge shell is 228.6 mm in length, has a mass less than 10 grams, and utilizes cone and socket vertical bearings and oil-less sleeve and pivot horizontal bearings. All bearings have less than 50 mg friction. The AR's 3-point independent suspension isolates the platter and drive system from the motor, base and its environment. Teledyne claims that this suspension is so effective that the top of the plate can be struck with a mallet without causing the tonearm to jump from the record groove.

Add-On Noise Reduction System

dbx, Inc., offers a custom-designed add-on tape noise reduction system for Nag-

ra IV-S portable stereo recorders. The dbx 193 requires no power supply of its own, and provides not only two channels of simultaneous noise reduction but also a two-channel audio amplifier that can be used to drive small field monitor speakers. There are four separate signal processing circuits, two for record and two for playback, to permit monitoring of the noise-reduced normalized signal while recording. Tapes recorded with the dbx 193-equipped Nagra may be played back on any other dbx professional noise reduction system. The unit itself is built to take the abuses of on-location recording. Other notable features include:

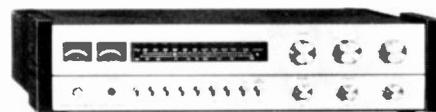


Circle No. 68 On Reader Service Card

30 dB tape noise reduction; 10 dB additional recorder headroom; no level matching required; operates from Nagra battery or external power supply; eliminates tape print-through; bolts directly to Nagra case without tapping or drilling; weighs only 5 pounds; provides separate monitor amplifier circuits. Suggested retail price: \$850.

Stereo Receiver Kit

Heathkit's new AR-1429 AM/FM Stereo Receiver has a rated power output of 35 watts, minimum RMS per channel into 8 ohms with less than 0.1% total harmonic distortion from 20 to 20,000 Hz. Important features—some of which Heath claims are uncommon in receivers in this price range—include: provision for adding an optional AD-1504 Dolby FM module; pre-amp out and power-amp in jacks for adding an



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audio equalizer and bi- or tri-amping; and a full-complementary symmetry power amplifier for minimum distortion. Hum and noise is -65 dB referenced to only 2 mV. Separation is 50 dB or better, due mostly to an improved version of the FM PLL stereo demodulator. Two 8-pole ceramic filters account for excellent channel selectivity on the FM band, and for improved AM channel selectivity two 4-pole ceramic filters are used. Mail order price: \$319.95.

Dynamic Processor

MXR Innovations says this MXR Dynamic Processor is capable of greatly enhancing the enjoyment of recorded and broadcast program material by means of a wide band linear expander and an impulse suppression circuit. The expander restores the "excitement



Circle No. 113 On Reader Service Card

of live performances" to processed music from records, tapes and radio broadcasts while reducing noise. A continuously variable expansion ratio, from 1 to 1.5, provides up to 20 dB of dynamic range enhancement. The impulse suppression circuit is said to be effective in the removal of annoying pops and clicks when using scratched or imperfect records. The Dynamic Processor can be incorporated into any stereo component system, and separate bypass switches for both sections allow all effects of the processor to be removed from the signal path. Specifications: typical dynamic range, 100 dB;

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WOW!

and other comments by stereo critics about Ohm loudspeakers.

Comments about the Ohm C2.

"Surely, all things considered, the design of the OHM C2 represents a fine achievement. With classical music its performance is adequate with something to spare. And with popular music — wow!"

High Fidelity – Nov./1976

Comments about the Ohm F.

"In our simulated live-vs-recorded test it rated A to A+. The sound began to warrant the use of such words as 'awesome'. The low bass, too, was extraordinarily clean and powerful. The Ohm F achieves state-of-the-art performance."

Stereo Review/November 1973

"The Ohm F's are in a class by themselves. The sound is most unusual inasmuch as it is complete, full, natural and transparent. The bass reproduction is clean and perfect."

*Hi-Fi Stereo
(Published in Germany)
October/1974*

"It may well be the finest speaker on the market and is certainly without a doubt among the top few."

*The Complete Buyer's Guide
to Stereo/Hi-Fi Equipment/1977*

Comments about the Ohm H.

"Ohm managed to get prodigious bass response out of a small box without sacrificing efficiency. The high end is handled by conventional drivers and is everything one might ask from a speaker. Dispersion is excellent and the overall sound quality is exemplary."

*The Complete Buyer's Guide
to Stereo/Hi-Fi Equipment/1977*

Comments about the Ohm D2.

"The OHM D2 is designed to provide the identical response as

the C2, sacrificing only the ultra-wide high frequency response of the latter."

*The Complete Buyer's Guide
to Stereo/Hi-Fi Equipment/1977*

Comments about the Ohm L.

"The upper mid-range and high frequencies were virtually perfect."

"In summary, the OHM L . . . is easily good enough to meet the sort of critical standards usually applied to much larger and considerably more expensive speaker systems."

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permission. All rights reserved.*

Comments about the Ohm E.

"Let me assure you, it handles Chopin and pretty well anything else from accordion to zither with equal dexterity. For anyone looking for 'just an ordinary speaker' at a modest cost as Hi-Fi speakers go — this could be it."

*Canadian Stereo Guide/Winter
1974*



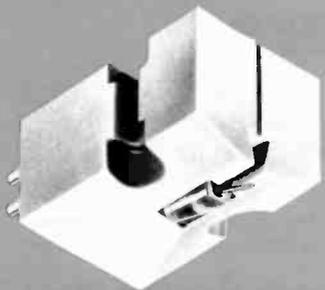
You can get a free 28-page brochure and complete reviews at any Ohm dealer, or by writing us at:
OHM ACOUSTICS CORP., 241 Taffy Place, Brooklyn, N.Y. 11205

DENON

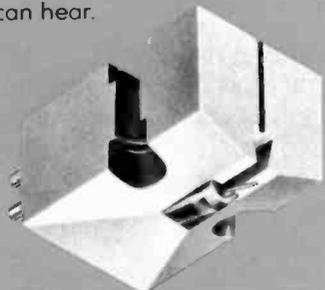
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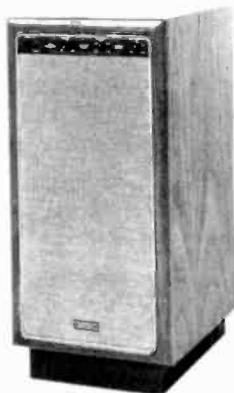
Circle No. 26 On Reader Service Card

AUDIO SHOWCASE

equivalent input noise, -89 dBV (20 to 20,000 Hz typical); input impedance greater than 100K ohms; output impedance, designed to drive 600 ohms or higher; expand level range, adjustable for unity gain, from -16 dBV to $+8$ dBV; frequency response, 20 to 18,000 Hz ± 1 dB at 0 dBV; total harmonic distortion, less than 0.25% from 100 to 15,000 Hz at 0 dBV and 0.05% at 1 kHz (typical). Price: \$199.95.

Powered Loudspeaker

Advent's Powered Advent Loudspeaker is a biamplified, two-way acoustic suspension speaker system that is said to uniquely combine wide range, tonal accuracy, compact size, and "extraordinarily" high acoustic output. The



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On Reader
Service Card

Powered Advent Loudspeaker is the latest result of the company's on going investigation of the interaction among the components in a music system and how it affects the sound quality of the system as a whole. And this unit, according to Advent, deals with the complex interaction between power amplifiers and speakers, and between speakers and the listening room. Only by integrating amplifiers and speaker drivers could these interactions be predicted and controlled, says Advent. Dimensions: $28\frac{3}{8}$ inches high by $14\frac{1}{8}$ inches wide by $11\frac{1}{8}$ inches deep. Suggested retail price: \$499.95.

Music Recovery Module

Garrard has come up with a new electronic component for sound systems called the Music Recovery Module (MRM). Its purpose is to make music more enjoyable by suppressing the click and pop noises present in all records, especially those that have been scratched. A time delay circuit pro-

vides the click and pop detector sufficient time to positively identify noise impulses, suppress them, then allow the desired music to pass through. The system cannot be "fooled" by musical transients, says Garrard. The unit is connected between a turntable and the auxiliary input of an amplifier. Once



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the Intensity Control is adjusted for the desired degree of scratch suppression, the MRM will eliminate most pop and click impulses. Residual surface noise is not affected by the MRM since that would lead to removal of much music as well. The suppressor may be deactivated by means of an on/off switch when scratch-free records are played. Suggested retail price: \$199.95.

Low-profile, High-performance Preamp

The Metron Group, a new international division of Cerwin-Vega, says this PR-1 preamplifier features all discrete full dual differential complementary circuitry, regulated power supplies (± 42 -V), precision step attenuators, and wide dynamic range. Specifications: frequency response RIAA, 30 to 15,000 Hz ± 0.2 dB; signal-to-noise ratio, 11HF "A" weighted, -84 dB; input sensitivity, 2.0 mV at 1 kHz; total harmonic distortion, 20 to 20,000 Hz, below 0.01% for phono to main output and below 0.005% for aux, tuner and tape to main output. The PR-1 is designed to accommodate seven stereo input connections: 2 tape, 2 phono, tuner, micro-



Circle No. 114 On Reader Service Card

phone, auxiliary. These connections can be routed to three separate stereo outputs, including a 600 ohm drive output rated at 11 volts maximum. Long life expectancy is attributed to semiconductor design involving use of 72 transistors, 19 diodes, 2 zener diodes, 4 LEDs and a single circuit board that eliminates virtually all wiring. Price: About \$500.

Belt Drive Turntable

Yamaha's lowest price turntable, model YP211, is designed to bring "component quality to a broader segment of the market" by providing the following features at a cost of only \$130: two speeds ($33\frac{1}{3}$ and 45 rpm); 4-pole synchronous motor; belt drive with 0.08% WRMS wow and flutter; auto-return/

HI-FI/STEREO BUYERS' GUIDE



Yes, the new Dual 604 is direct drive. Now let's talk about something really important.

You may have noticed that most turntable stories begin and end with the drive system. The tonearm is more or less an afterthought.

But not with Dual. Because the tonearm can make a big difference in how records sound and how long they last. Which is why Dual is very serious about tonearm design and performance. And why we can be very serious about tonearms in our advertising.

Let's consider the 604 tonearm.

The straight-line tubular design provides maximum rigidity with minimum mass. The four-point gimbal centers and pivots the tonearm precisely where the vertical and horizontal axes intersect. And the counter-balance houses two specially-tuned anti-resonance filters that absorb parasitic resonances originating in the tonearm/cartridge system and chassis.

Operation is semi-automatic, with another unique

Dual difference: the mechanical sensor. Switch it in and you feel when the stylus is positioned precisely over the 12" and 7" lead-in grooves. At the end of play, the tonearm lifts and returns to its post, and the motor shuts off. Automatically.

Now let's talk about the direct-drive system. It employs a newly developed DC electronic motor, with speed regulated by a CMOS integrated circuit and digital reference circuit. Speed accuracy is within 0.001 percent. Wow and flutter are less than 0.03 percent, rumble better than 70 dB. As with any great drive system, that's far beyond audibility.

But the important story with any turntable is simply this. The drive system merely turns the record. It's the tonearm that plays it.

Dual 604, semi-automatic, less than \$260. Dual 621, fully automatic plus continuous repeat, less than \$300. Both with case and cover. Actual resale prices are determined individually and at the sole discretion of authorized Dual dealers.

Dual[®]

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A name and components. We're Audionics of Oregon now, and we're introducing our Audionics System, a new generation of advanced audio components including our BT2 preamplifier, PZ3-II amplifier and T52 vented tower loudspeakers.

This Fall we're introducing our Tate System' SQ2 decoder, the first moderate-cost quad unit for audiophiles. This winter we'll deliver our BA150 analog/digital power amplifier with patented tube output and digital biasing circuitry.

We've been deeply involved in audiophile design for several years, and you can expect the best from us. Learn more from your audio specialist, or write.

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AUDIO SHOWCASE



Circle No. 101
On Reader Service Card

reject and shutoff; S-type tonearm with plug-in head and gold plated contacts; cueing lever; adjustable anti-skate. Signal-to-noise ratio is said to be better than 52 dB. Comes with a free-stop hinged but removable acrylic plastic dust cover.

Record Conditioner

Fidelitone offers a new record care product dubbed the Record Conditioner



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with Purifier Fluid by Fidelitone. The conditioner has a unidirectional pile pad mounted on a contoured, hand-rubbed cherrywood base that fits into a matching holder that protects the pad from dust. The purifier leaves no residue, reduces static charge, and significantly increases output sensitivity, according to Fidelitone. A half-ounce bottle of fluid that can be stored inside the conditioner is included in the suggested retail price of \$10.95. The fluid is also available in three replacement sizes: 1/2 ounces, \$1.49; 4 1/2 ounces, \$4.99; 16 ounces, \$16.95.

Indoor FM Antenna

British Industries (B.I.C.) is marketing the first electronically directable and frequency tunable indoor FM antenna. The new "Beam Box" fits right in your cluster of audio components. B.I.C. says the wire-dipole antenna generally used with most FM receivers cannot easily be oriented in the proper direction to pick up reflection-free, strong signals from all stations in any given area. Outdoor antennas are costly to install, impractical or prohibited for apartment dwellers, and require a rotator to provide best reception from all directions. The Beam Box has a passive electronic circuit that directs its sensitivity pattern towards any one of four geographic quadrants at the turn of a switch, without the antenna itself ever having to move. Multipath signals are suppressed and stereo separation and signal-to-noise performance are improved. The unit is also equipped with a front end that is tunable to the desired frequency range. When tuned in, the Beam Box is approximately 16 times more responsive to the desired signal than to other frequencies on the FM band, says B.I.C. The results: improved image rejection, IF rejection, spurious response rejection and reduced interference from unwanted signals in or outside the FM frequency band. The Beam Box uses no house current or battery current, and should not be confused with "booster" antennas which add noise to received signals. Price: \$89.95. ▲

ROTEL RT-1024 STEREO TUNER

"Surely one of the 'hottest' tuners on the market... one of the most sensitive... with just about every feature..."

Stereo Review, July 1977 Hirsch-Houck Laboratories Reports



Some Important Data

- FM Sensitivity, 9.3dB (1.6uV)
- 50dB Quieting, 11.5dB
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HI-FI/STEREO BUYERS' GUIDE

THE SUPERLATIVE SONY.

THE NEW TC-766-2 HAS THE LOWEST WOW AND FLUTTER OF ANY DECK SONY EVER BUILT.



TC-766-2

AN INCREDIBLE 0.018% (WRMS) AT 15 IPS, AND 0.04% (WRMS) AT 7½ IPS. Closed Loop Dual Capstan Tape Drive System. One capstan extends from the motor shaft itself, eliminating intervening gears that can hamper speed accuracy. The other tape drive capstan connects through an extremely steady belt-drive inertia flywheel.

PHASE COMPENSATOR CIRCUIT. The goal of any recording is a "mirror image" of the original signal. Sony's exclusive Phase Compensator Circuit comes closest to achieving this by rectifying phase distortion and producing sound quality virtually identical to the original source.

PROFESSIONAL STUDIO STANDARD VU METERS. Illuminated, calibrated and ultra-clear for the best monitoring possible, are identical in size, shape, color and sensitivity to those on professional consoles.

SYMPHASE RECORDING. Because of Sony's outstanding

Ferrite & Ferrite Heads, plus the remarkably precise fabrication and alignment of the head gap, recordings retain exact positioning of signal throughout the stereo field. The "location" of individual sounds won't wander. There's no annoying phase shift.

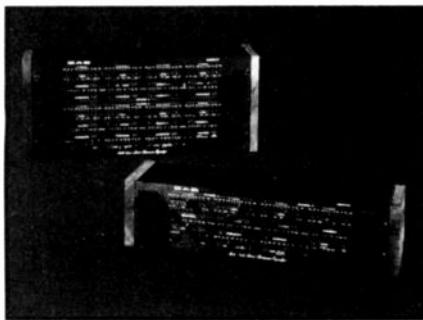
MORE PROFESSIONAL FEATURES. The TC-766-2 has 4 incredibly durable Ferrite & Ferrite heads for 2-track recording and playback, 4-track playback and erase, direct-coupled playback FET amplifier, flashing Standby Signal, Punch-In Record and solenoid-operated Logic-Controlled Transport Functions to let you move instantly to and from any mode without stopping. Standard equipment: RM-30 full-function remote control unit with record mute and hinged head cover.

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Our 2800 Dual Four-Band and 1800 Dual Two-Band Parametrics offer you controls that not only cut and boost, but also vary the bandwidth and tune the center frequency of any segment of the audio range. With this unique flexibility, any problem can be overcome precisely, and any effect created precisely.

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Rahsaan Roland Kirk/by Gary Giddins

The death of Rahsaan Roland Kirk on December 5, hurt the way the deaths of few artists do. He was 41, and though he had suffered a crippling stroke two years earlier the news was unexpected. His heroic rallying and determination to perform and to perform well—with one side paralyzed made him seem invulnerable. In fact, he had just finished a concert when the end came. A week earlier I had seen him at the Village Gate, seated in a wheelchair encouraging a band made up of his current sidemen.

Kirk was blind from birth but few musicians were as ubiquitous. His large figure, mouth implacable, with eyes hidden behind wrap-around glasses, was in regular attendance at concerts and clubs. Whenever an expatriate returned home or a great musician made a comeback or any benefit or jam of special importance took place, he was likely to be present. In the sixties, when the music was being torn apart by internal skirmishes and external indifference, I don't think any musician was more loved. Kirk made it his business to reconcile the avant garde with the traditional; he accomplished this in interviews and panel discussions, in his compositions and performing, and in the example he set for the younger musicians who worked with him or otherwise came under his spell. During that last evening at the Gate, his pianist, Hilton

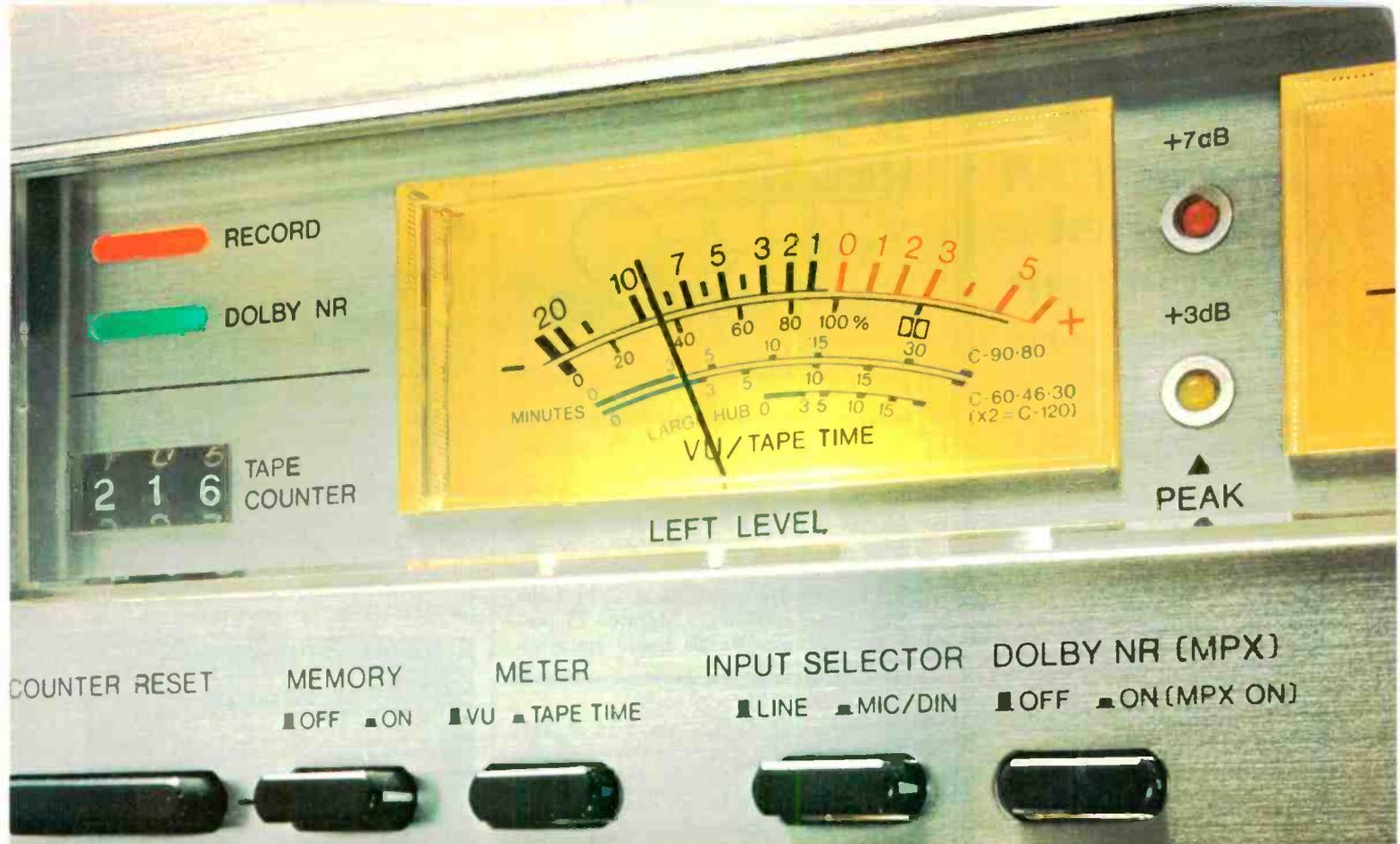
Ruiz, spoke of Kirk's teaching on the choosing of material, and played pieces by Fats Waller, Dizzy Gillespie, and Percy Heath. Kirk's rule was basically this: Honor the tradition.

He was, in Charlie Parker's phrase, a devout musician. Born in Columbus, Ohio in 1936, he was educated at the Ohio State School for the Blind, and was playing professionally at the age of 15.

Rahsaan's dreams, and his insistence on acting upon them, are legendary. He dreamed of playing several horns simultaneously, and he went about achieving that sound in the basement of an old instrument store where he discovered two virtually extinct members of the saxophone family—the soprano-like manzello, and the alto-like stritch. Together with the tenor, he learned not only to blow all three with stunning power, but to create striking parallel harmonies and contrapuntal melodies. One of the horns would be used as a drone, as he fingered the others. His rhythmic use of the horns was so acute that he could provide his own stop-time accompaniment. In addition, he

(Continued on page 81)

Gary Giddins writes on jazz regularly for the Village Voice and New York. His criticism has appeared in a wide variety of publications, and has twice won the ASCAP-Deems Taylor award for music criticism. He is at work on books for Dial and Oxford University Press.



3 Minute Warning from AIWA

With the AD-6550's unique new Remaining Tape Time Meter you never have to worry about running out of tape in the middle of recording your favorite music. In the past you monitored your tape visually and hoped that the musical passage and tape would finish together. Now, this extremely easy to use indicator gives you plenty of warning. It shows you exactly how many minutes remain on the tape. So that when you record the "Minute Waltz" it won't end in 45 seconds.



Bias Fine Adjustment

But there's a lot more to the AD-6550. AIWA has included a Bias Fine Adjustment knob that permits the fine tuning of frequency response to give optimum performance of any brand of LH tape on the market.

Wow and Flutter: Below 0.05% (WRMS)

The AD-6550 cassette deck achieves an inaudible wow and flutter of below 0.05% (WRMS) thanks to a newly designed 38-pulse FG servo motor and AIWA's special Solid Stabilized Transport (SST) system. And because we use Dolby* we also improve the S/N ratio to 65dB (Fe-Cr). So you can listen to the music instead of tape hiss. The AIWA AD-6550. Be forewarned.

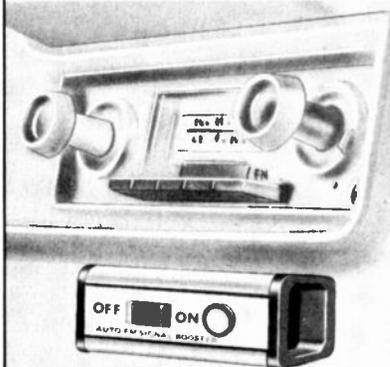


*Dolby is a Trademark of Dolby Laboratories, Inc.

STEREO ONE

Auto FM Signal Booster to eliminate signal fading

Compliments Any Dash Board.



Retail Price \$24.95

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SD550



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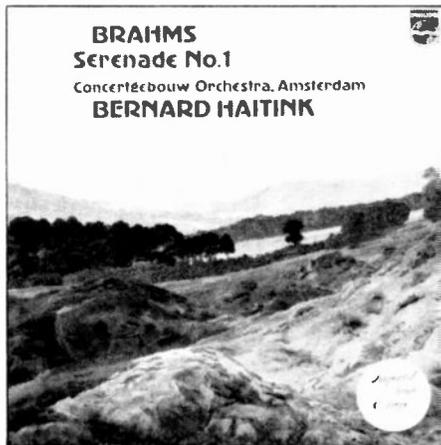
Circle No. 20 On Reader Service Card

A GUIDE TO RECENT STEREO RECORDINGS

by THOMAS D. KELLY

An avid record collector for nearly 20 years, Thomas D. Kelly has a keen ear for both live music and full-fi sound. Mr. Kelly played the records he reviews here on equipment consisting of an Empire 39 transcription system with a Shure V15 III cartridge, a C/M Labs 911 stereo amplifier, a Marantz 7T pre-amp, and two Bozak B-400 speakers

© Brahms: *Serenade No. 1 in D, Op. 11*, Amsterdam Concertgebouw Orch., cond. Bernard Haitink, Philips 9500 322. This lovely work began life in 1858 as a chamber work of but three movements, scored for flute, two clarinets, horn, bassoon and strings. Brahms's associates felt that it should be scored for full orchestra, the composer coupled with their wishes and the music's first performance in this form took place March 3, 1860 at Hanover. "The Serenade" is a beautiful



BRAHMS
Serenade No. 1
Concertgebouw Orchestra, Amsterdam
BERNARD HAITINK

Played to perfection

work, reflecting the composer's happiness and contentment during its period of composition, when he was surrounded by friends and financially more secure than ever before. There are six movements including two scherzi, two minuets played together, and the work ends with a delightful rondo that features the four horns prominently. This delectable music here is played to perfection, and right from the opening pages one can tell that the disc is something very special. The spacious aural picture is a delight, and the warmth

of the Concertgebouw has been caught to perfection. This new Philips recording is far superior to the rival London version with Kertesz and the London Symphony.

© Dvorak: *Symphony No. 8 in G Major, Op. 88* Concertgebouw Orch. of Amsterdam, cond. George Szell, Richmond mono R 23245. I am delighted that this extraordinary performance of Dvorak's "Symphony No. 8" has, at last been reissued in the United States. Originally issued on London in the early fifties, it is one of the finest performances of the work, and the reproduction, while perhaps a bit thin in the strings, is still entirely satisfactory. Of course there are many fine stereophonic recordings of the symphony, notably those by Istvan Kertesz and



An extraordinary reissue

the London Symphony, Bruno Walter and the Columbia Symphony and George Szell's own later recording with his Cleveland Orchestra, but this Szell-Concertgebouw collaboration is something very special and deserves a hearing.

© Dvorak: *Amid Nature, Op. 91; Carnival, Op. 92; Othello, Op. 93; Husitská, Op. 67*; Bavarian Radio Symphony Orch., cond. Rafael Kubelik, Deutsche Grammophon 2530 785. Of the four overtures heard on this disc *Carnival* is the best-known, but all contain Antonin Dvorak's finest qualities, with a wealth of charm, lyricism, and on occasion, such as the finale of *Husitska*, dramatic power. Dvorak was fifty when he wrote all four of them in 1891, and it has been suggested the first three are a symphonic cycle of a pastorella, scherzo and finale. The original title was *Nature, Life and Love* and, indeed, the titles are not inappropriate, with a leitmotif symbolizing nature appearing in all three. *Husitska* was written in 1883 for the opening of the new Czech National Theatre in

(Continued on page 78)

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Circle No. 22 On Reader Service Card

A review of the latest popular music releases

by KEN IRSAY



Emerson, Lake & Palmer: "Works, Volume 2". Atlantic SD 19147. \$7.98.

The two-album set, "Works," released last year at this time (March, 1977), featured each group member playing one disc side without the other two (but with a lot of orchestral accompaniment), then re-uniting on the fourth side. The album was well-received in both pop and classical circles. Loneliness having been too much for them, the boys are all together on this single disc. And "together" they really are. The songs, including five singles previously unavailable on an album, display E,L,&P's unique brand of electronic improvisation, jazz boogie, big band blasting and, of course, rock and roll. The album's high spots include Keith Emerson's Jerry Lee Lewis-type piano action on the "Tiger In A Spotlight" cut and Greg Lake's acoustic guitar pickin' and strummin' on "Watching Over You." Lest we forget, Carl Palmer's drumming on "Close But Not Touching" is superb. The cut opens and closes with a 1776 fife and drum corps sound.

Rod Stewart: "Foot Loose & Fancy Free." Warner Bros. BSK 3092. \$7.98.

Rod Stewart's gravelly, insistent voice, it seems to me, is best suited to songs of misery and despair, which he did indeed perform on his eight previous solo albums. This album continues the pattern and "women" problems predominate. On the churning rocker, "Hot Legs," Rod is once again being driven to the limit of his endurance by a demanding woman. "You Keep Me Hangin' On" is self-explanatory. It's a 7½-minute version of the 1960s soul number. In "I Don't Want to be Right," he's in love with one woman, married

to another. But in the midst of this stock stuff, there are two songs that stand out. Both are ballads and both reveal a sincerity and tenderness that Rod shows all too infrequently. "I Was Only Joking" is a very touching reminiscence of the frivolities of youth. It seems truly autobiographical and Rod sings it with feeling. "You're In My Heart," a Top 10 chart success a while back, has a catchy refrain and makes good use of a background chorus. This



album features Rod's best back-up band yet. They offer effortless rock and roll and judiciously restrained ballad accompaniments.

Alan Price: "Alan Price." United Artists JT-LA809-G. \$9.98.

Remember The Animals? They were the heavily blues-oriented British group that turned up on our shores immediately following the Beatles invasion.



Eric Burdon's lead singing dominated the group, but Alan Price was right in there banging the ivories. The Animals have re-formed and currently ride the airwaves with a very successful album. But our story is of Alan Price, a truly gifted musician, who not only feels right at home as an Animal, but scores a triumph on this mainline pop-oriented set, eight of whose eleven songs he wrote. The tunes, a healthy mix of up and down tempo numbers, have more commercial hooks than my uncle's tackle box. "Rainbow's End" is a tongue-in-cheek put-down of the middle class, in the style of the early Kinks. The wailing sax and infectious beat of "I've Been Hurt" are in marked contrast to the swiging easy romance of "Just For You." All three were written by Mr. Price. The diversity of pop styles performed by this one man is amazing. He deserves your ears and your respect.



The Joy: "The Joy." Fantasy F-9538. \$7.98.

In the early 1970s, Toni Brown and Terry Garthwaite were hot news because they were the first women to compose, sing and play lead instruments for a rock band, The Joy of Cooking. After some personnel changes and disappointing solo albums, Toni and Terry are back as The Joy, but they're still cooking. Basically, Brown and Garthwaite must be called jazz singers. They have that kind of expressiveness and flexibility about their voices. The instrumentation, fronted by Toni's piano and Terry's guitar, is exceptionally tight. Van Morrison's "Come Running" features a chugging harmonica and a bass that all but runs

(Continued on page 26)

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March 1977

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pop discs

away with the lead. A Goodmanesque clarinet in "On the Natch" adds the perfect touch of class and another bass-dominated cut, "Morning Man," is a slightly lascivious tribute to a morning disc jockey. Lots of talented guest musicians on this set, including Elvin Bishop, Taj Mahal and trumpeter Steve Madaio.

Johnny Rivers: "Outside Help." Soul City BT 76004. \$7.98.

Best known as an interpreter of other artists' songs during the 1960s ("Memphis," "Mountain of Love," "Tracks of My Tears," etc.), Johnny Rivers influence on the world of popular music has extended far beyond his own recordings. He discovered and first recorded the 5th Dimension, gave Glen Campbell the Jimmy Webb song, "By the Time I Get to Phoenix" and helped to organize the Monterey Pop Festival in 1967. With sales of 25 mil-

lion records and 16 gold records to his name, Johnny Rivers presents us with this new album as he enters his third decade in the music business. The set



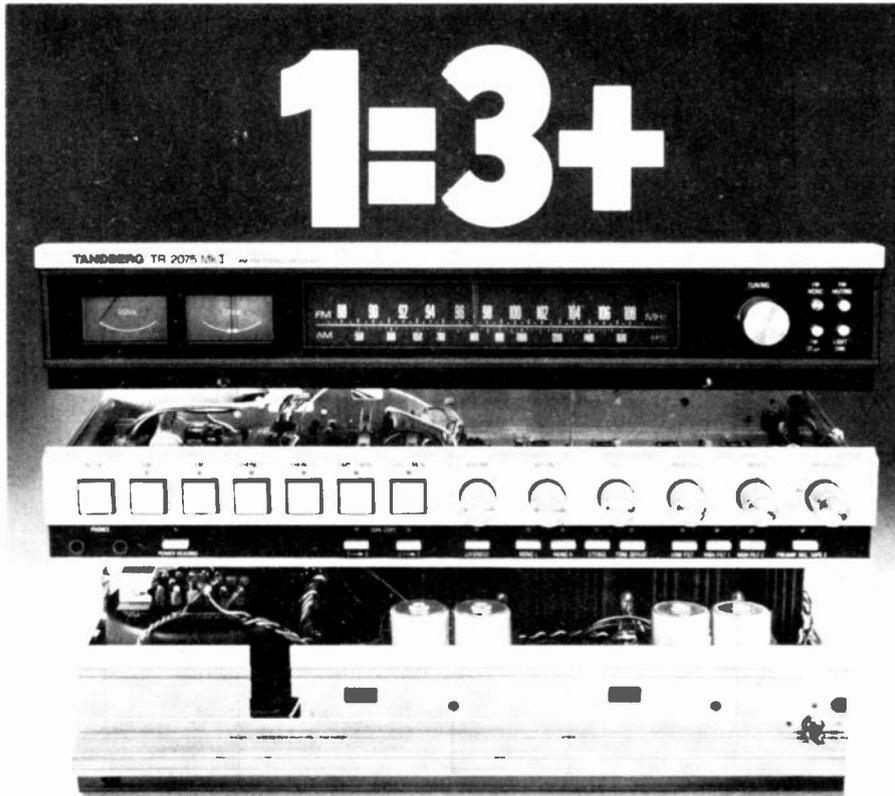
includes slow ballads, slow disco and a couple of rock numbers. Rivers' rhythm guitar and Scott Edwards' bass maintain the slow disco tempo of the title cut. "For You" features Johnny on acoustic guitar in this simply structured statement of love. "One Last Dance" is good funky rock and "Monkey Time" is a laid back update of the Major Lance hit from the 60s.

The Rumour: "Max." Mercury SRM-1-1174. \$7.98.

Remember how you smiled when you first heard The Band doing their "Music From Big Pink" debut album? The sound, the mood and the rough-around-the-edges vocalizing were so wonderfully different from everything else—you just had to feel happy. Well, this album is like that. The singing and instrumental work sound a lot like The Band. This is the first solo album by The Rumour, who usually play back-up to British rocker Graham Parker. The group comprises five pieces, including two guitars, bass, drums and keyboards, with some excellent augmentation by tenor and alto sax, trumpet and trombone. The mix highlights the rhythm of each tune and the obligatory reggae number, "Somethin's Goin' On" has just enough rock and roll to remove it from the streets of Jamaica. Each cut is strong, well sung and well played by a group that obviously enjoys each other's musical company. But my favorite song on the album, in fact one of my all time favorites, is "Do Nothing Till You Hear From Me," an astounding version of this Duke Ellington classic. I can't wait for the second album.

Them: "The Story of Them." London LC 50001. \$6.98.

The songs on this album were re-
(Continued on page 78)



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TANDBERG

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Our theory sounds fantastic.



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In an industry where trial and error methods are common, the Koss Theory of loudspeaker design may seem out of place. But once you hear the unmatched Sound of Koss in the new CM 1020 loudspeaker, you'll know our computerized theory helped make the optimum 3 bandpass speaker a reality.

The Koss Theory eliminates the guesswork in speaker design by selecting parameters for the best possible performance. That's why every part of the CM 1020 works superbly both alone and as part of the whole.

The dual ports, for example, enhance the woofer's front sound waves and dampen excessive woofer movement. There are two ports instead of one because two allow for improved cabinet tuning and greater structural stability. This added stability keeps the cabinet walls from beginning to flex causing unwanted sound-waves.

The port-augmented 10-inch woofer is a special de-

sign that provides a 3 dB gain in electrical efficiency and a 3 dB down point of 31 Hz while offering maximally flat response over the low bandpass. To capture all the presence and musical energy from 300 Hz to 3.5 kHz, the CM 1020 features a performance synthesized 4½-inch midrange driver. Handling the high bandpass is a 1-inch dome tweeter linked to a unique acoustic transformer. This Koss tweeter produces the highest energy output and lowest distortion of any 1-inch direct radiator tweeter on the market. Finally, to unite all these outstanding elements, Koss developed a unique, seamless crossover network.

Though we've tried to describe the superiority of the Koss CM 1020, nothing can match the thrill of a live performance. Ask your Audio Dealer for a demonstration, or write to Fred Forbes c/o the Koss Corporation for a free brochure of Koss CM loudspeakers. After experiencing the CM 1020, you'll agree: hearing is believing.

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THE FIRST CAR SPEAKER SYSTEM THAT YOU CAN FEEL RIGHT AT HOME WITH.

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We decided to change that. We designed the LS70, a 6" x 9" speaker, to meet the same high standards we set for our much acclaimed EPI 70 loudspeaker.

The result is a car speaker that performs like no car speaker ever performed. You get remarkably clear, accurate, "Linear Sound" as well as dispersion that other speaker manufacturers can only dream about.

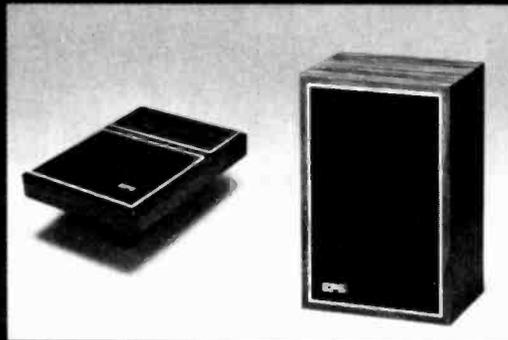
WHAT OTHER CAR SPEAKERS DO WRONG.

In the interest of saving space, most all car speaker manufacturers do something you'd never do with a home speaker — they use an oval woofer.

The problem is that an oval woofer inherently distorts, so right off the bat they're in trouble.

Another problem arises from the traditional co-axial or tri-axial automobile speakers.

In order to conserve space, manufacturers of these speakers literally



LS70 Car Speaker

EPI 70 Home Speaker

stack the tweeters and mid-ranges in front of the woofer. Unfortunately, this blocks and colors sound, causes distortion and impairs dispersion.

WHAT WE DO RIGHT.

First off, we use a low-mass, 6" round woofer so you don't get the distortion you'd get with an oval.

Secondly, it sits right next to our famous 1" air-spring tweeter, just the way it does in a home system; nothing comes between you and the sound.

Finally, we build LS70's to handle up to 60 watts RMS per channel. Other car speakers blow up at considerably less than this.

LS70's really have to be heard to be believed. But for now, let us leave you with this last bit of advice:

If you do decide to go with LS70's, and you ever sell your car, be sure to hang on to the speakers; even if you never get another car — they'll still sound awfully nice in your den.

	LS70	EPI 70
Frequency Response	70-20 KHz	60-20 KHz
Crossover	1800 Hz	1800 Hz
Dispersion	Nearly hemispherical in musical range	Nearly hemispherical in musical range
Tweeter	1" air spring	1" air spring
Woofer	6" long traverse	6" long traverse
Impedance	8 Ohms nominal, 4 Ohms D.C.	8 Ohms nominal, 4 Ohms D.C.
Grille	Acoustically transparent perforated metal	Acoustically transparent matte-black foam

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EPI
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CAR SPEAKER



EPI is a product series of Epicure Products, Inc.,
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Circle No. 35 On Reader Service Card

TURNTABLES

THINGS TO CONSIDER BEFORE YOU
CHOOSE ONE FOR YOURSELF

by WILLIAM S. GORDON

For the majority of audiophiles, the phonograph record is *the* primary source of their listening pleasure. Sure, the FM tuner may be on all day, but when it comes to serious listening, most of us turn to discs. Thus, it is somewhat of a mystery to us why, when divvying up the budget for buying a high fidelity system, the turntable so often gets short shrift.

Perhaps the reason that the turntable gets ignored is that it has such a mundane job to do. In the minds of many audiophiles, the turntable merely rotates the record. True enough, but that's not all it does. Considered as a system, it also supports the disc and isolates it from external influences. Now, when you consider that most turntables are bought *with* a tonearm, you can see that there is even more involved. The tonearm must support the cartridge at the proper angle to the disc, guide it accurately across the record, apply the proper tracking and anti-skating forces, be physically inert, and not apply excessive drag to the motion.

What then should you look for when buying a turntable? Although the two parts of the system—turntable and arm—are part of the same package, it's easier to consider them separately when analyzing performance. The first choice to make in selecting a turntable is whether it will be a changer, an automatic single-play, a semi-automatic single-play, or a manual single-play.

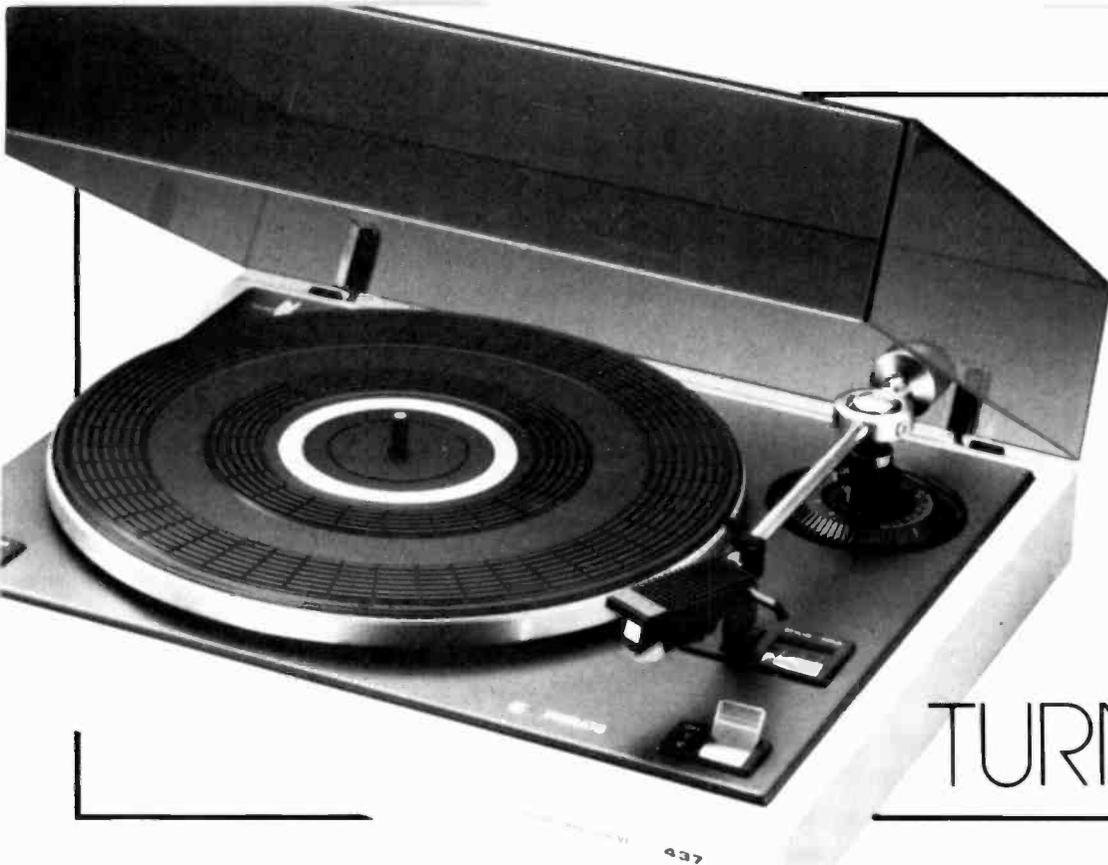
Fortunately, fine units are available in all categories. The days when even the best "changers" were of less than hi-fi quality is long since gone. To be sure, the \$29.95 specials are nothing to brag about, but there *are* good changers on the market—if you are willing to pay for them. Obviously, a changer has all the complexity of a single-play system *plus* the added complication involved

in dropping records onto the platter. So expect to pay more for a changer than for a single-play of equivalent virtue.

The inescapable technical drawbacks of a changer stem from the same source—having more than one disc on the platter. In general, the tonearm holds the cartridge at a different angle for each disc depending on the number of discs on the platter. The "vertical tracking angle" therefore changes for each record, creating additional distortion when it is far off the norm. Frankly, we doubt if this is cause to lose much sleep since, at the present day state-of-the-art and regardless of the standards that exist, cartridges vary all over the lot in vertical tracking angle; so do discs from different companies. So, it's gilding the lily to worry about a few degrees error caused by slight changes in the height of the tonearm.

More significant in our view, is the increased rumble, and (very likely) degraded flutter characteristics, of the turntable as more discs are piled on. Specifically, a warped record somewhere in the stack can raise havoc with the mechanical performance achieved on later records in the group. This is not really the changer's fault, but it is a real concern nonetheless. And, we can't help but shudder at the thought of relative slippage between the records





The Philips GA 437 is a belt-drive, manual turntable which includes an automatic tonearm lift, an adjustable anti-skate, and a direct-read stylus force gauge. It sells for about \$120. For details circle Reader Service No. 84.

TURNTABLES

and, on those models using a stationary spindle, between the disc and the center post.

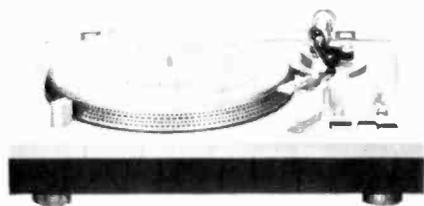
If you want to stack up a half dozen records and just sit down and enjoy, by all means get a changer. But, if you generally prefer to listen to both sides of the same disc before going on to the next, or if you like to skip bands, your best bet is a single-play device. (Note: ADC's newest Accutrac models provide both record *changing* and hand-skipping either from the console or by remote control via an ultrasonic link.)

Single-play turntables are by far the most popular disc handling systems with the dedicated hi-fi crowd. A single-play may be totally manual—you lift and position the arm

where you want it and return it to rest when the side is through—semi-automatic, or fully automatic.

Usually, the term semi-automatic refers to a turntable which will lift and return the arm to rest at the completion of the side, but one in which *you* must initially position the arm over the record. A fully automatic turntable does everything at the touch of a button; the turntable starts up, the arm moves to the lead-in groove, lowers, plays the side, and returns to rest at the end. Many also have an auto-repeat mode where the side will repeat one, or more times, or indefinitely until you call a halt to the Sorcerer's Apprentice.

On some automatics, you must set up the player for the size and speed record you will be playing. On others,



Yamaha's YP D6 direct-drive turntable features automatic return and shut-off, acoustic insulator feet, and an S-type static-balance tonearm. \$260. Use No. 101.



Mitsubishi's DP-EC1 direct-drive logic-controlled turntable offers a choice of completely automatic or manual operation. \$590. Circle No. 107.



Harman/Kardon's Rabco ST-8 straight-line tracking turntable includes an automatic lift-off feature and a built-in bubble level. Use Reader Service No. 71.



Garrard's DD75 is a direct-drive single-play machine which includes an automatic lift-off/shut-off feature. \$210. Circle Reader Service Number 70 for details.



Dual's 604 semi-automatic direct-drive turntable includes a lead-in groove sensor, damped cueing, and an anti-skate device. \$250. Circle No. 27.



Empire's 698 is a belt-drive, manual turntable whose speed is changed by physically moving the drive belt's position on the motor pulley. \$400. Circle No. 105.



Hitachi's PS-48 direct-drive, semi-automatic turntable sells for about \$240. Features include stroboscopic speed indicator. Circle No. 72.



Visonik's BD-4200 belt-drive, fully automatic turntable includes damped cueing and anti-skate features. Price: \$172. Reader Service No. 100.

everything is automatic. For example, the Mitsubishi DP-EC1 senses the size of the disc with an optical system, automatically selects a 33 rpm speed for a 10-inch or 12-inch record and 45 rpm for a 7-inch disc and positions the arm accordingly—all at the touch of a button. If no disc is on the turntable, that fact is also sensed, and the arm refuses to lower. If you decide you know better than the internal logic, you can override the speed control and set a 45 rpm speed for a large disc or 33 rpm for a small one. You can also skip the first bands of a record by keeping your finger on the start button. Now that's a fair degree of automation. ADC's Accutrac 4000 may not select speed and determine the record size for you, but it allows you to program which bands you

want to hear, the order in which you want them and which, if any, you want to be repeated. Furthermore, you can command your genie from across the room with a wireless remote control.

How much automation you want is your decision. Obviously, every feature that is added increases the cost if no shortcuts are to be taken in basic performance. Some degree of automaticity is certainly desirable. Today's phono cartridges track at very light forces and use very delicate styli. The less you have to handle the tonearm, the better. (Unfortunately, our manual dexterity has not kept pace with our engineering know-how.) At the very least, the turntable should have a smooth-acting, well-damped cueing system. You should be able to lift and

Rotel's RP-5300 is a direct-drive manual turntable which sells for about \$160. Features include a calibrated anti-skate, a 0-3 gram vertical tracking force adjustment with .1-gram increments. Circle No. 87 on Reader Service Card.



TURNTABLES

Optonica's RP-3636 direct-drive turntable has a mikage stone cabinet and adjustable acoustic insulators, oil-damped cueing, and anti-skate. For details on this \$300 unit, circle Reader Service Number 108.



Sansui's SR-535 automatic direct-drive turntable permits 1-5 memory-repeat plays or continuous play. \$250. Circle Reader Service No. 89.



Thorens' TD-126C belt-drive turntable includes a plug-in tonearm, and an electronic velocity sensor circuit. \$625. Circle No. 115.



lower the arm via a remote lever and never have to touch it while the stylus is in the groove. From there on, it's a matter of personal preference how much automaticity you want. Having used a good number of turntables over the years, we can't help but be partial to fully-automatics. It's nice to be able to push a button and sit back, without having to worry about whether the stylus is positioned above the lead-in groove, or having to rush back to lift the arm at the end of the side. But these features do not affect the *basic* performance of the turntable.

When it comes to basic performance, you must go to the spec sheets and the equipment reviews in magazines such as HFSBG. The most important mechanical specification of a turntable is its wow and flutter. When comparing flutter specs, pay careful attention to the weighting factor used. Some manufacturers spec the so-called weighted RMS flutter of the turntable. Usually, this is indicated by (WRMS). Others follow the IEEE/DIN measurement standard and rate the flutter as $\pm \times \% = \text{peak}$. The weighted peak flutter as given in the IEEE/DIN specification relates more closely to the audibility of the flutter than does the WRMS measurement.

Although each of the flutter measurement techniques employs a similar frequency weighting curve, the indications given by the peak-reading system are usually much higher than those given by the WRMS technique. No doubt for this reason, manufacturers often opt for the better-appearing WRMS figures. Unfortunately, the two systems cannot be related to each other so that it is impossible to predict what the flutter will be measured in accordance with IEEE/DIN standards, from a WRMS measurement. Just be sure that you are comparing apples with apples and oranges with oranges when looking at specs.

In our view, too much emphasis is placed upon absolute speed accuracy. Unless you have "dead-true pitch," the actual speed accuracy of the deck is not that important.

A deck which consistently runs 0.1% fast or slow will not reveal that fact to the average listener. Only when you are trying to "play along" with the record will absolute speed accuracy be important. Many turntables nowadays incorporate some sort of vernier speed control, usually covering a range of $\pm 3\%$ or more. This is more than sufficient to offset any basic inaccuracy.

Another important characteristic of a turntable is its rumble figure. Again, many different standards are invoked when measuring this parameter. Rumble is the audible result of vibration, stemming either from the drive motor or from the turntable bearings. The vibration finds its way into the phono cartridge via the stylus and thus creates an electrical signal that is amplified and heard through the loudspeakers. The rumble specification of a given turntable can look vastly different depending on the weighting curve that is used to measure it. For example, a measurement made to the DIN B standard practically ignores any rumble occurring outside of a narrow band centered on 300 Hz. By this technique, almost any turntable will have an excellent rumble figure. The DIN A curve includes rumble components in the range from 10 Hz to 300 Hz. The same turntable will look much worse under a DIN A measurement than under a DIN B measurement. In the United States, and with certain reviewers, the ARLI rumble measurement curve has found wide acceptance. Data taken with this technique usually lies somewhere between the DIN A and DIN B measurements. Because of the vastly different weighting curves employed, it is impossible to translate between one system and another. Caveat emptor.

Comparing Motors. Obviously, every turntable is operated by a motor, but all motors (and drive systems) are not the same. The oldest system—and it is still in use on many changers—employs a high-speed AC motor coupled to the platter rim through a rubber puck or idler. The puck is forced between the motor shaft and the platter rim. The degree of speed reduction is given by the ratio

of the inner diameter of the platter to that of the motor shaft. (The puck diameter is unimportant in this regard.) With such a system, it is easy to change speeds (say 33, 45, and 78 rpm) merely by cutting the motor shaft into a series of steps and by shifting the idler up and down to engage the correct section.

Providing a vernier adjustment of speed is not so simple. Some designs taper each section of the shaft and achieve slight speed changes by shifting the idler slightly along the taper. Others use a frictional drag on the motor. Although simple and efficient, puck drives do not provide much isolation from motor vibration and speed perturbations, and turntables of this design frequently exhibit worse flutter and rumble figures than competing models.

Belt-Drives. Much better in this regard, are the belt-driven turntables. With them, a relatively high-speed motor is coupled to the platter via a compliant belt. The belt may run around the outer rim of the platter—although usually a sub-platter is used so that the entire drive system lies within the periphery of the turntable. The limp belt filters out much of the rumble and speed perturbations that originate with the motor.

Just as with the puck drive, the speed reduction factor is given by the ratio of the diameters of the turntable platter (or sub-platter) to the motor shaft. Speed changes are accomplished by shifting the belt to a different step on the motor shaft (not as easily done as merely shifting a puck) and vernier control is usually achieved by controlling the motor speed. A few turntables use a combination belt and puck drive through an intermediate idler to reap the advantages of each system—simple speed change via the puck and better performance via the belt.

Direct Drives. The most modern turntable-drive system incorporates a slow-speed, servo-controlled motor that is coupled directly to the center spindle of the platter. Although no isolation is afforded by the drive system, a slow-speed motor can be designed to have very little inherent vibration. What rumble

does exist is of such a low frequency that it is inaudible. The servo mechanism provides excellent speed stability, and vernier speed control is easily accomplished merely by shifting the servo reference voltage a small amount. Usually 33 rpm and 45 rpm speeds are provided on these turntables with the shift accomplished by a switch change of the servo reference voltage. Since these turntables operate from their own internal, regulated supply voltage, they are practically immune to power-line voltage and frequency aberrations. A few servo-controlled turntables use a somewhat higher motor speed and a belt-type speed-reduction system.

Tests To Do In the Showroom. When auditioning a turntable at your hi-fi dealer's showroom, ask him to mount your favorite cartridge in the arm. Then play a warped record. If the tonearm/cartridge system has no difficulty tracking a warped disc, *and* it provides smooth, unexaggerated bass response (try an organ recording), chances are good that the tonearm and cartridge agree with each other. However, if the bass is boomy, try a more compliant cartridge or a higher mass tonearm. If the stylus pops out of the groove on a warp, go the other way.

While you're in the showroom, you can also check the turntable's suspension system. While you're playing a record, stamp on the floor, and rap the shelf on which the turntable rests. We've yet to see the turntable that is totally immune to external shock, but some are *notably* better than others. Treat this as a comparative evaluation.

Also, check the cue system. Raise and lower the tonearm with the cue lever. Does the stylus return within one or two grooves, or does it skip ahead or backtrack excessively? Does the arm bounce free when you rapidly activate the cue lever, or is the motion well damped? How long does it take for the arm to rise and descend? Some seem to play on forever after you hit the lever. Since a turntable, like a tape deck, is a component with which *you* interface, you should be happy with its action. The place to find that out is in the showroom. ▲



Micro Seiki's DD-40 direct-drive turntable has a tonearm height adjustment feature, an anti-skate device, and a vertical tracking force adjustment. A separately sold subarm base is available which permits twin tonearm operation. \$450. Circle Reader Service Number 10.



B.I.C.'s 981 turntable offers a multiple-play option, damped cueing, strobe speed indicator for about \$210. Circle No. 64 to get details.

Opera

For Today

Birgit Nilsson

by Speight Jenkins

□ A few great opera singers appear in any decade: vocal phenomena such as Birgit Nilsson occur rarely. Born in 1918, in Karup, Sweden, she made her debut in 1944, as Lady Macbeth in Stockholm, while the first time she appeared internationally was in the 1951 Glyndebourne Festival in England, in the unlikely role of Elettra in Mozart's *Idomeneo*. It was clear then to those who heard her that she had a hefty, bright soprano if perhaps a bit unwieldy. The years of the 50's went on, and she undertook Salome, more Verdi, a few Wagner roles. Her role as Elsa in *Lohengrin* brought her to Bayreuth in 1954, and she made her U.S. debut as Brünnhilde in San Francisco's 1956 production of *Die Walküre*. By that time people were talking, but still it was not a giant career.

Then in the late 50's as Miss Nilsson reached 40, her voice began to develop even more power and greater presence while her

artistry grew by leaps and bounds. The world at that time (as today) was crying for a new Wagner soprano: Kirsten Flagstad had long retired as had Helen Traubel. Astrid Varnay, always a special singer with her largest audience at the Wagner Festival in Bayreuth, was no longer young, and the dark flame of Martha Mödl had burned out soon after she began, proving that a mezzo-soprano can be pushed up to a dramatic soprano but the voice often will not hold up. Miss Nilsson's big leap took place on December 18, 1959. On that night she sang Isolde at the Metropolitan Opera, and she was suddenly preeminent as the dramatic soprano of this era. The night, a cold wet one, found the Met packed to the rafters: some of us had heard her in Ger-

many or on the West Coast; many others were curious. It was the debut of a new production of the Wagner work, with Ramon Binay as Tristan, and Karl Böhm conducting. Miss Nilsson had the audience in the palm of her hand before she finished Isolde's first outburst. Her voice, which Donal Henahan of the Times once called a "shining, stainless steel sword," hit the audience with a physical impact.

No matter how hard Böhm drove the volume, she surmounted it, conveying a lot of meaning. Truth to tell, the nine Isolde's that year were more vocal than interpretive; subtlety of phrasing and more sweetness would come later, but the audience was drunk on the sheer sound of a voice that was able to sing everything easily

and never sound tired. Later that season she sang *Fidelio* and the *Walküre* Brünnhilde, and Rudolf Bing, the Met's general manager, announced a complete Ring cycle for 1961-62.

In the ensuing 18 years Miss Nilsson has recorded for almost every major company, has sung a constantly expanding repertory in every major house in the world and has won an immense, musically appreciative audience. Most important, she has grown artistically in an almost steady path upwards. In her first Met years Miss Nilsson exhibited power, just for the sake of it, and a tendency to sing in a sharp, pronounced manner. Gradually these characteristics went away, and her specific roles — Isolde, the Brünnhildes, Elektra, Turandot—have all undergone her constant scrutiny. Phrases are rarely the same in any two performances, and even after an interpretation has reached the

(Continued on page 79)



Birgit Nilsson's voice often suggests brilliance, youth and though anger, hate, and soft sweetness are also within its compass.



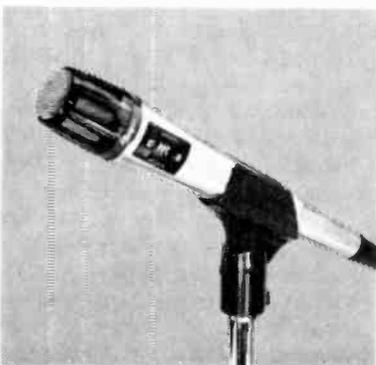
Birgit Nilsson appears as Sieglinde, with Jon Vickers as Siegmund, in a Metropolitan Opera production of Wagner's "Die Walküre."



Birgit Nilsson's voice was once described as a "shining, stainless steel sword." It surmounts the sound of any orchestra with ease, while still maintaining its color and beauty.



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GETTING THE MOST FROM YOUR RECORD PLAYER

by HERB FRIEDMAN

As a general rule it is possible to squeeze a little extra in the way of performance from any record playing system, and depending on how the system was originally unpacked and adjusted by the user it might be possible to extend the length of time a machine will give you top performance by several magnitudes. Something as simple as washing your hands with a liquid detergent before installing a drive belt can prevent a slow build-up of wow/flutter over a period of a couple of years. Often, replacing a perfectly good stylus with another can produce startling improvements in sound quality—the determining factor, is, of course, that the entire stylus assembly and not just the stylus itself determines the sound quality for a particular pickup.

Assuming you have obtained the correct pickup for your turntable—and we have covered this ground in a previous article (see the May/June 1977 issue of *HI-FI/STEREO BUYERS' GUIDE*)—optimum performance from a record player starts when you open the carton. Cut the carton's seals and then wash your hands in a mild liquid detergent, the type used for dishes. Rinse and *dry thoroughly* and then remove the record player and its components from the carton, placing the small items on a clean cloth or towel.

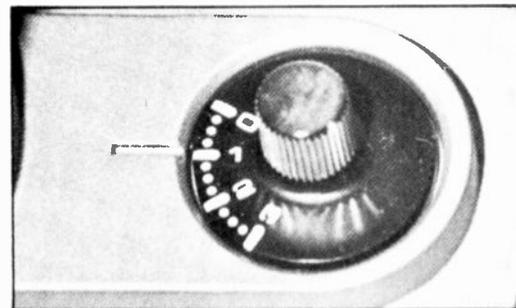
The reason for the *surgical scrub* is

that neither skin oil nor perspiration (with its salt content) does any part of a record player any good. In fact, both can cause intermittent sound after a few years of operation (corrosion of the pickup connections), wow/flutter, and a host of other ills.

As you unpack the record player resist the urge to feel the "precision smoothness" of a platter having a drive belt. Any body oil from your finger that gets on the drive rim will be well distributed by the drive belt, and depending on the composition of the belt, the oil can turn the *fresh rubber* into a sticky *gop* in a couple of years.

Keep your fingers well clear of all drive mechanisms and inspect the platter assembly as you read through the instructions. For some unknown reason, several turntables require an initial application of oil by the user. (User application of oil has probably ruined more turntables than anything else, but some of the very latest motors still require user oiling.) When the instructions specify "one or two drops" that's exactly what is meant—not a couple of "good squirts" for good luck. If there are any rubber drive parts or belt anywhere in view, cover them with a highly absorbent paper toweling before you uncover the oil tube. One single drop of oil on a belt or drive usually requires the assistance of an expensive technician to remove the

Keeping the tonearm rest's "positive lock" always on will protect against accidental stylus damage if the tonearm was knocked off its rest onto the turntable deck.



If your turntable has an anti-skate adjustment, start by setting it to your VTF value and then try values while playing a record to find the point that's best.

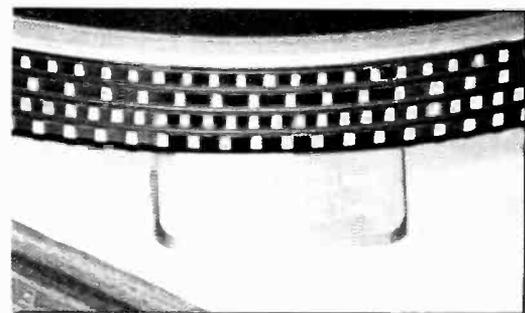
mess after the first revolution (oil spreads very rapidly).

Releasing the Motor Assembly. The motor assembly of almost all modern turntables is secured during shipping by several screws generally painted *red* or indicated by a red paper tab or washer. Make certain you remove all the hold-down screws or you'll soon be wondering where all the rumble is coming from.

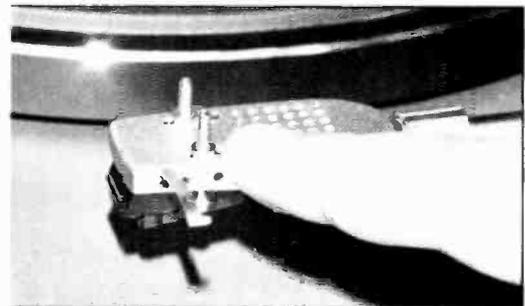
When you are certain the motor assembly is released (some turntables have captive screws that don't come all the way out), install the platter. If the turntable is the direct-drive or spindle-drive type just lower the platter gently on the spindle and let its own weight provide the *seating*; don't force or press the platter on the spindle.

If your turntable is the belt-drive type, once again wash your hands in a mild detergent and then install the drive belt. (A scrub is only good for two or three minutes before oil starts accumulating.) If it's hot and humid try to avoid handling the belt with your hands. If possible, use a screwdriver that's been wiped down with alcohol, or a rubber drive cleaner usually used with tape recorders, to position the belt over the pulley. Just this "clean room" procedure can go a long way towards insuring long-term minimal wow and flutter.

Installing The Pickup. A substantial



It is normal for some electronically-controlled turntables to have their speed drift as the electronics warm up. Check, and if necessary, reset the pitch controls.



If your pickup carrier permits, install the mounting screws with the nuts on top (on the outside). This makes it easier to make a precise stylus overhang adjustment.



Here's a look at the magnetic deposit on the inside drive rim of an electronically-controlled turntable. Making an all-out effort to keep skin oil, etc. off it during assembly will prevent this.

number of record players sold today, if not the vast majority of models, use the *universal* plug-in pickup head. Others, which do not use the universal head, have some form of plug-in pickup carrier. Except for the lowest priced players you'd be hard-pressed to find a "hi-fi" record player that does not have a removeable pickup carrier. Since *stylus overhang*, the amount the stylus extends beyond the spindle, is a critical measurement for optimum performance in the sense of lowest distortion, almost all carriers—regardless of type—provide for some means of allowing the user to adjust for the recommended overhang, and as a general rule most—but not all—turntables are provided with a special gauge that makes the overhang adjustment a *snap*, even for the stereophile who is usually all thumbs.

Most instructions provided with overhang gauges simply state that the stylus should be on a centerline between two marks. What is usually not specified is that the stylus should be at the same level as the gauge. If the instructions state otherwise, naturally, you should follow the manufacturer's instructions. Since pickup depth, that is, the distance between the top of the pickup (the mounting surface) and the stylus tip varies from pickup model to model, the stylus can only be optimum for one specific *depth*. Some turntable instructions mention that the pickup should be shimmed for depth, and spacers—to be placed between the pickup and carrier—are often provided. Other record players simply ignore the problem. Some tonearms, usually found on the high-performance/high-priced record players, have an *elevator* mechanism for the tonearm to insure the pickup is parallel to the record when tracking. (Parallel above the record—as when balancing—means that the stylus won't

dig in when tracking.) After the pickup is installed and the tonearm balanced, the elevator mechanism raises or lowers the tonearm pivot assembly until the pickup is parallel to the record. The pick-up is parallel to the record when stylus reflection from the disc shows that the stylus is at exact right angles to the record.

The effect on distortion from proper stylus position can be astounding. A simple shimming of a pickup to center the stylus as to overhang position and *depth* can mean the difference between good and *outstanding* sound quality, and between routine and *extended* record life.

Some turntables provide no overhang gauge; you're left on your own. Just make precise measurements with a ruler and be very careful not to damage the stylus while jockeying the pickup back and forth. (Since gauges are so inexpensive, there's really no justification for any record player above mid-fi quality not providing one as a matter of course.) Even if you must make measurements, try to shim the pickup to adjustment for *depth*. Because some of the modern pickups require extreme



When the turntable is assembled, with its locking screws released, check for 360° balance with a gauge like the Audio Kare AK-5, or a floating platter, adjust the support screws; adjust the feet, using tape shims, if necessary.



One of the best ways to care for your records is to use a tracking brush such as this one as you play your records. It will sweep the dust out of the grooves before the stylus can grind it in.

dexterity in order to be able to secure the mounting screws, it is often more convenient to install the screws upside down, that is, with the screws protruding up through the carrier. In this manner the pickup is secured by tightening the mounting nuts which are now on the opposite side of the carrier, out of the way of the overhang gauge. This arrangement is possible with many universal carriers, but rarely with proprietary carriers.

Tonearm Balancing. Next comes balancing of the tonearm. There's no problem as long as you disengage (or set to *zero*) the anti-skate. Don't try balancing while the tonearm is being pulled outward by the anti-skate bias.

If the counterweight has a built-in stylus force gauge simply set it to zero and then rotate the counterweight until the gauge indicates the force recommended for the pickup by its manufacturer. (As we have stated in a previous article, don't work outside the pickup's specified tracking force range; for optimum sound quality co-incident with maximum record life use the tracking force specified for a particular pickup.) Virtually all tonearms tested which utilize the combined counterweight/tracking force adjustment are accurate within 1/10 or 1/8 gram to as low as 0.75 gram total force. If your tonearm uses some form of magnetic or spring adjustment, the accuracy in the 1 to 2 gram range is often not even 0.25 gram, and we suggest an

external stylus force gauge be used for pickups requiring less than 1.5 grams stylus force.

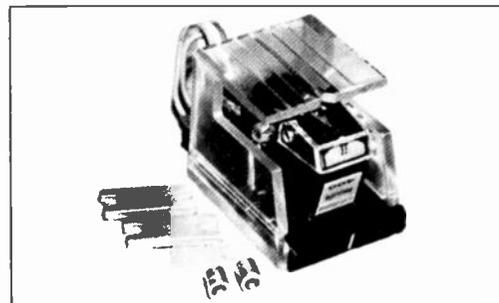
Make certain that the tonearm is really balanced and actually parallel to the platter. In many record players just a *slight* upwards or downwards tilt can represent up to 0.25 gram (when using the built-in stylus force gauge), and 0.25 gram is a substantial percentage of the total force required by high performance pickups.

Anti-Skate. The anti-skate compensation is usually matched to a specific value of stylus tracking force, though research has shown there is not necessarily a real correlation between the calibrations provided on the turntable and the optimum adjustment of the anti-skate. But if you're not armed with a laboratory test record and a storage oscilloscope, the calibrations are good enough—they're well inside the ballpark.

Regardless of the type of anti-skate compensation used on your turntable, whether a weight on the end of a string, or magnetic or spring force—just set it to the nearest value for the stylus force being used. Some anti-skate adjustments are broadly calibrated, say for 1, 2, or 3 grams. Others are calibrated in fraction of gram units, while still others have calibrations for spherical, conical, and even Shibata-type styli. Generally, just getting near the full-unit value (1 gram, 2 grams, etc.) isn't all that accurate to begin with,

shading fine differences is next to useless. If fine-tuning the anti-skate adjustment is important to you, a good method is to play a record with lots of clean high frequency energy and adjust for optimum sound.

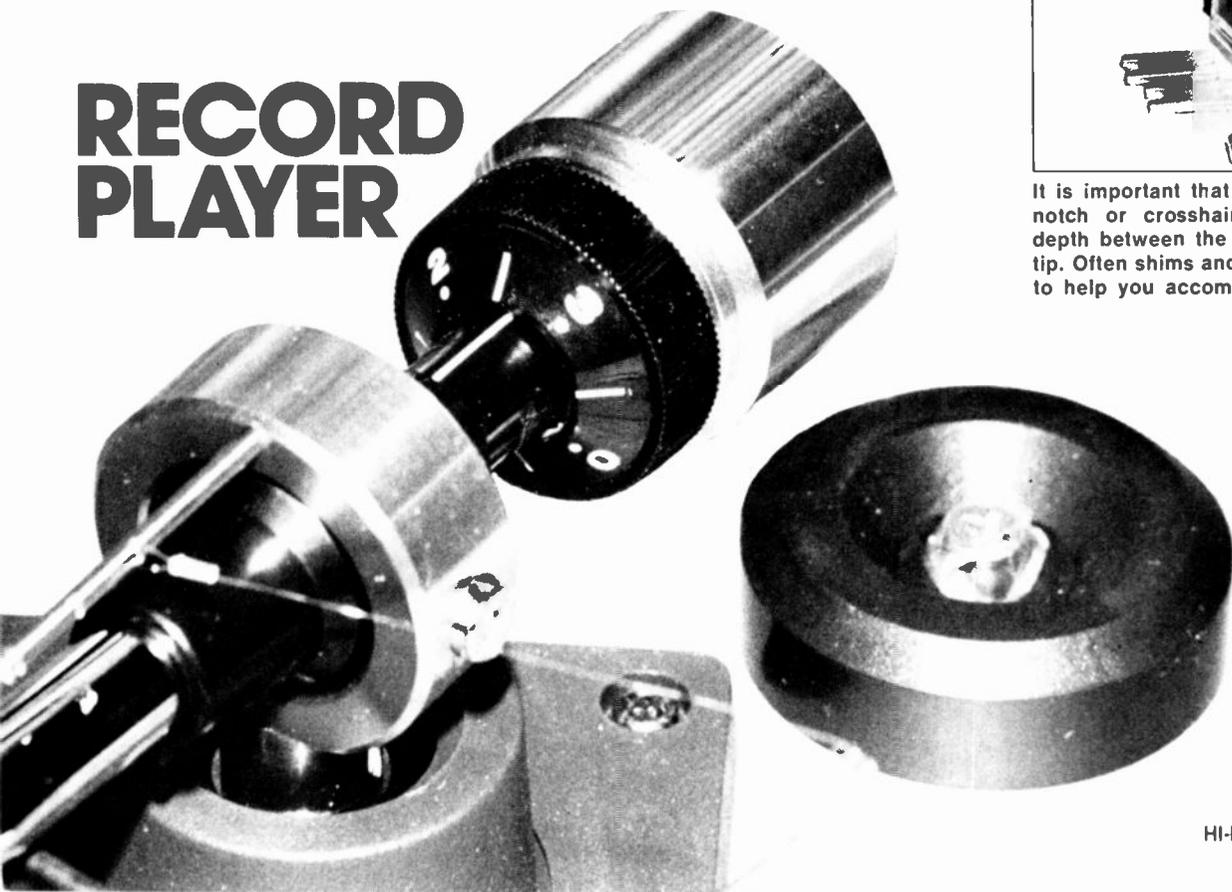
Long-Term High-Performance. Like anything else, a slow deterioration in performance slips past the user, and after a year or two many stereophiles no longer get hi-fi quality from their turntable system. They visit an audio salon, hear some outstanding sound, and believe their equipment needs replacement. Not necessarily true—a good record player should give many years of true hi-fi service. But getting long-term high fidelity sound requires a small, but necessary, amount of extra attention to the record player system. For example, some turntables are supplied with a small vial of special lubricating oil, and buried somewhere deep in the manual are instructions on lubricating the motor, drive, or whatever, at one, two, or three year intervals. How many of you who have such a unit can locate the vial of oil? If you have such a turntable, place a small sticker somewhere on the base indicating the lubrication dates for the next five years. The wear you save is the wow and flutter you won't get.

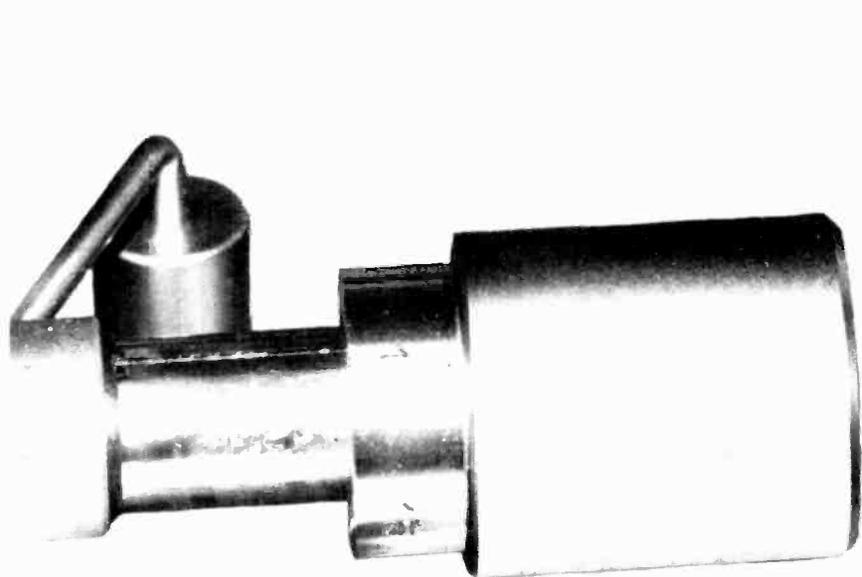


It is important that the stylus fit into the notch or crosshairs to provide proper depth between the carrier and the stylus tip. Often shims and spacers are provided to help you accomplish this.

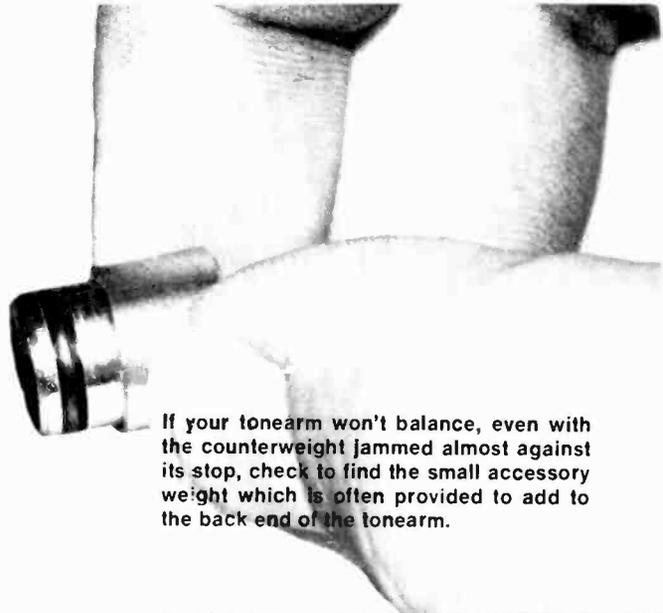
Many counterweights also serve as the stylus force adjustment and are calibrated in 1/2-gram increments. If the tonearm is balanced well, the VTF can be estimated within 1/8-gram accuracy, and a stylus force gauge isn't needed.

RECORD PLAYER

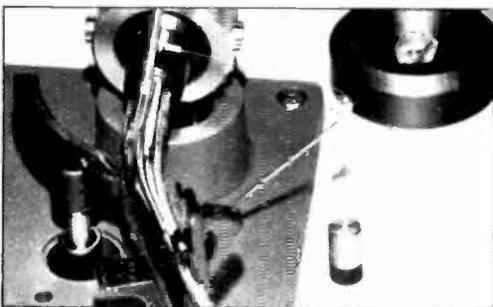
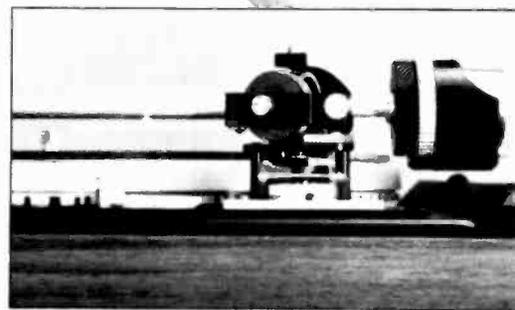




If your tonearm won't balance, even with the counterweight jammed almost against its stop, check to find the small accessory weight which is often provided to add to the back end of the tonearm.



Tonearm height controls, such as Dual's Vertical Tonearm Control, allow you to adjust the tonearm so it's always parallel to the record—with any pickup you choose.



If your anti-skate consists of a counterweight hanging on the end of a wire, it's wise to make sure that the wire loop remains secured in the appropriate notch on the support bracket.

Does your turntable use a rubber drive belt? Apply a sticker reminding you to check it every couple of years. If the belt "feels" dry, sticky, or has visible cracks even if it's still soft, order a new belt. Again, you avoid build-up of wow and flutter.

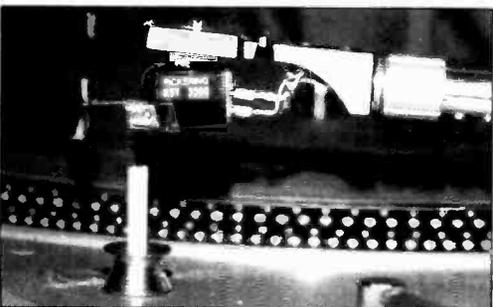
Oiled pivots and bearings in the tonearm gimbal or support have been known to gum, creating a slow increase in vertical friction—which causes the stylus to dig in on warped records. You can test for this by checking that the tonearm always returns to the balanced condition quickly without a helping push. If the tonearm hangs up, spend a few dollars for a minor overhaul at an *authorized* service shop. Make certain the shop is authorized to repair your particular turntable brand. If they're familiar with that manufacturer's line, they might know a simple solution to something the average service shop would say was impossible to fix. For example, several years ago one of the best-known makes of record players used a grease that turned to clay after a couple of years. Many a player that simply needed a chemical cleaning and new grease was scrapped because the user believed the "frozen" motor was defective.

How about your stylus? Is it more than two years old? Has the record player been through a couple of hot, humid summers? Treating yourself to a new stylus generally means treating yourself to improved sound quality because the elastomer (rubber) used as damping material in most stylus assemblies deteriorates (hardens) with age, the effect being accelerated by heat and humidity. Even if you have zero hours on the stylus itself (no wear), a new stylus is in order. And most important, get a manufacturer's exact replacement. There might be many fine *replacement styli* in the marketplace but there are many of inferior quality.

Speaking of records, cleanliness

means long wear and the highest possible fidelity. While there are many "cleaners" and "cleaning systems" available, as far as this author is concerned among the best available items is the small brush that tracks ahead of the pickup, deep down in the grooves, and gets rid of loose dust just before the stylus tracks over the spot. Whatever device you select, make certain it's getting deep down in the groove. Just about any device will clean the surface of a record; unfortunately for the user, that's not where the stylus tracks. If you want a clean surface do it before you play the record. During play, clean the grooves.

Finally, use a dust cover at all times except when handling a record. Dust settles on a turntable almost as fast as you can wipe it off. The spinning of the platter itself stirs up the loose dust and it settles on the record. If you want to keep the dust down on the deck, off the record, wipe your turntable down periodically with a product like Scotch "Dry Duster," a paper cloth chemically treated to hold dust. It's used in photo labs to keep dust down. The duster puts down a sticky (to dust, not people) substance that holds the dust till you next wipe the surface with a Dry Duster cloth. ▲



In environments that are unusually dusty, sound quality can be reduced by an accumulation of dust on the stylus. A stylus brush will help, if used so that the tips of the bristles barely touch the stylus.



A record player's best protection is an integral dust cover. It will often attract the dust which would otherwise settle on the record. Keep the cover down at all times, even when playing a record.

Often the worst part of any complex multi-component system is, where do you put all of those components, little black boxes and add-on gizmos? Just ten years ago a perfectly acceptable stereo system might have consisted of a receiver, turntable and speakers. Even today such modest systems are in wide use and, through constant improvements in electronics and manufacturing have rightly earned the name "hi-fi." But while such smaller systems can easily fit on a bookshelf, the growing selection of add-on gear is making those modest systems the exception rather than the rule. Stick in a tape deck (cassette, open-reel or both), equalizer, impulse noise reducer, dynamic range expander, matrix quad decoder and maybe a metering set or oscilloscope,

and your system is no longer quite so "modest." Plus, if you have gone the popular route of separate components instead of receiver, you might also have to contend with pre-amp, power amp and tuner. That bookshelf is suddenly terribly inadequate. Even with several sturdy wall-mounted shelves, you are still left with an unsightly maze of wires and cables hanging down in back.

Audio professionals (in radio, recording and related fields) overcame these problems years ago through rack mounting. Such racks were never very pretty, but they were made for studio use, not the average living room. And, until recently, consumer audio equipment was not available for mounting in standardized racks. Granted, you can spend money (often quite a bit)

and have a cabinet designed for your audio gear—or, if you are handy with tools, build it yourself. However, not everyone is able or willing to do that. Which is the reason that a whole new series of audio racks and cabinets are now being marketed by the same companies that manufacture hi-fi components.

Several years ago manufacturers of consumer audio gear began producing equipment with big hefty handles on them and with screw holes on the left and right edges of the cosmetic faceplates. Phase Linear was one of the first such companies and today numerous audio companies such as Pioneer, Kenwood, JVC, SAE, Sansui are producing this type of equipment. Contrary to popular belief, this is *not* part of some insidious plot to dazzle us with a "professional look," but rather an attempt to make mounting this new breed of gear a bit easier. And, let's be perfectly honest about it: no matter how much we say that the sound is the major consideration, looks *are* important. Today, a good stereo system is a status symbol and if there is a bit of "professional snob appeal" thrown

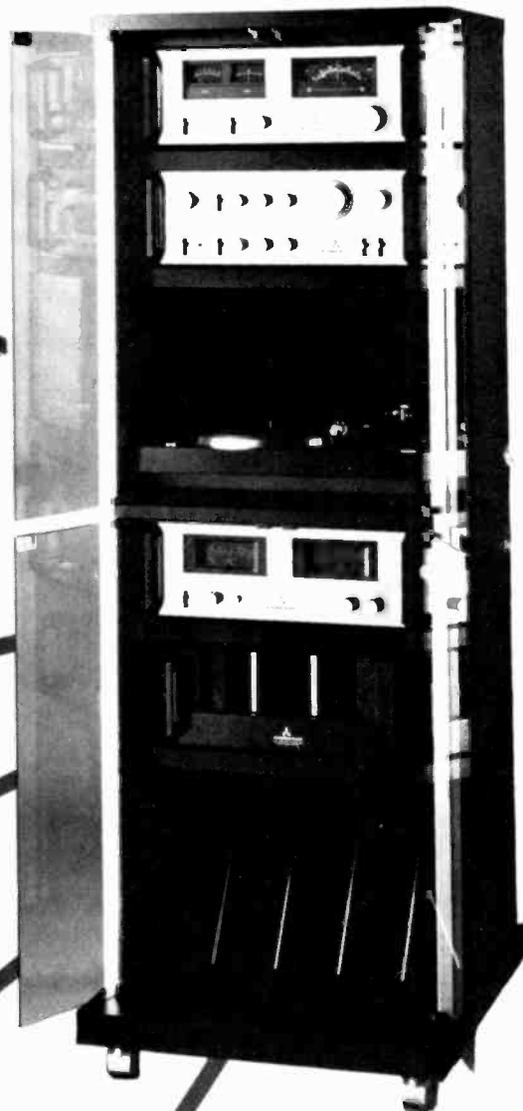
RACKING UP YOUR EQUIPMENT

WE REPORT ON OVER A DOZEN DIFFERENT RACKS

by ALFRED W. MYERS

Optonica's SY-800 provides space for 200 LPs as well as accommodating four components and a turntable. It's covered in vinyl which resembles rosewood. The shelves in the equipment section are removable. \$150. Circle Number 108.

Mitsubishi's DR-720 (right) stands almost six feet tall, is low-gloss black with aluminum trim, and is enclosed in front by four glass doors with push-to-open latches. Its price: \$300. Circle Reader Service Number 107.



in, so much the better. If you have a good system and are proud of it (as you should be) you have every right to show it off to its best advantage.

Before you rush out to buy one of the racks or cabinets shown in this article there are a few points to remember. First, not all audio equipment on the market is suitable for rack mounting. Several manufacturers do offer rack mount adaptors as an option for their non-rack components, but not all. Sometimes one manufacturer's rack adaptor will work well with another component. For example, Pioneer's JA-R101 is simply a cut-out face plate with mounting holes, handles and a support shelf in back. Designed for Pioneer's own non-rack gear, it will accept other brands of components. Also, just because a piece of equipment has handles and looks professional does not mean it will mount in a standard rack.

The illustrations show the assorted racks and cabinets loaded with equipment, but the prices are for empty units. Understandably, Pioneer racks are shown with Pioneer equipment.

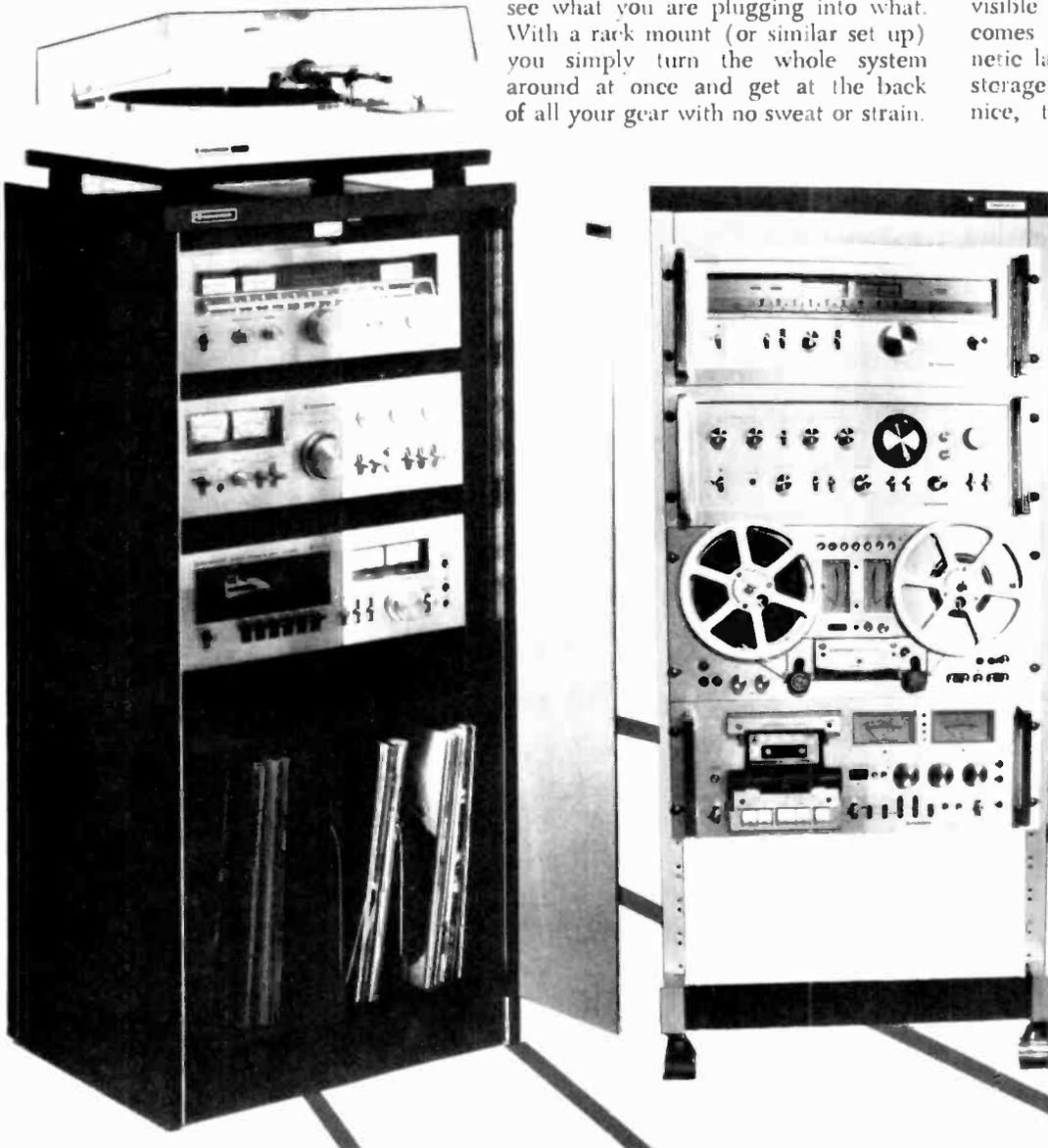
The same applies to other photographs. However, this does not mean you are restricted to one brand of components in one model of rack.

Close examination of the photos will reveal that not all of the "racks" are true rack-mount systems—many rely on shelves to support the components. There is certainly nothing wrong with this approach, but often shelves (even removeable ones) do not offer the placement flexibility that a true rack mount cabinet will provide.

You will notice that in many cases the racks and cabinets are mounted on wheels. This is probably one of the most convenient things in this type of installation. When you do have to change a component or make a wiring change it is no longer the same hassle as when the gear is mounted on shelves. No more having to twist the component sideways and praying that it is balanced properly on the edge of the shelf while you fiddle around in back. No more having someone point a flashlight over your shoulder, or, if you're alone, wedging a light between your collar bone and jaw so you can see what you are plugging into what. With a rack mount (or similar set up) you simply turn the whole system around at once and get at the back of all your gear with no sweat or strain.

A word about the Electronics Industry Association (EIA) performs numerous necessary functions, one of which was to standardize the rack-mount specifications for this type of gear in the United States. Their edict was that rackmount equipment must be 19 inches wide with panel heights in multiples of 1¾ inches. A glance at the bottom of the vertical post supports in the photo of the Pioneer JA-R2S rack will show the standard hole spacing. Many foreign-made audio components will conform to the horizontal dimensions but have different face-plate heights than exact 1¾-inch multiples. Spacing panels are available from a wide variety of sources to fill in any open areas in such a rack installation.

All rack manufacturers are not going the "professional look" route, however. Optonica, for instance, (from Sharp Electronics) has introduced their SY-800 audio equipment cabinet. Covered in wood-grain vinyl (rosewood), the Optonica cabinet provides space for over 200 LPs as well as audio components. Although not easily visible in the photograph, the unit comes with a glass door (with magnetic latch) in the front of the record storage area. In addition to looking nice, the door helps to keep dust



Kenwood's SRC-85 uses fixed shelves to house components. Also included with the Kenwood unit are ornamental "frames" which help create a uniform look with components which have different sized face plates. \$200. For details, circle Number 74. Pioneer's JA-R2S, at right, is about as purely functional as a home rack could get. It houses only true rack-mount units, and has no decorative side panels. The rack stands on casters for easy maneuvering and sells for about \$300. Circle Reader Service Number 85 to get details.

away from the records. The three shelves in the equipment section are not adjustable but they are removable. The Optonica SY-800 measures 33 inches wide by 17½ inches deep by 37.4 inches wide. It sells for \$149.95 and weighs 89 pounds.

A no-frills model, the Pioneer JA-R2S is about as close to a genuine professional rack as anyone could possibly want in their home. There are no decorative side panels on this unit. That is, when viewed from the side, you see the audio gear mounted within. The top shelf is rock-solid and is suitable for holding a turntable. The two top components (tuner and amplifier) are mounted in Pioneer's JA-R101 adaptor which was mentioned earlier. The CT-F100 cassette deck also uses a special rack adaptor. Note the hole spacing (bottom) which conforms to EIA standards. The JA-R2S measures 48 inches high by 21 inches wide by 18 inches deep. The JA-R101 adaptors sell for \$50.00 each and the JA-R2S costs \$300.00.

For some time a very attractive hi-fi cabinet has been shown in Mitsubishi advertisements. Because of the widespread response, Mitsubishi is now marketing the cabinet through its dealers. The DR-720 is not a true rack-mount unit in that it uses shelves to support the equipment. Selling for \$300.00, the DR-720 stands nearly six feet tall. Four glass doors (with magnetic push-to-open latches) protect the equipment and records from dust and children's inquiring fingers. The Mit-

subishi cabinet is finished in low gloss black with aluminum trim.

Sansui's cabinet, the GX-5 is a true rack-mount unit—the cassette deck, tuner and integrated amplifier are supported by mounting bolts at both sides. However, to overcome the problems of the EIA 1¼-inch vertical standards, Sansui uses continuous side slots (instead of holes) in combination with rear support clamps. In the record storage "bin" a set of dividers is included, but at the user's option, they can be removed and the entire unit used for audio hardware. The GX-5 has walnut veneer side panels with black and chrome trim. The Sansui cabinet measures 37½ inches high by 21¾ inches wide by 17 inches deep. It sells for \$250.00.

No doubt about it—the most elaborate (and expensive) rack mount system is Pioneer's "The Rack" (no stock number). Over six feet in height, this unit should be able to accommodate enough components to make any audiophile's dreams come true. But, with a price of \$1,750.00 (and over 400 pounds

in weight) it *should* answer your dreams.

The top of "The Rack" actually has two adjacent racks, with holes drilled to EIA specifications. The white counter is available with either a cut-out to accept a Pioneer turntable (as shown) or with a flush top in the event you just want to place a complete turntable with cabinet on the counter. (Several of today's modern turntables do not offer the option of removing the turntable mechanism from the enclosure, such as the Bang & Olufsen line. Also, a "super" turntable such as the deluxe Micro-Seiki does not even use an enclosure.)

Below the counter is a storage area for discs, tapes or other equipment. The giant Pioneer logo at top can easily be masked with a piece of contact paper. Add a small set of track lighting at the top and you'll have a real classy home for your hi-fi.

Truly utilitarian in concept, the rack mount cabinet from Spectro-Acoustics answers a definite need that the other units cannot—it is small enough to sit

RACKING UP

Hammond Industries' Audiofile Deluxe is offered in 4-, 5-, and 6-foot heights and accepts both rack-mount and non-rack-mount equipment. The 4-foot unit sells for \$349, in kit form, which includes the two Allen wrenches required for assembly. Circle Reader Service No. 130. At right, JVC's LX-3000 is a rack-mount unit in the strict sense, but a shelf is provided for use below the turntable for units which are not designed to be rack-mounted. The unit is available for \$299.95. For details, just circle Reader Service Number 73.



atop existing floor cabinets. Although in the photograph it is loaded with Spector-Acoustics gear, it is sold empty and will accept any hi-fi equipment that has EIA rack mount standards. No frills, but sturdy as a rock. In the event that you already have a record storage cabinet, the rack/cabinet can be placed on top with the turntable upon the rack unit. The nationally advertised price of the empty Spector-Acoustics cabinet is \$180.00.

Of all the audio companies now producing cabinets and racks, JVC's line is the most varied with four different component housings from which to choose. Available through authorized JVC dealers, the JVC units have prices to fit into practically any audio budget.

Their most elaborate model, the LX-3000 has a very professional look to it and conforms to the term "rack-mount" because the equipment is held in place by faceplate bolts as shown in the photograph. Audio hardware can be installed in this manner both above and below the space reserved for a turntable. A removeable shelf

is provided for use below the turntable in the event you have a component (such as the power amp shown) which will not mount "rack style." The LX-3000 costs \$299.95.

A less elaborate cabinet, JVC's LK-905 uses pieces of tubular steel running between the two uprights to support audio gear. The record storage area below the turntable will hold about 100 albums. Although not shown in the picture, a third piece of audio equipment can be mounted on the two metal tubes above the cassette deck. The LK-905 sells for \$179.95.

The LK31/MK31 unit is actually two separate pieces stacked upon each other. The plexiglass fronted record cabinet (which holds approximately 100 discs) is strong enough to support the audio components and cabinet mounted above. Obviously, this unit is designed to be a perfect fit for the JVC gear shown, but you can still mix and match components (sacrificing the "perfect fit" look). The MK31/LK31 combination sells for \$119.95. JVC is not offering them as separate items.

Even the most modest sound system deserves a nice "home" and JVC's LK10 is ideal. Although it offers space only for a turntable and receiver (or integrated amplifier), it fills a definite need, since there are many such systems in use. With its record storage area it is perfect for a college dorm,

teenager's bedroom or apartment—anywhere that a less elaborate stereo system is in use. The LK10 costs \$89.95.

The only modular type of rack mount unit is the *Audiofile* from Hammond Industries. It is sold in kit form and must be assembled by the purchaser. However, the only assembly tools required are two Allen wrenches and they are supplied with the kit.

The *Audiofile Deluxe*, which is pictured is available in 4, 5 and six foot heights, selling for \$349.00, \$399.00 and \$449.00 respectively. Although it is designed to accept EIA faceplate components, they are secured by clamps in channels in each of the four uprights. In this manner, shelves can also be used to support non-rack components. The floor area taken up by any of the "Click" Audiofile racks is 22 inches by 19 inches. The unit shown features brushed aluminum metal uprights and fixtures with black plexiglass side panels.

The SRC-85 cabinet from Kenwood uses fixed shelves to hold the audio equipment, but with a novel twist: two separate "ornamental frames" are provided for the two top component areas—for audio gear with different sized face plates. Between the audio section and the record storage area is a space meant for the storage of cassette tapes. The top of the unit is constructed of a special particle board which, according to Kenwood, was specially selected for its acoustic damping characteristics. The glass doors have magnetic latches. Kenwood's SRC-85 has a woodgrain finish and casters, and sells for \$200. Also in the Kenwood line is the CB-21 cabinet which houses several two-component combinations. ▲



Sansui's GX-5 rack is a true rack mount unit which provides flexibility in vertical placement of components through use of continuous side slots and rear support clamps. It has walnut veneer side panels with black and chrome trim. \$250. Circle Reader Service Number 89.



Spectro-Acoustics offers this bare-bones cabinet for \$180. It is sold empty, and will accept any audio gear that conforms to the EIA rack-mount standards. It is small enough to be used as an add-on rack, placed atop many of the other available racks. Circle No. 133 for details.

BASF PROFESSIONAL I CASSETTE TAPE



AN EXCELLENT ADDITION TO THE ROSTER OF HIGH PERFORMANCE CASSETTE TAPE

□ One thing to realize about any measurement standard is that it is unimportant if no one observes it. For example, though there is a *DIN standard* tape for European cassette decks and recorders, most machines sold in America are made in the Far East—primarily Japan. These Far East machines are factory-biased to Far East tapes, the majority of which are considerably different from DIN tape(s). American owners of the most popular cassette decks—which are Far East biased—couldn't care less about the DIN standard: the tape either sounds good on their deck or it doesn't. As a general rule, even the best of the DIN standard tapes have reduced highs when used on a Far East machine because of the higher bias level used in the Far East recorders.

To get around the problem of mismatched bias, BASF has introduced a tape specifically intended for Far East machines with their proportionally higher bias levels. Called *BASF Professional I*, the new tape requires a bias value in the range normally used by

many high-performance Far East tapes, as shown in Fig. 1.

Figure 1, provided by BASF, indicates the range of bias values commonly used or required by a variety of available tapes. Note that the original Philips bias value "matches" the budget price/quality tapes, while a higher bias value is needed for what is commonly considered the "high performance" tapes. Also note that the DIN bias is way out of the ballpark as far as the "high performance" tapes are concerned.

To see just how well BASF matched the performance of the better Far East tapes, and to more or less check whether their illustration was correct, we tested the BASF Professional I tape on a AIWA AD-6800 deck, perhaps the most outstanding modern consumer deck because of its built-in bias calibration system.

Firstly, we calibrated the AIWA deck to Maxell UD/XL Type I tape, a recognized high performance tape whose recommended bias value falls just about in the center of BASF's Far East tape bias illustration. Then we recorded a sweep frequency of 20 to 20,000 Hz.

Without disturbing the bias we recorded the same sweep frequency run on the new BASF Professional I, and the BASF Studio tapes.

The results are shown in Fig. 2, a photo taken from our spectrum analyzer. Each major vertical division represents 5 dB (not 10 dB as is generally used with this type scale).

The two almost overlapping traces are the Maxell and BASF Professional I tapes. For all intents and purposes they are identical in frequency response and midband output (also in signal-to-noise ratio). The minor variation depends on the specific portion of tape used and the instrument drift in the time interval between frequency runs. The lower trace with the high frequency roll-off is the BASF Studio tape which is intended for machines

with, or closer to, DIN bias. Note that at 10 kHz the *Studio* tape output is some 5 dB below that of the BASF Professional I and Maxell UD/XL Type I tapes, a typical result when comparing DIN to "Far East" tapes.

No question about it, BASF was rather conservative in describing the tape. It is an excellent addition to the attributes of BASF Professional I roster of high performance cassette tape.

Fact is, our lab liked the tape so much it was used for "high performance demonstrations" which the lab ran during a test and measurement seminar for writers in the high fidelity field.

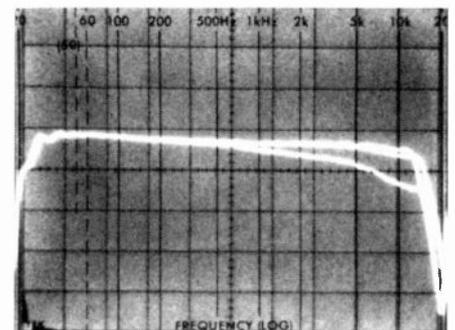
You can obtain additional detailed information on BASF's Professional I cassette tape by circling Number 150 on the Reader Service Card. Prices for the Professional I tapes are as follows: \$3.29 each for the C-60 cassettes, \$4.79 each for the C-90 cassettes, and \$6.29 each for the C-120 cassettes. ▲

QUANTITY OF RECORDERS TYPES

BIAS SETTING OF CASSETTE RECORDERS WORLDWIDE

0 HF	FX	UD	AD	AUDUA
SD	ED	FXJ	UDXL	

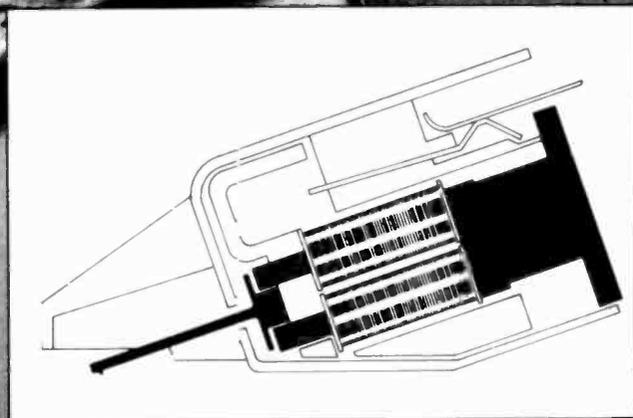
● In this illustration, provided by BASF, you can get a rough idea of the spectrum of bias settings used in currently available cassette tape machines. At left (1) is the European iron oxide bias setting, referenced to a DIN standard tape. At right (2) is a chrome bias setting based on the DIN standard of reference. In the middle (3) is the bias setting range used in Far East tape machines. Note that most cassette tapes sold in the United States are designed to be used with machines which provide a bias within this latter range.



● The top two traces which virtually overlap in this oscilloscope photo are of the frequency response performance of Maxell UD/XL Type I and the new BASF Professional I. Both tapes are intended to be used with tape recorders which have a "Far East Bias." As you can see, the BASF tape does, in fact, "match" Far East bias values. The lower trace, by contrast, is of the performance of a tape which was intended for use in a DIN-bias machine when used in a Far East bias recorder. Note that the DIN tape has 5 dB less output at 10 kHz when used this way.

INSIDE PHONO PICKUPS

**THINGS YOU
SHOULD KNOW
BEFORE YOU
PUT YOUR EARS
TO WORK**



Bang & Olufsen's MMC-6000 phono pickup sells for about \$125. It was designed for CD-4 use, employing a Pramanik stylus and a moving micro-cross construction. For details, circle Reader Service No. 119.

by FRED PETRAS

Telling someone which phono cartridge to buy is like telling a person which speaker system to buy. It's a no-no proposition, likely to get you in hot water. Choosing a phono (pickup) cartridge is much like choosing speakers—a highly subjective matter. Just as each speaker system has its own “personality,” so too, does a phono cartridge.

The best basic advice we can give relative to selecting a cartridge is to listen to as many as you can—in the homes of friends and relatives, and in your neighborhood hi-fi shops. A second bit of advice is that you bring along a favorite phonograph record, one whose sound—and sound nuances—are thoroughly familiar to you, as a reference.

Since you may not be able to make instantaneous comparisons of cartridges at your local hi-fi store—as you can with speakers—you'll have to “program” yourself to accommodate the time delays involved in the comparisons, in order to make meaningful evaluations. As you listen to Cartridge A, program its quality of massed string sounds in your head, then the way a plucked bass fiddle sounds, then how a bowed bass fiddle sounds, then how a cymbal comes across, etc. Relate those programmed sounds to what you hear—after a delay—when your record is played through Cartridge B, then C, etc.

Note: In some stores you may find salesmen limiting the number of comparisons you can make, since it can be a tedious, time-consuming process for a salesman (plugging in, removing head shells, or operating one turn-

table with one type of cartridge, another turntable with a second cartridge, etc.). In that case, you'll just have to accept it, and make your determinations as a consequence of comparisons in more than one store.

Many buffs end up in a dilemma after several comparisons. They find that some pickups are exceptional for reproducing certain types of music, or certain musical instruments, but may not have across-the-board capability to reproduce them all equally well. In that event you have two options: choose the cartridge that is the best compromise, or buy more than one, assigning each to specific types of music or sounds. Before you say this is conspicuous, ostentatious consumption, be aware that more and more audio buffs are multiple-cartridge owners—and take such ownership in stride as part of the hi-fi life.

In fact, one company—Audio-Technica—sells a protective module, Model AT6003 “Tri-Capsule” (at \$9.95) that holds three cartridges in their plug-in shells in a domed capsule, to ward off accidents and dust.

Incidentally, there is a practical side to multiple-pickup ownership. For instance, if the hi-fi system in your home is a family rig and is used a lot, and you are the only critical listener, it might be wise to install an all-around rugged cartridge for the less critical—and possibly less careful—members of the family, while you keep on hand your private “super” cartridge(s), in separate plug-in head shell(s) for your personal listening.

Selecting a cartridge by way of spec sheet or product directory comparisons is a tricky proposition. Why? Be-

cause there are no universal standards for rating and testing them. The ratings you do see apply largely to the products within a single manufacturer's line. Since there are no valid standards, comparing the products in that line with those of another manufacturer—a competitor who uses a different rating system to get specs which appear to be better—would be futile.

But it is possible to compare two basic specs with some sense of comparing apples with apples. Be sure to make note of channel separation and frequency response figures. A channel separation spec should be at least 20 dB at around 1,000 Hz, and at least 10 dB at 10 kHz and beyond, in order to avoid cross-talk. Most cartridges worth buying can offer such specs.

A frequency response figure is meaningful only if it includes a decibel variation spec. To say a cartridge's response is an apparently impressive 10 Hz to 25 kHz means little; to what degree can you hear (if you can hear) the 25 kHz signal? A less impressive spec of 20 Hz to 20 kHz, $\pm 1\frac{1}{2}$ dB may actually be a far better spec—and it is truthful by virtue of being complete.

After checking one or two of the better compendiums of cartridge information, you'll see that cartridges ranging from \$9.95 to \$350 all have essentially good *printed* specs—using existing and admittedly inconclusive rating techniques. Which in itself may prove the point that specs don't really say how good—or inadequate—a cartridge may be. So here we go again—back to our ears for final evaluations of such niceties as definition, stereo imaging, sweetness, and other vague—but significant—terms that can be evaluated only within the framework of your hearing, "aural personality," and experience.

One truism often heard in hi-fi discussions is that the best way to upgrade a system is to buy a new phono cartridge. Let us temper that by saying it is *one* way to upgrade a system, and it might be the best way, or it might not. For instance, if a hi-fi rig includes a pair of inadequate speakers, no new cartridge will correct or meaningfully improve its sound.

Assuming your system can be improved with a new pickup, you might feel that to improve it most you should buy the most expensive cartridge available. Not necessarily true. If, for example, your system—comprised of receiver, speakers and turntable, cost less than \$500, it could be improved realistically with a cartridge selling for around \$30. Going beyond that would be wasteful, in that your system could

PICKUPS

ADC's ZLM phono pickup features an Alipitic nude-mounted stylus, and has a recommended tracking force between $\frac{1}{2}$ and $1\frac{1}{4}$ grams. Its price is about \$135. For details, just circle Reader Service Number 106.

not utilize all the benefits of, say, a \$100 cartridge, or might not even be able to accommodate it. For instance, if the turntable section of your system is a \$125 changer whose minimum recommended tracking force is, say, three grams, the \$100 cartridge that tracks optimally at $1\frac{1}{2}$ grams would be brutalized in the changer, and if it did function, would have an exceedingly short existence. And so would the records played through it.

If asked what percentage of a basic system's total cost should be represented by the pickup, we'd say that a reasonable rule of thumb would be between 7 and 10 per cent. Essentially, the idea is to match the quality level of a new cartridge to the quality level of the total system.

"If your cartridge is more than three years old, don't replace your stylus!" that's the word from Audio-Technica, in the form of a headline for one of its current cartridge ads. It's not really new advice; we heard it from a source at Empire the first time more than 10 years ago. In each case the message is the same; cartridge technology con-

Empire's 2000E/III (\$70) pickup uses an elliptical stylus and has been engineered for matrix 4-channel playback. Its design emphasizes making the tip mass as light as possible. Toward this end it employs a moving iron construction and a nude-mounted diaza type diamond. Circle No. 105.

Ortofon's MC-20 phono pickup is a moving coil design with a recommended tracking force range of $1\frac{1}{2}$ to 2 grams. It employs a "fine-line" elliptical stylus. \$140. Circle Reader Service No. 110.

tinues to move ahead and you'll find that you can update your system for less than you might imagine.

A check of typical cartridge stylus replacements shows that their cost is anywhere from 35 to 60 per cent of the cost of a cartridge with stylus installed. While Empire, Audio Technica and others champion cartridge rather than stylus replacement as a means to enjoying state-of-the-art technology, often the *incremental improvements* are not audible, even to critical ears, if the cartridge with worn stylus is but one or two years old. If you are completely satisfied with how your cartridge sounds, you might be wiser to replace the stylus and wait for the next go-round—at which point the art/science of cartridges may have advanced sufficiently for you to hear a *significant improvement* in sound. (Suggestion: Meanwhile invest some of your savings in a sample direct-to-disc

type recording, for a new sonic thrill—to show that your favorite cartridge can still do a fine job—or to point up the fact that perhaps it is not as good as you've been thinking it is.)

Manufacturers supply stylus replacement guides, showing which number is needed for a given cartridge. Relative to stylus replacements, try to stick with those made by the manufacturer of your cartridge, rather than one made by another manufacturer. Shure, for example, notes that its tests of 241 styli not manufactured by Shure, but being sold as replacements for Shure

cartridges, showed that only one could pass the basic production line inspections that all Shure styli must pass.

A Marketplace Sampler. Over 25 companies produce phono cartridges that are marketed in the United States. To give a rundown on all the companies and all their pickups would be impossible outside the scope of a directory. What we'll do here is highlight the offerings of several representative producers, to give you an idea of what's "out there."

Audio-Technica has several series of cartridges. Its "Compass" models are

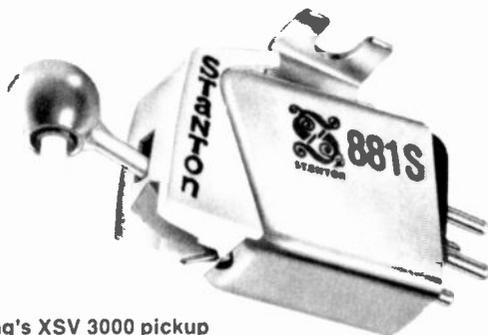
designed to accommodate three different application/tracking force needs. Using a "V-Magnet" generating system, they are said to offer better stereo separation, lower distortion, better frequency response, and longer record life because the two moving magnets used are lighter than a single magnet used in many pickups. The spherical tipped ATX-1, priced at \$35, is for use in lower-cost record players with required tracking forces of 1½ to 2½ grams. The ATX3E, using elliptical stylus is for recommended tracking forces in the 1 to 2 gram range. It sells for \$60. The ATX5E with elliptical stylus in nude mounting is for 1 to 1¾ gram tracking applications. It is priced at \$75. The best selling pickups in the total Audio-Technica line are the AT13EA at \$65, and the AT117 at \$45.

Empire Scientific, with nine models ranging from \$30 to \$150, reports two best-sellers—Model 2000E/1 at \$45, and Model 2000E/3 at \$70. The line includes two deluxe 4000 series models at \$85 and \$150, that have been engineered for discrete four-channel (CD-4), three matrix quad formats (SQ, RM, QS), as well as regular stereo playback. Among design niceties, Empire uses 4 coils, 4 poles, and 3 magnets ("More than any other cartridge") for better balance and hum rejection. All come with nude diamond styli for lighter tip mass.

Pickering, with 19 models, reports the XSV3000 at \$99.95 to be its best seller. Pickering units range from \$24.95 to \$139.95, the latter the XUV/4500Q, meant for all forms of four-channel operation as well as stereo, at one gram or less tracking force. It uses a "Quadrhedron" stylus tip for optimum tracking in the complex grooves of four-channel recordings and for ideal stereo playback. In effect, the XSV is the stereo-only version of the XUV/4500Q. It uses a "Stereohedron" tip.

All Pickering cartridges come with a mini-brush attached, hinged directly to the stylus assembly. It clears the grooves automatically and its independent action never interferes with tracking force. Among benefits claimed for the brush beyond all the benefits of a clean record, is a dampening of low frequency arm resonances.

Bang & Olufsen of America, division of a Danish firm, applies what it claims is a new concept in cartridge engineering and production—measuring, balancing and permanently sealing all of the elements of a cartridge into a unified whole, for significantly improved performance levels. The trade-off is that the user cannot replace the stylus. But



Stanton's 881 S phono pickup has a Stereohedron™ stylus. It is engineered to track optimally in the ¾ to 1¼ gram range. Individual calibration test results come packed with each unit. \$150. Circle No. 104.

Pickering's XSV 3000 pickup has a recommended tracking force range of ½ to 1½ grams. It uses a Stereohedron™ stylus and a tracking brush which cleans the groove ahead of the stylus. \$99.95. Circle No. 120.



The Sonus Blue Label pickup from Sonic Research is suitable for use with CD-4 records. Its recommended stylus force range is ¾ to 1¼ grams. It is fitted with a "Pathemax" stylus tip. \$125 (\$185 for an individually calibrated unit). Circle Reader Service Number 103.

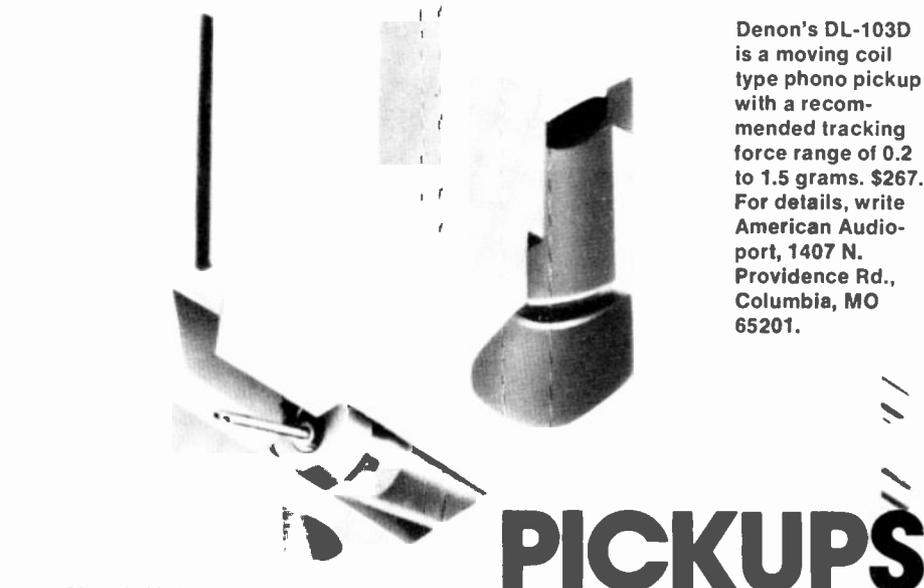


B & O justifies this by noting that, "First, it should be understood that while, in most cases, a replacement stylus assembly will provide acceptable results, there is no real guarantee that it will meet the specifications of the original unit." The company goes on to say that 90 per cent of the value of a cartridge is comprised of the stylus assembly, and that B & O's MMC series of three cartridges—priced at \$50, \$85 and \$125—"simply reflects this reality in construction and pricing." MMC stands for Moving Micro Cross, a patented stylus/cantilever/magnet assembly system that allows the effective tip mass to be greatly reduced—for better sound reproduction and better stereo separation.

Stanton Magnetics, with 18 models, reports the 681EEE as its top seller in two stylus configurations—with an elliptical stylus at \$82, and with a "Stereohedron" stylus at \$115. Newest in the line is the Model 881S called "The Professional Calibration Standard," at \$150. Stanton says the Calibration Concept was "An outgrowth of the needs of the recording industry for a cartridge of sufficient sophistication to be used as a primary calibration standard in system checkouts for linearity and equalization." The design concept also included producing a cartridge with the highest possible ability to protect records. This required a brand new tip shape, the Stereohedron (as subsequently used in the 681EEE). This tip combines a very large contact area with long and narrow tracing edges, and low dynamic mass (0.2 mg.) for better sound characteristics and gentlest possible treatment of the record groove. The Professional Calibration Standard also uses a "revolutionary new magnet made of an exotic rare earth compound which, because of its enormous power, is far smaller than ordinary magnets." The magnet also is positioned closer to the center of rotation for low inertia. The cartridge also features an improved suspension (patented). Each 881S comes packed with individual calibration test results.

Audio Dynamics Corp., division of BSR Consumer Products Group, has a main line of six pickups in two series (each series for a specific application), ranging from \$34.95 to \$135. It also has a variety of other cartridges as part of a "subsidiary" group of cartridges for a variety of other purposes, including four-channel applications.

The ZLM and XLM Mark 3 units are designed for fine manual and automatic turntables, the QLM series for medium priced manual and quality automatic



Denon's DL-103D is a moving coil type phono pickup with a recommended tracking force range of 0.2 to 1.5 grams. \$267. For details, write American Audioport, 1407 N. Providence Rd., Columbia, MO 65201.

PICKUPS

Shure's V-15 Type III has a tracking force range between $\frac{3}{4}$ and $1\frac{1}{4}$ grams. It comes supplied with a bi-radial elliptical stylus and sells for about \$90. For details, circle Reader Service # 121.

AKG's P8E phono pickup is a low-mass moving iron design with a recommended tracking force range of $\frac{3}{4}$ to $1\frac{1}{4}$ grams. Its price is about \$100. For details, circle Reader Service # 79.

Audio Technica's Compass series includes three models. At the top of the series, the ATX-5E tracks at 1 to 1.75 grams and sells for about \$75. Write A-T at 33 Shiawassee, Fairlawn, OH 44313, for further details.

turntables. The best sellers of the main line are the XLM Mark 3 at \$110 and the QLM Mark 3 at \$79.95.

ADC's latest claim to cartridge fame is a new stylus configuration in its \$135 odel ZLM. It is called the "Aliptic Tip," and is said to combine the virtues of elliptical and Shibata types without their shortcomings. Elliptic types contact the groove walls in only two small places; Shibatas thrust down far into the groove, to sometimes "ride" dust in the grooves, for distorted results. The Aliptic tip contacts the record walls at two broad areas, but remains high enough from the groove bottom to prevent sound contamination by dust.

Following a series of extensive use/

wear tests conducted by CBS Laboratories, ADC asserts that its cartridges produce less record wear than virtually any cartridge made in the U.S. today.

A relative newcomer to the cartridge field is Sonic Research, producer of the Sonus line. Founded by Peter Pritchard, former founder and president of Audio Dynamic Corp., it offers five high definition cartridges ranging from \$60 to \$185. The firm's philosophy is summed up in this statement: "The SONUS cartridge has been conceived as the means to narrow the gap between accepted standards of fidelity and those potentially attainable from today's best records." Sonic makes no claims for

(Continued on page 82)

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185 WPC
0.05% Distortion



Marantz 2385 — \$1095.00
Circle No. 80 On Reader Service Card

RECEIVERS

MARANTZ 2385 AM/FM STEREO RECEIVER

A high performance/high power receiver with unusually wide tone and filter control equalization. \$1095.00 in metal cabinet.

Description: An AM/FM stereo receiver FTC-rated at 185 watts RMS per channel into 8 ohms with no more than 0.05% THD from 20,000 Hz. Features include a stereo beacon, FM center-channel meter, AM/FM signal strength meter that also doubles as an FM multipath indicator, rear apron "pocket" for an optional Dolby FM decoder that is switched in by a 75/25 uSec FM de-emphasis selector, dual turnover bass (100, 250 Hz) and treble (5,000, 10,000 Hz) tone controls, a midband tone control, 9,000 and 15,000 Hz 18 dB/octave high filters, front panel tape dubbing jacks (that preempt the connections to the rear apron #2 tape jacks), peak indicator lamps that show when the amplifier is driven into overload (clipping), adjustable FM mute level, and an output hold-off to prevent power supply turn-on transients from being fed to the speakers.

There are inputs for two magnetic phono, aux, two tape and tape dubbing. Outputs for two speaker systems, two tape, tape dubbing, phones, and the FM detector. The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for volume, balance, concentric-clutched bass, concentric-clutched midband, concentric-clutched treble, tone control modes: out, in (normally, with 250 Hz and 5,000 Hz turnovers), in (with 100 Hz turnover), in (with 10,000 Hz turnover), in (with 100 and 10,000 Hz turnovers), mono/stereo modes, and input/FM de-emphasis selection. There are switches for power, tape copy 1 to 2, tape copy 2 to 1, tape monitor 1, tape monitor 2, MPX noise filter, multipath meter function, 15,000 Hz high filter, 9,000 Hz high filter, loudness compensation, FM mute, speaker system #1, and speaker system #2. The FM mute threshold adjustment is on the rear apron.

The FM antenna input is 75/300 ohms or a 75 ohm coaxial jack. A rod antenna and external connection are provided for AM. Switched and unswitched AC outlets are provided.

Overall dimensions are 19¼ in. wide x 7 in. high x 17¼ in. deep. Weight is 57.2 lbs.

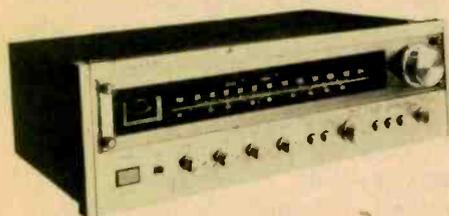
Performance—FM Tuner: Full limiting was attained with 9 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 7.7 uV. The stereo high fidelity sensitivity (55 dB quieting) was 55 uV. The FM mute could be adjusted to release within the range of 9 to 300 uV (9 uV also being the stereo threshold level).

At standard test level the stereo frequency response with 75 uSec de-emphasis measured +0/-1 dB from 20 to 15,000 Hz. With 25 uSec de-emphasis the stereo frequency response measured +0/-0.6 dB from 20 to 15,000 Hz. Monophonic distortion meas-

TEST REPORTS / RECEIVERS



Marantz 2385 — \$1095.00
Circle No. 80 On Reader Service Card



Onkyo TX-1500 — \$209.95
Circle No. 81 On Reader Service Card

15 WPC

0.5% Distortion

ured 0.2% THD. Stereo distortion was 0.3% THD. Note: Distortion values approximately 50% lower was attained with the tuning slightly off the meter-indicated center channel. The signal-to-noise ratio measured 76 dB. Stereo separation was 40+ dB. Selectivity was very good.

Performance—AM Tuner: Somewhat better than average with notably low background noise level.

Performance—Amplifier: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 215 watts RMS. The frequency response at 215 watts/8 ohms measured +0/-0.4 dB from 20 to 20,000 Hz at a distortion no higher than 0.38% THD at any frequency.

The tone control range depends on the turnover frequency. At 50 Hz: with a 250 Hz turnover (normal), the range measured ± 14 dB; with a 100 Hz turnover, the range measured ± 10 dB. At 10,000 Hz: with a 5,000 Hz turnover (normal) the range was ± 10 dB; with a 10,000 Hz turnover the range was ± 3 dB. The midband tone control is centered on 1000 Hz and provides a range of ± 6 dB.

The magnetic input hum and noise measured -66 dB separation was into the noise level.

Overall, the amplifier is conservatively rated by the manufacturer and actual performance exceeded the specifications. ▲

ONKYO TX-1500 AM/FM STEREO RECEIVER

Suitable for smaller playroom-type systems. \$209.95 in wood cabinet.

Description: An AM/FM stereo receiver FTC-rated at 15 watts RMS per channel into 8 ohms with no more than 0.5% THD from 20 to 20,000 Hz. Features include a stereo beacon, AM/FM signal strength tuning meter, automatic dub from one recorder to another, and servo-lock FM tuning—an AFC (automatic frequency control) that is applied in conjunction with the FM mute (the lock is off when the mute is off).

There are inputs for magnetic phono and two tape. The #2 tape is also designated as an aux input. Outputs are provided for two speaker systems, two tape, and phones.

There are controls for tuning, volume, balance, ganged bass, ganged treble, input selection, and speaker selection. Switches for power, mono/stereo, FM mute with lock, tape monitor 1, and tape monitor 2. Auto-dub is applied when both tape monitor switches are depressed.

The FM antenna input is 300 ohms. A rod antenna and external connection are provided for AM. There is one switched AC outlet. Overall dimensions are 17-5/16 in. wide x 5 7/8 in. high x 12-3/16 in. deep. Weight is 16.1 lbs.

Performance—FM Tuner: Full limiting was attained with 4.5 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 8.5 μ V. The stereo high fidelity sensitivity (55 dB quieting) measured 60 μ V. Full mute release attained with 2.5 μ V.

At standard test level the stereo frequency response measured +0.2/-2.5 dB from 20 to 15,000 Hz. Monophonic distortion measured 0.1% THD. Stereo distortion was 0.4% THD. The signal-to-noise ratio measured 73 dB. Stereo separation was 40+ dB. Selectivity was good.

The servo-lock FM tuning (AFC) action was moderate and

Average is the rigid performance standard we require a component to pass to make it a good buy in its price range. Anything less than this rating we do not consider suitable for review purposes or for you to consider buying. An average rating is in no way derogatory, because we have deliberately kept our standards high. For example, if a \$1,000 Pilgrim receiver is rated average, this means it is equal to other average-rated receivers in the same price range, is superior to an average \$600 Minuteman receiver, and far superior to an average-rated \$200 Tory receiver. Each receiver is average within its own price range, and should be compared only with similarly priced components.

Worst case: The test results given are the "worst case" for stereo and 4-channel equipment. For example, if the frequency response of an amplifier's left channel is ± 2 dB from 20 to 20,000 Hz while the response of the right channel is ± 3 dB from 20 to 20,000 Hz, the test report shows the worst case, which is ± 3 dB. Similarly, if an FM tuner's stereo separation is 40 dB left-to-right and 32 dB right-to-left, the test report will show a separation of 32 dB. You can therefore be certain that the performance levels of all other channels are equal to or better than the indicated results.

Please note: all prices listed in the test reports section, as well as prices listed elsewhere in this issue, are approximate and subject to change. Manufacturers list prices in several ways. For example, some precede all prices with "approximately," while others list "nationally advertised value." For the purpose of simplicity and consistency, our editorial policy is to report prices as prices. It is assumed that prices vary at the discretion of individual dealers and that advertised prices may change.

would lock a station's tuning if the signal was originally tuned anywhere within the main sideband area.

Performance—AM Tuner: Essentially average with slightly lower than average background noise.

Performance—Amplifier: The power output per channel with both channels driven 20 to 20,000 Hz into 8 ohms measured 15.4 watts RMS. The frequency response at 15.4 watts/8 ohms measured ± 0.5 dB from 20 to 20,000 Hz at a distortion no higher than 0.18% THD at any frequency.

The tone control range measured $+14/-16$ dB at 50 Hz; $+12/-13$ dB at 10,000 Hz.

The magnetic input hum and noise measured -79 dB; stereo separation, was 53 dB. ▲

OPTONICA SA-4141 AM/FM STEREO RECEIVER

This receiver features an "air check" reference signal for use when making recordings from FM broadcasts. \$399.95 includes metal cabinet with wood trim.

Description: An AM/FM stereo receiver FTC-rated at 65 watts per channel into 8 ohms with no more than 0.09% THD from 20 to 20,000 Hz. Features include a stereo beacon, FM center-channel and AM/FM signal strength tuning meters, "air check" (a 400 Hz oscillator calibrated to FM signal levels for pre-adjustment of tape recorders), automatic dub to or from either of two recorders, and an output hold-off that prevents power supply turn-on transients



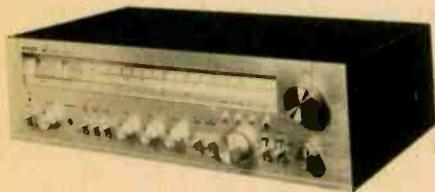
Onkyo TX-1500 — \$209.95
Circle No. 81 On Reader Service Card

65 WPC 0.09% Distortion



Optonica SA-4141 — \$399.95
Circle No. 90 On Reader Service Card

TEST REPORTS / RECEIVERS



Optonica SA-4141 — \$399.95
Circle No. 90 On Reader Service Card

from being fed to the speakers.

Inputs are provided for two magnetic phono, aux, and two tape. Outputs for two speaker systems, two tape, and phones.

There are controls for tuning, volume, balance, ganged bass, ganged treble, input selection, and speaker selection. Switches for power, 20 dB audio mute, low filter, high filter, stereo/mono, loudness compensation, tape dub selection, tape monitor selection, AM, FM, FM mute, and "air check."

The FM input is 75/300 ohms. A rod antenna and external connection are provided for AM. There are switched and unswitched AC outlets.

Overall dimensions are 21 $\frac{1}{8}$ in. wide x 6-15/32 in. high x 15-27/32 in. deep. Weight is 35.6 lbs.

Performance—FM Tuner: Full limiting was attained with 8 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 14 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 105 μ V. Full mute release was attained with 6.5 μ V.

At standard test level the stereo frequency response measured +0.5/–1.8 dB from 20 to 15,000 Hz. Monophonic distortion measured 0.07% THD. Stereo distortion was 0.22% THD. The signal-to-noise ratio measured 73 dB. Stereo separation was 38 dB. Selectivity was good.

The "air check" signal level to the tape recorders was 3 dB below the level equal to 100% modulation of the FM transmitter. To avoid excess recording level adjust the recorder's controls so the "air check" VU reading is 3 dB below what you use as the maximum recording level.

Note: The mono and stereo distortion are considerably reduced below the above values when the tuning is very slightly off the meter-indicated center channel.

Performance—AM Tuner: Average with somewhat poorer than average image rejection at the high end of the dial.

Performance—Amplifier: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 65.5 watts RMS. The frequency response at 65.5 watts/8 ohms measured +0.6/–0.3 dB from 20 to 20,000 Hz at a distortion no higher than 0.05% THD at any frequency.

The tone control range measured +12/–15 dB at 50 Hz; \pm 10 dB at 10,000 Hz.

The magnetic input hum and noise measured –59 dB; stereo separation was 57 dB. ▲

ROTEL RX-403 AM/FM STEREO RECEIVER

Good performance for an almost rock-bottom price. \$230.00 in wood cabinet.

Description: An AM/FM stereo receiver FTC-rated at 25 watts RMS per channel into 8 ohms with no more than 0.2% THD from 20 to 20,000 Hz. Features include a stereo beacon, AM/FM signal strength tuning meter, and an FM mute controlled by the mono/stereo selector; the mute is always on for stereo, off for mono.

There are inputs for magnetic and ceramic phono, aux, and tape. Outputs for two speaker systems, tape, and phones.

Controls are provided for tuning, volume, balance, ganged bass, ganged treble, and input selection. Switches for power, speaker

25 WPC
0.2% Distortion



Rotel RX-403 — \$230.00
Circle No. 87 On Reader Service Card

TEST REPORTS / INTEGRATED AMPLIFIERS

system A, speaker system B, hi-filter, tape monitor, mono/stereo, and loudness compensation.

The FM antenna input is 75/300 ohms and a 75 ohm coaxial jack. An internal antenna and external connection are provided for AM. There is one switched AC outlet.

Overall dimensions are 18.5 in. wide x 5.3 in. high x 10.8 in. deep. Weight is 15.4 lbs.

Performance—FM Tuner: Full limiting was attained with 7.5 μ V input. The monophonic high fidelity sensitivity (60 dB quieting) measured 11 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 55 μ V. Full mute release was attained with 5 μ V.

At standard test level the stereo frequency response measured +0.5/-3 dB from 30 to 15,000 Hz. Monophonic distortion was 0.22% THD; stereo distortion was 0.3% THD. The signal-to-noise ratio measured 69 dB. Stereo separation was 40+ dB. Selectivity was good.

Performance—AM Tuner: Average.

Performance—Amplifier: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 24.5 watts RMS. The frequency response at 24.5 watts/8 ohms measured +0.6/-0 dB from 20 to 20,000 Hz at a distortion no higher than 0.09% THD at any frequency.

The tone control range measured +9/-11 dB at 50 Hz; \pm 9 dB at 10,000 Hz. The magnetic input hum and noise measured -65 dB; stereo separation was 55 dB. ▲

INTEGRATED AMPLIFIERS

ONKYO A-5 INTEGRATED STEREO AMPLIFIER

A notably outstanding deep bass, yet the price is moderate. \$250.

Description: An integrated stereo amplifier FTC-rated at 45 watts RMS per channel into 8 ohms with no more than 0.1% THD from 20 to 20,000 Hz. Features include individual bass and treble tone control defeat switches, a subsonic filter (10 Hz cut-off), automatic dub from/to either of two recorders, and an output hold-off that prevents power supply turn-on transients from being fed to the speakers.

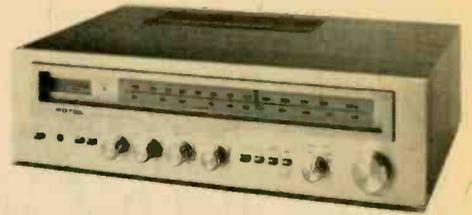
There are inputs for two magnetic phono, tuner, and two tape. Outputs for two speaker systems, two tape, and phones. Pre-amplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for volume, balance, ganged bass, ganged treble, input selection, speaker selection, tape monitor selector, and tape dub selector. There are switches for power, bass tone control defeat, treble tone control defeat, subsonic filter, mono/stereo, loudness compensation, and 20 dB audio muting.

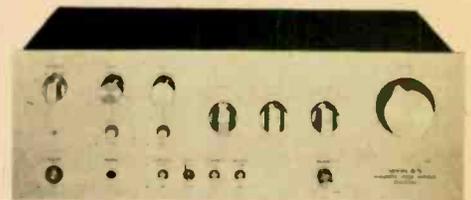
Two unswitched and a switched AC outlet are provided.

Overall dimensions are 17½ in. wide x 6¼ in. high x 15 in. deep. Weight is 25.8 lbs.

Performance: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 51.5 watts RMS. The frequency response at 51.5 watts/8 ohms measured +0.2/-0.5 dB from 20 to 20,000 Hz at a distortion no



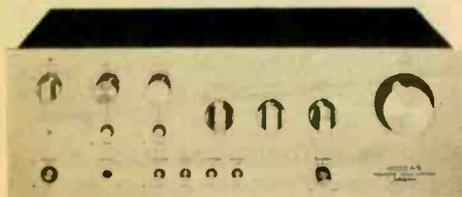
Rotel RX-403 — \$230.00
Circle No. 87 On Reader Service Card



Onkyo A-5 — \$250.00
Circle No. 81 On Reader Service Card

45 WPC
0.19% Dis.

TEST REPORTS / INTEGRATED AMPLIFIERS



Onkyo A-5 — \$250.00
Circle No. 81 On Reader Service Card

60 WPC
0.09% Dis.



Optonica SM-3636 — \$399.95
Circle No. 90 On Reader Service Card

higher than 0.03% THD at any frequency. (In fact, the distortion value was constant from 20 to 20,000 Hz—an unusual measurement which indicates excellent design.)

The tone control range measured +10/−13 dB at 50 Hz; +10/−19 dB at 10,000 Hz.

The subsonic filter has essentially no effect at 20 Hz (less than 1 dB attenuation at 20 Hz when the filter is switched in).

The magnetic input hum and noise was −66 dB; separation was into the noise level.

The listening panel reported an overall excellent sound quality with an outstanding deep bass, particularly with smaller "book-shelf size" speakers. ▲

OPTONICA SM-3636 STEREO AMPLIFIER

Features notably low distortion and very good overload recovery. Overall, notably good sound quality. \$399.95 includes metal cabinet with wood trim.

Description: An integrated stereo amplifier FTC-rated at 60 watts RMS per channel into 8 ohms with no more than 0.09% THD from 20 to 20,000 Hz. Features include a phono input with front panel selection of 22,000, 47,000, or 100,000 ohm input impedance, dual turnover bass (600, 300 Hz) and treble (3,000, 15,000 Hz) tone controls, tone control defeat, automatic dub from or to either of two recorders, and an amplifier output hold-off that prevents power supply turn-on transients from being fed to the speakers.

There are inputs for two magnetic phono (one with user-selected input impedance), tuner, aux, and two tape. Outputs for two speaker systems, two tape, and phones. The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for volume, balance, ganged bass, ganged treble, stereo/mono modes, input selection, output selection, and phono #1 input impedance. There are switches for power, bass turnover frequency, treble turnover frequency, tone control defeat, low cut, high cut, loudness compensation, 20 dB audio mute, tape dub selection, and tape monitor selection.

One switched and two unswitched AC outlets are provided.

Overall dimensions are 17-7/16 in. wide x 5-11/16 in. high x 14-5/16 in. deep. Weight is 33.7 lbs.

Performance: The power output at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 67.8 watts RMS. The frequency response at 67.8 watts/8 ohms measured +0/−0.3 dB from 20 to 20,000 Hz at a distortion no higher than 0.06% THD at any frequency.

The tone control range depends on the setting of the turnover controls. At 50 Hz: with both the 300 and 600 Hz turnovers, the range measured ±12 dB. At 100 Hz: the range was ±8 dB with a 300 Hz turnover, ±10 dB with a 600 Hz turnover. At 10,000 Hz: with a 3,000 Hz turnover, the range was +5/−8 dB; with a 15,000 Hz turnover, the range was +9/−15 dB.

The magnetic input hum and noise measured −71 dB; stereo separation was effectively into the noise at −64 dB. ▲

ROTEL RA-713 INTEGRATED STEREO AMPLIFIER

Provides considerable power at moderate cost. Good choice when used with moderately efficient speakers. \$260.00 in metal cabinet.

Description: An integrated stereo amplifier FTC-rated at 45 watts RMS per channel into 8 ohms with no more than 0.1% THD from 20 to 20,000 Hz. Features include left and right power output meters calibrated from 0 to 100 watts into 8 ohms with associated dB scales, automatic dub from/to either of two recorders, and an output hold-off that prevents power supply turn-on transients from being fed to the speakers.

There are inputs for magnetic phono, aux, tuner, and two tape. Outputs to two speaker systems, two tape, and phones. (Note: one of the two tape input/output connections is exclusively DIN—without phono jacks.) The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for concentric volume/balance, ganged bass, ganged treble, and input selection. There are switches for power, speaker system A, speaker system B, low filter, high filter, loudness compensation, 15 dB audio mute, stereo/mono modes, and tape dub/monitor selector.

Two switched AC outlets are provided.

Overall dimensions are 16.5 in. wide x 5.6 in. high x 12 in. deep. Weight is 24.2 lbs.

Performance: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 45.1 watts RMS. The frequency response at 45.1 watts/8 ohms measured $\pm 0.2/-0.4$ dB from 20 to 20,000 Hz at a distortion no higher than 0.045% THD at any frequency.

The tone control range measured ± 13 dB at 50 Hz; ± 11 dB at 10,000 Hz.

The magnetic input hum and noise measured 64 dB; separation was 54 dB.

The power output meters had a frequency response of $+0/-2.8$ dB from 20 to 10,000 Hz, falling to -4 dB at 20,000 Hz. Power readings are within 10% of the indicated value. ▲

YAMAHA CA-2010 INTEGRATED STEREO AMPLIFIER

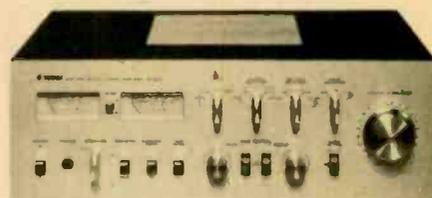
Full power distortion approaches the low values usually associated with preamplifiers. Features optional Class A operation. \$780.00 in wood cabinet.

Description: An integrated stereo amplifier FTC-rated at 120 watts per channel into 8 ohms with no more than 0.02% THD from 20 to 20,000 Hz. Features include switch-selected Class A operation which provides 30 watts per channel; two magnetic phono inputs, one of which can switch in a head amplifier for a moving coil (MC) pickup or loads for MM (standard magnetic) pickups of 47,000, 68,000 and 100,000 ohms; dual range turnover bass (125, 500 Hz) and treble (2,500, 8,000 Hz) tone controls; separate tape input and amplifier input selectors; automatic dub to and from either of two recorders; left and right power output meters cali-



Rotel RA-713 — \$260.00
Circle No. 87 On Reader Service Card

45 WPC 0.1%
Dis.



Yamaha CA-2010—\$780.00
Circle No. 101 On Reader Service Card

120 WPC
0.02% Dis.

TEST REPORTS / CASSETTE DECKS



Yamaha CA-2010—\$780.00
Circle No. 101 On Reader Service Card



AIWA AD-6800 — \$650.00
Circle No. 102 On Reader Service Card

brated in dB and 0.01 to 200 watts into 8 ohms, with the meters also serving as output level indicators for the tape outputs; an output hold-off that prevents power supply turn-on transients from being fed to the speakers; and an output cut-off that temporarily disables the amplifier if one tries to drive it into overload.

There are inputs for MC/MM (magnetic) phono, MM phono, tuner, aux, and two tape. Outputs for two speaker systems, two tape, and phones. The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for concentric volume/balance, ganged bass, ganged treble, input/tape monitor selection, tape input/tape dub selection, phono mode selector, mono/stereo modes, and speaker selection. There are switches for power, Class A/Class B, subsonic filter, high filter, bass turnover frequency, treble turnover frequency, 20 dB audio mute/preamplifier output cut-off, and meter selector (power output or tape output level). There are switches on the rear apron for preamplifier/main amplifier separation and a mode switch that provides main amplifier operation down to DC or inserts a blocking capacitor for DC blocking and isolation from subsonic frequencies.

There are three unswitched and one switched AC outlet.

Overall dimensions are 18½ in. wide x 6-11/16 in. high x 14-13/16 in. deep. Weight is 44 lbs.

Performance: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 121.7 watts RMS. The frequency response at 121.7 watts/8 ohms measured +0/-0.2 dB from 20 to 20,000 Hz at a distortion no higher than 0.02% THD at any frequency.

In the Class A mode the maximum power output per channel at the clipping level measured 32.8 watts RMS with the same distortion vs. frequency characteristics.

The tone control range depended on the setting of the turnover switches. At 50 Hz: the range measured ±7 dB with a 125 Hz turnover; ±10 Hz with a 500 Hz turnover. At 10,000 Hz: the range measured ±8.5 dB with a 2,500 Hz turnover; ±3.5 dB with an 8,000 Hz turnover.

With the subsonic filter switched in the frequency response at 20 Hz was down only 1 dB. The magnetic input hum and noise measured -74 dB; separation was 64 dB.

The moving coil phono input selector switch cut in a head amplifier that provided 8 dB extra gain for the #1 phono input.

The power output meters had an essentially ruler flat frequency response from 20 to 20,000 Hz, and output power indications were within 10% of the actual output at all power levels.

The listening panel reported excellent sound quality, particularly in the deep bass, but could not discern any difference in sound between the Class A and Class B (high power) modes. ▲

CASSETTE DECKS

AIWA AD-6800 DOLBY CASSETTE DECK

Magnificent! Superb human engineering. \$650.00 in metal cabinet

Description: A front-loading Dolby cassette deck featuring equalization and bias selectors and individual fine bias adjust controls

for standard (LH), Ferrichrome, and chromium dioxide tapes. It also includes a built-in independent two-tone (400,8000 Hz) test system, with its own simultaneous playback head, which is used for precisely adjusting the bias for any type or brand of tape. The bias-adjust conditions are automatically indicated on the VU meters when the test system is switched on: ideal bias adjustment is attained when the left meter (400 Hz) and right meter (8000 Hz) both indicate the same reading.

The VU meters have two independent pointers with independent scales. One pointer is standard VU, the second pointer is peak indicating, or peak-hold (which indicates the maximum peak values of any signal duration).

Other features include a record level limiter, automatic end of tape stop/disengage, memory reset counter, unswitched AC outlet, and a control socket for "player sync" that permits the recorder to be started remotely by a matching record player's tonearm drop. (The record player, the AP-2200 with the sync connections, is an optional accessory.)

There are inputs for microphone and line. Outputs for line and phones.

Controls are provided for friction-clutched left and right record level and friction-clutched left and right output level. Miniature controls are provided for LH, Ferrichrome, and chromium dioxide fine bias adjustment.

There are switches for power, input/bias test selection, Dolby/Dolby with MPX filter, tape bias selector, tape equalization selector, peak meters on (VU meters are always on), peak-hold meter mode for peak meters, record limiter, and counter memory on-off.

The tape mechanism has piano keys for the record interlock, REW, FWD, FF, stop/eject, pause (and timer control), and loading door control.

Overall dimensions are 18 $\frac{3}{8}$ in. wide x 6 $\frac{3}{8}$ in. high x 13-13/16 in. deep.

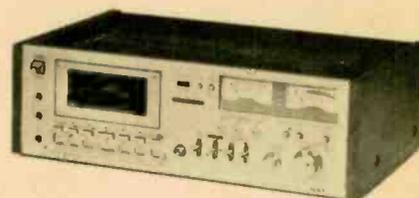
Performance: The playback frequency response from a standard test tape with a 50 to 10,000 Hz range measured +0.5/-1.5 dB.

Note: All tests were conducted with the bias optimized for each tape through the built-in test system.

Using BASF Professional Type I tape: without Dolby, the record/play frequency response was essentially ruler flat from 30 to 14,000 Hz, down 1.8 dB at 15,000 Hz and 1.2 dB at 20 Hz. Distortion at the meter-indicated 0-VU record level was 0.3% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 46 dB. With the Dolby active, the response was similar but down 1.8 dB at 13,000 Hz, 4 dB down at 14,000 Hz. Distortion and headroom remained the same. The signal-to-noise ratio measured 50 dB wideband, 58 dB narrowband.

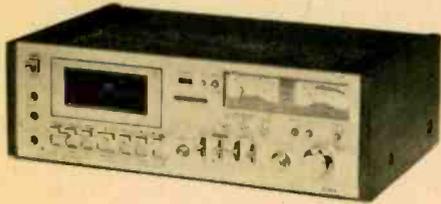
Using Sony Ferrichrome: with Dolby, the record/play response measured +0/-1.8 dB from 30 to 14,000 Hz, down 2 dB at 20 and 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 1% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 56 dB wideband, 62 dB narrowband.

Using BASF Professional Type II chromium dioxide tape: with Dolby the record/play response measured +2/-0.5 dB from 20 to 20,000 Hz (+2 dB below 100 Hz). Distortion at the meter-indicated 0-VU record level was 0.8% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 56

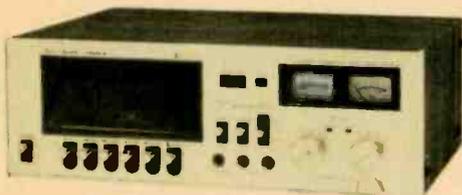


AIWA AD-6800 — \$650.00
Circle No. 102 On Reader Service Card

TEST REPORTS / CASSETTE DECKS



AIWA AD-6800 — \$650.00
Circle No. 102 On Reader Service Card



Fisher CR-5110 — \$249.95
Circle No. 69 On Reader Service Card

dB wideband, 61 dB narrowband.

The maximum output level corresponding to a 0-VU record level was nominally 800 mV.

Wow and flutter measured 0.1% steady.

The record level limiter has a fast attack and a relatively slow release (could be a little faster). The cut-in level is a shade below maximum record level (3% THD) when dealing with transient waveforms (such as program material)—overall, very effective.

The combination (dual) VU and peak indicating meters are superb. At first it's very confusing to see two pointers indicating different values. But one does get the hang of it and the peak system insures lowest distortion coincident with highest recording level. (The meters are the best illustration of peak vs. VU indication we have seen—beats any article on the subject.)

As for the built-in test system for bias adjustment: it is magnificent. With a little experience it's possible to virtually tailor the response to your own needs, such as ruler flat, rising highs, etc.

The bias test system works in conjunction with a third head that is used only for the bias test(s), it has no function in the normal sound reproduction process. The front panel of the machine, however, states "3-head", which by common understanding implies simultaneous record/play (or monitor) of the program signal. The statement is misleading and is the only blemish on an otherwise outstanding cassette deck, the first of the next generation of hi-fi cassette equipment. ▲

FISHER CR-5110 CASSETTE RECORDER

A front-loading deck of uncommonly small size. \$249.95 in wood cabinet.

Description: A front-loading stereo cassette deck featuring Dolby, three-head system for simultaneous record/play monitoring, a selector for "normal", ferrichrome, and chromium dioxide tapes, two calibrated VU meters, automatic end-of-tape stop/disengage, and a reset counter.

There are inputs for microphones and line. Outputs for line and phones.

Controls are provided for left and right record level. Switches for power, Dolby on-off, tape type, and tape/source monitor.

The tape mechanism has lever controls for the record interlock, REW, FF, play, pause, and stop/eject.

Overall dimensions are 13.7 in. wide x 4.7 in. high x 11.4 in. deep.

Performance: The playback frequency response from a standard test tape was down 10 dB at 2500 Hz because the head was not in standard alignment, though it is in alignment to itself for recordings made on the machine.

Using TDK-D tape: without Dolby, the record/play frequency response measured +2/-3 dB from 40 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 2.5% THD with 3 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 50 dB.

With the Dolby active the record/play frequency response measured +2.8/-3 dB from 40 to 13,300 Hz. Distortion and headroom remained the same. The signal-to-noise ratio referenced to 0-VU

record level was 56 dB wideband, 60 dB narrowband.

Using Sony ferrichrome tape: with Dolby, the record/play frequency response measured +1.5/-3.2 dB from 40 to 14,000 Hz (with a dip of 3.2 dB at 50 Hz). Distortion at the meter-indicated 0-VU record level was 2% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 56 dB wideband, 61 dB narrowband.

Using TDK-SA tape (for the chromium dioxide mode): the record/play frequency response measured +1.6/-2 dB from 40 to 13,000 Hz. Distortion at the meter-indicated 0-VU record level was 5% THD. The signal-to-noise ratio referenced to 0-VU record level measured 57 dB wideband, 63 dB narrowband.

The output level corresponding to a 0-VU record level was nominally 700 mV.

Wow and flutter measured 0.3% with peaks to 0.4%.

The simultaneous playback is only for monitoring while recording; it does not have Dolby deprocessing when recording and the user hears the "boosted" highs. During normal playback the machine switches in the combination record/play head for hi-fi playback, and this head is used regardless of the position of the tape/source monitor switch. (The manual does not clearly explain that the simultaneous playback is only a monitor to check a recording in progress, and is not a full fidelity output.) ▲

SCOTT CD-87R CASSETTE DECK

Provides lots of headroom and a better than average signal-to-noise ratio. \$349.95.

Description: A front-loading Dolby cassette deck featuring bias and equalization selectors for "normal", Ferrichrome, and chromium dioxide tapes, left and right calibrated VU meters, a peak record level indicator lamp, a memory reset counter, a tape path access "door" (for head/capstan cleaning), and an automatic end-of-tape stop/disengage.

There are inputs for microphones and line. Outputs for line and phones.

Controls are provided for concentric-clutched left and right record level, and ganged output level. There are switches for power, input selection, Dolby/Dolby with MPX filter, tape bias, tape equalization, and memory counter on-off.

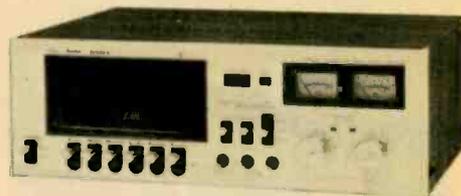
The tape mechanism has piano key controls for the record interlock, REW, forward, FF, stop, pause, and eject.

Overall dimensions are 18¾ in. wide x 5¼ in. high x 13¾ in. deep. Weight is 18.3 lbs.

Performance—FM Tuner: The frequency response from a standard test tape with a 50 to 10,000 Hz range measured +1/-0.8 dB.

Using BASF Studio Tape: without Dolby, the record/play frequency response measured +1.2/-1.8 dB from 20 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.4% THD with 9 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 49 dB.

With the Dolby active, the record/play frequency response measured +1.5/-3 dB from 20 to 12,000 Hz. Distortion and headroom remained the same. The signal-to-noise ratio was 51 dB wideband,



Fisher CR-5110 — \$249.95
Circle No. 69 On Reader Service Card



Scott CD-87R — \$349.95
Circle No. 91 On Reader Service Card

TEST REPORTS / CASSETTE DECKS



Scott CD-87R — \$349.95
Circle No. 91 On Reader Service Card



TEAC A-650—\$650.00
Circle No. 10 On Reader Service Card

60 dB narrowband.

Using Sony Ferrichrome tape; with Dolby, the record/play frequency response measured $+0/-3$ dB from 20 to 12,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.4% THD with 7 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 51 dB wideband, 61 dB narrowband.

Using BASF Professional II chromium dioxide tape; with Dolby, the record/play frequency response measured $+0/-3$ dB from 20 to 11,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.8% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 54 dB wideband, 63 dB narrowband.

The maximum output level corresponding to a 0-VU record level was nominally 320 mV.

Wow and flutter measured 0.12% with peaks to 0.14%.

The peak indicator recording lamp illuminates when the signal level exceeds 0-VU by 3 dB (generally allowing 3 to 6 dB "extra" headroom). ▲

TEAC A-650 DOLBY CASSETTE DECK

Features outstandingly low wow and flutter—comparable to the best reel-to-reel equipment—and excellent Dolby tracking. \$650.

Description: A front-loading Dolby cassette deck featuring two motor drive (one for the capstan, the other for the reels), solenoid push-button control of the tape mechanism allowing direct drive changes without an intermediate stop, microphone/line input mixing, two calibrated VU meters, left and right peak record level indicators, bias and equalization selectors for "normal," Ferrichrome and chromium dioxide tapes, automatic end of tape stop/disengage, a memory reset counter with stop or automatic play from rewind, a record mute which leaves the tape mechanism in the record mode with the audio signal muted (for selected program-segment erasure), and a record level limiter.

There are inputs for microphones and line. Outputs for line and phones.

Controls are provided for concentric-clutched left and right microphone record level, concentric-clutched left and right line record level, and concentric-clutched left and right output level. There are switches for power, bias, equalization, record level limiter, Dolby/Dolby with MPX filter, FM Dolby/Dolby copy, and memory counter on/off/auto start. Left and right FM Dolby calibrate controls are provided on the rear apion.

The tape mechanism has touch-to-operate pushbuttons for the record interlock, forward, FF, REW, stop, pause, and record mute. There is a lever control for cassette eject.

Overall dimensions are 17 $\frac{1}{4}$ in. wide x 7 in. high x 12 $\frac{1}{4}$ in. deep. Weight is 28 $\frac{3}{4}$ lbs.

Performance: The playback from a standard test tape with a 50 to 10,000 Hz frequency range measured $+0.5/-1$ dB.

Using TDK-SD tape: Without Dolby, the record/play frequency response measured $+1.5/-1$ from 30 to 13,000 Hz, down 3 dB at 14,000 Hz. Distortion at the meter-indicated 0-VU record level was 1.2% THD with 7 dB headroom to 3% THD. The signal-to-noise ratio was 46 dB.

With the Dolby active, the record/play frequency response was ± 2 dB from 30 to 13,000 Hz, down 5 dB at 14,000 Hz. Distortion at the meter-indicated 0-VU record level was 1% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 51 dB wideband, 57 dB narrowband.

Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured $+2/-3$ dB from 30 to 10,000 Hz. Distortion at the meter-indicated 0-VU record measured 1.2% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 52 dB wideband, 59 dB narrowband.

Using Maxell UD/XL Type II tape (in preference to chromium dioxide): with Dolby, the record/play frequency response measured $+1.6/-2$ dB from 30 to 13,000 Hz, down 3 dB at 14,000 Hz. Distortion at the 0-VU record level measured 0.9% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 55 dB wideband, 61 dB narrowband.

The maximum output level corresponding to a 0-VU record level was nominally 460 mV.

The peak record level lamps turn on when the record level is 5 dB above 0-VU.

The record level limiter had no measurable effect within the normal range of signal levels.

Wow and flutter measured a "rock steady" 0.06%. An outstanding value even for professional studio recorders.

The tape mechanism's tape handling and loading is one of the best and easiest to use we have seen. The tape control is excellent. (We would specifically recommend this machine for especially hard physical use.) ▲

REEL-TO-REEL

PHILIPS N4504/44 TAPE DECK

An unusually light standard-sized machine. Highly portable, even by children. \$449.95.

Description: A three-speed (7.5, 3.75, 1½ ips), three-motor, three-head system, 4-track stereo tape deck accommodating reel sizes to 7 inches. Features include a Philips DNL (Dynamic Noise Limiter), automatic end-of-tape stop through metal foils user-applied to the tape, headphone output level and balance controls, built-in reel locks, two calibrated VU meters, pre-wired socket for an optional remote control, and a reset counter.

There are inputs for microphones and line. Outputs for line and phones.

Controls are provided for ganged left-right record level, record level balance, headphone volume, and headphone balance. There are switches for power, stereo/mono track selection, speed, tape/source monitor, and DNL on-off.

The tape mechanism has push button controls for the record interlock, REW, FF, start, pause, and stop.

Overall dimensions are 16¾-in. wide x 16¾-in. high x 7¼-in. deep. Weight is 18 lbs.

Performance: The playback frequency response from standard test tapes measured $\pm 2.4/-0.2$ dB from 50 to 10,000 Hz at 7.5



TEAC A-650—\$650.00
Circle No. 10 On Reader Service Card



Philips N4504/44 — \$449.95
Circle No. 84 On Reader Service Card

TEST REPORTS/ REEL-TO-REEL



Philips N4504/44 — \$449.95
Circle No. 84 On Reader Service Card

ips, +2.5/-2.2 dB from 50 to 7500 Hz at 3.75 ips (the frequency limits of the two test tapes).

Note: No recommendation was made as to the type of tape to be used. We therefore selected Scotch type 212 because it delivered a relatively smooth response at 7.5 ips.

At 7.5 ips the record/play frequency response measured +0.4/-2 dB from 40 to 13,000 Hz, down 3 dB at 35 and 18,000 Hz. Distortion at the meter-indicated 0-VU record level measured 1.5% THD with 3 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 53 dB. Wow and flutter measured 0.1% steady.

At 3.75 ips the record/play frequency response measured +0/-3 dB from 35 to 10,000 Hz. Distortion at the meter-indicated 0-VU record level was 1.1% THD with 3.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 55 dB. Wow and flutter measured 0.12% steady.

The output level corresponding to a 0-VU record level was nominally 230 mV. (Somewhat low compared to most other hi-fi tape decks.)

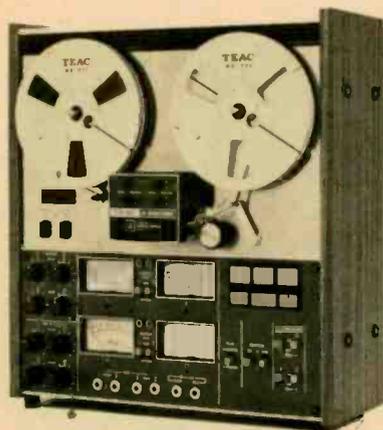
The Dynamic Noise Limiter is a dynamic high frequency filter during playback—it has no effect when recording. It attenuates the noise-producing frequencies above 4000 Hz when the signal level falls below a preset threshold value. It does not filter high level sounds. In effect, it reduces tape hiss (and record noise).

Though the manual states that auto-stop is attained by applying foil strips to the beginning and end of the tape, the deck automatically disengages and stops within 10-seconds after the tape runs out or breaks. The only purpose of the foil would be to provide a stop before the tape runs out.

Though the deck is unusually light in comparison to other hi-fi decks, it is full-size. The weight reduction is accomplished primarily by using a lightweight plastic for the entire cabinet and all non-critical components. ▲

TEAC A-2340SX 4-CHANNEL SIMUL-SYNC STEREO TAPE DECK

Provides an easy way to make synchronized multi-track recordings. \$1000.00 in wood enclosure.



TEAC A-2340SX—\$1000.00
Circle No. 10 On Reader Service Card

Description: A two-speed (7.5, 3.75 ips), three-motor, three-head system, 4-track mono/stereo/4-CH recorder accommodating 5-inch and 7-inch reels. Unit features SIMUL-SYNC, a means whereby the record heads can be used as play monitors for the individual preparation of each track for eventual in-line synchronized play. Other features include "cue" (monitoring during fast winds), microphone/line mixing, individual record selectors for each track, four calibrated VU meters, two-position bias and equalization selectors (a chart for various popular tapes is provided), built-in reel locks, a reset counter, automatic end-of-tape stop/disengage, and individual source/tape monitoring for each track.

There are inputs for front and rear microphones and line. Outputs for front and rear line and phones.

Concentric-clutched microphone/line record level controls are provided for the left front, right front, left rear, and right rear. Standard controls are provided for the left front, right front, left

rear, and right rear outputs. There are switches for power, speed, 2-CH/4-CH, equalization, bias, left front/right front/left rear/right rear record modes, left front/right front/left rear/right rear source/tape monitor, and SIMUL-SYNC selection (monitor) for tracks 1, 2, 3 and 4.

The tape mechanism has push-tabs for the record interlock, forward, rewind, fast forward, and pause. A lever moves the tape against the play head during high speed winding for "cue."

Overall dimensions are 18 $\frac{3}{4}$ in. x 17-5/16 in. x 8 $\frac{3}{4}$ in. Weight 48.5 lbs.

Performance: At 7.5 ips, the playback from a standard test tape with a 50 to 15,000 Hz frequency range measured +2.4/-0.5 dB—rising towards 2.4 dB at the higher frequencies.

At 3.75 ips, the playback from a standard test tape with a 50 to 15,000 Hz frequency range measured +2.4/-0.5 dB—rising towards 2.4 dB at the higher frequencies.

At 3.75 ips, the playback from a standard test tape with a 50 to 7,500 Hz range measured +1.2/-0 dB.

Using Maxell UD-35 tape: at 7.5 ips, the record/play frequency response measured +2/-1 dB from 20 to 20,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.68% THD with 9 dB headroom to 3% THD. The unweighted signal-to-noise ratio referenced to 0-VU record level was 49.6 dB. Wow and flutter was 0.07% steady.

At 3.75 ips, the record/play frequency response was nominally +1.8/-1 dB from 30 to 18,000 Hz, with a 4 dB rise at 15,000 Hz. (With other brands of tape the rise was approximately 2 dB, but the amount of headroom was reduced.) Distortion at the meter-indicated 0-VU record level was 0.9% THD with 9 dB headroom to 3% THD. The unweighted signal-to-noise ratio referenced to 0-VU record level was 49 dB. Wow and flutter: 0.17% steady.

The intertrack separation was 46 dB. (Very good.) The output level corresponding to a 0-VU meter indication was 300 mV. The maximum output level was nominally 600 mV. ▲



TEAC A-2340SX—\$1000.00
Circle No. 10 On Reader Service Card

RECORD PLAYERS

The high frequency response of phono pickups is sharply affected by the load capacity of the record player with which it is paired. The capacitance of the record player's output cables plays an important part in determining the load capacity of a record player. The capacitance of record player output cables varies over a broad range of values depending on the manufacturer and particular model number.

Beginning with this issue's test reports, we will include our measurement of the total cable capacitance (including tonearm wiring). Note: some test reports in this issue were ready for publication before we added this measurement to our testing procedure. Thus, no significance should be attributed to the fact that some reports don't include the cable capacitance measurement.

Cable capacitance can be increased, if necessary, by using an extension patch cord, whose capacitance adds to the total capacitance provided by the record player. Watch for an article which explains this in further detail in our next issue.

TEST REPORTS / RECORD PLAYERS



Dual 604 — \$250.00

Circle No. 27 On Reader Service Card

DUAL 604 RECORD PLAYER

This unit delivered typical performance for its price range. \$250.00 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) electronically controlled record player with integral base and dust cover. Features include full-time illuminated 33 and 45 strobes and semi-automatic operation. The motor starts when the tonearm is moved off its rest. At the end of play the tonearm lifts and returns to its rest, and the motor is turned off.

The tonearm lift has detents at the 10- and 7-inch diameters for instant manual positioning from the start of the record when using the tonearm lift/drop. The detents can be turned off if desired.

There are controls for speed selection, pitch (one control serves for both speeds), detent on/off, and tonearm lift.

The tonearm has a combination sliding/micro-adjust counterweight. The VTF adjustment is calibrated from 0 to 3 grams in 0.1 gram increments to 1.5 grams, and 0.5 gram increments to 3 grams. There is a calibrated anti-skate. The pickup mounts in a slide-in carrier for which a stylus overhang gauge is provided. The tonearm rest has a positive lock.

Performance: The speeds held constant over an applied test range of 90 to 140 volts with total immunity to transient line voltage variations. The pitch control range measured +3.4/−6% at 33 rpm; +2.3/−4.9% at 45 rpm. Wow and flutter measured 0.06% with peaks to 0.12%.

The tonearm's VTF calibrations were "right on," a particularly attractive feature if you're using a pickup operating in the one gram region. ▲

FISHER MT-6225 TURNTABLE

Has notably low wow and flutter for its price range. \$249.95 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) electronically controlled record player with integral base and dust cover. Features include full-time illuminated 33 and 45 strobes and semi-automatic operation. The motor starts when the tonearm is moved off its rest. At the end of play the tonearm lifts and returns to the rest, and the motor is turned off.

There are controls for 33 speed, 45 speed, 33 pitch, 45 pitch, reject (with recycle to off), and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as a 0 to 3 gram stylus force adjustment calibrated in 0.1 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal plug-in carrier. No stylus overhang gauge is provided (though a measurement for ruler-adjustment is given in the manual). The tonearm rest has a positive lock.

Performance: Both speeds held constant over an applied test range of 90 to 140 volts with total immunity to transient line voltage variations. The pitch control range measured +5/−5.4% at 33 rpm; +3.4/−6% at 45 rpm. Wow and flutter measured 0.05% with peaks to 0.1%.

The tonearm's calibrations were accurate within 0.1 gram across



Fisher MT-6225 — \$249.95

Circle No. 69 On Reader Service Card

the entire range; a particularly attractive feature if you're using a pickup operating in the one gram region. ▲

MITSUBISHI DP-EC1 AUTOMATIC RECORD PLAYER

It improves the sound quality of even the highest quality phono pickups. One of the most outstanding we've tested when it comes to tracking warped records. Overall, a beautiful machine. \$590.00 includes integral base and dust cover.

Description: A two-speed (33, 45) single record manual/automatic record player. A photo-optical system determines the playing speed (33 rpm for 10-inch and 12-inch records, 45 rpm for 7-inch records) and the automatic tonearm indexing. The motor speed can be manually changed in the event the record speed does not conform to standard size/speed relationships. The photo-optical system prevents tonearm drop when no record is on the platter. The unit cycles to off at the end of each play whether manually or automatically started; it can, however, be programmed for continuous repeat play.

The tonearm lift is considerably different from the usual lift/drop arrangement. If the start button is held down the tonearm tracks (while lifted) across the record, and stops when the start is released. Then the arm is dropped. The lift is combined with the reject button. By holding the stop/lift button for a second the arm is lifted and position maintained, if the button is pressed rapidly the unit cycles to off.

A full-time illuminated strobe for both speeds is provided, though there is one speed adjustment (used for both speeds). Push-button controls are provided for speed reset (manual change of automatic speed selection), repeat play, stop (reject)/lift, and start/cue (tracking cue).

The tonearm has a micrometer-adjust counterweight that also serves as an 0-3 gram stylus force (VTF) adjustment calibrated in 0.1 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal plug-in shell for which a stylus overhang gauge is provided. The gauge serves several other pickup alignment functions, and tonearm-user adjustments allow a relatively high degree of total pickup/tonearm optimization. Low capacity output cables are provided for use with CD-4 and stereo pickups.

Performance: All speeds held constant over an applied test voltage range of 90 to 140 VAC with total immunity to transient line voltage variations.

The pitch control range measured $+3/-3.8\%$ at 33 rpm; $+3.7/-4.7\%$ at 45 rpm. Wow and flutter measured 0.04% with peaks to 0.1%.

The stylus force adjustment could be set within a 0.2 gram accuracy.

The listening panel reported excellent overall performance and most mentioned that even the highest quality pickups appeared to sound "somewhat better than usual" on this player. It was their unanimous opinion that tracking of warped records was outstanding, equalled by few other players they have used. ▲



Mitsubishi DP-EC1—\$590.00

Circle No. 107 On Reader Service Card

TEST REPORTS / RECORD PLAYERS



Optonica RP-1414—\$139.95
Circle No. 90 On Reader Service Card

OPTONICA RP-1414 RECORD PLAYER

Has very high resistance to external shock and vibration. An excellent budget choice if you have shakey floors and furniture. \$139.95 includes base and dust cover.

Description: A two-speed (33, 45) record player with integral base and dust cover; user provides the pickup. The mechanism is manual start with automatic end-of-play cycle to off. The motor always starts when the tonearm is moved off its rest, it stops when the arm is returned to the rest.

There are controls for speed selection, cut (reject), and tonearm lift.

The tonearm has an adjustable counterweight and an 0-4 gram stylus force adjustment calibrated in full gram increments. There is a calibrated anti-skate with stops for two grams and three grams. The pickup mounts in a universal plug-in shell. No stylus overhang gauge is provided. The overhang is measured to 50 cm. with a ruler or a full scale illustration in the manual can be used as a guide (lay the pickup and shell over the illustration).

Performance: Both speeds held constant over an applied test range of 100 to 140 volts, with essentially total immunity to transient line voltage variations. Speed accuracy was essentially precise. Wow and flutter measured 0.05% with peaks to 0.15%.

The tonearm's stylus force adjustment could be estimated with $\frac{1}{4}$ -gram accuracy.

The system is unusually resistant to external shock and vibration, and is recommended when a turntable must be mounted on shakey floors, shelves, or cabinets. ▲

PHILIPS GA-437 TURNTABLE

Has unusually high resistance to external shock and vibration. Good choice for shakey floors and boot-stompin' dancers. \$119.95 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) manual record player with integral base and dust cover. The motor is started and stopped by the tonearm lift control (motor is off when tonearm is lifted). At the end of play the tonearm is automatically lifted and the motor is turned off (though the tonearm remains positioned over the record).

Controls are provided for speed selection and the tonearm lift/power control.

The tonearm has a micro-adjust counterweight that also serves as the stylus force adjustment. A 0 to 3.5 gram scale calibrated in 0.5 gram increments is part of the tonearm rest and indicates the vertical tracking force whenever the tonearm is in the rest. There is a calibrated anti-skate. The pickup mounts on a plug-in carrier for which a stylus overhang gauge is provided. The tonearm rest has a positive lock.

Performance: The 33 rpm speed was 0.67% high; the 45 rpm speed was 0.42% high (both essentially insignificant variations). Both speeds held constant over an applied test range of 100 to 140 volts with total immunity to transient line voltage variations. Wow and flutter measured 0.06% with peaks to 0.15%.



Philips GA-437 — \$119.95
Circle No. 84 On Reader Service Card

The stylus force calibrations were "on the mark," and intermediate values can be estimated within $\frac{1}{8}$ gram.

This record player is uncommonly insensitive to external shock and vibration; the stylus tracks the grooves under severe external motion conditions. ▲

PIONEER PLC-590 TURNTABLE AND PA-1000 TONEARM

Though available as individual components the turntable and tonearm are also intended to be a complete record player assembly. The PC-590 is \$550.00 with base and dust cover. The PA-1000 (less pickup) is \$100.00.

Description: The PLC-590 is a two-speed (33, 45) turntable mounted on an integral base with dust cover. Several mounting adaptors are provided to accommodate the Pioneer PA-1000 and SME-3009/II tonearms, and a universal mount that can be custom-drilled for virtually any other component tonearm.

The motor speeds are electronically locked to a crystal frequency reference (quartz lock), or they can be manually controlled (pitch control) by a speed adjustment to $\pm 6\%$ of the standard speeds. A meter-calibrated -6, -4, -2, 0, +2, +4, +6 indicates the manually selected speed variations from standard, and the quartz lock condition. When lock is selected the meter scale illumination is turned off and the words quartz lock appear along with the selected speed. Quartz lock appears only if the turntable speed is really locked: for example, the words do not appear in the brief interval while speeds are being changed.

Controls are provided for power, quick stop (approximately 1.5 seconds), 33 rpm, 45 rpm, pitch (speed adjust), and quartz lock on-off.

The PA-1000 tonearm has a universal mounting assembly that permits it to be mounted on virtually any motorboard. It has a combination sliding/micrometer-adjust counterweight that also serves as a stylus force (VTF) adjustment from 0-3 grams in 0.5 gram increments. A calibrated anti-skate is provided. The pickup mounts in a universal plug-in head. No overhang gauge is provided; the manual specifies a 15 mm overhang. The assembly has an integral tonearm lift and tonearm rest. The tonearm kit is supplied with a low capacity output cable assembly that plugs into the bottom of the stand (no tonearm wiring is required). Also included in the tonarm kit are a universal mounting kit and the necessary special tools (spanner wrench and extra-fine screwdriver).

Performance: The speeds were precise, even better than usually accepted as "excellent" when using strobe systems. There were no variations over the applied test voltage range of 90 to 140 VAC, and there was total immunity to transient line voltage variations. The speed variations indicated by the meter were essentially precise: either "right on" the mark, or 0.5% worst-case error (i.e.: -6% actually was -6.5%). Wow and flutter measured 0.05% with peaks to 0.13%.

The accuracy of the tonearm's stylus force adjustment depends on the accuracy of the user's balancing of the tonearm. Under typical conditions the worst-case error was $\frac{1}{8}$ gram within the estimated value (the calibrations are at 0.5 gram intervals).

For the protection of the pickup's stylus, make certain the



Pioneer PLC-590—\$550.00
Circle No. 85 On Reader Service Card



Rotel RP-5300 — \$160.00
Circle No. 87 On Reader Service Card

tonearm lift is up when the arm is in the rest. This way, if the arm is accidentally knocked out of the tonearm rest the stylus won't slam into a record. (If there's no record on the platter there's no problem because the rubber mat is unusually soft—as all mats should be.) ▲

ROTEL RP-5300 RECORD PLAYER

This unit delivered typical performance for its price range. \$160.00 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) electronically controlled manual record player with integral base and dust cover. Features include full-time illuminated strobes for 33 and 45. Operation is completely manual, and the motor must be turned off by the user after the tonearm is returned to its rest.

There are controls for power/speed select, 33 fine speed (pitch), 45 fine speed (pitch), and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as an 0-3 gram VTF adjustment calibrated in 0.1 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal plug-in carrier. The 45 record adaptor is calibrated to serve as the stylus overhang adjustment. The tonearm rest has a friction lock. Low capacity cables are provided for CD-4 stereo pickups.

Performance: Both speeds held constant over an applied test range of 90 to 140 volts with total immunity to transient line voltage variations. The pitch control range measured +8/-3% at 33 rpm; +7/-3% at 45 rpm. Wow and flutter measured 0.05% with peaks to 0.14%.

The tonearm's VTF calibrations were right "on the mark", a particularly attractive feature if you're using a pickup operating in the one gram region.

Note: The overhang gauge requires taking extra care when initially adjusting the pickup to avoid damage to the stylus. ▲

SETTON TS-11 FRONT ACCESS RECORD PLAYER

Overall quality is quite good, but more important, it will fit where other players can't. \$179.95 includes integral base and telescopic dust cover.

Description: A two-speed (33, 45 rpm) semi-automatic record player featuring an integral base, all controls on the front of the base (termed *front access*), and a telescopic dust cover that permits the player to be installed with as little as a 5 $\frac{1}{2}$ -inch total "compartment" height.

The motor starts when the tonearm is moved off its rest; it stops when the tonearm is returned to the rest. At the end of play the tonearm automatically cycles to the rest.

Controls are provided for speed select, reject, and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as a 0 to 4 gram VTF calibrated in 0.5 gram increments. There is a calibrated anti-skate. The tonearm rest has a positive lock. The pickup mounts in a universal plug-in carrier. An overhang gauge is provided. The output cable capacity is nominally 100 pF.

Performance: Both speeds held constant over an applied test



Setton TS-11 — \$179.95
Circle No. 125 On Reader Service Card

range of 100 to 140 volts with essentially total immunity to transient line voltage variations (there was an almost immeasurable transient variation). The 33 speed was 0.5% fast; the 45 speed was 0.37% slow—both insignificant deviations. Wow and flutter measured 0.07% with peaks to 0.15%.

The tonearm's VTF calibrations could be set within $\frac{1}{8}$ -gram accuracy.

The record player has much better than average resistance to external shock and vibration. It takes considerable pounding to make the stylus skip a groove.

The telescopic dust cover is asymmetrical, allowing easy record handling even though the cover does not lift up. This arrangement permits the player to be installed in compartments or cabinets with as little as $\frac{5}{8}$ -inch height. ▲

SONY PS-T2 TURNTABLE

This unit delivered typical performance for its price range. \$140.

Description: A two-speed (33, 45 rpm) electronically controlled record player with integral base and dust cover. Features include full-time illuminated 33 and 45 strobes and semi-automatic operation. The motor starts when the tonearm is moved off its rest. At the end of play the tonearm lifts and returns to the rest, and the motor is turned off.

There are controls for speed selection, 33 and 45 fine speed (pitch), tonearm lift, and reject (with recycle to off).

The tonearm has a micro-adjust counterweight that also serves as a 0 to 3 gram stylus force (VTF) adjustment calibrated in 0.1 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal plug-in carrier for which a stylus overhang gauge is provided. The tonearm rest is non-locking.

Performance: Speeds held constant over an applied test range of 90 to 140 volts with total immunity to transient line voltage variations. The pitch control range measured +6.6/-4% at 33 rpm; +10/-5.7% at 45 rpm. Wow and flutter measured 0.04% with peaks to 0.1%.

The tonearm's calibrations were within 0.1 gram accuracy, a particularly attractive feature if you're using pickups operating in the one gram region. ▲

VISONIK BD-2200 TURNTABLE

Suitable for budget-price quality systems. \$119.00 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) manual record player with integral base and dust cover. The motor starts when the tonearm is moved off its rest; it stops when the tonearm is returned to the rest. There are controls for speed select and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as an 0 to 4 gram stylus force (VTF) adjustment calibrated in 0.5 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal carrier for which a stylus overhang gauge is provided. The tonearm rest has a locking device. Medium capa-



Sony PS-T2 — \$140.00

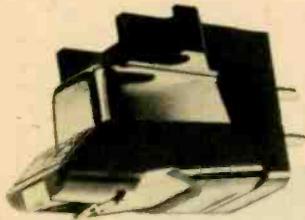
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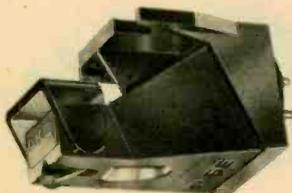
Visonik BD-2200 — \$119.00

Circle No. 100 On Reader Service Card

TEST REPORTS / PHONO PICKUPS



ADC XLM Mk III — \$54.95
Circle No. 106 On Reader Service Card



AKG P6E — \$50.00
Circle No. 79 On Reader Service Card

city output cables are provided.

Performance: Both speeds were essentially "on the mark" and held over an applied test range of 100 to 140 volts with total immunity to transient line voltage variations. Wow and flutter measured 0.06% with peaks to 0.22%.

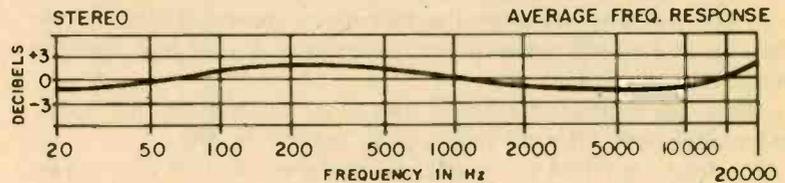
The tonearm's stylus force calibrations range from precise to within ¼ gram accuracy, and any value could be estimated within ¼ gram accuracy. ▲

PHONO PICKUPS

ADC XLM MK-III STEREO PHONO PICKUP

Excellent sound typical of its price range. At this level of performance you must look for your own nuances in sound quality. \$110.

Description: A magnetic pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.5 grams. Best results were attained in the 1.0 to 1.5 gram range using a typical high performance record player. There was no effective difference in sound quality between 1.0 and 1.5 grams.

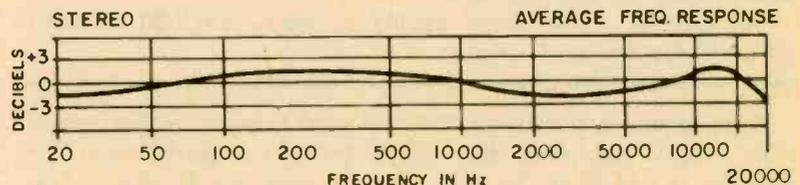


Performance: The frequency response measured within ± 2 dB from 20 to 20,000 Hz. Channel balance was within 1 dB to 14,000, rising to 2 dB to 20,000 Hz. The worst-case stereo separation measured 25 dB at 1000 Hz; 20 dB at 15,000 Hz. ▲

AKG P6E STEREO PHONO PICKUP

A good choice for budget-priced record players that require pickups rated for moderate tracking force. \$50.00.

Description: A magnetic pickup with a 0.4 x 0.8 elliptical stylus. The manufacturer's recommended VTF is 1.5 to 3 grams and best results were attained between 2.5 and 3 grams.

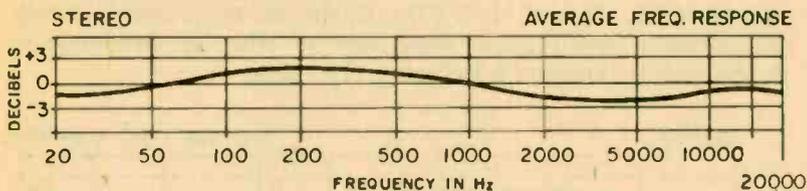


Performance: The frequency response measured within ± 2.0 dB from 20 to 20,000 Hz, but one channel has a 3 dB peak at 14,000 Hz. Overall channel balance was exact to 10,000 Hz, with a 2 dB high end difference centered on 14,000 Hz. The worst-case stereo separation measured 22 dB at 1000 Hz; 12 dB at 15,000 Hz. ▲

AUDIO TECHNICA COMPASS ATX3E STEREO PICKUP

A notably excellent sound for the price. Difficult to believe this one is blister packaged. Excellent choice for low to moderate priced multi-play record players. \$60.00.

Description: A magnetic pickup with a 0.4 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 1 to 2 grams and best results were attained with 2 grams.



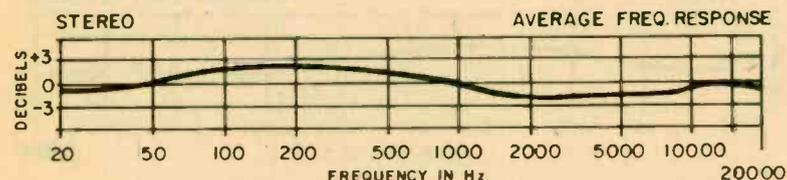
Performance: The frequency response measured within ± 1.5 dB from 20 to 20,000 Hz with an unusually smooth response for the price. Channel balance was essentially "on the mark," under 0.5 dB. The worst-case stereo separation measured 22 dB at 1000 Hz; 21 dB at 15,000 Hz. ▲

ORTOFON MC20 STEREO PHONO PICKUP WITH MCA-76 MOVING COIL AMPLIFIER

Magnificent sound. Truly spectacular definition. Sound quality is so clean we actually heard sounds from some records we didn't know were there. \$168.00 for the pickup, \$250.00 for the amplifier, \$355.00 for the combination.

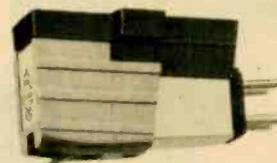
Description: The pickup has a shape described as fine line. The manufacturer's rated VTF is 1.5 to 2 grams and best results were attained at the suggested tracking force of 1.7 grams, though there is very little variation in listening quality over the entire range.

The associated preamplifier is intended for both stereo and CD-4 pickups and has a bandpass filter for use with CD-4 pickups to prevent extraneous noise from interfering with CD-4 demodulation. We could neither hear nor measure any difference in sound quality for stereo. A bypass switch connects the pickup directly to the associated amplifier's phono input when using a standard magnetic pickup.



Performance: The total system frequency response measured within ± 2.5 dB from 20 to 20,000 Hz with a channel balance of 1.5 dB. The worst-case separation measured 21 dB at 1000 Hz; 17 dB at 15,000 Hz.

Note: The stylus assembly is an integral part of the pickup and cannot be changed by the user. Replacement pickups are provided on an exchange basis. ▲



Audio Technica ATX3E — \$60.00



Ortofon MC20/MCA-76 — \$355.00
Circle No. 110 On Reader Service Card

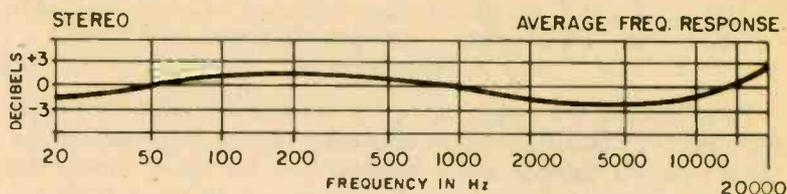


Sonus Blue Label — \$125.00
Circle No. 103 On Reader Service Card

SONUS BLUE LABEL STEREO PHONO PICKUP

Excellent sound typical of its price range. At this level of performance you must look for your own nuances in sound quality. \$125.00.

Description: A magnetic pickup with a special stylus shape for stereo records. The manufacturer's recommended VTF is 0.75 to 1.25 grams. Best results were attained at 1.25 grams, with slightly less ultra-deep bass at lower VTFs. Otherwise, when used in a high performance record player there was no effective difference in sound quality throughout the rated VTF range.

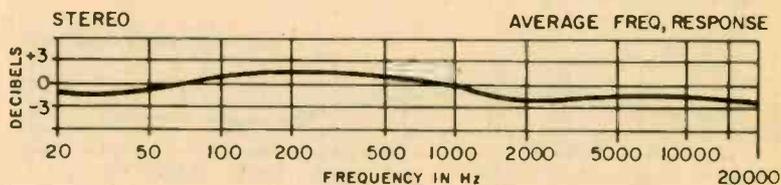


Performance: The frequency response measured within ± 2 dB from 20 to 20,000 Hz, with the right channel rising 2 dB at 20,000 Hz. Channel balance was within 1 dB from 20 to 17,000 Hz, rising to 2.5 dB at 20,000 Hz. The worst-case stereo separation measured 17 dB at 1000 Hz, 21 dB at 15,000 Hz.

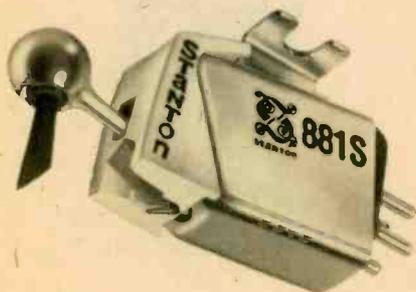
STANTON 881S STEREO PHONO PICKUP

Excellent sound quality. At this level of performance you must look for your own nuances in sound quality. \$150.00 includes integral tracking dust brush.

Description: A magnetic pickup with a Stereohedron stylus. The manufacturer's recommended VTF is 0.75 to 1.25 grams and best results are attained anywhere within this range when using a typical high performance record player. The pickup has an integral dustbrush that tracks ahead of the stylus. The brush applies a 1-gram negative tracking force that must be compensated: to obtain a 1-gram VTF the VTF gauge must indicate 2 grams.



Description: The frequency response measured within ± 2 dB from 20 to 17,000 Hz, within 3.5 dB from 17,000 to 20,000 Hz. One channel has a slight bump around 12,000 Hz which had no noticeable effect on the reproduction when listening to music. Overall, the sound quality far outclasses the measurements. Channel balance was within 2.5 dB. The worst-case stereo separation was 27 dB at 1000 Hz; 21 dB at 15,000 Hz. ▲



Stanton 881S — \$150.00
Circle No. 104 On Reader Service Card

LAST-MINUTE REPORTS

B.I.C. 920 RECORD PLAYER CONVENIENCE PAK

Considering the package price that can often be attained, it's an attractive, better quality choice for budget systems. \$84.95 includes base, factory installed pickup, and dust cover.

Description: A two-speed (33, 45 rpm) automatic turntable or record changer for 12-inch records mode of operation depends on which one of two supplied spindles is used. The unit always cycles to off after the "last" record is played. In the automatic mode the tonearm indexing of record size is determined by the speed control—12-inch for 33 rpm, 7-inch for 45 rpm. A program selector allows a single record to be repeated up to six times, or the last record in a stack can be repeated until the total number of programmed plays is completed; the final programmed play is considered a "last" record.

The tonearm has a slide-adjust counterweight and an 0 to 4 gram VTF adjustment calibrated in 0.5 gram increments. There is a calibrated anti-skate and a locking tonearm rest. The pickup shell cannot be removed but can be rotated to facilitate pickup changes or repair (stylus assembly). The pickup's mounting position is predetermined, no stylus overhang adjustment can be made, nor is a gauge provided. The turntable is supplied with low-capacity cables for CD-4/stereo.

The *convenience pak* consists of separate components—the record player, integral base, lift-off dust cover, and factory installed Shure M75ECS pickup—packaged as a single component in one shipping container.

Performance—Record Player: Speeds remained constant over an applied test voltage range of 100 to 140 volts, with a barely noticeable variation caused by transient line voltage variations. With a single record on the platter the 33 rpm speed was 0.6% fast; the 45 rpm speed was 0.7% fast. Wow and flutter measured 0.1% with peaks to 0.25%.

The stylus force adjustment was accurate within 0.25 gram.

The record changer was jamproof even when using records with worn spindle holes. Overall, the handling is good.

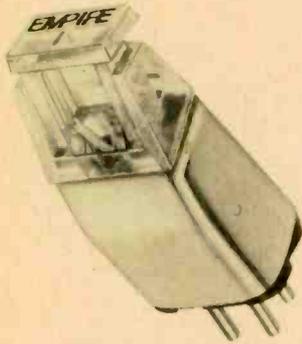
Performance—Pickup: The pickup is rated for a VTF of 1.5 to 3 grams. The record player requires a minimum of 1¼ grams VTF, and best results were attained with 2.5 to 3 grams. The frequency response measured ± 2 dB from 20 to 13,000 Hz, rising to a peak of 7 dB at 18,000 Hz. The peak is due primarily to the low capacity cables provided, and can be easily "tamed" by substituting standard 1-meter shielded cables (at least 240 pF per 1-meter length). The more capacity in the cable the better. Do not add external bulk capacity.

Worst-case separation measured 21 dB at 1000 Hz; 15 dB at 15,000 Hz.

Note: This package is often available at a "special reduced price," and as such it's a good way to get decent quality for low-cost systems at a rock-bottom price. ▲



B.I.C. 920 — \$84.95
Circle No. 64 On Reader Service Card

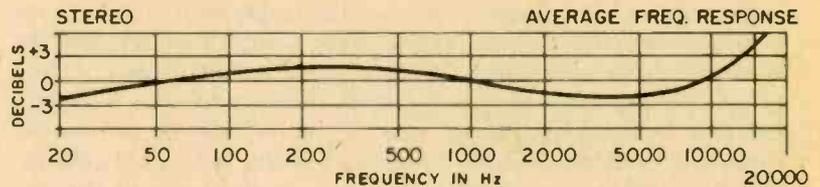


Empire 2000 E/III — \$70.00
Circle No. 105 On Reader Service Card

EMPIRE 2000 E/III STEREO PICKUP

Sound quality was typical for its price range. \$70.00.

Description: A magnetic stereo pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.5 grams and best results were attained at 1.5 grams (we don't recommend less than 1.5 grams).



Performance: The frequency response measured ± 2 dB from 20 to 14,000 Hz, rising to +7 dB at 20,000 Hz. The overall sound quality is somewhat edgy in the upper highs because of the rising response. The rise can be reduced by adding capacity through shielded patch cord extensions for the record player's output. The worst-case stereo separation measured 24 dB at 1000 Hz; 23 dB at 15,000 Hz. Channel balance was within 2 dB. ▲

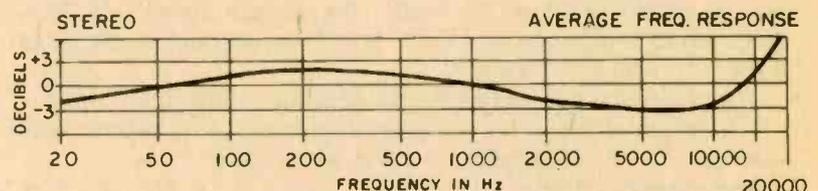
SHURE M91ED STEREO PICKUP

Performance is typical of its price range. A somewhat rugged pickup often used in lower cost multi-record players. \$64.95.

Description: A magnetic stereo pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.5 grams and best results were attained at 1.5 grams.



Shure M91ED — \$64.95
Circle No. 121 On Reader Service Card



Performance: The frequency response measured $+2/-3.5$ dB from 20 to 18,000 Hz. There is a 3.5 dB dip at 10,000 Hz that rises 7 dB to 20,000 Hz. Overall sound is somewhat edgy because of the rise, which can be reduced somewhat by adding capacity through shielded patch cord extensions for the record player's output. Channel balance measured precisely "on the mark." The worst-case stereo separation measured 24 dB at 1000 Hz; 25 dB at 15,000 Hz (but 17 dB at 7000 Hz). ▲

LITERATURE LIBRARY

201. There are over 400 kits described in the new *Heathkit* catalog for virtually every do-it-yourself interest—amateur radio, hi-fi components, color TV, test instruments, digital clocks and weather instruments, radio control equipment, marine, aircraft and auto accessories, and many more.
202. *Electro-Voice* will send complete information on Thiele-Small parameter speakers and systems which combine flat, wide response, high efficiency, and small size (to half size of sealed systems) including Interface and Sentry systems. There's also information on new separate component speakers.
203. *Crown* offers a new four-color brochure illustrating and describing the company's complete line of hi-fi amplifiers, preamplifiers, speaker systems, control centers and tape recorders.
204. *Sony's* "High Fidelity Components" has a glossary defining major specification, control and convenience feature terminology, which complements the reference chart of specifications for components.
205. The new 20-page, full-color stereo-phone catalog from *Koss* features lively photography and art to show 15 of the company's dynamic and electrostatic stereophones and listening accessories. There is a specification comparison chart and prices.
206. *Kenwood's* wide range of receivers, amplifiers, tuners, tape decks, stereo compacts, and speakers is described in a new brochure.
207. The full range of *Magnavox* audio products from the tuner/amplifiers to combination stereo FM/AM radio phonographs and 8-track tape player/recorders are featured in this new 60-page four-color audio catalog.
209. *JBL's* brochure describes the Decade "family" of loudspeakers: the L26, the L16 and the L36. Each system features styling, hand-craftsmanship, and sound quality, yet is priced for the budget-minded. Their enclosures are finished in natural oak.
210. *Klipsch* loudspeaker systems are attractively presented, including explanation of the Klipschorn corner horn and corner mirror effect. Available for a few dollars are reprints covering design, stereo re-creation, etc.
211. "Hearing Is Believing," a booklet from *ESS, Inc.*, has a serious theme and a constructive purpose. Fundamentals of loud-speaking technology are examined. How to develop a superior loudspeaker is spelled out.
213. *Pickering* has attractive specification sheets on stereo headphones. Also offered is a colorful brochure on cartridges in the UV-15, XV-15 series, as well as the V-15 Micro IV series.
216. For tips from leading sound engineers, send for "The Music-Maker's Manual of Microphone Mastery" from *Shure*. It describes how to match voices and instruments.
220. This full-color booklet by *Dynaco* is subtitled "High Fidelity Components for the Audio Perfectionist." There are two intro-

ductory articles to help you choose your component stereo system. Following is detailed information on the components.

221. A new series of product literature is now available from *Jensen Sound Laboratories*. The new catalogs feature four-color photographs and graphic illustrations of the high fidelity line.
222. *TDK* has a new booklet, "SA... a new state of the cassette art," in which they claim great things: much lower noise levels, greatest dynamic range, unexcelled frequency response, high precision, among others. So send for the booklet to see if you agree.
223. *Technics-Panasonic* has a complete condensed catalog of its line of stereo and 4-channel receivers, separate amplifiers, turntables, tape decks, speakers, separate tuners, microphones, headphones, integrated amplifiers, and CD-4 4-channel demodulators.
224. Before you purchase your hi-fi equipment, read "The Garrard Guide," what every hi-fi shopper should know about Garrard automatic turntables. There are 11 pages of information and pictures.
225. As part of a broad educational campaign, *Sansui* is making available a booklet, "A Non-Technical Guide to QS 4-Channel Sound," for the consumer. It describes the various forms of 4-channel, their advantages, disadvantages and availability of material.
227. *Tandberg* has an attractive color booklet displaying its tape decks, cassette deck, receivers, speakers and accessories.

228. *Pioneer* value-packed receivers are gracing more and more living rooms as audiophiles turn on, and tune into, the quality sounds of *Pioneer*. Circle, the number 228 and let *Pioneer* do the rest.

230. Make your own evaluation of why *Acoustic Research* (AR) components, designed basically for home use, are often selected for critical professional and scientific applications.

231. *JVC* offers three catalogs—"Tape-it-Live" is in English, French and German and features portable stereo cassette deck and accessories. "Listening for the Future" is all about the *JVC* FM/AM-stereo receiver series. The "JVC High Fidelity Catalogue" is a 36-page full-color delight.

232. *Sherwood Electronics Laboratories* has literature available on its full line of receivers, amplifiers, and tuners. Included are specifications and independent reviews.

233. In "Meet the Creator," *TEAC* invites you to explore the realm of musical creativity with the *TEAC* 3340 4-Channel Simul-Sync Tape Deck. The booklet introduces some of the basic effects that can be produced, using ample diagrams.

237. The 32-page *Pioneer* booklet, "How I Install Car Stereo," by a 26-year-old expert who has installed nearly 5000 car stereo systems, shows in detail how to mount, wire, troubleshoot and maintain hi-fi in your automobile.

238. *Fuji* has just made available a new booklet on their tapes—"Cassette Tape and How to Make It Work for You." It is written on a non-technical level and contains practical information on the selection and use of cassette recorders/players.

239. *3A's* 24-page color catalog gives detailed information on many subjects, among them the principles of acoustic pressure feedback and infinite acoustic loading.

240. A new 6-page color brochure has just been released by *B&K-Precision*. It describes their complete line of discrete semiconductor test instruments for laboratory, industry, maintenance, and service.

241. *Allison* loudspeaker systems claim to be unique in producing in real-room environments. This booklet on their models One through Four explains in quite some detail how they work. Each system is pictured alongside its specifications.

242. A new four-color brochure from *VOR* describes in detail the inner workings of the patented automatic "dry" vacuum record cleaner—the *Vac-O-Rec*. It cleans by lifting dust and dirt with mohair brushes, and a fan blows them away.

243. A new 12-page catalog from *Quam-Nichols* lists 127 loudspeakers, covering virtually any application and providing a tool for selection. It includes listings for new mobile 2-way radio replacement speakers—CB and land mobile business.

244. *Beyer Dynamic's* full-color brochure presents their large assortment of dynamic microphones and headphones. They claim to have the right headphone for every job—monaural, binaural, 2- or 4-channel listening, hi-fi equipment, receivers, televisions and dictating machines.

245. *Celestion* speaker systems are created in England, but are now being made available throughout the world. Send for this brochure to see why they claim such excellence in the speakers they conceive, design and produce.

246. *B&F Enterprises' Truckload Sale* catalog features 10% off their already low prices. All merchandise is high-grade military or industrial surplus: speaker kits, TV games, computer terminals, tools, TV components, lenses, transformers, semiconductors, and more.

247. *Ace Audio Co.* offers a short form catalog of kits and wired units. Pictured are preamps, equalizers, and amplifiers. Descriptions and specifications aid you in making your choices.

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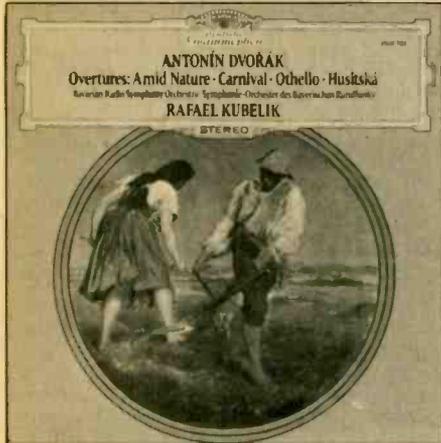
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Prague and is based on two ancient songs: the powerful hymn of the followers of the Bohemian religious reformer Jan Hus, and the Hussite campaign song *St. Wenceslas*. The two themes are developed together in ex-



Charm, lyricism and dramatic power citing fashion and, for me, this is the most intriguing of Dvořák's overtures. Kubelik and the Bavarian Radio Orchestra play all four superbly, and the reproduction is typical of Deutsche Grammophon's high standards of quality. ▲

corded in England between 1964 and 1967 during the first wave of the British invasion. Unfortunately, this group, fronted by Van Morrison, got lost in the transatlantic shuffle. After hearing Morrison wail the blues and belt the rockers on this set, I'm convinced he made a wrong turn when he went mellow. "Time's Gettin' Tougher Than Tough" is a traditional blues by Jimmy Witherspoon, with guitar and sax trading solos over easy drumming and Van's shout vocals. The mix on "Stormy Monday" is a bit primitive with over-emphasized bass but Morrison's stylish vocal makes the song a worthwhile inclusion. "Bright Lights, Big City" is a rocker with some piercing organ and guitar solo riffs, while "My Little Baby," the most outright commercial cut in the package, will recall Mickey & Sylvia's "Love Is Strange" with its "oh yeah . . . uh huh" vocal background. This album is part of London's Collector Series, which also includes the early work of David Bowie, Ten Years After, Genesis, Savoy Brown, John Mayall and Thin Lizzy.

Mama's Pride: "Uptown & Lowdown". Atco SD 36-146.

If you still pull those early Allman

Brothers albums out of the archives for a good go round every so often, this second offering from St. Louis-based Mama's Pride is just the ticket. It's the same blend of rock and roll, blues and down home funk that won the Allmans worldwide acclaim. It's not a carbon copy, but let's not quibble. For example, the opening cut, "Can I Call You A Cab," is not like the early Allman Brothers. You'd swear it was middle Ray Charles at first with its bluesy vocal wailing with lush background strings. But then it launches into that good ol' rock and roll with some real fine group "oooooh, aaah" background to Danny Liston's gritty lead vocal. If you've got particularly bright speakers in a live room, you'll have to tone down the treble on the hot cymbals. Either that or put up some heavy draperies. "Stranger To Me Now" is a moody piece with a good blues vocal. It tails out with some fine guitar licks and machine gun drumming. "End of the Road", the old Marvin Gaye number, features excellent bass work by Dickie Steltenpohl, and an interesting intro with a dramatic tempo change highlights "Merry-Go-Round." All in all, "Uptown & Lowdown" is an album which shows that Mama's Pride has come of age.

Philip Glass: "North Star". Virgin PZ-34669. \$6.98.

It's been called space rock, sci-fi rock or simply electronic music. But what it's been called by most casual pop music listeners is weird. And Philip Glass is its premier practitioner. Greatly influenced by the music he heard during visits to India, the Himalayas and Northern Africa, Glass began to blend the rhythmic, reptitious musical sounds of these areas with some ideas developed from his own background in Western European and American classical music. In 1968, he began touring Europe with his own ensemble of two keyboards, three wind instruments and a singer. In addition to being received enthusiastically by the sophisticated European audiences, Glass numbered among his admirers a coterie of avant garde rock musicians, including Peter Dinklage, Brian Eno and David Bowie, much of whose work reflected the basic components of Glass' otherworldly sounds. Groups such as Kraftwerk and Tangerine Dream build their entire repertoires from sound patterns that Glass pioneered. Until now, Glass' recorded works were difficult to find in this country. "North Star" is his first American album. It is all free form music. Each cut is a basic theme, around which no complete song (as the

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word is generally understood) is built. Various tempos are repeated endlessly either by trilling female voices in close harmony or by organs and buzzing synthesizers. In some cases a flute and tenor and soprano saxophone repeat basic riffs with slowly developing subtle variations best detected through stereo headphones. This music is not for everyone, but if you're a fan of The Who, David Bowie, Tangerine Dream, etc., this is the fountain from which they drank.

Starz: "Violation." Capital SW-11617.

It's always seemed a bit incongruous to me to hear songs about crime, injustice and the general decline of civilization sung in the context of an easy

going folk song—the way it was done in the Sixties. Somehow it seems more fitting for such subjects to be dealt with within the harsh cacophony of heavy metal hard rock—the Seventies style. Starz is a true product of the Seventies. This their second album in as many years includes much that can only be called standard hard rock with all the familiar riffs and inconsequential lyrics you'd expect, but there's more. It began with the song, "Pull the Plug" on their first album. The theme was the question of the propriety of using artificial means of sustaining life and focused specifically on a much discussed case in the New York City area. Call it grim, bizarre or simply tabloid rock, Starz continues in this set with

two songs in particular. "Violation" portrays a world of 1984 with outside restraints on "rock and roll," "losing control," "loving someone" and "having fun." So far it sounds like the timeless teenage lament, but things get a bit heavier with the introduction of "Clockwork Orange"—type electro-shock control techniques. In a more contemporary vein, "Subway Terror" shares with the nation the feelings borne by most New York commuters. But the point of view is from the bloodthirsty mugger prowling through the train looking for his next victim. If you like the usual ingredients of hard rock, such as intentionally distorted guitar, a heavy bass and drum bottom you'll find Starz to be experts in the genre. ▲

OPERA: BIRGIT NILSSON

(Continued from page 34)

place where one imagines that Miss Nilsson should be satisfied, she is still apt to change.

During the Bing years (for her, 1958-72), she frequently sang in Italian operas other than her familiar Turandot—Aida, Amelia in *Un Ballo in Maschera*, Tosca, Lady Macbeth—and these roles except for Aida did not suit her voice ideally. Though she was invariably musical and more than capable of singing them, she needed more natural warmth and legato.

Her last season at the Met was in 1974-75. In 1975 the Internal Revenue Service decided that Miss Nilsson owed \$500,000 in back taxes and fines and she left the United States for good. During that last season she took on Sieglinde in *Die Walkure*, a role she had always wanted to sing, and to it she brought a radiance and femininity surprising to most listeners.

In that same season (1974-75), Miss Nilsson sang each of the three Brünnhildes as well, and though the *Götterdämmerung* Brünnhilde was the most imposing and moving performance of the role I can remember, the *Siegfried* showed some vocal strain. It was consequently thought that because she was nearing 57 her voice was going. How wonderful to report that on her return to Europe she corrected whatever problem she had been having and took on yet another exacting role, the Dyer's Wife in Strauss' *Die Frau ohne Schatten!* She has sung this all over Central Europe in the last two years with great success. As recently as fall of 1977, her performances of the role at the Vienna Staatsoper were free, clear, well-produced and solidly on pitch. And she turns 60 next May.

Nilsson's whole repertory can be found on records, with the *Ring* and *Tristan* represented twice. Unfortunately

ly, her voice has rarely had the impact on disc that it does in performance. As a matter of technical analysis, Miss Nilsson's voice is not a big round instrument like Helen Traubel's or Eileen Farrell's. It is an instrument that penetrates any orchestra with ease maintaining its color and beauty. Her voice often suggests youth and brilliance, though anger, hate, or soft sweetness are also within its compass. But on records except for some notable exceptions, the power and thrust, the sheer force, does not come through. A classic example is the *Elektra* recording on London Records. Many have said that they enjoy this recording, and there is no question that it catches Miss Nilsson at the peak of her career and is sung well. But the orchestra is too overwhelming. Having heard Miss Nilsson sing twenty or twenty-five *Elektras*, I know she never is so swallowed by any orchestra. The effect, sought by the producer, was to blend voice and orchestra subtly. It is done effectively, but in so doing the sheer visceral effect of what Miss Nilsson did at the Metropolitan

The two sets which capture her exactly as I experienced her voice are the *Tristan und Isolde* conducted by Karl Böhm on Deutsche Grammophon, and the whole *Ring* on Philips, again conducted by Böhm. The presence, brilliance and power of her soprano are faithfully transmitted. All are live performances from Bayreuth, which no doubt helps make them seem more real, but something also must be said for the work of the engineers. They cleverly reproduced the overtones so that the sense of Miss Nilsson encountered in life is retained.

Not far behind are the London *Götterdämmerung* and *Siegfried*. Here producer John Culshaw was out to strike

a good orchestra-voice balance and it is not quite accurate to performance, but her sound is wonderful, even younger than on Philips. Particularly the *Götterdämmerung* gives one an idea of the wealth of emotion which she could pour into a role. And the high C's of the *Siegfried* Brünnhilde show that Miss Nilsson is the rare specimen of Wagner soprano who had to work for the low notes all her career, not the high notes.

As one looks through her considerable recorded oeuvre—35 listings in the 1976 Schwann Artists Catalogue—certain other performances stand out. Her Aida, with Corelli on Angel, has all of her power and intelligence in phrasing, and it is particularly appealing in the Tomb Scene. The only problem with the Aida generally is Miss Nilsson's earlier-mentioned lack of tonal warmth and legato, qualities that generally characterize the Italian soprano. There is, nevertheless, much excitement and superior musicianship. The London Salome, a role which Miss Nilsson did with great success for two seasons at the Metropolitan (1965-67), has the same problems as does *Elektra*. It is well recorded and made at a period when her voice was in perfect estate, but the balance between her and the orchestra is not realistic. She was never so overwhelmed by what came from the pit. And both *Turandots* (London and Angel) are magnificent.

Some of the recital records, particularly "Birgit Nilsson Sings German Opera," catch the excitement of her performances, but in general the aria cuts did not suit her well. She needed the whole role to make her effect, and she did not have the knack of creating a whole role in a short touch of a character.

In general, hers is a powerful legacy.

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She has been one of the imposing opera performers of the 20th century, making the Wagner repertory her own and in fact identifying herself with Brünnhilde and Isolde in a manner that no one soprano has ever done. In earlier days there was always one or more continental dramatic sopranos and usually another favored in America. In the age of Nilsson, she owned the roles

everywhere from Moscow to Tokyo, and in every way she lived up to them. All one had to do was attend not just the first night, but the fourth night of any Nilsson performance and one would hear what an artist she was. She was giving all that she had to make the character come alive and she remains a rare soprano, a phenomenon of our time. ▲

JAZZ: RAHSAAN ROLAND KIRK

(Continued from page 20)

played a variety of flutes—often singing and playing phrases in tandem—and dozens of percussion instruments.

Later dreams gave him the name Rahsaan, and the conception behind at least two unusual recording projects: *The Inflated Tear* and *The Case of the 3-Sided Dream in Audio Color*. He once said his dreams "led me to see music even more clearly as a way of setting off vibrations within a person so that he can more deeply feel and recognize his identity and his potential." He came to call his bands the Vibration Society.

The image of Kirk blowing sweet dissonance on three saxophones with Herculean force, his body, often clad in a yellow parachute jumpsuit, swaying precariously back and forth, instruments hanging from his neck, shoulders, ear, and body straps, can never be forgotten by those who saw him in action before the stroke. But Kirk would have been a major jazz innovator if he played only tenor or flute. His virtuosity had spread across the country by word of mouth before he left Ohio. Harry Carney, who introduced the technique of circular breathing into jazz, was amazed by the uses to which Kirk put that ability to sustain a breath for several minutes. His speed was stupefying. Still, he was not trapped by his virtuosity—he used it musically, ingeniously, humorously and occasionally, for the best sort of showmanship. After the stroke, he limited himself to tenor, which was like asking Stokowski to be satisfied conducting a string quartet, but he always gave extra measure. He could be crabby or outspokenly political, but he never failed to play. His machinations on behalf of jazz power were best represented in the late sixties when he founded the Jazz and People's Movement and, with noted peers, demanded attention on several television shows.

Kirk was one of the greatest of all bluesmen. Some of his early recordings—"Slow Groove," "You Did It, You Did It"—place him firmly in the tradition of the jump band shouter. He also wrote lively novelty themes, like "Serenade to a Cuckoo," and pretty pop

pieces, like "Theme for the Eulipions." A constant motif in his compositions was reference to the pantheon of jazz musicians he most admired. He wrote several memorable tributes which reflect an artist in style as well as name—among them "From Bechet, Byas & Fats," "Lady's Blues," "A Quote from Clifford Brown," "Mingus-Griff Song," "Three for Dizzy," and "Carney and Bigard Place." I've often wondered if he actually heard Lester Young play the whole-tone riff in his "No Tonic Prez," or if he simply heard its implications in Young's ethereal lyricism. He also wrote lyrics for Mingus's "Good-bye Pork Pie Hat," and commissioned words for Coltrane's "Giant Steps." His singing increased considerably during recent years.

His first record, made in 1956, was recently reissued as *Early Roots* (Bethlehem), and shows him already dividing his energies between blues and favorite standards. Two outstanding albums for Mercury were *We Free Kings* and *Rip, Rig and Panic*; they are out of print, but there is a representative anthology of the Mercury years called *Kirk's Work*. His early Atlantic recordings are also out of print, but *The Art of Rahsaan Roland Kirk* is a fascinating compendium. Two later albums for Atlantic well worth hearing are *Bright Moments*, and the surrealistic encounter with Al Hibbler on *A Meeting of the Times*. For four months during 1961, he was a member of Charles Mingus's Jazz Workshop, and recorded with Mingus on *Oh Yeah!* (Atlantic); he was reunited with Mingus in 1974 on *Mingus at Carnegie Hall* (Atlantic). But a more satisfying reunion was the sequel to *Rip, Rig*, called *The Jaki Byard Experience* (Prestige)—his playing on "Memories of You" and "Evidence" is staggering in its sure-footedness and staggering invention. Of recent albums, *3-Sided Dream* (Atlantic) and *Kirkarton* (Warner) are excellent. The last has a performance of "Serenade to a Cuckoo" that illustrates his increased mastery on flute since the 1965 version, as well as standards, jazz classics, and originals. American music has lost another great one long before his time. ▲

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hi-fi/stereo BUYERS' GUIDE MAY/JUNE 1978

ON YOUR NEWSSTAND:
April 27, 1978

INSIDE PHONO PICKUPS

(Continued from page 48)

"breakthroughs" in technology, modestly stating that its Sonus products are "The result of many years of refinement of techniques and materials."

The Shure line of 18 cartridges ranges from \$29.50 to \$90, with the top-priced unit—Model V-15 Type Three—the firm's best seller. Shure also has a six-model Standard Stereo Dynamic Series, priced from \$22.95 to \$39.95, intended for economy systems. Included in the regular series is the M24H, priced at \$84.95, meant to play all quad formats as well as stereo. It features a "long contact hyperbolic" stylus tip.

In a move designed to take advantage of its expertise in transducer technology, AKG, a big name in microphones, headphones and reverberation systems (with over 600 patents!) recently entered the pickup field with five models, priced from \$40 to \$135. Its top seller is the Model P8E at \$100, with a tracking force range of 3/4 to 1 1/4 grams. AKG uses a proprietary (and newly patented) approach called "Transversal Suspension" for resonance-free suspension, proper damping of the stylus assembly, and suppression of torsional and axial movement—among other benefits.

Moving-Coil Pickups. Most true hi-fi cartridges are magnetic types—as opposed to ceramic types used in low-fi or low-end mid-fi products. But there is another group of phono pickups which is gaining prominence among professionals and audio aficionados—the moving-coil type. Great American Sound Co., in a brochure promoting its calibrated "Sleeping Beauty" series describes the following among some advantages inherent in moving-coil technology: The low moving-coil mass extends the vinyl resonance to beyond the audio range; the extremely low-DC coil resistance dampens the resonance rise in the response and its associated undershoot (near 10 kHz); the low coil impedance makes the cartridge insensitive to electrical loading (long phono cables, etc.); because of the moving-coil cartridge's static magnetic field, FM tracing distortion cannot generate intermodulation distortion (which is heard as smearing).

The moving-coil cartridge's main disadvantage is low-output signal. This requires the use of either a pre-preamp (sometimes called a head amp) or a step-up transformer. Such a device can be an add-on, or be built into a preamplifier (which is the route GASC takes).

Another disadvantage is that virtually all require stylus replacements by the factory, which means tying up the

unit for perhaps two weeks. If you have a standby cartridge, fine; if not, there goes your listening for two weeks or so.

Are moving-coil cartridges worth their high cost? (GASC's cost \$160 with spherical stylus, \$180 with elliptical stylus, and \$200 with super elliptical stylus. Other firms charge from \$110 to \$325.) That's like asking if a Continental or Rolls-Royce is worth the price. It depends on your aural taste. As with other types of hi-fi equipment, there are such considerations as mystique, status appeal, snob appeal to be weighed—along with, of course, first-rate sound. Again, we go back to the premise that choosing cartridges is like choosing loudspeakers—it's a matter of *what sounds good to your ears*. To some ears, a top-notch magnetic cartridge can sound as good as a top-notch moving-coil type. To another pair of ears, auditioning the same pickups, the reverse might be true.

Following are key examples of the moving-coil cartridges available: Denon's DL-103 at \$135, DL-103s at \$180, and the DL-103d about to be introduced, price not available but certain to be above \$180; EMT (Gotham) XSD-15 at \$350; Entré (American Audiopoint)'s Entré-1 at \$200; Fidelity Research's FR-1MK2 at \$130, and FR-1MK3 at \$210; Nakamichi MC-500 at \$110, MC-1000 at \$250; Ortofon MC20 at \$140, SL20E at \$120 and SL 200 at \$165; Satin's Model M-117G at \$155, M-18E at \$110, M-18X at \$240, and M-18BX at \$325; and Supex (Sumika)'s SD-901 at \$155, and SD-900 at \$180.

Note: One of the lowest priced moving-coil units in the above group, the Nakamichi C-500, with a higher than usual output, can be used with most preamplifiers *without* an intermediate step-up transformer or head amp. Its stylus (and that of the MC-1000) is not replaceable. However, the firm has a trade-in policy toward new cartridges. The Supex SD-901 is also a high output type, needing no pre-preamplification. All four Satin models are high output types, requiring no head amp. Further, they allow user replacement of styli—unlike all the other moving-coil types.

A final, special note: Most of us have what could best be described as "good listening" moods, when our hearing and emotions and physical condition are "in tune" to a greater degree than at other times. If you can chart your good listening moods, try to do your cartridge evaluations during those times. You'll end up as a totally satisfied customer. Happy choosing! ▲

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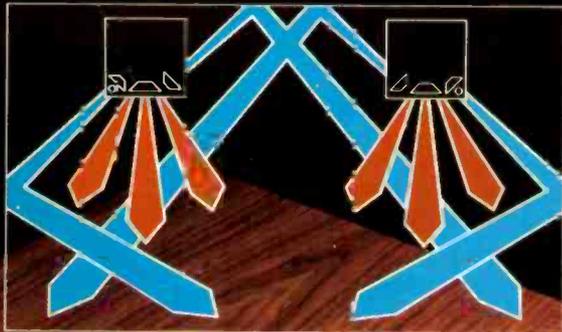
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