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SPEAKERS**

**Happy 15th Anniversary Issue*

02367

hi-fi/stereo

BUYERS' GUIDE

JULY-AUGUST 1979 \$1.35

SPEAKER MYTHS

THEIR INFLUENCE ON YOUR SPEAKER CHOICES

ONE STOP SHOPPING

FOR COMPONENT SYSTEMS: BUYING TIPS

METAL TAPE

HAS ITS TIME COME?

CAR STEREO INSTALLATION

HOW TO UPGRADE WHAT YOU HAVE

DO IT YOURSELF

ON

PTH GHTS

SCT-30 DECK

67D EL DECK

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07



The first high-technology record cleaner was the Discwasher System. Four scientific revisions later, the Discwasher is literally years ahead of all other devices.

WITH PRIORITY TECHNOLOGY:

Discwasher D3 Fluid is proven by lab tests to be the safest active cleaning fluid for record care. But a good fluid is not enough. The Discwasher System is also a *precision removal system* that uses capillary action with slanted micro-fibers to lift dust, dirt, and dissolved debris off the record, rather than pushing them around like "dry" and "constant humidity" methods. The real dimensions of record care are safety plus integrated function.

WITH PROVEN VALUE:

The uniquely styled Discwasher handle is constructed of hand-rubbed walnut which will long outlast "plastic wonders". This easily held handle is lightweight because of an integral cavity which conveniently holds the D3 Fluid bottle. A special brush to clean the directional-fiber Discwasher pad is included without charge, and also fits inside the handle cavity.

WITH GENUINE SATISFACTION:

Only Discwasher gives immediate performance, long-term record safety, pleasing physical characteristics and a price that hasn't changed in five years.

Seek out the Discwasher System, by name. Only Discwasher delivers technology, value and satisfaction.

YOUR RECORDS DESERVE SUPERIOR CARE: SEEK OUT THE DISCWASHER® SYSTEM



 **discwasher, inc.**
Columbia, MO 65201

We'll match the tonearm on our lowest-priced turntable against the tonearm on their highest-priced turntable.



We'd like to be very clear about what we have in mind. By "their" we mean everyone else's. And, our lowest-priced turntable is the new CS1237.

The CS1237's tonearm is mounted in a four-point gyroscopic gimbal—widely acknowledged as the finest suspension system available. The tonearm is centered, balanced and pivoted exactly where the vertical and horizontal axes intersect.

From pivot to tonearm head, the shape is a straight line, the shortest distance between those two important points. (Curved tonearms may look sexier, but at the cost of extra mass, less rigidity and lateral imbalance—none of which is consistent with good engineering practice.)

Tracking force is applied by a flat-wound spring coiled around the vertical pivot, and this force is maintained equally on each groove wall whether or not the turntable is level. The tonearm's perfect balance is maintained throughout play.

By contrast, tonearms which apply tracking force by shifting the counterweight forward are actually unbalanced during play and prone to mistracking. For example, on warped records the stylus tends to dig in on the uphill side of the warp and to lose contact on the way down.

Vertical-bearing friction in the CS1237 tonearm is astonishingly low—less than 8 milligrams. It can track as low as 0.25 gram—which means it will allow *any* cartridge to operate at its own optimum tracking force.

There's still more. The counterweight is carefully damped to attenuate tonearm resonances. Anti-skating is separately calibrated for all stylus types. Cueing is damped in both directions to prevent bounce. And because the CS1237 can play up to six records in sequence, the stylus angle can be set for optimum vertical tracking in either single-play or multiple-play.

To find any other tonearm that seriously matches the CS1237's, you have two choices.

You can consider one of the more exotic separates. But you'll find they cost as much as the entire CS1237. (Price: less than \$180, complete with base and cover.)

Or you might compare it with one of the higher-priced Dual turntables. You'll find a few additional refinements, but no difference in design integrity or manufacturing quality. Which is why no other turntable quite matches a Dual. Any Dual.



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CONTENTS: JULY/AUGUST 79

Vol. 14 No. 4

22/JAZZ

by J.R. Taylor

Taylor evaluates the early years of Sonny Rollins' career.

29/SOUND PROBE

by Hans Fantel and Chris Greenleaf

Our speaker critics report on the performance of the Ohm I speaker.

30/OPERA

by Spelght Jenkins

Marilyn Horne's opera career is examined by Jenkins.

31/POP DISCS

by Ken Irsay

Irsay has ears for George Harrison, Bonnie Tyler, Judy Collins, Creedence Clearwater Revival and Tanya Tucker, among others.



34/RECENT STEREO RECORDINGS

by Thomas D. Kelly

Kelley's critical comments are focused on recent releases of works by Brahms, Elgar, Falla, Glazounov, Grieg, Liszt, just to name a few.

39/SPEAKER MYTHS

by William S. Gordon

Myths like "bigger is always better" are dissected for you, so you can apply the useful aspects of these myths to your speaker buying.

43/CAR STEREO INSTALLATION

by Herb Friedman

Upgrading the car stereo system you own now can be an easy afternoon's project, if you have help in avoiding the pitfalls. Read then go ahead and do-it-yourself!



46/SPOTLIGHT ON: AKAI GX-267D REEL-TO-REEL TAPE DECK

The GX-267D not only delivers outstanding sound quality with as few gimmicks as possible, but it also is the easiest machine to operate that we have seen in years.

47/METAL TAPE

by William S. Gordon

Has its time come? A discussion of what metal tape is and what it potentially has to offer you.

50/ONE STOP SHOPPING

by Fred Petras

Component selection at its simplest can be achieved by selecting units all from the same manufacturer's line. Petras itemizes the brand names that offer you that option and gives buying tips, too.



54/SPOTLIGHT ON: REALISTIC SCT-30 CASSETTE DECK

The SCT-30 is a heavyweight where it really counts—almost every cent goes into sound quality rather than unnecessary frills.



55/TEST REPORTS

RECEIVERS
TUNERS
INTEGRATED AMPS
PREAMPLIFIERS
CASSETTE DECKS
REEL-TO-REEL
RECORD PLAYERS
PHONO PICKUPS

DEPARTMENTS

6/AUDIO SHOWCASE
57/READER SERVICE CARD
71/LITERATURE LIBRARY
73/CLASSIFIED ADS

Cover photo: Dave Niedo
Kennedy/Niedo Studio

For details on the three speakers pictured on the cover, see page 67.



Cleaning your records is only half the battle.

What do you suppose happens when the hardest substance found in nature—diamond—is dragged through the soft, intricate vinyl canyons of a phonograph record at a force which produces acceleration that exceeds 1000 G's!

Friction and wear.

From the very first time you play a record, a process of decay takes place. The delicate high frequency sounds are the first to be impaired. Then the midrange. With every play details are lost and noise becomes more pronounced, eventually rising to a hailstorm often punctuated sharply by clicks and pops. And

the better your equipment, the more annoying the disturbance.

Regular cleaning of your records is important and necessary—to remove the dust and oily films that can further mar performance—but it's simply not enough. The best way to preserve the music on your records is Sound Guard® Record Preservative.

Sound Guard is a revolutionary dry lubricant that virtually eliminates record wear. It's so thin that it will not affect the sound of a new record. It's so effective that a treated record may be played 100 times with no audible degradation of per-

formance or increase in surface noise.* A built-in anti-static property helps keep dust off your records between cleanings.

It's true that it requires a little extra effort and expense to protect your records with Sound Guard. But when you add up the investment you've made in your stereo system and record collection, you really can't afford not to do it.

Sound Guard. Everything else is a lot of noise.



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Q • How close can hi-fi get to an authentic musical experience?

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If you want to find out how good the new Audio-Technica Stereophones really are, don't just compare them with other headphones. Put them up against the very finest *speaker* systems. But don't just listen to the equipment. Listen to the *music*. And be ready for a surprise!

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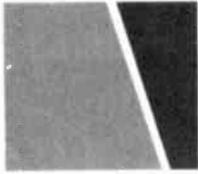
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fact: viscous-damping straightens out all your records



your favorite record may be a tangle of warps

Your phono cartridge "sees" such records as twisted, heaving surfaces, jolting up and down 0.5 to 8 times a second. Even records that look flat have warps, and a warped record can change the cartridge-to-record distance, the tracking force, and the vertical tracking angle. Warps produce frequency "wow" and distortion, and can dangerously overload speakers and amplifiers.

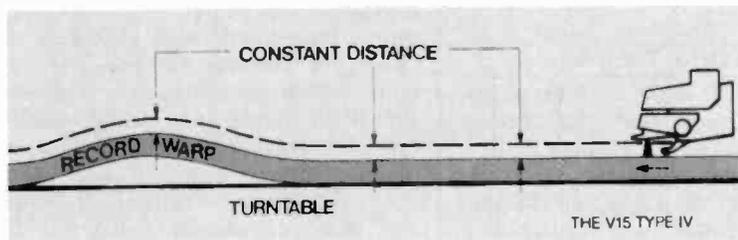
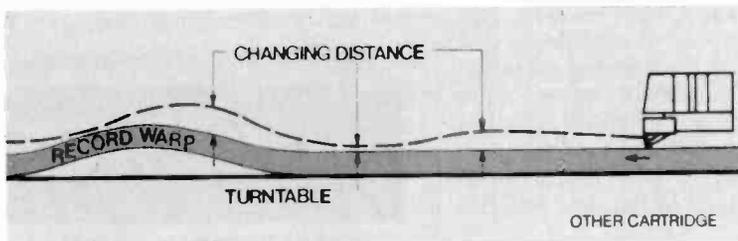
What's more, somewhere between 5 and 15 Hz, every tone arm-cartridge system has a resonance frequency—a frequency at which a warp will produce an exaggerated response that may result in mistracking and in extreme cases, cause serious damage to both the record and stylus.

The Shure V15 Type IV is the first cartridge in the world to incorporate effectively the principles of viscous damping. The Dynamic Stabilizer acts something like a "shock absorber," carrying the cartridge over surface irregularities without distortion, without bottoming out, and without risk of damage to records or stylus. It even protects the stylus should it be dropped accidentally onto the record.

the role of the Dynamic Stabilizer:

The V15 Type IV's Dynamic Stabilizer makes certain you hear the recorded information, not the warps. The viscous-damping system of the Dynamic Stabilizer resists rapid changes in the cartridge-to-record distance. This remarkable Shure innovation eases the stylus over warps without affecting the tracking force on warped or unwarped portions of the record. And the tone arm-cartridge resonance is attenuated to a subaudible level. As a further bonus, the Dynamic Stabilizer cushions the stylus from accidental impacts.

Get the straight talk today at your dealer's showroom. Ask for a free demonstration of the V15 Type IV.



V15 Type IV
the viscous-damped cartridge by...



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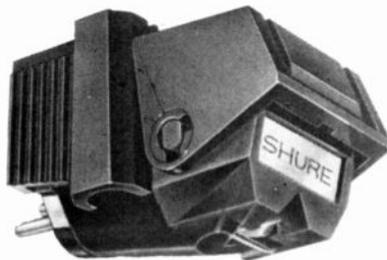
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Mid-Priced Phono Cartridge

Shure offers a new "mid-priced" high-trackability phono cartridge fitted with the same nude diamond tip, hyperelliptical stylus found in the company's highest-priced cartridge. The unique configuration of the stylus results in an elongated and optimized tip-groove contact area that is claimed to dramatically reduce both harmonic distortion and intermodulation distortion. The new tip provides as much as a 25 per-



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cent reduction in distortion over a conventional biradial (elliptical) stylus, according to Shure. With this new stylus, the M95HE cartridge has an ultra-flat frequency response, light tracking, and significantly improved trackability (at $\frac{1}{2}$ to $1\frac{1}{2}$ grams). Price of the cartridge is \$89.50. The N95HE stylus alone costs \$34 and those who now own the M95 cartridge may purchase the new stylus separately to raise the performance of their units to the new M95HE standards.

Direct Drive Turntable

Aiwa's model AP-2600 U direct drive, quartz-locked turntable features a quartz PLL servo DD motor and a 13-inch diameter aluminum alloy die-cast platter. It offers 33 $\frac{1}{3}$ and 45 rpm speeds, with a ± 6 percent pitch control. Wow and flutter are put at 0.025 percent WRMS and the signal-to-noise ratio is 60 dB (IEC-B curve) and 75 dB (DIN-B curve). Operation is automatic lift and stop. The static balanced type tonearm has a length of 9.3 inches and an overhang of 0.6 inches. Other tonearm specs: tracking error angle,

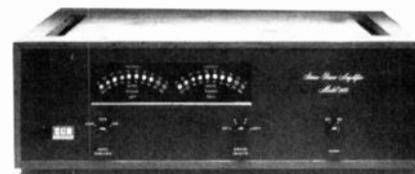


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+2.1 degrees and -1.6 degrees; offset angle, 2.2 degrees; stylus pressure range, 0-3 grams; usable cartridge weight, 3-14 grams; cueing device, oil-damped free-stop type. The turntable weighs 23 pounds and has the following dimensions: 20.2 inches wide by 6 inches high by 15.1 inches deep. Price is approximately \$400.

Stereo Power Amplifier

From BGW Systems comes this model 210 stereo power amplifier rated to deliver a "conservative" 100 watts per channel into 8 ohms from 20 to 20,000 Hz. The unit has two groups of ten-segment colored LED indicators, formed into arcs to simulate conventional meter scales. Each channel is said to be calibrated to give precise power measurements. A sensitivity selector allows you to select a wide range of power indication levels, and a four-position speaker selector switch allows easy switching of the output power to one, two or both sets of speaker outputs. Each channel has its own heat sink module, and the 330 sq. in. surface area is claimed to yield an extremely large "safe operating area" for the unit's twelve power transistors. The design is complementary, DC-coupled, and incorporates temperature sensing



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circuitry. The input amplifier stages utilize high-speed, high slew rate circuitry. In addition to time-delay circuitry which eliminates slew transients, the BGW model 210 incorporates a fail-safe speaker protection feature. Sensing circuitry triggers a fast acting heavy-duty relay to turn off the amplifier when a potentially harmful DC voltage would damage the speakers. An optional walnut-veneered enclosure is available. Suggested retail price: \$599.

Beam Controlled Speaker

Altec Lansing's Model 14 speaker system is claimed to virtually eliminate

Ohm's Law 7:

Big bass sound can come from small bookshelf loudspeakers.

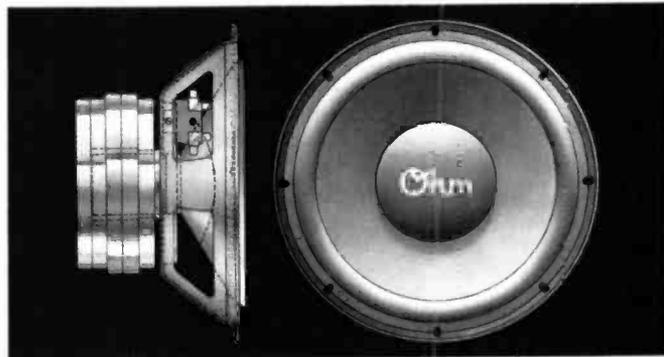
Among loudspeaker manufacturers, traditional wisdom has it that you need a big woofer in a big cabinet for really deep bass.

Once again, Ohm has defied the traditional laws of loudspeaker design.

The Ohm L is a compact, reasonably-priced, vented loudspeaker which rests comfortably on a bookshelf.

Yet, its bass response is absolutely flat to 42 Hz. And it can be driven to loud levels with as little as 15 watts rms. (That's only *half* as much power as a comparable acoustic suspension system needs.)

But there's more to an Ohm L than superlative bass and high efficiency in an easy-to-live-with size. Using time/phase matched drivers, and Ohm's phase consistent crossover, the L achieves a highly coherent sound that many expensive, widely-advertised "phase aligned" systems can only envy.



The Ohm L woofer; output capacity unmatched by any other 8" woofer we've tested.

Here's what the audio critics have said about the Ohm L:

High Fidelity Magazine:

"In listening tests, the Ohm L's aspirations ex-



ceeded those expected of its price class by a notable margin. The overall sound is solid, yet transparent and detailed. Deep bass is tight, with a sense of ease that is maintained to relatively high listening levels... Stereo imaging is excellent - to the point where the sound seems totally detached

from the speakers."

Sound Advice:

"This speaker also rates high in depth, ambient reproduction, and airiness... the L is a very musical speaker, does a good job with the delicacy of orchestral and choral music, has great dynamic punch, is quite efficient (8 watts for 100 dB at 3'), sounds good in a small room... and absolutely blooms in a large room (output to spare)."

Stereo Review:

"The Ohm L, though diminutive beside many of the floor-standing or oversize 'bookshelf' speakers we have seen, sounded in every way like a full-size system. Blindfolded, one would never guess its compact dimensions." (Copyright 1977 by the Ziff-Davis Publishing Co. Reprinted from *Stereo Review* June, 1977 by per-

mission. All rights reserved.)

Sound (Canada):

"...This is a loudspeaker which, despite its small size, manages to sound large...The high frequencies are crisp and one listener remarked that one could count the wires on the brushes. The low frequencies are well-controlled and there is a very good compromise between sensitivity, damping, and low bass. The lows are strong without deteriorating into the one note variety and deep without becoming lost by overdamping."



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beaming because a new horn design produces sound in a "continuous wedge of energy" without regard to change in frequency. Audio "myths" that the Model 14 explodes, according to the company, include: inability to get full range response from a two-way speaker; that the best and only speaker protection devices are fuses and circuit breakers; that you can't combine high efficiency with high power capacity; that high-performance speakers must

be super expensive. The Model 14's speaker components consist of a 12-inch bass driver plus a radial phase plug compression driver mounted to a Mantaray constant directivity horn. These are contained in a vented enclosure. Specifications: frequency response, 35 to 20,000 Hz; crossover frequency, 1500 Hz; sensitivity, 95 dB SPL; dynamic range, 44 dB minimum crest factor above 70 dB SPL at 4 feet; dispersion, 90 degrees at -6 dB horizontal and 40 degrees at -6 dB vertical, tilted to 30 degrees up, 10 degrees down; long term broad band maximum power, 75 watts unprotected and 200 watts with automatic power control (included); operational power range, 10 to 350 watts; long term maximum acoustic output, 114 dB SPL. \$495.

"New Concept" Phono Cartridges

A brand new concept in moving-magnet design of phono cartridges is claimed by Audio-Technica for this top-of-the-line AT25 unit. The innovation centers on two toroidal (doughnut-shaped) coils whose laminated cores also serve as pole pieces for the moving magnets. The technical benefits said to derive from this design are low inductance, low impedance and greater efficiency. Audible benefits claimed in-



clude cleaner reproduction of transients and high-level, high-frequency signals. Unlike moving coil models, the AT25 does not require a special transformer to boost the output. The stylus assembly uses a rigid, lightweight beryllium cantilever. The natural diamond stylus has a 0.2 by 0.7-mil elliptical tip that is square-shanked and nude-mounted for precise alignment and low mass. The stylus assembly is secured to the cartridge body with a set screw to eliminate unwanted resonances that can occur with conventional stylus assemblies. Nationally advertised at \$275, the AT25 has an integrated headshell with a built-in distance gauge for adjusting stylus overhang to optimum tonearm specs. For \$250, you can choose the AT24 cartridge which is identical to the AT25 except that it lacks the integrated headshell.

Three-Way Speaker

Epicure Products' first three-way speaker, Model 500, is capable of handling 100 watts RMS or up to 500 watts peak power. "Critical" to the unit's performance is a 10-inch woofer that features a "focused field" magnetic circuit to ensure linear response and low distortion at very high listening levels. A specially-designed "sealed" four-inch midrange driver handles the most critical region of vocal and instrumental passages, according to EPI. A one-inch



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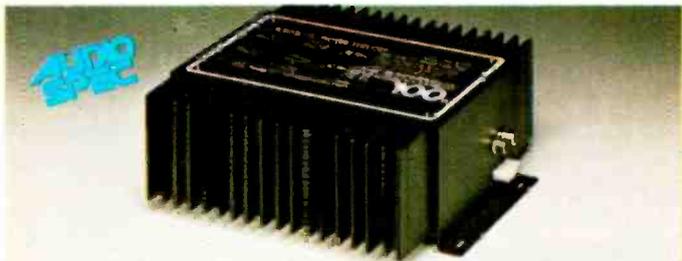
air-spring tweeter was chosen because it reproduces high frequencies smoothly and disperses them evenly to create a well-defined stereo image. The Model 500's essentially flat impedance curve means that, even at highest volume levels, amplifiers will be able to drive the system without difficulty. Specifications: frequency response, 50 to 20,000 Hz, down 3 dB at 50 Hz; crossover frequencies, 750 and 3000 Hz; recommended RMS power range, 15 to 100 watts RMS, 500 watts peak; im-

Superb* Awesome** Outrageous***

Great car stereo sound used to be an all-or-nothing affair. Either you blew a bundle, or you settled for second best. Now meet the Sanyo Expandables. Car components engineered to let you work your way up from "superb" to "outrageous." In steps that your budget can handle.



FT646 AM/FM/Cassette. Sendust Alloy head. 40-19,000Hz $\pm 3\text{dB}$ with metal tape. 1.5 μV FM sensitivity (IHF). \$219.95†



PA6100 Stereo Power Amp. 50 watts RMS per channel into 4 ohms 20-20,000-Hz, with more than 0.05% total harmonic distortion. \$149.95†



EQZ6200 Graphic Equalizer. 7 frequency bands with 12dB boost or cut. LED signal level meters. Audio muting & equalizer defeat. \$69.95†

* Step 1: "Superb."

Start off your system with one of Sanyo's new AUDIO/SPEC car stereos and a pair of Sanyo speakers. You'll get great specs, great sound, and the superior engineering of the world's largest tape equipment manufacturer.

Some models give you Dolby noise reduction, Sendust Alloy heads (for all tapes *including metal particle*), and electronic tuning with digital readout of frequency, time, and date. You can also get super-low distortion preamp level outputs — highly recommended for Step 2.

** Step 2: "Awesome."

Whenever you're ready to really *feel* the music, get hold of an AUDIO/SPEC high fidelity power amplifier. We've got four models, with 25 to 60 watts RMS per channel into 4 ohms. *All rated per FTC home hi-fi specs, with full 20-20,000Hz power bandwidth and no more than 0.05% total harmonic distortion!* Some have a unique motor-driven fader for balancing front and rear speakers.

The amplifiers accept preamp level or high level (speaker) inputs, so they'll work with just about any radio/tape unit. Awesome!

*** Step 3: "Outrageous."

If nothing less than the ultimate will do, plug in a Sanyo AUDIO/SPEC graphic equalizer between your radio/tape player and the power amp. With 7 bands of precise control, you can customize the sound to fit your taste and your car's acoustics. In seconds, you can actually "re-engineer" any recording to bring out any vocal or instrumental range. Hear it, and you'll be hooked!

The Sanyo Expandables are at better auto sound dealers now. Check out the features and the phenomenal sound, and start planning *your* Expandable system.

Then watch it grow on you.

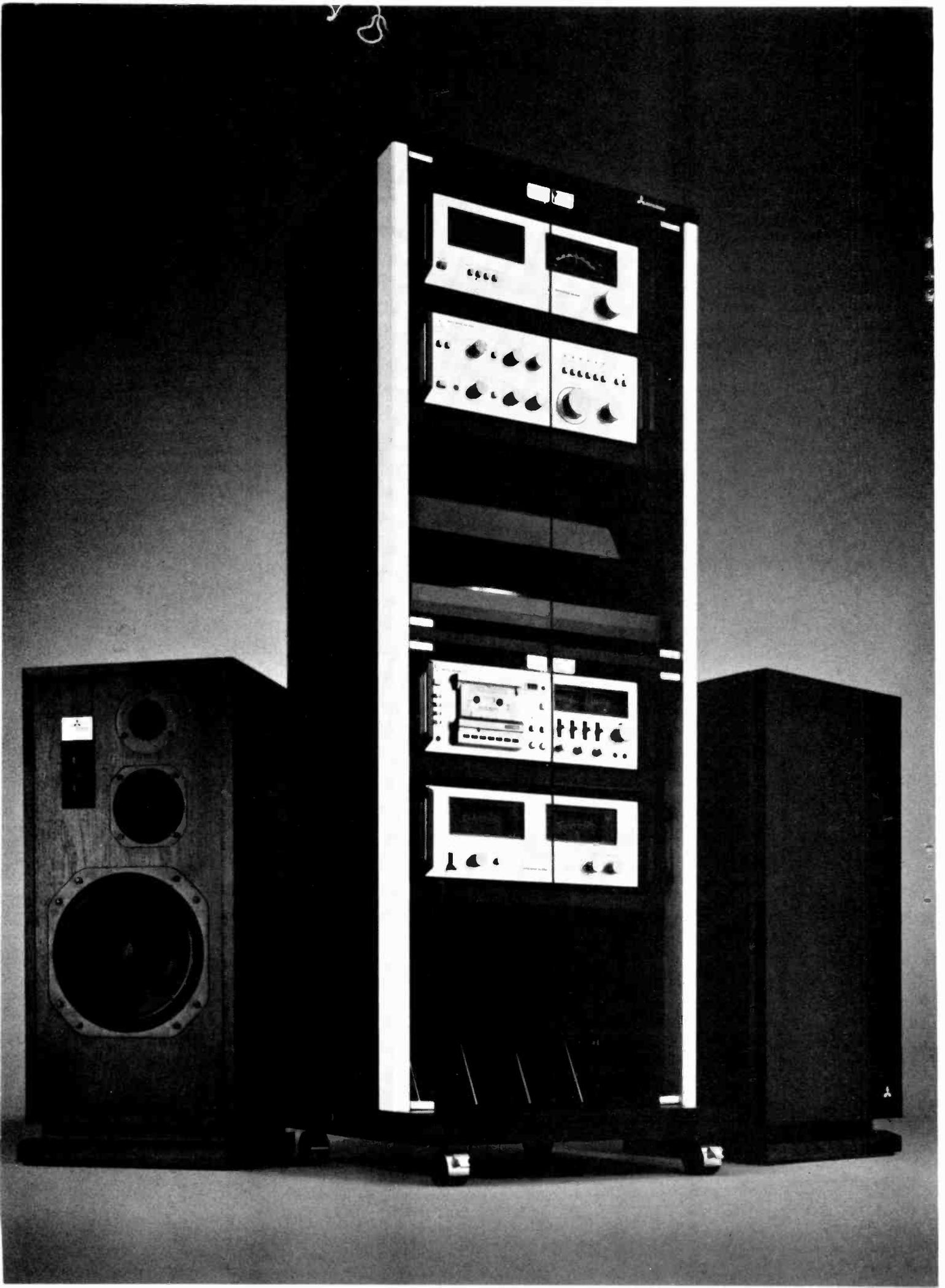
The Sanyo Expandables: great sound that grows on you.

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The Ritzy Mitsubishi.

It's called The System, from Mitsubishi.

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Because as anyone who knows woofers from tweeters will tell you, there's more to ritzy than mere expense.

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A 75 watt, 100 watt, or 150 watt amplifier, each capable of 80 dB inter-channel separation, a high signal-to-noise ratio and low distortion.

A Logic Control Turntable that breaks every record in the industry for completely

automatic operation. Not to mention its specially designed high-resolution, low-resonance tone arm for faultless sound.

A three-head, closed loop, dual-capstan drive tape deck, complete with feather touch controls that let you record professional quality cassette tapes.

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An AM/FM stereo tuner with a quartz-PLL synthesizer, plus LED's and digital read-out, for the ultimate in tuning accuracy and convenience.

Peak meters that can dock with the amplifier and monitor your equipment channel by channel. So you can maintain perfect balance and protect the system from overload.

And last, but not least ritzy, our exclusive new MS-40 loudspeakers.

They completely eliminate

the spurious vibrations caused by conventional paper cone speakers, because they aren't made from paper.

Instead, we make our cone with an aluminum honeycomb core in a sandwich of glass fiber. The honeycomb structure is rigid enough to maintain its shape, yet light enough to be exceptionally responsive.

Put each of these remarkable components together in one handsome rack, and you've got The System.

One name. One look.

From one company, with one standard of quality.

Excellence.



DR-720—Rack, DA-P20—Preamplifier, DA-A10DC—Power Amplifier, DA-720—FM Stereo Tuner, DA-M10—Power Level Meter, DP-EC20—Turntable Unit, DT-30—Cassette Tape Deck and MS-40—Speakers. For more information write Melco Sales, Inc., Dept. 44, 3030 East Victoria Street, Compton, California 90221.

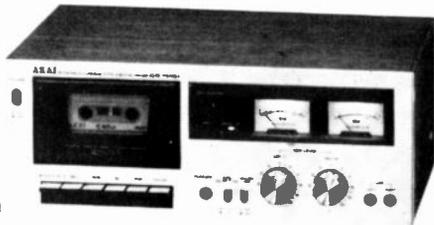
Circle No. 15 On Reader Service Card

AUDIO SHOWCASE

pedance, 4 ohms. Suggested retail price: \$400.

Economical Cassette Deck

Akai's "amp-styled" stereo cassette tape deck, Model CS-703D, features front loading, Dolby noise reduction, vertical headblock assembly, electronically controlled DC motor, full-release auto stop, and tape selector switch for LN and CrO₂ tape. Also illuminated VU meters, full function operating controls, locking pause control, tape counter and fully damped door. The front panel is of brushed aluminum. Wow and flutter



Circle No. 62 On Reader Service Card
is put at less than 0.06 percent WRMS,

and signal-to-noise ratio is said to be better than 56 dB with chrome tape and peak level at 3 percent total harmonic distortion. Dolby improves S/N by up to 10 dB (above 5000 Hz). Frequency response is 40 to 15,000 Hz ± 3 dB using chrome tape, and distortion is less than 1.3 percent with LN tape (1,000 Hz, "0" VU). The unit weighs 13.3 pounds and measures 15 inches high by 10.5 inches deep. The enclosure is finished with walnut-grained vinyl. Price: \$199.95.

Self-Analyzing Power Amplifier

Crown calls this SA2 stereo power amplifier a "self-analyzing" design that provides more useable power per output device than was previously possible. This additional power is claimed to yield a tighter, cleaner, more solid bass along with greater purity of sound than is obtainable from other high-technology amplifiers. The SA2 is rated at 220 watts per channel minimum RMS into an 8 ohm load, both channels operating, from 20 to 20,000 Hz, with total harmonic distortion less than 0.05 percent. For a 4 ohm load the output is 350 watts per channel. Other specifications: intermodulation distortion, less than 0.01 percent; slewing rate, greater than 30 volts per microsecond; damping factor, greater than



Circle No. 106 On Reader Service Card

700 DC to 400 Hz into 8 ohms; loads impedance, rated for 16, 8 and 4 ohms; monaural output, 700 watts into 8 ohms at 0.12 percent THD, 20 to 20,000 Hz or 1200 watts into 4 ohms at 1.0 percent THD at 1 kHz; hum and noise, 115 dB below rated output ("A" rated). The SA2 limits output only when a built-in computer reports that the power transistors are approaching their safe operating limits for the conditions under which they are operating. The user thus has much more power available from a given number of output devices. Price: \$1595.

AM/FM Power Antenna Line

Two new automotive AM/FM power antennas are offered by Harada Industry of America. The RX-20, priced at \$54.00, is a fully automatic unit that can quickly be extended from its fully retracted position to full extension, either by means of the car ignition or by means of the radio "on" switch. Model RX-10, priced at \$41.00, is a fully retractable, semi-automatic version that operates by means of a special switch. Both units feature the company's "super-powerful" 10-pole motor that is claimed to provide "extra drive power" for smooth, effortless operation even under the most severe icing con-

Remove both static and dust in one easy stroke!

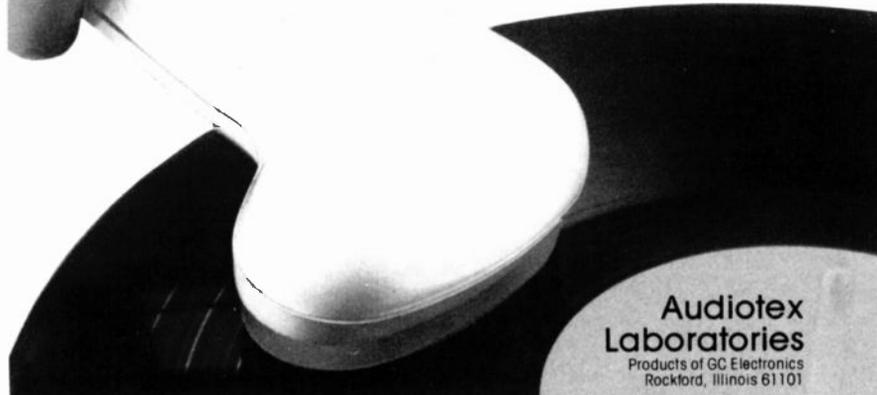
Audiotex Laboratories introduces the RC-2000

HOW IT WORKS: The RC-2000 utilizes a piezo-electric element which you activate by simply pushing a trigger bar. Immediately a stream of ionized air bombards the record, neutralizing its static charge and freeing dust particles. These particles are then swept away by the RC-2000's nylon brush and caught by a soft velvet surface. As easy as that, you've got a clean record. No more liquid residues; no more removing static a second time after you clean. No batteries to replace either! Try it, then throw away your cloths, liquids and brushes.

ACCLAIMED EVERYWHERE! Lightweight, durable, the RC-2000 is designed for years of repeated use. Stereo owners throughout Europe have used it and loved it; now it's available to U.S. audio connoisseurs, too, through leading stereo high fidelity stores.

RC-2000 (Cat No 30-8585)

A MASTER STROKE IN RECORD CARE!



Audiotex Laboratories
Products of GC Electronics
Rockford, Illinois 61101

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Circle No. 104
On Reader Service Card

ditions. A noiseless clutch further adds to the efficiency of operation. Antenna body and cables are completely shielded against electrical interference from any source, and heavy-duty hardware assures watertight protection against any weather. The antenna masts are made of chrome-plated stainless steel. Thanks to a double-contraction mounting nut and a self-locking plastic cable,

Gruesome Twosome.



Performance. Power. Period.

Mitsubishi Car Audio. It's Power by the Pair. The CV-21 Control Power Amplifier has 20 watts RMS per channel and features separate volume, treble, bass and fader controls and high/low inputs. It can be used as a control amplifier with a tuner or tape deck, or as a power booster for existing car stereo radios.

For the ultimate in control, it's the CV-23 Graphic Amplifier/Equalizer. It is a perfect match with car audio components or existing car stereos.

The CV-23 features 30 watts RMS per channel, fader and balance controls, two-channel LED power indicators, selector switch, high/low inputs and a 6-position graphic equalizer for complete sound contour control.

Well defined lows. Transparent mid-ranges. Shimmering highs.

The CV-21 and the CV-23 are the Gruesome Twosome.

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**We build
a speaker
that sounds
like music**

It can accurately reproduce the 120+ dB peaks that are found in some live music. That's more than just being able to play music loud. It can accurately reproduce the music bandwidth - from below 25Hz to 20kHz. And the Interface:D's vented midrange speaker reproduces midrange sounds with the clarity and purity that allows precise localization of sound sources - both lateral and front-to-back.

The Interface:D is the only commercially available speaker we know of that can meet these criteria. Audition them at your Interface dealer.



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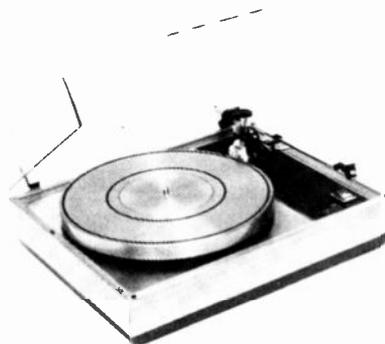
**Interface:™
D**

AUDIO SHOWCASE

the mast can easily be replaced without dismantling the entire antenna assembly, should the mast be damaged. Both models come with standard flush-mounted heads, and special mounting heads are available for installation on GM, Ford, Chrysler, and most imported cars.

Belt-Drive Transcription Turntable

This Ariston RD11S made-in-Scotland high quality two-speed belt-drive transcription turntable is distributed in the U.S. by Osawa & Co. The unit is claimed to exhibit extremely low rumble of -80 dB and wow and flutter of less than 0.05 percent. The platter, of machined aluminum-zinc alloy, weighs 9.5 pounds and spins on an ultra-low friction mirror-finish shaft on a self-lubricating Teflon main bearing. The

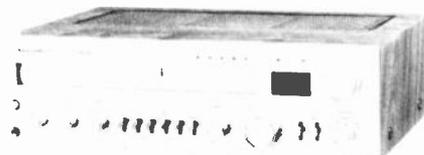


Circle No. 111 On Reader Service Card

motor is a 24-pole synchronous device featuring a specially balanced armature coupled to a clutch system to assure swift and smooth run-up to playing speed. To minimize acoustic feedback and groove skipping from external vibrations, the platter, motor and tone arm mount are attached to a rigid sub-surface plate which is isolated from the turntable base with specially designed precision shock absorbers. The RD11S comes with a teak base and hinged dust cover. The price, with the recommended AC-300MKII tonearm is \$985. The turntable is also available without a tonearm for \$500.

Digital Readout Receiver

Radio Shack's new Realistic STA-240 AM/FM Stereo Receiver features a digital readout in addition to a conventional slide-rule type tuning dial. The digital readout permits easier station location, especially when stations are close together on the broadcast band, because you can tune to a station's



Circle No. 32 On Reader Service Card

exact frequency. An automatic AM bandwidth control operates like a "gate" by opening wide on strong signals for maximum audio fidelity and closing to narrow band operation for reduced noise when signals are weak. An exclusive Auto-Magic® FM tuning is said to allow easy tuning-in of stations; it then automatically fine-tunes the station and locks it in for drift-free reception. There are two tape dubbing and monitor switches, plus input and output jacks to permit simultaneous recording with two separate tape decks, or dubbing from one deck to another even while listening to a different program source through speakers. Other features: five point LED signal strength indicator, low and high filter switches, and 25/75 microsecond de-emphasis selector to provide correct output for Dolby-equipped tape decks. Audio output power is 60 watts per channel RMS minimum into 8 ohms from 20 to 20,000 Hz, with no more than 0.15 percent total harmonic distortion. FM tuner sensitivity is rated at 1.9 µV with a capture ratio of 1.5 dB. Price, in a wood cabinet with genuine oiled-walnut veneer side panels, is \$429.95.

Vented Box Speaker

The middle entry in a new line of speakers by Celestion Industries, the Ditton 551, uses a vented box design and features three active drive units having barium ferrite magnets. The power handling capability of the 551 is from 20 to 140 watts (music handling power). Midrange and treble units have independent level controls



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that offer from 2 dB lift to greater than 6 dB cut. The treble and midrange are positioned asymmetrically to provide best frequency response and

YOU CAN'T TAKE ANY MACHINE AT FACE VALUE.

Every tape recorder is a machine by definition. Pretty faces, knobs and buttons are incidental to the recorder's fundamental responsibility. To move tape. And that is where a TEAC shines.

Twenty-five years of specialization has taught us that balance is the critical factor in determining how accurately and for how long a tape recorder will move tape.

Balance means no part stands alone. It also means delicate physical relationships. Good drive motors produce tremendous energies, magnified in fast modes. The slightest imbalance will cause vibration and audible deterioration.

Our hysteresis torque motors, one on each reel, maintain the delicate balance between start-up, back torque and running torque to prevent tape stretch and breaking. Precise tape-to-head contact is maintained to pre-



vent high frequency loss. That's why a TEAC sounds better initially and maintains its sonic integrity after years of use.

The most important part of any drive system is the capstan assembly, where balance, again, is crucial. For accurate tape speed, the size and roundness of the capstan shaft are of utmost importance. So we use automated lathes to form each shaft. Then micro-grind each one to a

tolerance of 0.2 micron (0.000008 inch).

Our hysteresis synchronous capstan motor is specifically designed for speed accuracy. Deviations (wow & flutter) are kept to the absolute minimum. Our massive flywheel is dynamically-balanced and coupled to the drive mechanism with belts that are tested under the most severe temperature, humidity and

atmospheric conditions to assure dimensional stability for years to come.

For fast action and positive feel, we use highly responsive micro-switch transport controls. They activate solenoids almost twice as powerful as those in other machines. You can even hear the distinctive sound of a TEAC mechanism in action.

Our erase, record and playback heads are secured to a steel mounting plate — itself a product of over 20 years of design refinement — then aligned in the three critical planes.

Finally, we mount everything to a ¼-inch high density duralumin base plate. Physical relationships must remain constant. Especially in the tape world of micro-tolerances.

To us, it's a matter of craftsmanship. To you, a matter of decision. That's why we invite you to look beyond mere face value. Peel away the cosmetics and you'll find the real measure of any tape recorder. Especially ours.

For more information, see your TEAC Audio Specialist dealer or write us at Dept. SG-7.

TEAC®

**Bass and treble used to be
all the tone control you wanted.**



Now you're ready for S.E.A., the outboard equalization system built into our best receivers.

Controlling tone with just two knobs is like trying to play Chopin on a pair of bongo drums.

That's why we invented our S.E.A. graphic equalizer. It lets you compensate for room acoustics, differences in phono cartridges, FM frequency response, cassette tape roll-off or less-than-perfect speakers. You can bring a vocal right out into your living room, boost low bass or send a strident guitar part packing.

Now while we sell a lot of outboard S.E.A.'s, we know the best place for a good equalizer is next to a great receiver. That's why we built a 5-band S.E.A. into our JR-S201, 301, 401, and 501 integrated receivers.

All four boast DC power amp sections, phase linear ceramic IF filters, FM muting and twin tuning meters, dual tape inputs and speaker outputs, subsonic filters, LED source indicators and the unique knobless styling that makes them look as distinctive as they sound.

All put out rated power at less than 0.03% THD through a patented Triple Power Protection Circuit that guards amp and speakers from on/off shocks, shorts and DC surges.

And of course all four receivers have the S.E.A. Record circuit that lets you equalize your favorite S.E.A. settings onto a tape while

recording it, and make dynamite tapes for your car stereo, too.

Our three largest models include dual power meters; our two top receivers feature a pilot signal canceller built into their Phase-Locked FM IC circuitry that gives you 45dB stereo channel separation all the way from 50Hz to 10kHz.

So when you're out pricing receivers, ask the salesman why some status brands cost twice as much as JVC, but still have only two imprecise tone controls. And why JVC stacks up feature-for-feature and watts-per-dollar against many other receivers that don't have a built-in 5-band graphic equalizer.

For the name of your nearest JVC dealer, call 800-221-7502 toll-free (in NY State call 212-476-8300). Or write to US JVC Corp., 58-75 Queens Midtown Expressway, Maspeth, NY 11378.

JR-5501 (shown) 120 watts RMS/chan, both chan. driven into 8 ohms, 20 20kHz with no more than 0.03% THD. **JR-5401** 85 watts RMS/chan, both chan. driven into 8 ohms, 20 20kHz with no more than 0.03% THD. **JR-5301** 60watts RMS/chan, both chan. driven into 8 ohms, 20 20kHz with no more than 0.03% THD. **JR-5201** (shown) 35 watts RMS/chan, both chan. driven into 8 ohms 20 20kHz with no more than 0.03% THD. Built in S.E.A. provides +12dB equalization at 40Hz, 250Hz, 1kHz, 8kHz and 15kHz. (Also shown) **SEA 80** full octave outboard equalizer with ten band realtime frequency spectrum analyzer and built in pink noise generator



Now you're ready for JVC.

Circle No. 38 On Reader Service Card

AUDIO SHOWCASE

directional characteristics. Since the design principle relies upon the enclosure being inert, the cabinet walls are of 18 mm high-density veneered particle board plus foam lining to damp standing waves. The three-way system consists of a 10-inch woofer, 2-inch soft dome midrange radiator, and a dome tweeter, plus front panel midrange and tweeter controls. Frequency response is from 38 to 20,000 Hz \pm 3 dB when measured in 2 pi steradians. The third order Butterworth crossover frequencies are 600 and 4500 Hz. The individual driver impedances are equalized against frequency to optimize the crossover performance. Price: \$499.50 each.

"Not Exactly Cheap" Turntables

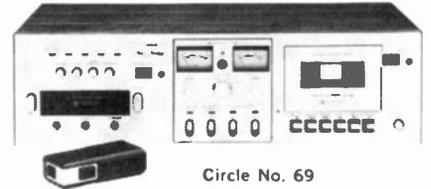
In a move intended to dispel the notion that Thorens makes only high-priced turntables, the company now offers two models priced under \$300. Admittedly "not exactly cheap," these units retain most expensive Thorens features including an Isotrack plug-in tonearm, belt drive and a DC motor



with 72-pole tachogenerator for precise speed control. The photo shows the TD-104 model. Add a photoelectric automatic shut-off and tonearm return and it becomes the model TD-105. Features include: 33 and 45 rpm speeds; individual \pm 6% pitch controls for each speed; LED illuminated electronic touch sensors for speed selection; viscous damped cue control; illuminated strobe in platter rim; four-point suspension with damped spring elements; dust cover with spring-loaded hinge. Specifications: wow and flutter, 0.05 percent DIN 45507; rumble, -48 dB unweighted and -65 dB weighted; platter, 2% lbs, 11-13/16 inches diameter; tonearm length, 8% inches; effective mass, 7.5 grams; anti-skating, compensating spring. Distributed by Elpa Marketing Industries.

Cassette/8-Track Deck

Fisher's new ER-8155 dual 8-track and cassette recording deck features wireless remote electronic editing and Dolby noise reduction. The unit records on either deck or both at once. The cassette side includes precision front-loading transport with Auto-Stop at end-of-tape, a tape selector switch for normal, chrome and ferrichrome tapes; also a LED indicator for pause mode. In the 8-track configuration there's a selectable Auto-Stop at the end of each program or all four, illuminated program indicators, locking pause, fast forward



Circle No. 69
On Reader Service Card

buttons, and a digital elapsed time indicator. Both models include separate left and right channel VU meters and record level controls. Dolby, MIC and line inputs, headphone output. Specifications: frequency response, 40 to 12,000 Hz \pm 3 dB; signal-to-noise ratio (with Dolby), 56 dB for cassette and 52 dB for 8-track; wow and flutter, 0.09 percent WRMS for cassette and 0.15 percent WRMS for 8-track. Price: \$449.95.

Three-Way Loudspeaker

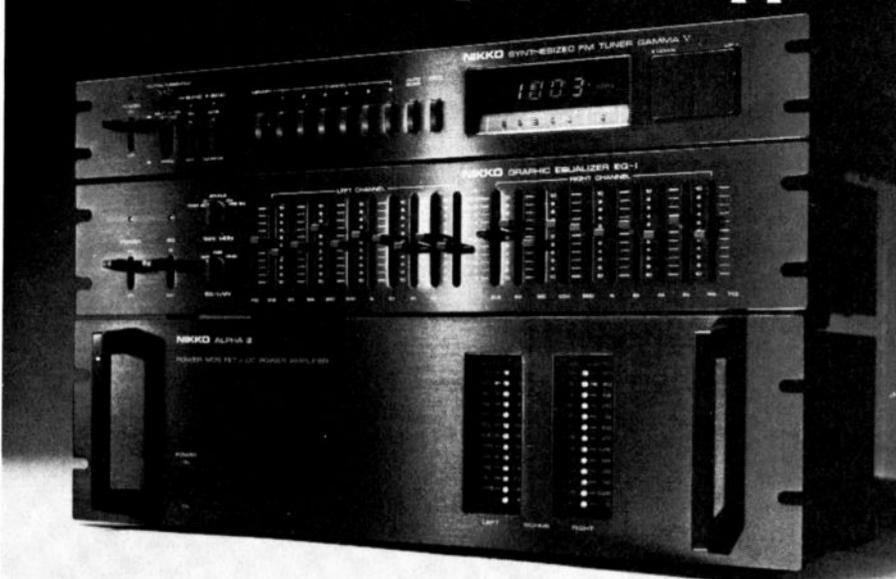
KEF Electronics offers a "Calinda" three-way loudspeaker system in which the low- and middle-frequency range (45 to 3,500 Hz) is covered by a 200 mm (nominal) drive unit, having a Bextrene diaphragm with visco-elastic damping for low coloration, and a high temperature voice coil assembly capable of handling the output of a 100 watt amplifier on program. To achieve maximum bandwidth and efficiency with the chosen enclosure volume of 45 liters, bass loading is provided by a 300 mm by 210 mm passive radiator unit with a flat-fronted polystyrene dia-



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phragm, which extends the useful frequency range downwards to 23 Hz

Nikko. Not Any Stereotype!



Unlike any stereotype, Nikko Audio actually delivers the seed of sound in our professional series.

The Gamma V Synthesized FM Digital Tuner has a LED readout showing locked-in MHz numbers. Accuracy on the button.

The EQ 1 Graphic Equalizer shapes the acoustics of your room into a recording studio.

The Alpha III Power MOS-FET DC Amplifier has the lowest THD anywhere

near the price range—0.008% (80 watts per channel, both channels driven into 8 ohms, 20 Hz to 20 kHz).

Call our roll-free number for your nearest Nikko dealer: (800) 423-2994.

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In Canada: Superior Electronics, Inc. © Nikko Audio 1978

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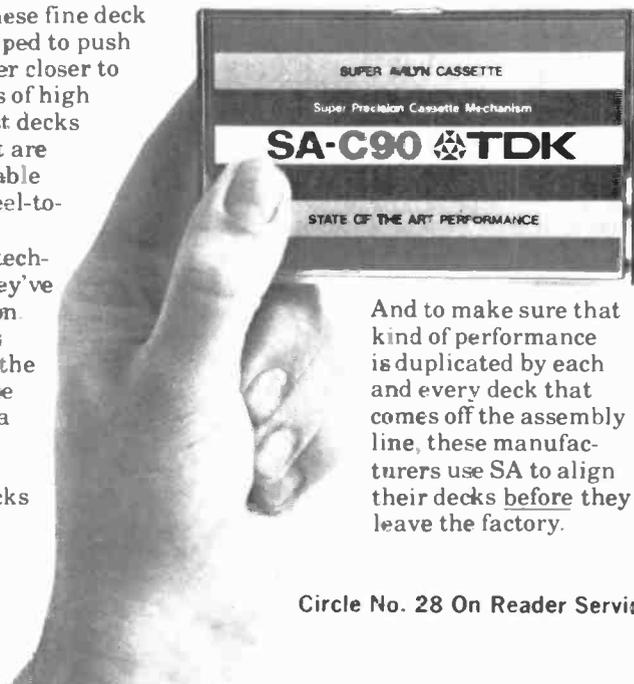
The standard bearers.



The high bias standard.

In the past few years, these fine deck manufacturers have helped to push the cassette medium ever closer to the ultimate boundaries of high fidelity. Today, their best decks can produce results that are virtually indistinguishable from those of the best reel-to-reel machines.

Through all of their technical breakthroughs, they've had one thing in common. They all use TDK SA as their reference tape for the high bias position. These manufacturers wanted a tape that could extract every last drop of performance from their decks and they chose SA.



And to make sure that kind of performance is duplicated by each and every deck that comes off the assembly line, these manufacturers use SA to align their decks before they leave the factory.

Which makes SA the logical choice for home use; the best way to be sure you get all the sound you've paid for.

But sound isn't the only reason SA is the high bias standard. Its super-precision mechanism is the most advanced and reliable TDK has ever made—and we've been backing our cassettes with a full lifetime warranty* longer than anyone else in hi fi—more than 10 years.

So if you would like to raise your own recording standards, simply switch to the tape that's become a recording legend—TDK SA. TDK Electronics Corp., Garden City, NY 11530.

TDK
The machine for your machine.

*In the unlikely event that any TDK cassette ever fails to perform due to a defect in materials or workmanship, simply return it to your local dealer or to TDK for a free replacement.



Stan Getz listened to us.

He's a world famous jazz musician. After he listened to the System B, a 4-way, 5 driver loudspeaker system, this is what he said:

"This speaker doesn't pretty up or muddy up the sound. I like sound that's bright and natural. That's what the System B gives me."

The reason the sound is "natural" is because we've done everything possible to minimize distortion and provide smooth, broad, frequency response.

We've painstakingly designed each individual driver component for the greatest possible clarity.

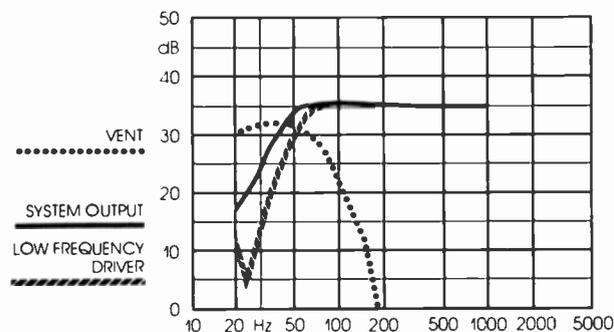
We've carefully selected each crossover frequency to isolate the resonance of each driver at least a full octave below its crossover region. This together with our Impedance-Compensated Crossover Network, completely eliminates distortion at the critical crossover frequencies. As a result, the sound comes through "bright" and "natural."

You don't have to run a great amount of power through the System B in order to get wide dynamic range, either.

The System B has the power handling capacity to produce an incredible 115 dB of sound pressure at its 150 watt rating.

Normally, high efficiency goes hand-in-hand with insufficient bass response.

That's not the case with System B.



Improved bass response as the result of the low frequency driver and vent working together

It blends extremely efficient drivers with a vented enclosure.

The vent works closely with the low frequency driver to extend the bass response downward to the limit of recorded music.

There's much more to this amazing speaker system than it's possible to describe in detail here.

That's a good reason for you to go to your Jensen Home Audio Dealer for a demonstration.

After all, your ears are the ultimate test.

But one more word from the master, Stan Getz.

"I like to hear sound as it is. I don't like prettied-up sounds where you put everything through a powder puff. These speakers give me accurate sound."

Listen to the Jensen System B in person.

Stan Getz did. He liked what he heard.

So will you.

Listen with the professionals.



Listen to JENSEN speakers.

JENSEN SOUND LABORATORIES
Division of Pemcor, Inc., Schiller Park, IL 60176

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auto FM
amplifier



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Amplifier with
variable gain control

- Increases Signal up to 16 Times
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- Switch for FM and AM Reception
- No Adverse Effect on AM Reception
- Extends FM Reception Range
- L.E.D. Indicator Light
- Linear Potentiometer Gain Control
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auto amplifier
available...**
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34 West Interstate Street, Bedford, Ohio 44146
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Sonny Rollins/by J.R. Taylor

The Milestone Jazzstars' national tour in the fall of 1978 was clearly the jazz event of its year. Sold-out at most of its stops and widely praised by reviewers, the Jazzstars tour presented three major performers in the strength of their maturity—pianist McCoy Tyner, bassist Ron Carter and saxophonist Sonny Rollins (supported by drummer Al Foster). Although equal solo time was accorded to each of the three, they nevertheless had subtly differing statures. Twenty years before, when Carter had been a student at the Eastman School of Music, and Tyner had been a local performer in Philadelphia, Sonny Rollins had already been thought of for some time—and by quite a number of people—as the greatest saxophonist alive.

Rollins' return to public performance after a three-year semi-retirement has been followed by acclaim unprecedented even for him. At times, as in the case of his most recent release *Don't Stop the Carnival* (Milestone), Rollins' recent records have lived up to their ecstatic notices. But the new listener could spend at least as much enjoyable time with the recorded Rollins of the 1950s.

Rollins came to his first decade of recording while still in his teens and with less than five years of experience as a saxophonist. Born in Harlem in 1930, he was recognized early as a leader within a very fast musical peer

group that included saxophonists Jackie McLean and Ernie Henry, pianists Walter Bishop Jr. and Kenny Drew, and drummer Art Taylor. After switching from alto to tenor saxophones in 1947, Rollins attracted the attention of slightly older—but much more professionally established—musicians.

Chief among these was Miles Davis, who frequently used Rollins in his bands from 1950 through 1954. By the end of that time, Rollins was known as a leading young voice on his instrument; yet just then, he chose to "retire" for a year in Chicago, where he took non-musical jobs and worked to overcome personal crises. During this period, Davis offered Rollins the tenor chair in a new quintet he was forming; when Rollins declined, the chair went to John Coltrane.

The end of 1955 found Rollins ready to work again; and as chance had it, the saxophone job in the Clifford Brown-Max Roach quintet opened when that outstanding group was playing in Chicago. For six months afterward, Rollins, Roach and Brown paced one of the classic jazz ensembles; then in June of 1956, Brown and Richie Powell (the group's pianist)

(Continued on page 70)

J. R. Taylor is with the Smithsonian Institution's Jazz Program. He has written on music for the *Washington Post Book World*, the *Village Voice* and others.

If music is the big thing in your life, you're sure to love



Sansui's new little speakers.

If you love music, you want to hear it all. The full frequency range. The full dynamic range. Even if your listening room isn't as big as a concert hall.

But to reproduce low frequency signals, the speaker has to move a lot of air. That's why most woofers are much larger than most tweeters, and why most speaker cabinets are so big.

And that's why the new Sansui J11 is a major breakthrough in speaker design. From a woofer no bigger than most tweeters — in a cabinet the size of a loaf of bread — Sansui engineers have been able to achieve outstandingly rich bass response. All the way down to 45 Hz.

Part of the secret is the lightweight but unusually rigid diaphragm material, aided by a long-throw surround and a powerful magnet structure designed for high output, linear response, and low distortion. And a special voice coil that allows you to run up to 60 watts of power without fear of heat build-up.

Another part of the secret is that we're really using two woofers. The second one is called a "passive radiator," for it has no magnet or coil structure of its own. But it's acoustically coupled to reinforce the output of the regular woofer, to move all that air for big bass response.

The soft-dome tweeter design gives you wide dispersion for the best stereo imaging, and its powerful 9000 Gauss magnet structure and integral phase equalizer provide the high output and clarity needed for real-life music reproduction.

And if you like to take your music with you, you'll appreciate the almost indestructible, handsome, aluminum enclosure of the J11. Attractive enough to put anywhere, you can hang it from a nail in a wall, or get Sansui's versatile swivel bracket for more permanent installations.

If you have just a little more room and appreciate the lustre of a Steinway finish as well as a Steinway sound, you'll love the J33. A bit larger than the J11, it has an 8" woofer for still more efficiency. And its mirror-image pairs give music mirror-image perfection.

Visit a Sansui authorized dealer soon and compare the J11 and J33 to some of the giant-size models. Close your eyes, and the difference will disappear.

J11: sensitivity: 85dB/W/M; 11-13/16" H x 4-13/16" W x 5-3/16" D. J33: sensitivity: 90dB/W/M; 16-1/8" H x 9-7/16" W x 7-1/8" D. Both models packed in matched pairs in a convenient carrying case.

SANSUI ELECTRONICS CORP.

Lyndhurst, New Jersey 07071 • Gardena, CA. 90247
Sansui Electric Co., Ltd., Tokyo, Japan
Sansui-Audio Europe S.A., Antwerp, Belgium
In Canada: Electronic Distributors

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Sansui

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(-10 dB). Specifications: frequency response, 40 to 30,000 Hz ± 2 dB at 2 meters on axis; dividing frequencies, 45 and 3500 Hz; nominal impedance, 8 ohms; program rating, 100 watts; characteristic sensitivity, 83 dB SPL at 1 meter on axis for 1 watt (band-limited pink noise, anechoic conditions); maximum continuous sinusoidal input, 28V rms, 100 to 3500 Hz and 8V rms from 3500 to 20,000 Hz; maximum output, 102 dB SPL at 1 meter on program peaks under typical listening conditions. Price of the Calinda is \$325.

Dynamic Stereo Headphones

Sony's new DR-6M dynamic stereo headphones are said to be uniquely suited to sound monitoring while recording live performances or off-the-air programs because of the accurate sound clarity and wide frequency response. Large 50 mm diameter cone type drivers have a sensitivity of 110 dB/mW, impedance of 28 ohms at 1 kHz, and a frequency response of 20 to 20,000 Hz. The rated output is 10

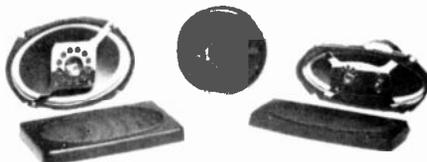


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mW, with a maximum of 100 mW. The DR-6M weighs 350 grams, folds to fit a coat pocket, and sells for \$58.

"Comp Line" Speakers

Roadstar Corp. of America offers a new line of eight car stereo speaker systems designed to provide a high-quality competitive alternative to private label and unbranded speakers. The new "Comp



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Line" has many of the features of Roadstar's deluxe line, including wire

grilles, snap-on covers, rolled foam edges and heat-dissipating aluminum spiders. Yet retail prices are from 25 to 40 percent lower than those on comparable deluxe models. Shown on the left is a 6 by 9 coaxial which comes in 12-ounce and 20-ounce coaxials plus a 22-ounce three-way model; on the right, a 4 by 10 three-way available as a 22-ounce coaxial and a 22-ounce three-way; in the middle, a 5½-inch coaxial, which comes as a 22-ounce coaxial and a 22-ounce three-way. Suggested retail prices range from \$34.95 per pair for the 22-ounce 5 by 7 coaxial to \$59.95 per pair for the 22-ounce 6 by 9 three-way.

Integrated Amplifier

"Absolutely uncompromised state-of-the-art design" is claimed for Sausui's "Straight DC" AU-919 integrated amplifier. The rack-mountable unit achieves an "extraordinarily-high" 200 V/microsecond slew rate, for lowest possible transient intermodulation distortion, and carries a power rating of 110 watts per channel, minimum RMS, both channels driven into 8 ohms from 5 to 20,000 Hz, with no more than 0.008 percent total harmonic distortion. DC amplifier design is used in all major circuits in the preamp as well as power amp sections, and a "jump switch" is

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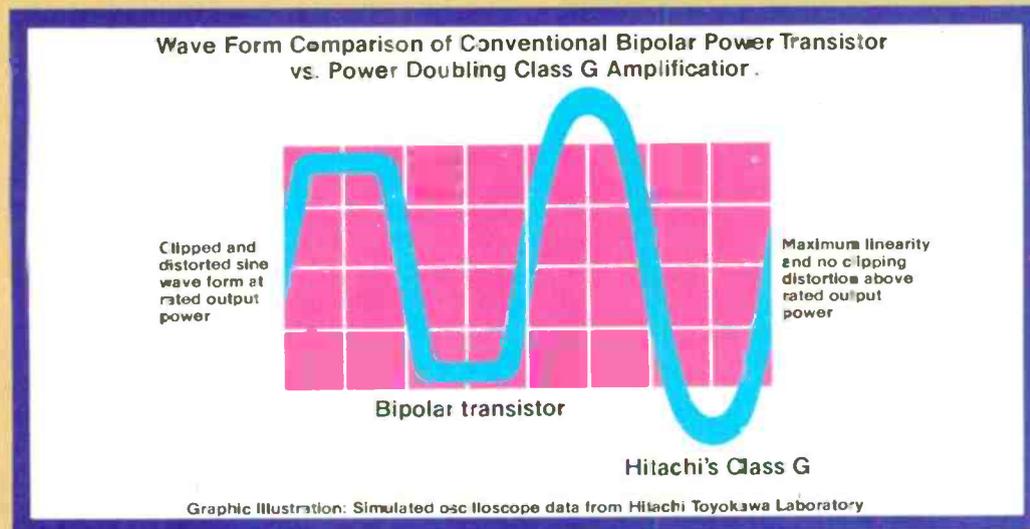
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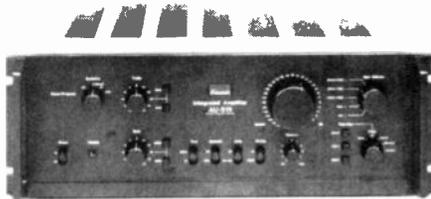
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AUDIO SHOWCASE

provided to achieve pure DC response (down to zero Hz) from the Aux input to the speaker output. Frequency response of the power amp section extends from 0 to 500,000 Hz, +0 dB/-3 dB. A two-pole open-loop compensation system extends the bandwidth to this phenomenal half-million Hz limit, with a claimed unconditional sta-



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bility. A "Diamond Differential" DC (DD/DC) circuit provides the very high level of drive current necessary to achieve the outstanding slew rate. DD/DC circuitry is also employed in the phono equalizer portion of the pre-amp section which boasts an RIAA accuracy of ± 0.2 dB from 20 to 20,000 Hz, a 320 mV overload capacity, and a 90 dB signal-to-noise ratio when used with regular, moving-magnet cartridges. Other features: two-way tape dubbing; two-system speaker system switching; selectable bass and treble turnover frequencies; switchable sub-sonic filter, 20 dB muting, tone control defeat functions. The price tag: \$800.

In-Dash AM/FM Radio/Cassette Unit

Audiovox's "Hi-Comp Concept" in-dash AM FM stereo radio and auto-reverse cassette player combination comes in two models. Model HC-009F is for Ford, Mercury and Chrysler cars; model HC-009G is for GM product cars and Universal. A built-in amp booster produces 36 watts maximum RMS power, and 10 watts RMS per channel at 0.5% total harmonic distortion.



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There are separate bass and treble tone controls, plus four-way speaker balance. Other features include: Dolby; locking fast-forward and rewind; auto-reverse program selector; fader control;

FM local-distant switch; FM noise canceller switch; mono-stereo selector; pushbutton cassette ejector; loudness switch; cassette program indicator lights; FM mute switch; precision manual tuning control; pushbutton AM-FM band selector; amplifier power boost switch; slide-bar volume control; illuminated slide-rule dial. Price: \$499.

Decorator Designed Speakers

These decorator designed "Galatian" speakers by Speckman are available custom-made in luxurious fabrics ranging from mink to burlap, in a "rainbow of colors" plus elegant metal accents. The units may be stacked, hung from chains or be floor mounted. The cylindrical enclosures are said to provide sonic advantages as well as eye appeal. The 360 degree phase-coherent vertical-dispersion radiation pattern of direct and reflected sound offers complete listener freedom from speaker placement. Speckman claims the speakers may be placed next to each other, behind furniture, or in other locations where conventional speakers would produce muffled or distorted sound or



Circle No. 107 On Reader Service Card

else hole-in-the-middle-of-the-room effects. Model S310 is a 3-way system featuring a 10-inch woofer, 4 $\frac{1}{2}$ -inch midrange, and a 1-inch dome tweeter, with a frequency response of 29 to 20,000 Hz ± 2.5 dB. It's priced at \$345 in standard color fabrics, and \$279 each in Midnight Black finish. Other speaker systems in the line are priced as low as \$130 each.

FM Antenna Power Amplifier

This Magnum FM Power Sleuth, a tunable FM antenna power amplifier, is the first product offered by a new company called Audio Marketing by Von. The unit is primarily designed for boosting fringe area FM reception, but it is also useful in urban and suburban areas where indoor or dipole antennas are used. The Sleuth has been successfully tested and marketed in Canada for the past few years. Specifications: RF gain, 35 dB maximum with ± 5 dB

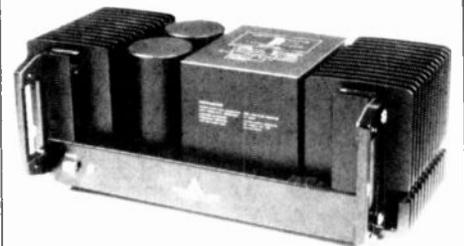


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deviation; RF stages, 3; noise figure, 7 dB maximum; spurious rejection, 90 dB minimum; image rejection, 85 dB minimum. Price: \$150.

Power Amplifier

Mitsubishi Audio's DA-A7DC power amplifier delivers 75 watts per channel RMS into 8 ohms with 0.01 percent total harmonic distortion, and has the following specifications: frequency response, 20 to 20,000 Hz (+0/-0.1 dB); power bandwidth, 10 to 60,000 Hz; channel separation at 1 kHz, 80 dB; signal-to-noise ratio, 122 dB (11HF A network). The circuitry is entirely direct-coupled. Like all other Mits-



Circle No. 78 On Reader Service Card

bishi amplifiers, the DA-A7DC utilizes a unique "locking" system; any of the company's preamps or tuner-preamps may be joined so that the front-panel controls on one unit regulate all functions for both coupled units. Relay-operated protection circuits guard output transistors from overload and isolate the speakers from potential damage. The unit weighs 26 lbs. 8 ounces, and measures 16 $\frac{1}{2}$ inches wide by 6 $\frac{1}{2}$ inches high by 9 $\frac{1}{2}$ inches deep. \$330.

Speaker Wire

DB Systems offers a new 12-gauge sound cable, DBP-8 Speaker Wire, that minimizes loss of power and damping factor, while having no effect on the frequency response of loudspeakers. These are important considerations, especially in systems utilizing 4 ohm speakers or runs of more than 20 feet. The heavy 12-gauge, dual-conductor copper wire has leads at both ends pre-tinned and cut to 16-gauge to easily fit any type of connector. As a convenience, solderless banana plugs are packaged separately. Prices of the DBP-8 wire: 3 meters, \$7.35; 6 meters, \$11.50; 9 meters, \$15.36; (approx. 10,

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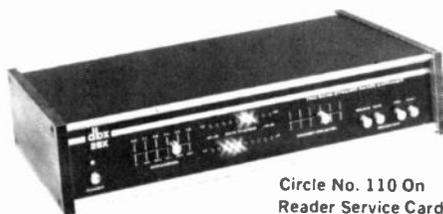


Circle No. 112 On Reader Service Card

20 and 30 feet respectively). Set of 4
banana plugs costs \$2.40.

Linear Dynamic Range Expanders

Typical recording processes rob live music of much of its dynamic excitement, so these two linear dynamic range expanders by dbx, Inc., are designed to recreate the impact of live music by providing up to a 50 percent increase in dynamic range. Model 1BX is claimed to be the most sophisticated single-band expander on the market. Its RMS detector has an infrasonic filter to prevent false triggering by turntable rumble or record warp. Ten LED displays monitor the amount and direction of gain change resulting from the



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expansion process. Model 2BX divides the frequency spectrum into two bands, and treats each separately; this is important when expanding music of strongly percussive nature. By separating the lower frequencies, the 2BX prevents the bass from influencing the vocals or midrange instruments. The 2BX has two separate ten-LED displays, one for each band. Both units utilize true RMS detectors and voltage control amplifiers in their circuitry. Their release time is program-dependent, not fixed, which results in smooth action that does not alter the character of the music as dynamics are expanded. Both are true stereo expanders that maintain rock-solid stereo imaging, according to dbx. An additional benefit: 20 dB noise reduction as low level noise is expanded downward. Suggested prices: model 1BX, \$245; model 2BX, \$450.

Sound Stack Audio Furniture

Sound Stack is a new system for storing and displaying fine stereo and electronics equipment. According to the maker, Interstate Industries, the unit was designed for audio enthusiasts seeking attractive, enduring and versatile modules. Three module sizes handle a broad range of standard components. Two units take equipment up to 19 inches wide on shelves or on a 19-inch EIA standard rack. These units are available in 35- and 48-inch heights.

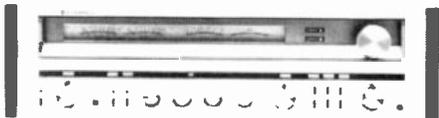


Circle No. 116 On Reader Service Card

The smaller is particularly well-suited for stacking. The third module will shelve components up to 24 inches wide, and is offered in a 48-inch height. The units are delivered knocked-down, but are easy to assemble because of a unique "Dowel Cam-Lok" system. Options include reversible shelves, a circuit-breaker protected power strip, switch-operated interior lighting. Prices range from \$199.95 to \$299.95.

Receiver with Pulse Count Detector

Kenwood's new receiver line includes the KR-8050 receiver, which features both a high-speed DC amplifier section and a tuner section with pulse count detector. The KR-8050 has a rated output of 120 watts per channel RMS into an 8-ohm load, 20 to 20,000 Hz, with no more than 0.02% total



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harmonic distortion. Rise time is rated at 0.9 μ Sec and slew rate of 200 volts/ μ Sec. The tuner section of this receiver includes pulse count detector technology which was originally developed for Kenwood's high-end tuners. Pulse count detector technology is responsible for reduced distortion and improved signal-to-noise ratios. S/N spec for the KR-8050 is 85 dB. Other features include IF bandwidth selection. It will sell for about \$820. ▲

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Judging a speaker by its specs is like judging a wine by its label. Music, like wine, is a sensory reality that cannot be described but must be experienced. And while we can't actually let you hear the speakers we evaluate, we try to relate the technical factors of their construction to the actual sound to give you an idea of the subjective aspects of the listening experience. We hope this helps you in forming at least a preliminary notion of whether you might like a particular model. Then, it's up to you to visit your local audio specialty stores to audition a selection of speakers for yourself. Your own ears must be the final judge—after all, you'll be living with your choice, and that's what counts!

by HANS FANTEL and CHRISTOPHER GREENLEAF

Ohm I

Description

If you are willing and able to spend upward of a thousand bucks for a pair of speakers, you have a right to expect something exceptional. And that's just what you get from the Ohm I. And it's not surprising, at that. For Ohm is a company that has never been afraid to follow its ears, even when they pointed in an odd direction.

Some years back, Ohm pioneered a radically offbeat approach with its Model F, which employed an omnidirectional Walsh driver as its main radiating unit. This design earned a deserved reputation for its outstanding musical quality, and the engineers at Ohm must have been scratching their heads rather seriously in an effort to improve on their own remarkable achievement. The present Ohm I proves that they succeeded.

Even outwardly, the Ohm I is unusual, taking the form of a truncated obelisk—a tapered column with a 15-inch square base rising 34 inches to a 13-inch square top. Walnut veneer is the standard finish, but teak and rosewood are also available. The veneer is carefully matched in grain, beautifully finished, and covers even the surface under the grille. In all, it makes a strikingly elegant item in any living room.

But we're dwelling on externals while the real news lies inside. A total of five drivers provides the kind of omnidirectional sound spread that seems to be something of an avant-garde trend among the latest unconventional speakers—Bose and B&W being other examples. It provides a splendid feeling of musical spaciousness not attained by other design modes.

But the real payoff of this particular model is a combination of efficiency and power handling that, as far as we know, is unmatched. It takes less than



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10 watts to drive the Ohm I to generous, room-filling sound levels. But while most high-efficiency speakers get seriously frazzled when presented with a high-power wallop, the Ohm I uncompromisingly accepts inputs up to 1000 watts—repeat: one-thousand watts, and that third zero is no misprint! Understandably, there is no need for a protective fuse.

Frankly, we haven't tested this upper limit. For one thing, we haven't got a 1000-wpc signal-source and—aside from Yankee Stadium—we don't know anyone who has. Besides, the furniture was already hopping around when we had the volume up less than half-way up on our 60-wpc Sony, and the bass-rock-solid and utterly real—made our toes curl. Obviously, this speaker stands up to Gustav Mahler or any disco. But—and that's another rare and remarkable attribute at such enormous sound

levels—it never sounds like “disco”—it always sounds like music.

What kind of structure does it take to create this sound? Pull off the front and top grilles and you see the answer. Front bottom is a 12-inch subwoofer with a massive 72-ounce magnet that has its own resonating cavity vented through a 5-inch diameter duct, ample enough to prevent the audible “breathing” sometimes heard from smaller bass vents. We poked into the hole and found that the duct extends nearly all the way to the rear wall before opening into the resonating space—a configuration that creates the effective equivalent of an 18-inch woofer.

A front-facing 1-inch soft-dome tweeter is located right above the vent and accounts for the exemplary stereo imaging which precisely pinpoints the apparent location of players—a quality

(Continued on page 74)

Opera

For Today

Marilyn Horne

by Speight Jenkins

□ Not many opera singers can claim unique mastery of a specific repertory, but in the international circuit today Marilyn Horne, an American mezzo-soprano from California, is far and away the leading exponent of the coloratura tradition for her voice. Not that other mezzos do not have some florid capacity. But almost invariably they are lyric mezzo-sopranos with voices close to soprano in sound. The uniqueness of Miss Horne's instrument comes not from its range (from low F to high B) but from its flexibility and darkness, its immense roundness and accuracy of sound throughout its range.

Several registers, expertly blended, are heard throughout her voice. The



Marilyn Horne plays Fides in the moving *Le Prophete*, which will be revived next fall at the Metropolitan in New York City.

mastery of the dramatic mezzo soprano tradition, exemplified in the post-World War II years by Gioletta Simionato and to a lesser degree Fiorenza Cossotto. These two ladies, both Italian to the core, sang some *bel canto*, and Miss Simionato had an amazing range up to a high C when she retired. But they had very powerful voices and their emphasis lay in brilliantly dominating the orchestra and punching out sepulchral chest tones. Flexibility, runs, and all the niceties of *bel canto* were important to Miss Simionato but not to her successors, and these style techniques are actually not required in the major mezzo-soprano roles of Verdi. In recent
(Continued on page 68)



In Gluck's tragic *Orpheus and Euridice*, Ms. Horne is captured in the dramatic role of Orpheus.

most famous is the "bass" area, but the movement to it is not a sudden shift; it is accomplished gradually as she adds more of a pure chest sound to the voice that supposedly is coming from the head. What such terms mean is that sound appears to move from the top notes, which are a mix of a little chest sound and a lot of head resonance, to the middle, which is a pretty even mix, to the bottom, which is high on chest and low on head resonance. The difference between Miss Horne and most other singers is that her lowest notes are not spoken but have rich tone. They are musical, exactly as the lowest tones of a

great bass or a low-lying instrument are musical. Additionally, she can move in fast-flying sixteenth-notes from the low area in the bass clef up to the top and down. Sopranos, lots of them, can move over their range, but they do not generally have low notes and almost never employ any chest sound for effect. All of Miss Horne's attributes go for making her the *non pareil* mezzo-soprano in the operas composed by Rossini, Donizetti and Bellini, in short the *bel canto* repertory.

This does not mean, as proven in New York's Metropolitan Opera, that her capacities include



Pictured here in the lead role of Rossini's *Il Barbiere di Siviglia*, Ms. Horne plays Rosina.

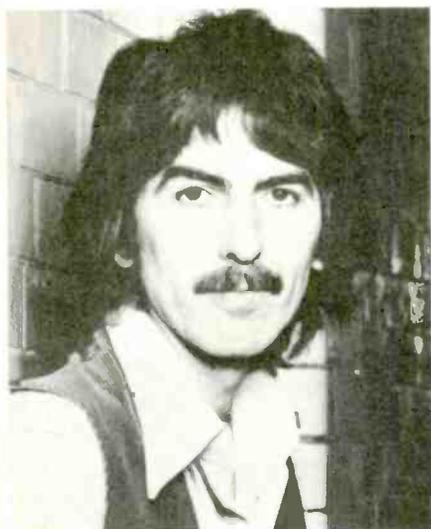
pop discs

A review of the latest popular music releases

by KEN IRSAY

George Harrison: "George Harrison." Warner Bros. \$7.98.

Harrison says he'll give up recording for gardening. His final vinyl harvest is bountiful indeed. A light mixture of



pop, rock and ballads, this disc contains a sublime example of Harrison's unique guitar style in "Love Comes to Everyone," on which Eric Clapton and Stevie Winwood appear.

Bonnie Tyler: "Diamond Cut." RCA. \$7.98.

Romantic ballads, country tunes and rugged rock are all nicely orchestrated and bear the inimitable Tyler sandpaper vocal style. A favorite: the churning "Too Good To Last."

Sad Cafe: "Misplaced Ideals." A&M \$7.98. **Nazareth: "No Mean City."** A&M. \$7.98.

Who says hard rock ain't got no



class or style? Who says the incessant drumming and wildly distorted guitars make up for a lack of talent? Not these groups. Their class, style and talent is evident as they "rock hard." Pop melodies, jazz licks and gutsy vocals characterize both groups. It's "roll-up-the-rug" time.

Judy Collins: "Hard Times For Lovers." Elektra. \$7.98.

An artist of this stature has no need to bend or twist her style to accommodate audiences, but the rich orchestrations and pop arrangements on some of these songs signal Judy's intent to broaden her base. Her pristine voice shines through on the title cut written by The Eagles, "Desperado" and the



standard, "Where or When." Composers Randy Newman and Stephen Sondheim are also represented.

Creedence Clearwater Revival: "1968/1969." "1969." "1970." Fantasy. \$8.98 each per two-record set.

These are the first six albums recorded by Creedence in those three incredibly fruitful years for the San Francisco rock group. Although never acclaimed by the critics, their brand of unadorned, cleanly recorded rock music won unabashed public support. Their "Proud Mary" was recorded 100

times by other artists. These budget-priced sets are a must for serious collectors.

Tanya Tucker: "TNT." MCA. \$7.98.

Move over Dolly. Here comes Tanya, crossing that well-travelled bridge between Nashville and Pop City. And she wastes no time shedding her country



skin with the album opener, "Lover Goodbye," a steaming rocker. Buddy Holly's "Not Fade Away" is a standout.

Bob Welch: "Three Hearts." Capitol. \$7.98.

On his second solo album, Welch's vocals take a back seat not only to his sensational guitar playing and mature lyrics, but also to a rock solid rhythm



pop discs

section. Members of his former group, Fleetwood Mac, make guest appearances. Highlight: a slowed-down version of the Beatles' "I Saw Her Standing There."

Fabulous Poodles: "Mirror Stars." Epic. \$7.98.

This is your basic 1960s style rock and roll: good harmonies, guitar/bass/drums-dominated instrumentation and memorable hooks you'll be humming for weeks. Every cut, save one piece of outright pornography, is a potential hit single. No electronic gadgetry here.

Michael Franks: "Tiger in the Rain." Warner Bros. \$7.98.

Latin and rock tempos augment Franks' well-known, laid-back jazz sound. He sings with Flora Purim on



several cuts and divides rhythm work between two separate aggregations, making for more variety of sound than his last album.

Raphael Ravenscroft: "Her Father Didn't Like Me." Portrait. \$7.98.

Gerry Rafferty's band and a truckload of accomplished musicians help lift this set above the ordinary. Ravenscroft is the saxophonist whose memorable hook made Rafferty's "Baker Street" one of last year's biggest hits. This is "rainy Sunday afternoon" listening music.

Irakere: "Irakere." Columbia. \$7.98.

Galloping Latin percussion mixed with insistent brass, sensuous woodwinds and a beautiful classical piano solo all make for an exciting American debut by this Cuban group. Irakere

has the distinction of being the first musical act to be signed to a U.S. record label since pre-Castro days. The set was recorded live at the Montreux and Newport festivals.

Tonio K: "Life in the Foodchain." Full Moon/Epic, \$7.98.

Perceptive and whimsical observations on the human condition and interpersonal relationships—with a dynamite rock back-up that would stand on



its own even without the great lyrics. Many top name musicians contributed.

McGuinn, Clark & Hillman: "McGuinn, Clark & Hillman." Capitol. \$7.98.

This is not a Byrds album, but an incredible simulation, and why not? The gents are three-fifths of the 1960s supergroup. There's some string sweetening here and there, but mostly the sound is the folk-country-rock of old, with those Byrds harmonies supreme.

Jefferson Starship: "Gold." Grunt. \$8.98.

If you never liked the psychedelic ramblings and barely structured songs of the Starship, but enjoyed the occasional commercial-sounding tunes, this disc is for you. It combines ten hits from four albums. The best are "Count On Me," "Ride the Tiger" and "With Your Love." A never-released 45 is included as a bonus.

Herbie Mann: "Super Mann." Atlantic. \$7.98.

Rather than being constrained by the disco format, Mann uses it as a jumping-off point for some great "flutes of fancy."

Brooklyn Dreams: "Sleepless Nights." Casablanca. \$7.98.

This recording almost gets lost in the

crowd with its disco-like arrangements, but the rhythm and blues style vocals make it special. "Street Man" has an infectious shuffling tempo and some effective changes. Donna Summer shares lead vocals on "Heaven Knows."

Best of the Superdiscs

Smokie: "The Montreux Album." RSO. \$7.98.

Skin tight four-part harmonies, solid mid-tempo rock arrangements and substantial pop melodies mark the fourth U.S. release from one of Europe's hottest groups. This could be their American breakthrough.

Charlie Musselwhite: "Times Gettin' Tougher Than Tough." Crystal Clear. \$15.00.

Harmonica great Musselwhite fronts a heavyweight combo for some R&B jamming. (Direct-to-disc)

Herbie Hancock & Chick Corea: "In Concert." Columbia. \$13.98.



A double disc concert featuring two of jazz world's greatest pianists. (Sony PCM digitally mastered)

East Bay City Jazz Band: Decibel Records, PO Box 631, Lexington, Mass. 02173.

Dixieland, recorded with tape, but using Richard Burwen's state-of-the-art signal processing equipment. (Standard analog)

Paul Jackson: "Black Octopus." East World. \$15.95. Dist. by Audio Technica.

Jazz and funky rhythms featuring bassist Jackson, Herbie Hancock and others. (Direct-to-disc)

Eiji Kitamura: "Swing Sessions." RCA. \$16.95. Dist. by Audio Technica.

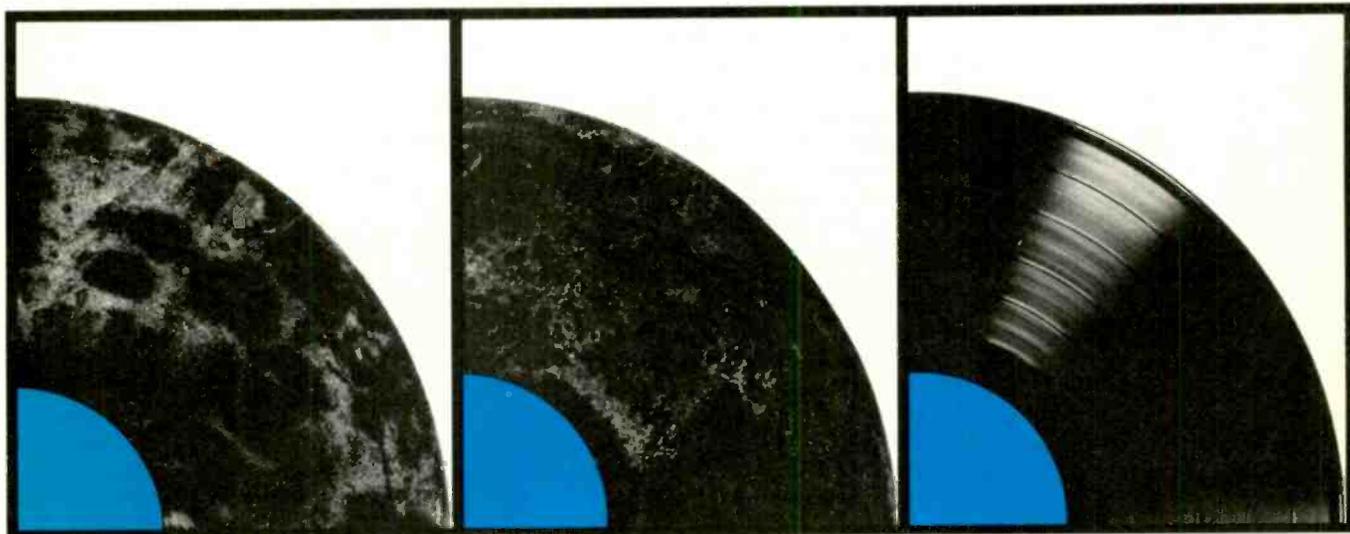
Well-known to American swing-jazz buffs, clarinetist Kitamura is backed by vibraphone, piano, bass, drums and a female singer for some swing classics. (Direct-to-disc) ▲

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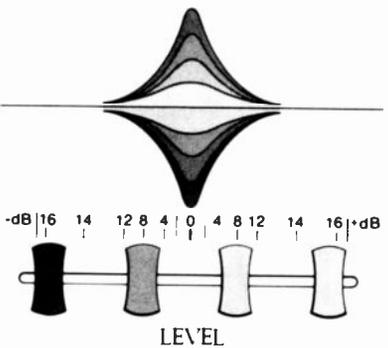
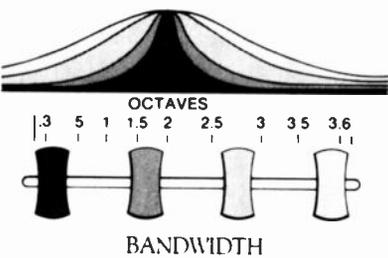
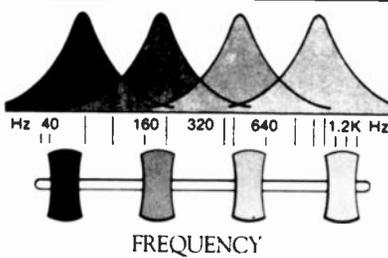
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A GUIDE TO RECENT STEREO RECORDINGS

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: *Symphony No. 1 in C Minor, Op. 68*; *Symphony No. 2 in D, Op. 73*; *Symphony No. 3 in F, Op. 90*; *Symphony No. 4 in E Minor, Op. 98*; *Tragic Overture, Op. 81*. Berlin Philharmonic Orch., cond. Herbert von Karajan, Deutsche Grammophon 2711 022, four records.

Karajan, now in his early seventies, is re-recording much of the standard repertory with the orchestra that he has honed to perfection. Without question the Berlin Philharmonic is one of the top orchestras of the world. With their own particular brand of virtuosity and lustre, they respond to Karajan with total unanimity. These are majestic performances of Brahms' masterpieces, carefully paced, relaxed yet not lacking in tension. Surely one never will hear them performed more perfectly than they are here, and the engineers have done their work exceedingly well, with rich orchestral textures and no lack of clarity. One might question why the "Academic Festival Overture" and "Variations on a Theme by Haydn" were not also included, as there would have been ample room for them. But let us accept the treasures that are offered here. There is much competition in the familiar repertory of Brahms, and much of it costing considerably less than the new DG set, but this is top quality for top dollar.

© Elgar: *Enigma Variations, Op. 36*; *Pomp and Circumstance Marches 1, 2 and 4*. Amsterdam Concertgebouw Orch., cond. Neville Marriner, Philips 9500 424.

I found Marriner's first recording with the Concertgebouw, *The Planets* of Holst, rather disappointing, somewhat perfunctory, lacking in imagination and

engineered rather poorly compared to most of the recent Philips Concertgebouw discs. But on this new Elgar recording Marriner is totally sympathetic to the scores, directing a reading of *Enigma* that is as powerful as it is sensitive. There are many fine recordings of this masterpiece, but none superior to this, even those by acknowledged masters of things British: Barbirolli, Bould, Colin Davis and Sir Malcolm Sargent. Couplings of course vary from version to version, but the Philips solution I find highly attractive, as the second side is filled out with three of the familiar "Pomp and Circumstance" marches. Of course the first march, which, incidentally, was recorded years ago monophonically by the Concertgebouw with Antal Dorati conducting, is included, but it is also a pleasure to hear the vivacious second in C minor, and the vigorous fourth. The engineering is superb, with the sound of the Concertgebouw organ richly textured in the *Enigma* finale. There is top quality listening on this Philips disc, which is recommended without reservation.

© Falla: *Nights in the Gardens of Spain, Harpsichord Concerto*, Joaquin Achucarro, piano and harpsichord; London Symphony Orch., cond. Eduardo Mata, RCA Victor ARL1-3004.

Nights in the Gardens of Spain is seldom encountered in the concert hall, but quite well represented on recordings, with outstanding performances available by Alicia de Larrocha, Philippe Entremont and Gonzalo Soriano (unfortunately both of the Artur Schnabel RCA recordings are marred by substandard sonic quality). "Nights" is one of the composer's most evocative scores, a set of three impressionistic nocturnes for piano and orchestra, rich in imagery. Achucarro is a first-rate pianist, and is given a rich accompaniment by Mata. This new version of "Nights" is well worth owning, particularly as the coupling is so intriguing. Falla composed his *Harpsichord Concerto* at the suggestion of Wanda Landowska, who performed in the Barcelona premiere in 1926 with the composer conducting. Later Ms. Landowska gave the American premiere in 1927 with Serge Koussevitzky and the Boston Symphony. The concerto is scored for harpsichord plus a small chamber ensemble, the latter beautifully represented here by first-desk players of the London Symphony. It is a rather strange piece, far removed from the sensuousness of "Nights." Falla authorized the piano version, but there is no question that the music sounds better on the harpsichord. The listener has

the opportunity to decide for himself, as both versions are included on this disc. The reproduction is representative of RCA's best, which is to say, very good indeed.

© Glazounov: *The Seasons Ballet; Concert Waltzes, Op. 47 and 51*. Philharmonia Orch., cond. Yevgeny Svetlanov, Angel S 37509).

Surely this is one of the more delectable ballet scores: it is a constant stream of enchanting melodies, beginning with Winter and ending with the exciting Bacchanale representing autumn. *The Seasons* has always been represented rather well on recordings. Some collectors may remember the early RCA 78 rpm album with Antal Dorati and the Dallas Symphony Orchestra. London released two recordings shortly after, one with Ernest Ansermet and the Suisse Romande Or-

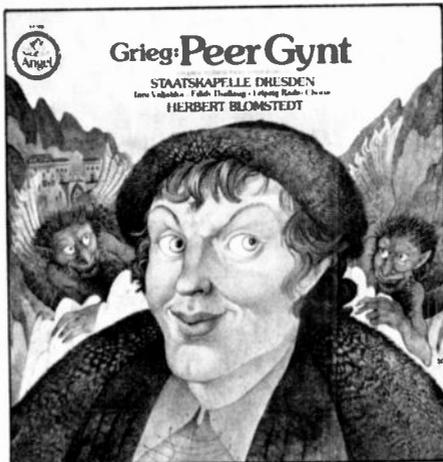


Well balanced Seasons

chestra, the other with Albert Wolff and the Paris Conservatory Orchestra—both are still in the catalog. These have rather thin orchestral textures to my taste, and I much prefer the later Capitol recording with a studio orchestra directed by Robert Irving, now available on Seraphim (60292). Unquestionably best of all is the superb Angel Melodiya disc with Boris Khaiken and the Moscow Radio Symphony Orchestra, which represents “vivid” engineering of an exhilarating performance. The new Angel set is excellent, perhaps a bit more subdued than Khaiken’s, but beautifully played and clearly recorded. The two charming concert waltzes are a distinct bonus, and for many collectors they may tip the scale in favor of this new LP, that contains a full hour of fine listening.

© Grieg: *Incidental Music to Peer Gynt*. Taru Valjakka, soprano; Edith Thallaug, mezzo-soprano; Leipzig Radio Chorus; Dresden State Orch., cond. Herbert Blomstedt, Angel S 37535.

One could hardly say that there is a crying need for another recording of the complete incidental music Grieg composed for Henrik Ibsen’s play, as there is a fine Angel disc with Sir John Barbiroli conducting, another Angel LP of the distinctive Sir Thomas Beecham interpretation, and a budget-priced London Stereo Treasury LP with Oivin Fjeldstad and the London Symphony Orchestra. However, this new



Stand-out vocals

Angel LP is a thoroughly first-rate presentation, and Blomstedt, who already has to his credit superlative recordings of works of Carl Nielsen, further impresses us as one of today’s more important young conductors. Of particular interest for me is the appearance of soprano Taru Valjakka singing the two brief songs of Solveig. Valjakka made a recording several years ago of *Lconnotar* of Sibelius, displaying a voice of remarkable quality and timbre. Hopefully this superlative singer will make more recordings in the future. Sopranos of this calibre are few and far between.

© Liszt: *Wild About Liszt, Volumes 1 and 2*. Earl Wild, pianist; Quintessence PMC 7096 and 7097.

Earl Wild’s prodigious virtuosity is already well represented on discs. Earlier in his career Wild played Gershwin’s *Concerto in F* and *Rhapsody in Blue* so often that conductors seldom thought of him for other repertory. Fortunately for the musical world he has long since escaped from his previous label as a “Gershwin pianist,” and he has done so through his own tremendous technique and sheer musicality. Many of his fine concerto performances are now available, and anyone not familiar with them should at least investigate these scintillating recordings. They include Rachmaninoffs’ concerted works, MacDowell’s *Concerto No. 2*, concertos of Paderewski and Scharwenka, Liszt’s *Concerto No. 1*, Grieg’s *Concerto in A Minor*, and, as a nod to the past, his rather unique recording of his

own fantasy on themes from *Porgy and Bess* coupled with a series of virtuosic etudes based on Gershwin songs. These two new discs offer ample evidence of Wild’s affinity for music of Liszt. Volume I, recorded by RCA in 1976, offers the *Sonata in B Minor*, *Funérailles*, *Les jeux d’eaux à la Villa d’Este*, *Hungarian Rhapsody No. 4* and *Dance of the Gnomes*. Volume II, originally recorded in 1973 by EMI, offers as its major works the *Ballade No. 2 in B Minor*, *La Ricordanza*, *Petrarch Sonnet No. 123* and *Tarantelle de Bravura*. This is extraordinary piano artistry, beautifully reproduced.

© Mozart: *Piano Concerto No. 14 in E Flat, K. 449; Piano Concerto No. 23 in A, K. 488*. Ivan Moravec, pianist; Czech Chamber Orch., cond. Josef Vlach, Quintessence PMC 7107.

On almost everyone’s favorite list of concertos selected from Mozart’s two-dozen plus for the piano, one could be sure to find the two works coupled together on this superb new disc. Both concertos are among Mozart’s finest, each ending with one of the composer’s most exuberant finales. These recordings were made in April 1974 by Supraphon, and are reissued here at budget price. Moravec has always been one of the more satisfying pianists, with a string of distinguished recordings already to his credit. Additional lustre is added to this LP with interpretations



Melodic beauty

of extraordinary clarity and insight. The performance is impeccably articulated, and the warm collaboration of Vlach and the Czech ensemble provide chamber-music intimacy. The reproduction is warm, natural and well-balanced.

© Rachmaninoff: *Symphony No. 1 in D Minor, Op. 13*. Saint Louis Symphony Orch., cond. Leonard Slatkin, Candide QCE 31099.

Rachmaninoff’s first symphony, as

STEREO RECORDINGS

conducted by Alexander Glazounov at the 1897 premiere, was a dismal failure that was damned by critics, resulting in a three-year period of despondency for the young composer. When listening to this melodious and often exciting work today, one can only assume that audiences of the time were incredibly poor judges of musical merit, or, as has been suggested by some who were present on the occasion, Glazounov's presentation was totally inadequate be-



First rate recording

cause of his inebriation. The first symphony apparently then was lost, but a set of orchestral parts turned up at the Leningrad Conservatory permitting the full score to be reconstructed. The second "premiere" was in 1945 to an enthusiastic reception. This early Rachmaninoff opus is gaining a larger following, and is represented rather well on discs. The Philadelphia Orchestra under the direction of Eugene Ormandy gave the American premiere in 1948 and has a fine version with their own particular stamp of authority. André Previn and the London Symphony have recorded it for Angel, an equally admirable effort, but Walter Weller's recording with the Suisse Romande Orchestra on London lacks rich orchestral sound. This new Candide performance is a knock-out in every way. The Saint Louis Symphony here sounds like one of the great orchestras of the country. I do not mean to negate their fine playing, but this does perhaps emphasize how important warm acoustics are to orchestral sound, both live and recorded. The sonically minded will delight in the transparent, full-bodied orchestral sonorities heard on this stunning disc. Dynamic range is outstanding, and one almost might think that this was a digital recording.

For a sample, try the opening of the finale, side two, cut two, and you'll be sold. And at a budget price yet!

© Respighi: *The Fountains of Rome; The Pines of Rome*. Berlin Philharmonic Orch., cond. Herbert von Karajan, Deutsche Grammophon 2531 055.

One might not think of Karajan as being an ideal interpreter of these colorful Respighi showpieces; his earlier Angel recording of "Pines" with the Philharmonia Orchestra was adequate but showed no particular rapport with Respighi and was decidedly lacking sonically. On this new disc Karajan revels in Respighi's rich orchestrations, and the Berlin Philharmonic responds with a vengeance. "Fountains" is glorious; the second section, "Triton Fountain," has never glistered more brilliantly. In "Pines," the combined efforts of Karajan and the DG engineers produce a clear recording of every strand of the hectic opening section, "Pines of the Villa Borghese." "The Pines of the Janiculum" is given a rich Stokowskian treatment, and the entrance of the recorded sound of a nightingale, which must have really startled audiences at the 1924 premiere, is positively enchanting. Needless to say, the mighty sound of the Berlin brass in "The Pines of the Appian Way" is awesome. Of



Enchanting showpieces

course there is much competition for this popular coupling of Respighi's two most popular symphonic poems but Karajan's must be considered among the very finest.

© Wagner: *Excerpts from Act 2 of Die Walkure; Siegfried Idyll*. Lauritz Melchior, Lotte Lehmann, Ella Flesch, Alfred Jerger and Emanuel List, with the Vienna Philharmonic Orch., cond. Bruno Walter, Turnabout/Vox Historical Series THS 65163.

Collectors who treasure, as I do, the magnificent recording of Act I of *Die Walküre* recorded in 1935 with Lotte Lehmann as Sieglinde, Lauritz Mel-

chior as Siegmund, Emanuel List as Hunding, and Bruno Walter conducting the Vienna Philharmonic, will welcome this marvelous reissue. The performance of Act I, now available on Seraphim 60190, is definitive, with Melchior the perfect and unequalled Wagnerian *heldentenor*, Lehmann perhaps the most sensitive Sieglinde ever, and List a thundering, imposing Hunding. Orchestrally the performance is resplendent; it is regrettable that Walter did not record more opera. Sonically, too, this recording is outstanding; the richness and well-balanced monophonic sound is a delight to the ear. The recording of Act I was the first installment of a projected complete "Walküre" which, unfortunately, never materialized. Act II was recorded, but at two different locations, with Bruno Walter conducting only five 78 rpm sides, and Bruno Seidler-Winkler the remainder. Lehmann, Melchior and List continued in their roles, and the same superb quality that distinguishes Act I is equally evident here. This is only a total of approximately 21 minutes of the second act, but every Wagnerite should own this disc. The third scene of Act II is between Siegmund and Sieglinde as they attempt to escape Hunding's wrath; the final scene is the dramatic death of Siegmund.

© *Annie's Song*, James Galway, flute; National Philharmonic Orch., cond. Charles Gerhardt, RCA Victor ARL1-3061.

Galway is the leading flute virtuoso of his generation, who has held the position of principal flute with a number of top ranking orchestras, including the London Symphony and, most recently, the Berlin Philharmonic. Galway already is represented on discs by outstanding recordings of Bach and Mozart concertos, sonatas of Franck and Prokofiev, and by two charming collections of display pieces, one titled "Man With The Golden Flute," the other "The Magic Flute of James Galway." This new LP continues in the latter vein, offering a delightful collection of short works of Marais, Villa-Lobos, Kreisler, Fauré, Mozart, Hasse, Debussy, the traditional "Brian Boru's March," "Belfast Hornpipe" and "Spanish Love Song." A fantasy on themes from Bizet's *Carmen* brings the album to a disappointing close, with a hodgepodge of familiar themes that doesn't really seem to work on the flute. The title song of this album, written by John Denver, is attractive enough, but for this critic is far from the high point of the recording. The reproduction is superb, and this LP should have a wide following. ▲

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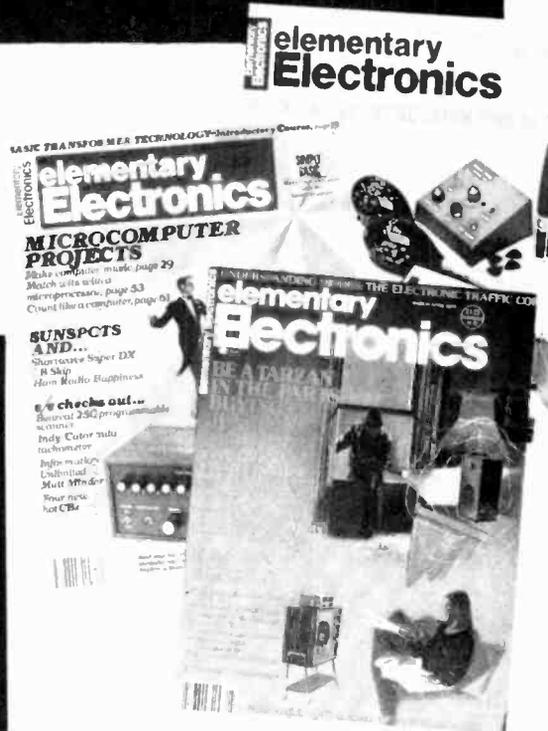
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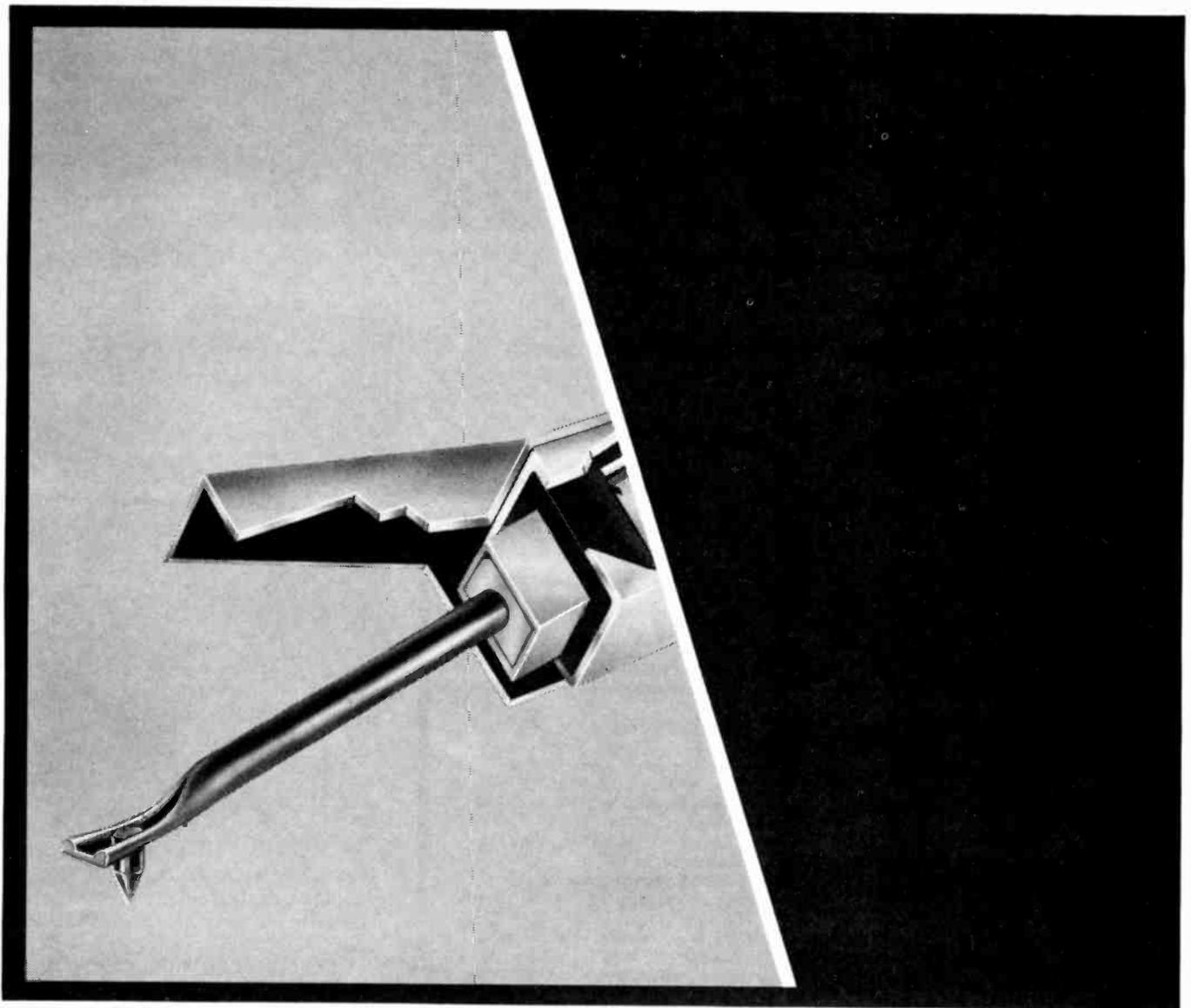
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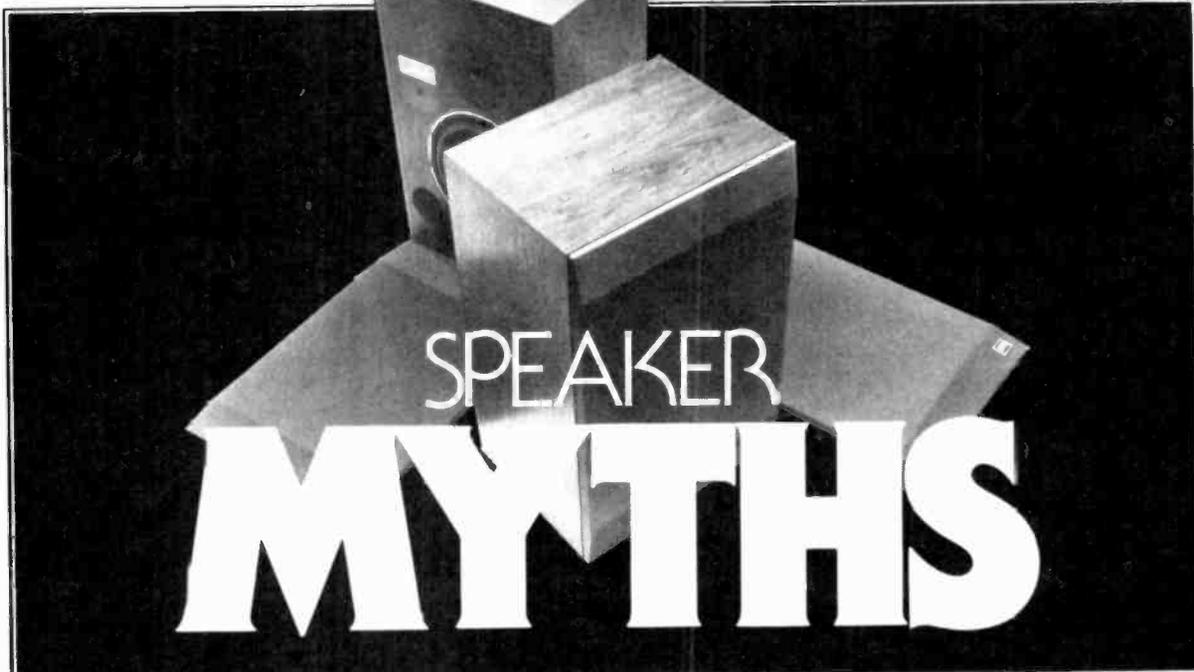
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SPEAKER
MYTHS

HOW THEY RELATE TO YOUR SPEAKER CHOICES

by WILLIAM S. GORDON

Where science fails to provide clear answers, myths abound. A nice "simple" high-fidelity component like an amplifier can be described pretty well by its specifications. Measurements made on it are relatively unambiguous; they can be performed by just about any reasonably technical person and yield data that are pretty much the same. The technically astute individual can examine the data and interpret them in a more or less straightforward manner.

Not so with a loudspeaker. Manufacturer's data are virtually incomparable.

Partial data is given, if indeed any data is given at all. A test reviewer's numbers may serve as a means of comparison, but only among products reviewed by that individual. There is no unanimity of opinion of even *what* should be measured much less how it should be measured. The reason for this sad state of affairs is not that manufacturers or reviewers wish to shirk their duty, but that, try as they will, they find it difficult to correlate a set of measurements with what they hear.

BIGGER-IS-BETTER MYTHS

It is really not very surprising that the consumer is left to flounder about when making a purchase decision. And it is equally

unsurprising that he is frequently misled by the prevalent mythology. The four most common myths have a common root: the bigger is better syndrome. To this we may attribute the ideas that the bigger the woofer the better, that a large speaker magnet is always better than a smaller one, that a speaker will work best in a larger enclosure than in a smaller one, and that the greater the number of drivers, the better.

Each of these concepts contains a grain of truth, but not one of them is universally true. They are, in short, myths. It is certainly true that a woofer with a large radiating area can develop

MYTHS

more low-frequency sound level for a given motional displacement than can a driver with a smaller area. But, note well the italicized phrase. If the larger speaker is stiffly suspended, and the cone cannot move *as far* as the cone of the smaller speaker, it may, in fact, not be able to develop as great a sound-pressure level in the room. And a large speaker that, in its enclosure, has a higher resonant frequency than a smaller speaker in its enclosure, will not be able to respond to as low a frequency.

Finally, in many systems, the woofer alone is not the

sole source of low-frequency radiation. In a vented system, or one using a "passive radiator" or "drone cone," there is useful radiation from the vent or drone in the low-frequency region. In fact, at very low frequencies, *most* of the sound emanates from the vent or drone. And, it's not unusual to find a relatively small (say 8-inch) active woofer driving a larger passive radiator.

Not only is a smaller woofer not necessarily inferior to a larger one, it can have some advantages. If the first crossover is set at a rather high frequency—for example, 1500 to 2500 Hz as is the case with many two-way systems—the

woofer will have to handle a goodly portion of the midband. To put this in perspective, the woofer will be handling the fundamental components of *all* music to a point approximately *three octaves* above middle C! Hardly one's concept of bass! A smaller, lighter cone will be able to handle these higher frequencies much more readily than a big massive one. And it will disperse these higher-pitched sounds more uniformly; the large cone will concentrate the high-pitched sounds on-axis, and the response will be noticeably poorer off-axis.

This is not to say that a smaller woofer is necessarily *better* than a larger one.

S

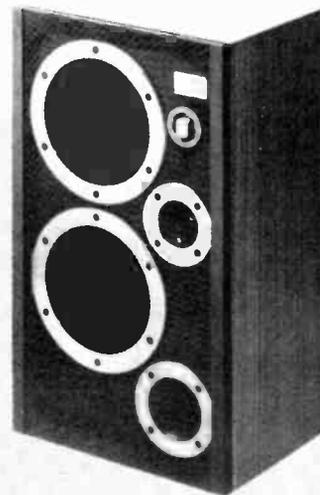
peakers have always been the most difficult component to choose, because after all has been said and done, you are left with your own ears as the sole reliable testing devices and with your own best judgement as the deciding factor.

We've selected the speakers shown here as examples of the diversity of products you will run across at your local dealer's.

Start your selection process by listening to a broad spectrum of speaker types, being careful not to fall prey to the myths we discuss in the accompanying article. Then, by listening further, gradually narrow the field down until you find the pair of speakers that will best suit your needs and budget.



H. H. Scott's S188T is a three-way controlled impedance loudspeaker which includes a 1-inch dome tweeter, a 10-in. woofer, a 4½-in. midrange driver and three-position tweeter and midrange acoustic adjustment controls. Internal protection circuitry to guard the system is built-in as well. Price of this tower speaker is about \$200 each. For details, Circle R.S. No. 90.



Wharfedale E-30's are high-efficiency computer-optimized speakers, comprised of two 6.7-inch bass/midrange drivers and a horn tweeter with level control. Overall dimensions of the speaker are 22.8 inches high by 13.2 inches wide by 10.3 inches deep. Suggested price, \$300 each, including hand-finished walnut-veneer enclosures. Circle R.S. No. 131.

The size of the woofer is a compromise, one that must be made in light of the whole system. If the woofer is to be used *only* in the low-frequency region, say up to a few-hundred Hertz, *all other things being equal*, a large one is *probably* better than a small one, and that's what you're probably going to find in the system.

ABOUT MAGNET SIZE

There is only *one proper* magnet strength for any given system and that depends upon the size and mass of the woofer cone, the size of the enclosure and how it's tuned and damped, and the desired efficiency and low-frequency cutoff point. A magnet that is

larger than necessary is not only a waste of money, it will *not* yield as good results. Using filter-theory analogies developed by Thiele and his followers, the optimum magnet strength can be predicted mathematically, given the other parameters. If the designer wants to get the theoretically best low-frequency response, given the other constraints, he'd better design the woofer with a magnet of that strength.

Note that, in the above, we said magnet *strength*, not magnet *weight*. Buying a loudspeaker system on the basis of the weight of the woofer magnet only makes sense if you intend to use it as a boat anchor. A

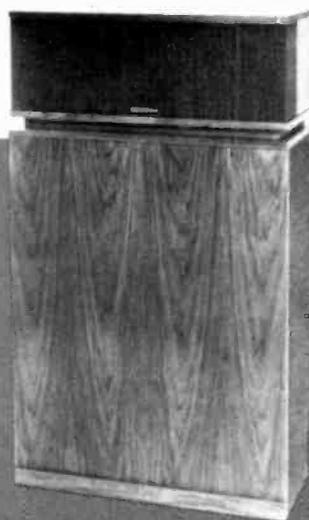
given "weight" magnet varies widely in "strength" depending on the type of magnetic material from which it's made and how it is formed.

ENCLOSURE SIZE

As with the magnet, there is only one proper-sized enclosure for a given system. The filter-theory equations predict what *that* should be, too. Indeed, it is true that a larger box will provide the *possibility* of either better efficiency, lower distortion, or a deeper low-frequency cut-off point, or some lesser improvement in each, *but only if* the remaining design parameters (woofer size, magnet strength, and venting) are also juggled properly. Sim-



Avid offers the Model 230 speaker as part of its "Un-boxed" speaker line. Designed to minimize cabinet diffraction effects, its drivers include a 10-inch woofer with foam surround, a 4½-inch midrange, and a 1-inch fabric dome tweeter. Crossover points at 475 and 4,000 Hz. Min. recommended power is 15 watts, max. power is 150 watts. Price about \$225 ea. R. S. No. 132.



Klipschorn corner horn loudspeakers must be placed in the corners of a room for optimal performance. They are fully horn-loaded and incorporate a folded horn design. Klipschorns are available in 10 different finishes incl. birch, walnut, rosewood, oak, cherry and teak. Priced from \$274 each to \$1651 each, depending on type of finish chosen. Circle 134.



The Interface: D speaker system is available from Electro-Voice for about \$1500 per pair. Recommended amplifier power range is 1.5 to 500 watts. Nominal impedance is 8 ohms. Driver ensemble consists of 12-inch downward-firing woofer, 6½-inch vented midrange and radial horn tweeter. Dimensions of walnut-veneer cabinet are 32 x 21¼ x 15½ in. No. 67.

MYTHS

ply taking a woofer and sticking it in a larger box is likely to produce *worse*, not better, results. The whole system would have to be completely redesigned to suit the bigger enclosure. If that is done, then, yes, the larger enclosure will provide better performance.

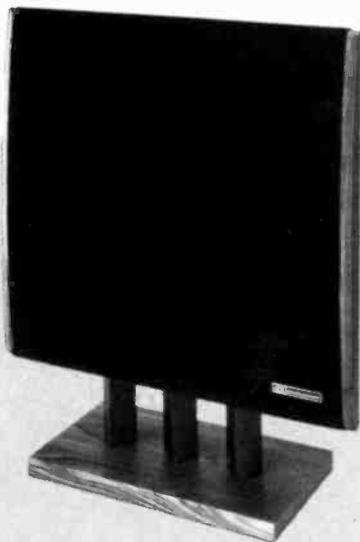
NUMBER OF DRIVERS

There's a grain of truth in the adage that the more drivers the better, but additional drivers are not an unmitigated blessing. If a driver could be designed that would handle the entire frequency range with uniform dispersion and low distortion, that would be

ideal. At this point in time, that's but a dream. As we said previously, a large driver is too massive, too directional, and too prone to cone-breakup-induced distortion to handle the higher frequencies. So, the music spectrum is divided between a multiplicity of drivers, each designed to serve just a portion of the range.

Doing so is a mixed blessing. Each driver may test quite well in the laboratory, but it is hardly the best state of affairs to have the fundamental tones coming from one speaker and the overtone structure from another or two others or three others. There's the problem of spatial separation (the overtones come from

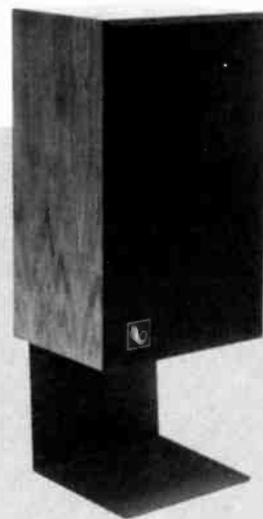
a different location than the fundamentals) and that of time coherence (the overtones may arrive at your ears before the fundamental tones that are generated by a big deep woofer). And there is the problem of phase coherence in the crossover region. At every crossover point, and at nearby frequencies, sound is coming from *two*, spatially separated drivers. At some points in the room, the sound waves add up in phase and the sound is louder; at other locations, the sound waves are out of phase and cancel. Hardly ideal. The more drivers (and hence crossovers) there are, the more chance
(Continued on page 69)



Dahquist DQ-10's require 100 watts RMS min. and can handle up to 200 watts. Five drivers are utilized in each speaker and are mounted on individual baffle plates that are positioned so that all frequencies reach listeners' ears in proper phase. Dimensions: 31½ H x 30½ in. W. x 9 in. D. Speaker stand (shown) opt. Approximately \$900 per pair. Circle R.S. No. 127.



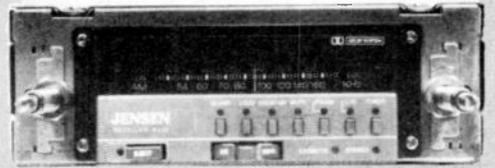
Acoustic Research's \$550 AR-90 includes two 10-inch side-firing woofers, an 8-inch lower midrange element, a 1½-inch upper midrange, and a ¾-inch tweeter in a walnut-veneer cabinet with 3 grilles. 50 watts of power min. is recommended. Crossover freq. are 200, 1200 and 2000 Hz. Level controls for the three high frequency drivers inc. Circle 60.



Infinity's Quantum Jr. includes an electromagnetic induction tweeter (EMIT) which is used in the company's top-of-the-line model. Also included are a 1½-inch midrange and a 12-inch woofer. Nominal impedance is 4 ohms. Recommended power range: 25 to 200 watts per channel. Overall dimensions are 25 by 14½ by 12 inches. \$299 each. Circle Number 129.

Mobile High Fidelity

CAR STEREO INSTALLATION:



UPGRADING WHAT YOU NOW HAVE

by Herb Friedman

Your reading materials on car stereo products is bound to include more than one brochure that will try to convince you that your car's trunk, dashboard, firewall, doors or tailgate (take your pick) is the ideal speaker baffle, and for that reason your car is bound to give you even better sound than you can dream of getting in your home. In short, that's a bunch of nonsense.

You can come very close to the top-notch quality you've come to expect from your home system—but only through making some very discriminating choices when selecting both the speakers and the electronic guts of your car system.

Many hi-fi buffs own a car which now is outfitted with a car radio and speaker(s) which were provided by the car manufacturer as extra cost options. For many lovers of true-to-life music, this will be the summer that they take a Saturday afternoon to install new speakers and a new in-dash unit. It's really not very difficult, provided that you have all the materials that you need plus a little patience. What follows was designed to get you geared up and well-prepared for the day you decide to take the plunge toward better sound in your car.

First of all, let's take a quick look at your choices in terms of in-dash units. You're in for a pleasant surprise.

Mixed in with a large assortment of junk sold as "high fidelity autosound" is some really fine equipment like the Jensen R420 shown in the photographs of an actual user upgrading installation. These quality in-dash receivers have FM sensitivity and selectivity as good as, and sometimes better than, many home hi-fi receivers. They pack a reasonable amount of power (about 10 watts per channel, or more through outboard power amplifiers), and can be obtained with cassette players, and Dolby noise reduction automatically switched between FM and cassette with the proper FM de-emphasis (25 μ Sec for Dolby, 75 μ Sec for non-Dolby). Many of the better models have independent bass and treble tone controls, and front-to-rear electronic faders so you don't burn up output power in an external resistive fader. Almost all high performance models provide an electrical feed that causes a motor driven antenna to extend when the radio is turned on, and retract when the radio is turned off.

Other models have features that give a substantial extra edge to your mobile system. For example, the Jensen R420

is *bi-amped*. Touch a switch and the lows are fed to the rear speakers while the highs are fed to the front. If your car has itty-bitty front speakers you won't be forced to drive them into distortion by socking them with full-frequency power. They can be fed only the high frequency energy, which they can easily handle. If, on the other hand, you have high-power front speakers you can turn off the bi-amping and feed full-range sound to both front and rear.

Another extra in the R420, a feature to look for in other units, is protection against leaving the cassette in the player mechanism with the capstan engaged. If the ignition or the radio is turned off, while the cassette is engaged, a special "memory" sounds a beep until you eject the cassette. This prevents a flattened capstan roller, which is the prime source of cassette wow and flutter in mobile (mo-fi) tape players.

A really good AM/FM in-dash unit will have independent adjustment of bass and treble, a left-to-right balance control and a front-to-rear fader (also called front-to-rear balance), Dolby (especially important for prerecorded tape), individual front and rear stereo amplifiers (if, instead, you try to split

CAR STEREO INSTALLATION

one pair of left and right outputs to the front and rear you'll be splitting the available power).

Two other possible features to look for are a switch-selected bridge connection and pushbutton station selectors. A bridge connector will come in handy in the event that the unit of your choice has separate front and rear amps, but you intend to use either front speakers only or rear speakers only. The bridge connector allows you to incorporate the power capability of *both* amps, for use with whichever two speakers you choose. Pushbutton station selectors are handy for keeping your favorite stations at your fingertips, although sometimes in feature-laden high performance units there simply isn't enough room on the front panel to include them with everything else.

Moving on the possibilities for speaker selection, be prepared for the most confusing assortment of products in many a year. Much of the stuff is just plain bad, with very few gems to be found.

The really good speakers, and there are some exceptions to the rule, come from manufacturers whose marque is known to stereophiles, such as Epicure, Jensen, Mitsubishi, and Motorola. A few excellent models are also available from companies basically known only for autosound, such as Clarion. Except for complete speakers—meaning speakers in their own enclosures—such as those from Mitsubishi, autosound speakers are made to fit the factory cut-outs in most modern American car rear decks (6 x 9 or 4 x 10 inches),

and the front dash cutouts, which might be as small as 3½ inches. You simply remove the junk speakers presently in your car and substitute the new speakers, using the existing wiring. In many instances the improvement in sound quality attained by simply upgrading the speakers is dramatic and startling.

There are basically two types of mo-fi speakers, both shown in our photographs. In one there is a woofer with a tweeter and possibly a mid-range element to the side, such as the ones you'll get from Epicure in their model LS70. On the other hand, there is the Jensen type coaxial, or triaxial (the one shown), where the tweeter (and midrange) are mounted on a plate spanning the woofer. Both systems claim they are the best. The fact is, in autosound, the position of the tweeter and midrange have little to do with the sound quality. The sound quality depends on dozens of factors including top quality materials, workmanship and design—and you must let your ears and your own critical faculties be the final judge.

The Coaxial and triaxial models generally measure 6 by 9 inches and can be directly substituted for original equipment speakers from underneath the rear deck (through the trunk). The side-by-side models such as the Epicure LS70 are generally mounted on what appears to be an oversized plate, but upon close inspection you'll find the holes in the plate exactly correspond to that of a 6 x 9 speaker and are mounted just the same as any other 6 x 9 speaker.

If you have one of the older car models where the dealer installed the rear speakers by cutting through the rear deck from the top, and then covered the opening with a decorative grill, you can remove the grill and

substitute a surface mounting mo-fi speaker assembly that drops in from the top, from the passenger compartment. These are somewhat easier to install, especially if your car already has the cutout in the rear deck. The disadvantage is that the speaker is more noticeable when installed this way and it announces to every hoodlum passing by that you have expensive equipment in the car. (Since the CB fad died down, mo-fi gear has become the favorite ripoff item of car equipment thieves.)

A complete upgrading installation can usually be handled by the average stereophile on a Saturday afternoon if the car is one of the recent models where the radio goes in from the front, rather than the way it used to be installed: through the air conditioner duct, past the glove compartment, and finally snaked behind the dashboard and through the front. (And they call

1 Secure Unit On Mounting Plate.

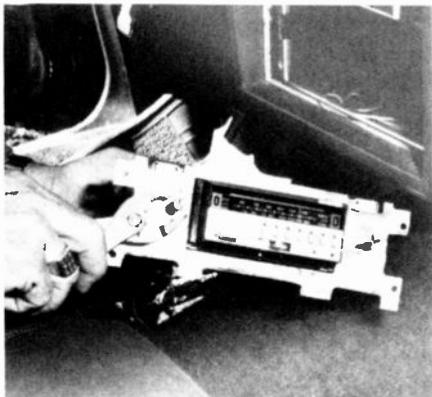
Remove your current radio from its mounting plate, and secure your new in-dash unit to it with the two mounting nuts. Tighten firmly with pliers.

2 Slide Into Dash & Fasten.

Slide the mounting plate ensemble into the dash and fasten with mounting plate screws (2 or 4). If you can't reach the wiring from underneath the dash, you'll have to connect all power and speaker wires before sliding it in. If you have access from below, connect the wires from below after the unit has been secured.

3 Replace Dash Trim Panel.

If your car has a separate trim panel like the one shown here, pop it back into position.



1 Secure Unit On Mounting Plate.



2 Slide Into Dash & Fasten.



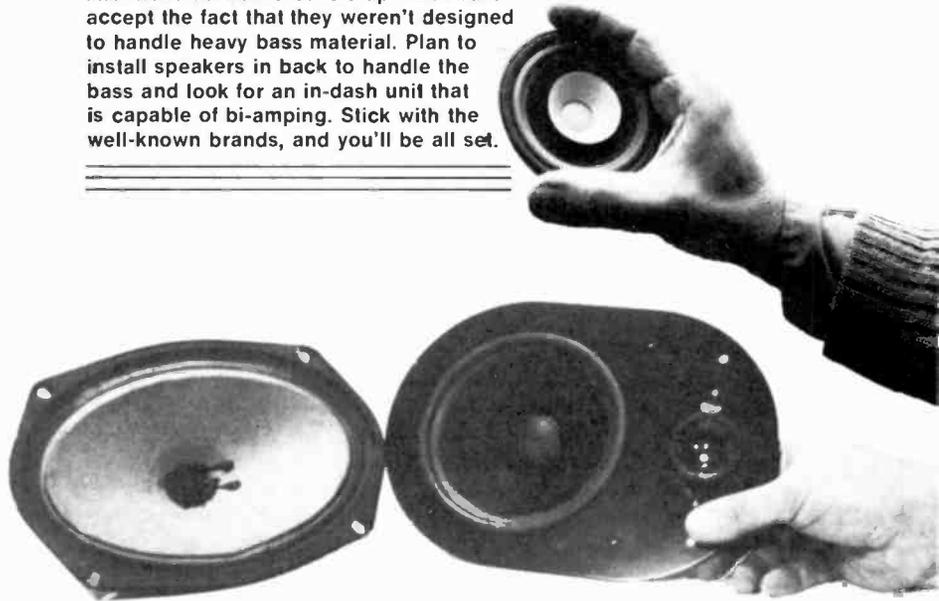
3 Replace Dash Trim Panel.

those years the "good old days".)

To install the radio (tackle only newer cars if possible), remove the screws (or pop-off fasteners) that secure the front of the dash. You'll expose a honeycomb of compartments into which the accessories such as the radio, clock, speedometer, etc., fit. On American cars, the radio is mounted on a support plate, usually held in place by two or four screws. Remove the screws and simply slide out the entire old radio assembly. Disconnect the antenna, speaker, and power wires. Remove the old radio from the support plate, mount the new radio in its place, reinstall the wires, slide the radio back into its compartment, and secure the plate. That's the whole bit.

Of course, it's more than likely that the wires from your new radio won't match the existing wiring. No problem here. All quality mo-fi units come with
(Continued on page 67)

You might opt to install 3½-inch speakers like these Jensen C-8970's up front. Just accept the fact that they weren't designed to handle heavy bass material. Plan to install speakers in back to handle the bass and look for an in-dash unit that is capable of bi-amping. Stick with the well-known brands, and you'll be all set.



At left is an ordinary 6-by-9-inch car speaker typical of those supplied with car-dealer-installed sound systems. At right is the Epicure LS70, one of the two loudspeakers we worked with. The LS70 has a separate woofer and tweeter. Larger than the ordinary 6x9 speaker, mounting holes correspond to those of the 6x9.

4 Install Unit's Trim Plate.

Add the trim plate which came with your new in-dash unit over the dash trim panel.

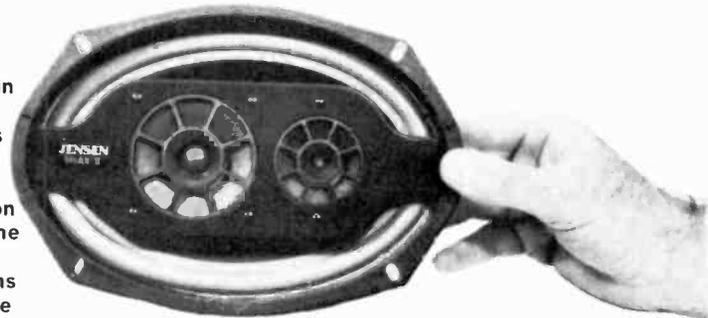
5 Replace All Knobs.

Last of all, replace all control knobs. On high quality in-dash units you'll have several controls to thread onto each shaft. (In this unit volume, bass, and treble controls are at left, and tuning, balance, and fader controls are at right.)

6 Optimize AM Reception.

At some point you must "peak" the AM reception by tuning to a weak station and adjusting a screw for loudest volume. On our Jensen unit, the adjustment screw is reached with a long screwdriver through the cassette compartment door. On other units the adjustment screw might be on the rear or side, and you will have to make the adjustment before installation in the dash.

Another approach to quality car speaker design is exemplified in Jensen's Triax II. The element that measures 6x9 is the woofer, and the midrange and tweeter are mounted on a bracket that spans the 9-in. length of the woofer. Coaxial designs omit the midrange. The Triax II's are an improved version of their triaxial design.



4 Install Unit's Trim Plate.



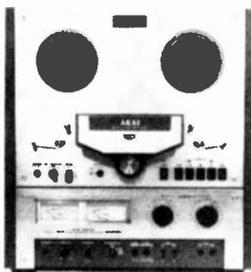
5 Replace All Knobs.



6 Optimize AM Reception.

SPOTLIGHT ON...

AKAI GX-267D REEL-TO-REEL TAPE DECK



Circle No. 122 On Reader Service Card

IT DELIVERS OUTSTANDING SOUND QUALITY WITH VIRTUALLY NO GIMMICKS

□ In today's marketplace it's almost axiomatic that a tape recorder be as complex as possible to operate: the more controls, switches, levers, meters, lamps, and dials, the greater the probability that the average stereophile will believe that he or she is hearing high fidelity sound. For example, we have come to expect that a "high fidelity" recorder will have separate switches for tape bias and equalization. Is there really a need for *two* separate switches? In fact, *single* switch could easily set the correct bias and equalization for a given type of tape.

All extra, unnecessary features—such as separate bias and equalization selectors—simply add to the overall cost. Few tape fans have real need for all the gingerbread that adorns many of the latest recorder models. *Simplicity* itself can often be the key to high-performance, in terms of both sound quality and ease of operation.

A case in point is Akai's model GX-267D reel-to-reel tape deck, which includes an auto/manual reversing mechanism that can automatically record or play both directions of a 4-track stereo/mono tape, or continuously play both directions, repeating the cycle endlessly until manually turned off. One would expect the mechanism, its controls, and ancillary features, to require

recourse to the instruction manual before each use. But this isn't the case. Fact is, the Akai GX-267D not only delivers outstanding sound quality with as few gimmicks as possible, it is also the easiest machine to operate we have seen in years.

The GX-267D is a two-speed (7.5, 3.75 ips), 3-head system, two-motor, 4-track stereo/mono tape deck accommodating reel sizes to 7 inches. Reel locks are built into the tape spindles.

If you have tried some of the auto-reversing mechanisms of the past and were disappointed with results from the *reverse* mode you're in for a pleasant surprise with the GX-267D. Rather than simply adding an extra head to provide the reverse sound mode, with the capstan pulling the tape across the heads from one direction and pushing from the other (which increases wow, flutter, and adds a host of stability problems), the Akai has two completely independent head sets, with the capstan positioned between the two so that the tape is always pulled across the head regardless of the direction of tape travel.

The reversing functions are controlled by a manual switch and by sensing foils which are applied to the tape by the user. The manual control switch sets the machine for forward drive, forward with automatic reverse when sensing foil tape has been applied at the end of the tape and is detected by the tape guide sensing pole, or continuous reversing when sensing foil has been applied to both ends of the tape. Even if the machine is set for continuous operation, it will only reverse once in the record mode. Thus each direction is recorded, yet the machine will not permit overrecording.

For manual reverse operation in the play or record mode, the normal complement of tape mechanism control switches—record interlock, REW, stop, play, FF and pause—has a *reverse* switch. Small indicator lamps directly over the play and reverse control

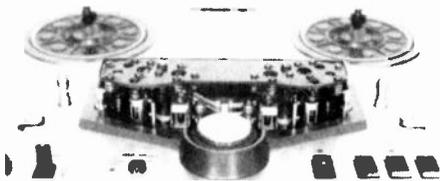
switches indicate the upcoming direction of tape travel.

Separate record selectors are provided for each track, allowing users to record on one track at a time. The switches are used primarily for sound on sound or monophonic recordings. They also serve as safety devices while recording. If both switches are *off*, the record mode cannot be entered—thereby erasing the tape—even if the tape mechanism's record interlock control is accidentally depressed.

An unusual feature for reel recorders, included on the GX-267D, is a *record mute* and its associated *timing light*. The record mute simply disables the input signal while the tape is driving in the record mode. When the record mute is activated, the timing light flashes approximately every second. If you're trying to program a tape with more or less equal "dead air" between selections, you simply count off the number or timing pulses desired before turning off the record mute.

Another convenience is a *timer start* switch, which holds the record or play control presetting, while the power source (controlled by an associated timer) is *off*. When the timer activates the power source and power is supplied to the deck, the machine starts in the user-programmed mode—either record

(Continued on page 74)



● The reason that both forward and reverse performance with this machine are identical is to be found in the tape head arrangement. Two complete sets of heads with the capstan between the two assures that the tape is always pulled—rather than pushed—over the operating heads. Tape guides on either side of the head assembly also function as sensing posts for the foil tape which activates the automatic reversing mechanism.



● A single switch allows you to select Normal operation (forward to end of tape, then stop), Auto Reverse operation (forward to end of tape, automatic reverse back to beginning of tape, then stop), and Continuous Play operation (automatic reverse at both ends). The timing light to the left of the REC MUTE selector blinks approximately once every second, allowing you to time the dead air between selections.



You've probably seen ads for it. You've probably read about it. Metal tape—or "metal-alloy" tape—the next revolution in cassette recording. But is it really here—NOW? Read on and draw your own conclusion.

To put things in perspective, let's see where tape has been and where it's going. Tape recording dates back to World War II, although the concept of magnetic recording stems from Valdemar Poulsen's wire-recorder patent—he called it a Telegraphone—issued at the turn of the century. The history of magnetic recording is one of a continuous struggle to cram more and more information onto a given length of tape and to do it at ever-reduced noise levels. Metal tape is the latest chapter in that story.

The whole objective of magnetic-tape development is to come up with a substance that readily can be magnetized

and de-magnetized (erased) when you want it to and yet retain whatever magnetic pattern you impose upon it, indefinitely and over a wide range of environmental conditions. To be able to cram lots of information in a small space, the tape must be *magnetically* divisible into very small parts. That is, you must be able to change the magnetic pattern on a microscopic scale and still have the tape retain the memory of what you've done. And the magnetic pattern imparted to the tape must be uni-

HAS ITS TIME COME?

METAL TAPE

by WILLIAM S. GORDON

METAL TAPE

form and smoothly variable in strength over a wide range to capture and preserve the dynamic range.

If this task were an easy one, the perfect magnetic tape would have been invented years ago. There's certainly been enough effort devoted to it. But it's not easy, nor has a perfect product been developed, so from time to time, we hear of new breakthroughs in tape formulation.

The magnetic coating of the first tapes was formulated from iron oxide — a particular form of iron oxide called "gamma-ferric oxide." Later tapes were formulated from improved ferric oxide. Then we saw tapes that were "doped" with cobalt — the so-called "high-energy" tapes — then chromium dioxide and, in quick succession, "cobalt-modified" iron oxide (the ferricobalts) and ferrichrome, a two-layer tape combining an underlayer of iron oxide with a top coat of chromium dioxide.

Two Important Magnetic Properties

To understand what these new products were attempting to "improve," we should have some idea of those magnetic properties that are important. A magnetic material is characterized by the basic properties — coercivity and retentivity. The coercivity is a measure of how difficult it is to magnetize (and demagnetize) the material. It is measured in oersteds (pronounced as if it didn't have the initial "o.") The greater the coercivity, the stronger the magnetic field required from the record head to impart a magnetic imprint on the tape, and the stronger the field required from the erase head to remove it.

Contrary to your probable inclination, high coercivity is desirable. Obviously, the object is not to make the recording process more difficult, but high coercivity, in a sense, makes the recording more "permanent." After the tape leaves the influence of the recording head, it's left on its own. It tends to self-demagnetize, to relax. The shorter the wavelength that was recorded on the tape, that is, the higher the frequency for a given tape speed, the greater the self erasure, and the less signal is available when the tape is played back later. So high coercivity is associated with good high-frequency characteristics. Note that this self-erasure does not increase with time. As soon as the

tape leaves the recording field, it establishes a new equilibrium. The magnetic field stemming from the pattern that was recorded influences adjacent particles and causes the de-magnetization.

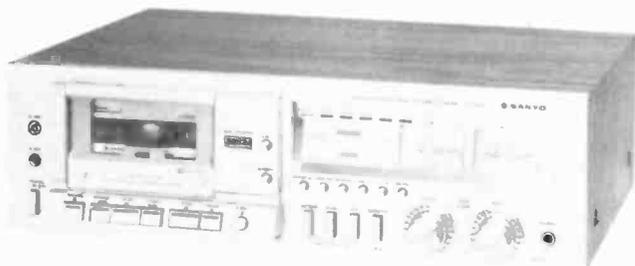
The second parameter of importance is retentivity which, as the name implies, is a measure of how well the tape "retains" the magnetic imprint, how strong the magnetic pattern is, how much "flux" emanates from the tape, flux that can be "read" by the playback head and contribute to the output signal.

Since retentivity is a "bulk" property of the magnetic material, we must know how much magnetic material is present in the coating. The thicker the coating, the greater will be the available flux even if the retentivity of the material is the same. So we have another related parameter "remanence." This tells us the maximum available flux from a *particular* piece of tape and takes into account *both* the retentivity of the raw magnetic material *and* the amount of magnetic material in the coating. Retentivity is measured in "gauss", remanence in "lines per ¼ inch."

Iron Oxide, Chrome, and Ferrichrome Tapes

Early tapes had a coercivity of about 250 oersteds and a retentivity of about 900 gauss. Improved low-noise ferrics exhibited somewhat better figures (say a coercivity of 290 oersteds and a retentivity of 1050 gauss). Researchers found that by adding the metal cobalt to the magnetic material, the coercivity could be increased quite dramatically, and high-energy tapes with coercivities of 360 oersteds were produced. The problem was that these tapes were unstable. If they were heated — even locally by friction with the moving parts of the deck — they would lose some of their magnetic imprint. The output, especially at high frequencies, would drop after repeated plays.

Chromium dioxide seemed to be the answer, and, indeed, it was a gigantic leap forward. Chromium dioxide had much higher coercivity (500 to 550 oersteds) and somewhat higher retentivity as well (1400 gauss). Furthermore, it was stable. To use the product required higher bias, recording and erase levels. (You can't have the advantages of high coercivity without its drawback; it is more difficult to record.) And, since the tape had better high-frequency recording capability, it could be used with less equalization. A new playback-equalization curve was standardized (the 70-microsecond curve) to cash in on chrome's better high frequency recording capability. The result was lower background noise — less hiss.



Sanyo's RD5370 is a solenoid-operated three-head cassette deck which has a tape selector button for metal tape among its features. Other features include timer standby switch, peak indicating VU meters, tape/source monitoring. \$400. Circle Reader Service Number 125 for details.



TEAC's C-1 cassette deck may be modified to record and play metal particle tape at a cost of \$150, freight charges included. Modification takes 2 to 3 weeks. The C-1 also offers pitch control, bias optimization modules, optional dbx module. \$1300. Circle Reader Service No. 10 for details.

The introduction of a product with such radically different magnetic properties as chromium dioxide required especially-modified tape decks. Yet the benefits were apparent and now chrome-capable decks are universally available. Chromium-dioxide manufacture was (and is) a DuPont exclusive, protected by patents. Although the chemical giant was willing to supply the material to other tape manufacturers (for a price) and even licensed one (BASF) to produce the powder, such a situation is not conducive to convincing others to rest on their laurels.

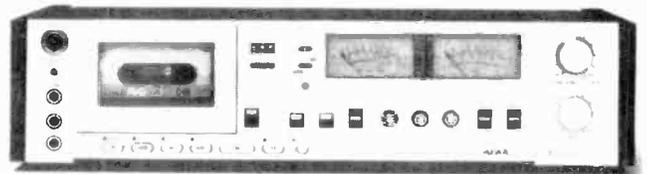
The theoretical advantages of cobalt doping were still there. The problem was one of stability. Cobalt-modified iron oxide could have as good or better properties than chromium dioxide if it would keep them. TDK was the first to solve the cobalt-stability problem with their SA product. The cobalt ions were accepted into the iron-oxide crystal lattice rather than just being admixed, and stability was achieved. Maxell followed with UDXL-II, and now we have Scotch Master II, BASF Professional-II, and Memorex High Bias—all cobalt-modified products.

When TDK introduced SA, they had their choice of characteristics. By controlling the amount of cobalt, they could "dial in" the coercivity they desired. They decided to produce a "chrome-compatible" tape—which is what SA and others of that ilk are—rather than to shake up the industry with a maverick product requiring yet another bias and equalization setting. In the lab, SA-type products were made with coercivities of 1000 oersteds, but the final SA cassette product was adjusted to have a coercivity of 540 oersteds and a retentivity of 1500 gauss.

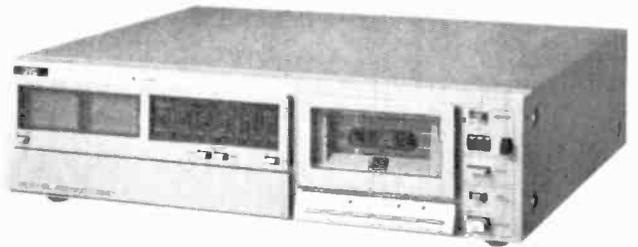
As it turned out, chrome products had better high-frequency properties than the ferrics thanks to the virtual doubling in coercivity. But the ferrics had somewhat better low-frequency properties. Ferrichromes are an attempt to marry the virtues of both in a single product. Treated as a unity, a ferrichrome tape might have a coercivity of 340 oersteds and a retentivity of 1500 gauss. By keeping a better *balance* between coercivity and retentivity, the uniformity of improvement at all wavelengths should be better. Increased coercivity has the greatest effect on the highs, retentivity on the lows.

The Advent of Metal Tape

That brings us to the emerging metal tapes which have the remarkable property of simultaneously increasing *both* the coercivity *and* the retentivity. The first
(Continued on page 70)



AIWA's AD-6700U is a front-loading cassette deck and is capable of handling the new metal particle tapes. Other features include solenoid-type mode controls, bias fine-adjustment for Normal, CrO₂, and FeCr tapes, and an LED peak indicator. \$750. Circle Reader Service No. 61.



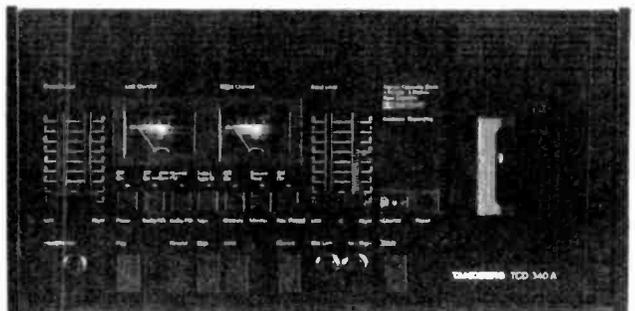
JVC's KD-A8 cassette deck includes an automatic bias and equalization optimizer system and is capable of handling metal particle tapes. Solenoid controls, Super ANRS and ANRS noise reduction systems, and timer standby switch are among its other features. \$750. Circle No. 74.



Luxman's 5K50 cassette deck requires installation of new tapehead assemblies at a later date to handle metal tapes. The \$1995 price tag includes the cost of this modification. Features include user-adjustable azimuth settings and a recording system called BRBS. Circle No. 124.



Dual's new cassette deck, the C839 RC, will be on dealer's shelves early this fall and will offer metal tape capability, automatic reversing, and optional wireless remote control. Other features include 6-position bias/EQ switch and fade/edit control. Under \$900. Write Dual for details.



Tandberg's 340AM cassette deck utilizes a three-head system (completely separate recording and playback heads and a dual-gap erase head), and is designed to handle the new metal particle tape formulations and Maxell UDXL I tape. Price is about \$1300. For details, circle No. 97.

by Fred Petras

ONE STOP SHOPPING FOR BETTER HI-FI COMPONENTS



Optonica's hi-fi component line includes receivers, tuners, cassettes, cassette decks and turntables—all of which may be housed in the rack shown here. Pictured here are the ST-3636 tuner, SM-4646 integrated amp, RT-3535 II and RT-2050 II cassette decks. Reader Service No. 81.

Hitachi's offerings include a 40 wpc integrated amp (HA-330), the FT-340 tuner, the D-550 cassette deck, and the HT-350 turntable. The rack pictured here is Mode LV-5000. Also in Hitachi's line are receivers, preamplifiers, power amplifiers and speakers. Circle Number 72 for details.

From Akai, you'll find the EQ-400 rack, which will house the GX 4000 DB reel-to-reel tape deck, the CS-732 cassette deck, the AA-1150 receiver and the AP-307 turntable. You'll also find speakers, tuners and integrated amps in Akai's line of products. For details, circle Reader Service No. 62.

More and more music lovers and sound buffs, both established and newcomers to hi-fi, are looking for fine sound the easy way—via one-brand systems.

If you fit that description, take heart. You have a broad scope of equipment to choose from, supplied by sixteen brand names—including the biggest, most respected and most widely available names in the audio industry. They are: Akai, Fisher, Hitachi, JVC, Kenwood, Marantz, Mitsubishi, Optonica, Philips, U.S. Pioneer, Sansui, Scott, Technics, Toshiba, and Yamaha.

The one-brand-system approach to buying hi-fi has several advantages:

- Shopping for a system is dramatically simplified, and can be accomplished in one store.
- Buying on a one-brand basis can sometimes mean a total-system discount, and/or a bonus in the form of one or more of the following: free delivery, free installation, free blank tapes, record and/or tape care accessories, headphones, and special in-home service courtesies.
- One-brand systems can be as flexible as multi-brand systems, and in some cases can accomplish this flexibility with less equipment, as can be found, for example, in JVC and Fisher receivers with built-in graphic equalization.
- Esthetically, the one-brand system gives you a matched look that better enables the system to be worked into the home decor. Further, most of the companies we're talking about provide special cabinets or racks to house

their equipment. Generally in wood or wood-type finish, these furniture units make integration of the system into home surroundings even easier, and generally more effective.

Relative to your choices, you can buy a system consisting of receiver, turntable and speakers in all but one (Mitsubishi) of the sixteen brands mentioned. (Mitsubishi offers a tuner/preamp and power amp combination instead of a standard receiver.) Further, they all also offer the option of a cassette deck. These same sixteen companies offer you a chance to assemble separate-component systems consisting of tuner, integrated amp (or preamp and basic power amp), turntable, speakers, along with the cassette deck option. In five brands—Akai, Philips, Pioneer, Sony, and Technics—you have the added option of a reel deck.

Several of the companies we're talking about have carried the one-brand concept to the hilt by also offering stereo headphones. These are: JVC, (U.S.) Pioneer, Sony, Sansui, Technics, Toshiba, and Yamaha.

Extras. Moreover, some of the above companies offer a few "extras" that go beyond an essential complete receiver or separates-oriented system. Pioneer, Technics and JVC, for example, offer graphic equalizers. Pioneer also offers a dynamic processor to overcome the limitations of some program sources. Sansui and Pioneer sell

reverberation amplifiers for special effects. And if super-TV sound is important to you, Pioneer provides it via a component-type UHF/VHF audio tuner. Further, Pioneer sells a timer unit, to enable you to tape a favorite radio program while away from home, or otherwise occupied. JVC has a binaural headphone/microphone combination packaged with a biphonic processor for live taping with "three-dimensional" reproduction. Sansui sells a dual-meter unit with dual mini-cue-monitor speakers to help achieve "pro" recording results.

If you buy a Scott component system you can maximize its performance via its Model 83CZ Audio Analyzer which gives readings on tone control contours, visual analysis of frequency response, readouts on various speaker positions, and checks of the tape deck. It also functions as a sound pressure level meter via its built-in microphone.

Technics offers a matching programming unit to allow the user to program the firm's quartz-synthesizer digital stereo FM tuner and other equipment over a period of up to one week. Thus the user could program the tuner and a tape recorder to turn on and operate for a set time interval, shut off, and repeat the process tuned to the same or different station(s).

As noted, buying on a brand basis is often an expression of one's acquaintance with it, and satisfaction with it. But suppose you have no specific brand preferences among the sixteen involved in this survey? Or suppose—as a newcomer to hi-fi—you've never even heard of them? In either case, let us assure you that regardless of which of these you select, your choice will be a *safe one*. A more pertinent aspect of brand choice



Among Sansui's rack-mountable products are the SC-1110 cassette deck, the AX-7 mixer/reverb unit, the AU-217 integrated amp and the TU-217 AM/FM tuner—all cased in the GX-5 rack. On top is the SR-333 direct-drive manual turntable. On either side you see the Sp-2500X speakers. Sansui also offers your choice of receivers, headphones, and vertical system racks—as well as one power amp and one preamp. Circle Reader Service Number 89.

Pioneer's product line includes receivers, integrated amps, power amps, one preamp, tuners, dynamic processor, graphic equalizer, disco mixing amplifier, digital timer clock, headphones, reel-to-reel decks, cassette decks, speakers, and an assortment of rack configurations. Pictured here are the HPM-100 loudspeakers, the CT-F900 cassette deck, the SX-1980 receiver, and the PL-630 turntable. For detailed information, please circle Reader Service Number 85.

ONE-STOP SHOPPING

would be the *scope of products* offered under a specific brand name. If you are the uncertain type, you might prefer picking from a *narrow range* of offerings. If you are certain of your preferences, you might opt for a brand name offering the *widest scope* of products from which to make a choice. To bring the matter into a better perspective, here's a basic rundown on what you'll find in the various brands of audio products to help you come to an effective, happy buying decision.

Akai: Six receivers, 15 to 120 wpc output; four integrated amplifiers, 20 to 80 wpc; three tuners; five turntables; six speaker systems; 10 cassette decks; 14 reel-to-reel recorders; one 6 in/2 out mixer; equipment cabinet.

Fisher: Twelve receivers, including five with five-band graphic equalizer system, 10 to 150 wpc; two integrated amps, 55 and 70 wpc; two tuners; five turntables; 10 speaker systems of which five come in two finishes; five cassette decks; two vertical audio cabinets.

Hitachi (Combined regular line and "Hi Tech" series): Six receivers, 18 to 200 wpc; three integrated amplifiers, 30 to 65 wpc; three power amps, 50 to 200 wps; three preamps; four tuners; seven turntables; six speaker systems; nine cassette decks; two component racks (one vertical, one horizontal).

JVC: Six receivers, 18 to 120 wpc; five integrated amps (including one with five-band graphic equalizer system), 30 to 65 wpc; three tuners; 10 turntables; three speaker systems; one mini-speaker system; nine home cassette decks; two portable stereo cassette decks; one preamp-graphic equalizer; three graphic equalizers; binaural headphone/microphone/biphonic processor system; five component racks.

Kenwood (Combined regular line and "Purist" line): Eight receivers, 14 to 160 wpc; 11 integrated amps, 20 to 150 wpc; four power amps, 100 to 300 wpc; two preamps; 10 tuners; 12 turntables; 10 speaker systems; five cassette decks; three stereo system racks.

Marantz: Twelve receivers, 15 to 300 wpc; seven integrated amps, 30 to 150 wpc; three basic amps, 86 to 152 wpc; three preamps; six tuners; five turntables; 15 speaker systems; five cassette decks.

Mitsubishi: Three power amplifiers, 75 to 150 wpc; two preamplifiers; two tuners; two tuner/preamps; three turntables; five speaker systems; two cassette decks; two mobile vertical audio equipment racks. Further, Mitsubishi offers a four-unit micro-component system consisting of matched 70 wpc amp, preamp, tuner, and cassette deck.

Optonica: Four receivers in both chrome and satin black finishes; three integrated amplifiers, with one also in black; two tuners, with one also in black; three turntables; two speaker systems; three cassette decks in both chrome and black finish; two horizontal audio equipment cabinets.

Philips: Four stereo receivers, 20 to 60 wpc; three integrated amps, 40, 60 and 80 wpc; one preamp; one



Technics ST-8044 tuner, SU-8044 integrated DC amplifier, M-22 cassette deck, SL-3200 turntable are all shown housed in the SH-510 rack. Also, shown are the SB-4500 Linear Phase speakers. The suggested price for the entire system is \$1350. In Technics' line you'll also find reel-to-reel machines, micro-components, receivers, microphones and headphones. For detailed information on Technics entire line, please circle Number 98 on the Reader Service Card.

Fisher's audio component system Model 1810 consists of the RS-1022A 22 watts per channel receiver, the MT 6115 belt-drive turntable, the CR4025 cassette deck with wireless remote control, a pair of MS 135A three-way loudspeakers, and PT 113 cabinet. Bought as a system, its price is about \$850. In addition to the component types mentioned above, Fisher also offers tuners, integrated amplifiers, and receivers with built-in graphic equalizers. Circle No. 69.

210 wpc power amp; two tuners. All of the foregoing in choice of chrome or black finishes. Also: Nine turntables; 10 speaker systems (including one tri-amplified, and three bi-amplified); one cassette deck in chrome or black finish; three reel decks.

U.S. Pioneer: Nine receivers, 20 to 270 wpc, including one four-channel unit with 40 wpc output; five integrated amps, 40 to 100 wpc; two power amps, 150 and 250 wpc; one preamp; three tuners; one TV/audio tuner; dynamic processor; graphic equalizer; reverberation amplifier; disco mixing amplifier; digital timer clock; eight turntables; 11 speaker systems; 10 stereo headphones; seven cassette decks; six reel decks; two vertical wood system racks; one mobile vertical metal system rack; one three-section EIA-standard "studio" type system rack.

Sansui: 10 stereo receivers, 26 to 300 wpc; one 60 wpc quadraphonic receiver; eight integrated amps, 25 to 160 wpc; one 110 wpc power amp; one preamp; seven tuners; one reverberation amp; one 6 in/2 out audio mixer with built-in reverb; meter monitor with cue monitor speakers; six turntables; nine speaker systems; five stereo headphones; four basic cassette decks, each available in chrome or black finishes; five vertical system racks.

Scott: Six receivers, 15 to 120 wpc; four integrated amps, 40 to 85 wpc; one 60 wpc power amp; one preamp; three tuners; seven turntables; eight speaker systems; one cassette deck; one audio system analyzer;

one mobile vertical system rack.

Sony: Seven receivers, 25 to 150 wpc; three integrated amps, 50 to 100 wpc; four preamps two tuners; two power amps, 100 and 160 wpc; one electronic crossover; 10 turntables; six speaker systems; nine stereo headphones; seven cassette decks; nine reel decks.

Technics (Regular and Professional series combined): Nine receivers, 15 to 330 wpc; five integrated amplifiers, 38 to 115 wpc; four tuners; one preamp; one equalizer; one 70 wpc power amp; one meter system; 19 turntables; 10 speaker systems; three stereo headphones; six home cassette decks; two portable stereo cassette decks; four 10½-inch reel decks; one component stand; two mobile rack mounts for professional units. Technics also offers a matched micro-component series consisting of tuner, preamp and 40 wpc power amp.

Toshiba: Seven receivers, 25 to 150 wpc; one integrated amp, 42 wpc; four tuners; two preamps; two power amps, 40 and 65 wpc; seven turntables; five speaker systems; three stereo headphones; five cassette decks; micro-component system consisting of tuner, preamp, and 40 wpc power amp; two component racks.

Yamaha: Seven receivers, 15 to 170 wpc; six integrated amps, 45 to 125 wpc; one moving coil head amp; six tuners; five turntables; eight speaker systems; three stereo headphones; three cassette decks.

Regarding the budget aspects of your buying decision, we'll offer our basic, oft-repeated bit of advice: Don't (Continued on page 67)



The Kenwood system you select might include such components as the SRC-65 equipment rack, the KD-2070C turntable with Pickering cartridge, the KA-5700 integrated amp, the KT-5500 tuner, and LSK-500 speakers. Called Separates 3, its price: about \$800. Circle No. 75.

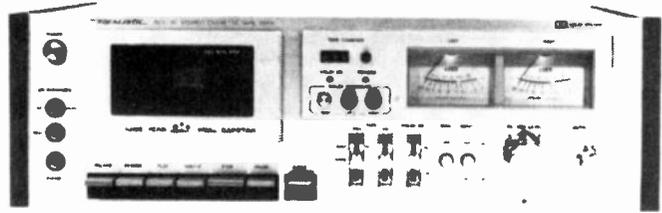
The MGA (Mitsubishi Electric) E-200 system includes the DA-U200 integrated amp, the DA-F200 tuner, the DP-200 turntable, and a pair of SS-200 speakers in a horizontal or vertical rack—all for about \$500. The DT-4105 cassette deck is \$200 extra. Circle Reader Service No. 78.

This H.H. Scott system consists of the 460A 70-wpc integrated amplifier, the 570T AM/FM tuner, the PS17 semi-automatic turntable, and a pair of 196B speakers (not shown). The complete system with rack costs about \$1500. Scott will send details, if you circle RS Number 90.

SPOTLIGHT ON...

REALISTIC SCT-30 CASSETTE DECK

Circle No. 32 On Reader Service Card



AN OUTSTANDING VALUE FOR ITS PRICE

As a general rule, the higher the fidelity the greater the number of convenience features, and the user ends up paying for both fidelity, and conveniences that might not be needed or wanted. Fact is, it is rare to find high fidelity sound in a moderately priced cassette deck because the best sound quality generally goes into the feature-packed models.

But strip out some of the frills, and perhaps a convenience feature or two, and it is possible to obtain high fidelity sound quality from a moderately priced cassette deck.

A perfect example of how to do it is the Realistic SCT-30 stereo cassette deck by Radio Shack, a company not heretofore known for high performance

cassette equipment.

Priced at only \$379.95, the SCT-30 is a *heavyweight* only where it really counts, just about every cent goes into sound quality and not "frills."

The SCT-30 is basically a front-loading cassette deck with dual capstan drive, Dolby, and a three-head system. That's right: it includes simultaneous record and playback even when recording Dolby (through a dual Dolby system). Bias and equalization selectors are provided for normal (ferric), Ferrichrome, and chrome tapes along with a single bias fine adjustment for all tape types. Other features include left and right Dolby calibration controls with a Dolby test oscillator, and left and right peak-indicating record level meters. (The test report which appears elsewhere in this issue gives an itemized list of all other features.)

A logical question is: with so much included, what was left out to keep the price in a "moderate" range? The answer takes some looking. The most obvious thing is the lack of a memory counter; instead you find an ordinary rewind counter. No great savings, but every little bit helps. Next, where is

the calibration system for the bias adjustment? There is none, and that's where a substantial savings is made.

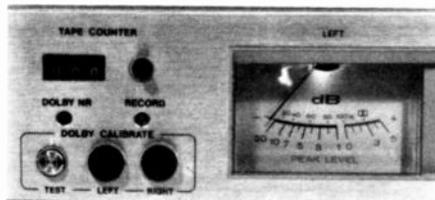
Calibration is accomplished without such a system. Using the brand of tape you prefer (you must stick to one type and brand if you want to avoid recalibrating the system), you turn the Dolby off and tune your receiver or tuner to interstation FM noise. You start recording, and as you switch back and forth between the source and tape monitor you slowly adjust the bias adjustment control located on the rear apron until the FM noise coloration from the tape sounds exactly the same as it does from the source monitor.

It's not an operation that is accomplished quickly. A really good calibration took us anywhere from 10 to 20 minutes of experimentation, but the end result can be as good as if the

(Continued on page 72)



Left and right Dolby FM calibration controls and a bias fine tuning control are located on the rear. As with the Dolby calibration, users should calibrate bias level for optimal performance with one particular type of tape and then use that tape consistently. Adjustment is made by ear, using FM interstation noise as a signal source and then finding the bias level which will allow you to match sound quality when switching from source to tape monitor.



A Dolby test oscillator and individual track level adjustments are provided on the front panel for optimizing Dolby tracking. To avoid recalibration each time a different tape is used, it is recommended that you decide to use one type of tape consistently and then calibrate the machine for that type of tape.



Tape head cleaning is a breeze with the SCT-30, thanks to the fact that the door is completely detachable. The entire tape path is completely accessible for easy cleaning with an ordinary Q-tip. No need for complicated cleaning devices here.

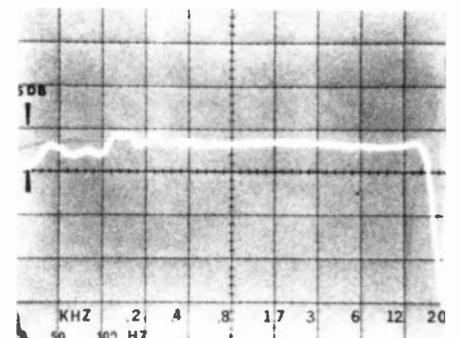


FIG. 1A

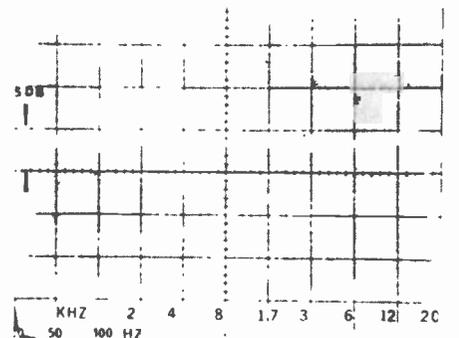
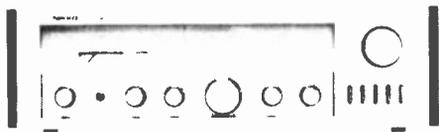


FIG. 1B

TEST REPORTS

RECEIVERS/55	62/CASSETTE DECKS
TUNERS/56	64/REEL-TO-REEL
INTEGRATED AMPS/59	65/RECORD PLAYERS
POWER AMPS/60	66/PHONO PICKUPS
PREAMPS/61	

RECEIVERS



Circle No. 150 On Reader Service Card

NIKKO NR-819 AM/FM RECEIVER

A 45-watts-per-channel receiver that measures up to our standards without any significant problems. The amplifier section is its greatest strength; while the FM tuner section is acceptable as is, its distortion characteristics could be improved by more exact factory alignment of the automatic frequency control feature. \$369, in a metal cabinet with wood trim.

DESCRIPTION: An AM/FM stereo receiver, which is FTC-rated at 45 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.05% THD. Features include a stereo beacon, FM center channel and AM/FM signal strength tuning meters, FM automatic frequency control (called "T-Lock") which is automatically applied when the hand is removed from the tuning knob, an FM mute for automatic FM stereo/mono (always mono when mute is switched off), and a subsonic filter.

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

Controls are provided for tuning AFC, volume, balance, ganged bass, ganged treble, input selection/FM muting, and speaker selection/power. There are switches for the subsonic filter, high filter, loudness compensation, mono/stereo, and tape monitor.

The FM antenna input is 75/300 ohms. An external connection is provided for AM. There are switched and

unswitched AC outlets.

Overall dimensions are 19 $\frac{1}{4}$ in. wide x 6 $\frac{1}{2}$ in. high x 12 $\frac{3}{4}$ in. deep. Weight is 22.7 lbs.

PERFORMANCE: FM TUNER: For 300 ohm and tee antennas: full limiting was attained with 5.5 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 10 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 70 μ V. Full mute release was attained with 30 μ V.

At standard test level the stereo frequency response measured +0.6/-0 dB from 50 to 15,000 Hz (the rated frequency range). Monophonic distortion measured 0.22% THD. Stereo distortion measured 0.5% THD. The signal-to-noise ratio was 62 dB. Stereo separation measured 30 dB. Selectivity was good.

Note: Substantially lower distortion was attained with the AFC held off by keeping the hand on the tuning knob, but the AFC pulled tuning to a higher value of distortion. Better actual operating distortion would be attained with a better AFC factory alignment.

PERFORMANCE-AM TUNER: Depends on the length and placement of the wire used for the AM antenna. (Note: The manual implies that there is an internal antenna, but we could not receive any stations until a wire was connected to the AM antenna terminal.)

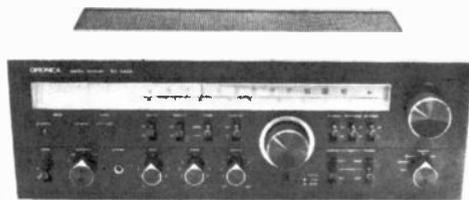
PERFORMANCE-AMPLIFIER: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 48 watts RMS. The frequency response at 48 watts/8 ohms measured +0/-0.5 dB from 20 to 20,000 Hz at a distortion no higher than 0.05% THD at any frequency.

The tone control range measured +11/-10 dB at both 50 and 10,000 Hz.

The magnetic phono input hum and noise measured -66 dB; stereo separation was 48 dB.

The subsonic filter results in an attenuation of 3 dB at 20 Hz. ▲

TEST REPORTS/RECEIVERS



Circle No. 149 On Reader Service Card

OPTONICA SA-5405 AM/FM RECEIVER

A 65-watts-per channel receiver whose features include an Air Check which may be used when recording FM broadcasts. Our lab reports an unusually clean, crisp FM sound quality. The electrical alignment of this unit is superb. \$450, in a wood cabinet.

DESCRIPTION: An integrated AM/FM stereo receiver which is FTC-rated at 65 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.08% THD.

Features include: a stereo beacon, FM center channel and AM/FM signal strength tuning meters, FM *Opto Lock* (automatic frequency control applied when the hand is removed from the tuning knob), automatic dubbing from/to either of two recorders, *Air Check* (400 Hz output tone which may be used for presetting recorders when taping from FM); 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, aux, and two tape. Outputs for two speaker systems, two tape, and phones.

Controls are provided for tuning/AFC, volume, balance, ganged bass, ganged treble, speaker selection, and input selection. There are switches for power, low filter, high filter, stereo/mono, loudness compensation, hi-blend (mpx noise filter), FM muting, Air Check, tape dubbing selector, tape monitor selector, and 20 dB audio mute.

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

Overall dimensions are 19-9/32 in. wide x 6-13/32 in. high x 15-1/32 in. deep. Weight is 27.5 lbs.

PERFORMANCE: FM TUNER: For 300 ohm and tee antennas: Full limiting was attained with 3.2 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 8 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 55 μ V. At standard test level, the stereo frequency response measured ± 0.8 dB from 30 to 15,000 Hz, down 2 dB at 20 Hz. Monophonic distortion measured 0.13% THD. Stereo distortion was 0.08% THD. The signal-to-noise ratio measured 71 dB. Stereo separation was 40+ dB. Selectivity was very good.

The automatic frequency control (AFC) goes in very hard with a perfectly aligned center-channel pull-in. It provides the most accurate automatic tuning of any AFC system we have used. (The FM center channel tuning meter is unneeded because on this receiver the AFC pulls the tuning to precise center channel tuning.)

The Air Check output level is equal to 60 to 70 percent modulation of the FM transmitter. It has no relationship to anything. Figure your recorder, using the Air Check, should be set about 1.5 dB below what you use as the "O-VU" or "peak" record level.

Our listening panel reported an unusually impressive clean, crisp FM sound.

PERFORMANCE: AM TUNER: Background noise was higher than average.

PERFORMANCE: AMPLIFIER: The power output per channel at the clipping level with both channels is driven 20 to 20,000 Hz into 8 ohms measured 69 watts RMS. The frequency response at 69 watts/8 ohms measured ± 0.5 dB from 20 to 20,000 Hz at a distortion no higher than 0.095% THD at any frequency.

The tone control range measured +14/-15 dB at 50 Hz; +8/-10 dB at 10,000 Hz.

The magnetic phono input hum and noise measured -65 dB; stereo separation was 57 dB.

Note: There was a slight self-oscillation when the treble boost just touched the maximum setting. This might be uncharacteristic of other units. If not, simply back off the treble boost so it isn't against the "stop"; it will have no effect on the maximum treble boost. ▲

TUNERS



Circle No. 148 On Reader Service Card

DESCRIPTION: An FM stereo tuner featuring a digital frequency readout, stereo beacon, center channel and signal strength tuning meter, 25 and 75 μ Sec de-emphasis, a 10 dB output attenuator, stereo-only operation in addition to the usual mono, and auto-stereo modes, and a dual-level mute.

SAE 8000 FM TUNER

A feature-laden FM tuner which includes 1/2-inch high LED digital frequency readout, switch-selectable 25- and 75- μ Sec de-emphasis, high blend filter, 10 dB output attenuator. Its price: \$700 in a 19-inch rack-mount panel.

There are outputs for line level, tape (a stereo "phone" jack on the front panel), oscilloscope, and the FM detector.

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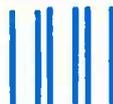
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TEST REPORTS/ INTEGRATED AMPLIFIERS

There is one control: for tuning. Switches are provided for power, mute level 1 or 2, mute defeat, 10 dB output attenuator, stereo filter (hi-blend), 25/75 uSec de-emphasis, mono, and stereo-only (auto mono-stereo with both switches on).

The antenna input is 75/300 ohms.

Overall dimensions are 19 in. wide x 5.75 in. high x 10.5 in. deep.

PERFORMANCE: For 300 ohm and tee antennas: Full limiting was attained with 3 uV input. The monophonic high fidelity sensitivity (60 dB quieting) measured 7 uV. The stereo high fidelity sensitivity (55 dB quieting) was 50 uV.

Full mute release was attained with 4.5 or 12 uV, depending on the setting of the mute level selector.

At standard test level, the stereo frequency response with 75 uSec de-emphasis measured +0.1/-0.5 dB from 20 to 15,000 Hz. With 25 uSec de-emphasis, the stereo frequency response was +0.5/-0.2 dB from 20

to 15,000 Hz. Monophonic distortion measured 0.1% THD. Stereo distortion was 0.35%. The signal-to-noise ratio measured 68 dB. Stereo separation was 40+ dB. Selectivity was excellent. Note: For minimal distortion, tuning must be precisely on the meter-indicated center channel. Distortion rises rapidly on either side of "center." The output level corresponding to 100% modulation measured 960 mV.

PERFORMANCE—DIGITAL READOUT: The digital readout is an "interpolation" of conventional tuning and is sufficiently accurate to put the user right on the station. Final tuning for optimum reception is done by adjusting the tuning for a meter-indicated center channel. The digital readout increments are 100k Hz units, such as 91.1, 91.2, 91.3, 91.4, 91.5, etc. Though U.S. FM assignments are "odd" (91.1, 91.3, etc.), the "even" steps cause no errors or confusion. In particular, the large 0.5-inch LED numerals are easy to see and proved to be a decided operating convenience. ▲

INTEGRATED AMPLIFIERS



Circle No. 149 On Reader Service Card

OPTONICA SM-3205 INTEGRATED AMPLIFIER

A 40-watts-per-channel integrated amplifier that is remarkably compact, considering its power rating. Features include output power meters calibrated both in watts into 8 ohms and in dB increments, dubbing capability to and from either of two recorders, and 20-dB muting switch. \$250 in metal cabinet with wood trim.

DESCRIPTION: An integrated stereo amplifier which is rated at 40 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.19% THD. Features include: left and right output power meters calibrated 0.01 to 70 watts into 8 ohms and -40 to +2.5 dB with 0-dB equal to 40 watts/8 ohms; automatic dubbing to and from 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, tuner, aux, and two tape. Outputs for two speaker systems, two tape machines, and headphones.

Controls are provided for volume, balance, ganged bass, ganged treble, input selection, and speaker selection. There are switches for power, low/high filter (not both simultaneously), loudness compensation, 20 dB muting, tape dubbing selector, tape monitor selector, and mono/stereo mode.

Switched and unswitched AC outlets are provided.

Overall dimensions are 17-7/16 in. wide x 5-11/16 in. high x 10 in. deep. Weight is 20.9 lbs.

PERFORMANCE: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 42 watts RMS. The frequency response at 42 watts/8 ohms was +0/-0.5 dB from 20 to 20,000 Hz at a distortion no higher than 0.15% THD at any frequency.

The tone control range measured ± 12 dB at 50 Hz; ± 9 dB at 10,000 Hz.

The magnetic input hum and noise measured -67 dB; stereo separation was into the noise level.

The output power meters measured ruler flat from 50 to 20,000 Hz, down 3 dB at 20 Hz. Output power calibrations were consistently 20% higher than the actual output power.

The low cut filter is semi-subsonic filter; when in use, response measures 3.5 dB down at 30 Hz, 6 dB down at 20 Hz. ▲



Circle No. 147
On Reader Service Card

DESCRIPTION: An integrated stereo amplifier, which is FTC-rated at 80 watts RMS per channel into 8 ohms, 10 to 20,000 Hz, at a distortion of 0.005% THD. Features include: switch-selected cartridge resistive loading of 100, 10k, 25k, 50k and 100k ohms and capacitive loading of 100, 200, 300, 400 and 500 pF; a phono input radio frequency interference filter; 12-step left and right output power fluorescent light-bar displays

TEST REPORTS / INTEGRATED AMPLIFIERS

PIONEER SA-8800 INTEGRATED AMPLIFIER

A feature-laden non-switching amplifier rated at 80 watts per channel. Features include phono cartridge resistive loading selection, phono cartridge capacitive loading selection, phono input radio frequency interference filter, fluorescent output display—and that's just naming a few. Our lab found that it has exceptionally low distortion and exceptionally fine sound. Total control of cartridge loading allows users to fine-tune the performance of virtually any phono pickup cartridge—getting just a little extra out of whatever pickup you choose to use. \$550 in wood cabinet.

calibrated from 0.001 to 80 watts into 8 ohms; a subsonic filter; automatic dubbing to and from either of two tape recorders; tone control defeat; break-in connections for accessory equipment (such as graphic equalizer); 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, aux, tuner, 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, resistive cartridge loading, and capacitive cartridge loading. There are switches for power, tone control defeat, subsonic filter, loudness compensation, high filter, tape-duplicate selector, and tape monitor selector. The phono input RF filter in-out switch is on the rear apron.

Two switched and two unswitched AC outlets are provided.

Overall dimensions are 17-11/16 in. wide x 6 1/8 in.

high x 16 3/4 in. deep. Weight is 34.4 lbs.

PERFORMANCE—AMPLIFIER: The power output at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 84 watts RMS. The frequency response at 84 watts/8 ohms measured +0/-0.2 dB from 20 to 20,000 Hz at a distortion no higher than 0.007% THD at any frequency.

The tone control range measured +11/-13 dB at 50 Hz; +9.5/-11 dB at 10,000 Hz.

The subsonic filter resulted in an attenuation of 2.2 dB at 20 Hz.

The phono input RF filter appeared to have no effect on sound quality. Its effectiveness in suppressing radio frequency interference remains an unknown factor because the amplifier was completely immune to interference when placed adjacent to both high power shortwave transmitters and CB transceivers. Whatever, the filter causes no degradation to the sound quality when used with standard, commonly-used pickups.

PERFORMANCE—OUTPUT POWER INDICATORS:

Each sector has a turn-on factor of about 1.5 to 2.2, which is also slightly frequency dependent at the extremes of 20 and 20,000 Hz. The power readings are therefore approximate: for example, at 1000 Hz the 10-watt sector will illuminate over the range of 9 to 20 watts. The "action" is a peak-signal rise with a delayed decay, producing the visual effect of a flowing light-bar.

PERFORMANCE—CARTRIDGE LOADING: The listening panel reported that the cartridge loading is so extensive it is possible to fine tune a little bit extra in the way of sound quality out of any high performance pickup. A few of the settings, however, degraded overall sound quality, but the selection is so broad you can find the optimum capacity/resistance for virtually any commonly-used pickup. ▲

POWER AMPLIFIERS



Circle No. 146
On Reader Service Card

DESCRIPTION: A stereo power amplifier which is FTC-rated at 75 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.01% THD. This unit can be used as an independent power amplifier, or it may be docked with a preamplifier to form an integrated amplifier. It also may be docked with a tuner/preamplifier to form an integrated receiver. The DA-A7DC has its own power and speaker selection switches whose functions can be transferred through

MITSUBISHI DA-A7DC POWER AMPLIFIER

A power amplifier that demonstrated in our lab that it is capable of exceeding the specs published by the manufacturer without any struggle. It offers notably low distortion measurements and the listening panel reported an exceptionally clean sound with a superb deep bass that can literally be felt. \$330.

a special patch cable to any of the docking components.

There is one line level input. Outputs for two speaker systems and the speaker patch cable.

An output hold-off prevents power supply turn-on transients from being fed to the speakers.

Overall dimensions are 16 3/4 in. wide x 6 3/4 in. high x

TEST REPORTS/PREAMPLIFIERS

7½ in. deep. Weight is 26.6 lbs.

PERFORMANCE: The power output per channel, at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms, measured 85 watts RMS. The frequency response at 85 watts/8 ohms measured ruler flat from 20 to 20,000 Hz at a distortion no higher than 0.007% THD at any frequency. Distortion measurements fall to even lower values when the amp is

putting out 70 watts. The signal-to-noise ratio referenced to 10 watts output was better than 90 dB.

Power output of 85 watts/8 ohms was attained with a 1.1 volt input.

The listening panel reported an exceptionally clean sound and a "superb deep bass we could actually feel." ▲



Circle No. 150 On Reader Service Card

NIKKO ALPHA III POWER AMPLIFIER

This power amp is rated at an output of 80 watts per channel with no more than .006% THD. It put out 95 watts per channel in our lab, ruler flat from 20 to 20,000 Hz, and with no more than .0085% THD—a distortion figure so low that it is just about immeasurable with our test equipment. \$520, in a metal cabinet with 19-inch rack panel.

DESCRIPTION: A stereo power amplifier FTC-rated at 80 watts RMS per channel into 8 ohms 20 to 20,000 Hz, at a distortion of no more than 0.006% THD. Features include: left and right peak indicating 13-step

LED output power indicators calibrated from $-\infty$ to +3 dB, and from 0 to 160 watts for 8 ohms loads (with 0-dB representing 80 watts); an output hold-off that prevents power supply turn-on transients from being fed to the speakers; and dual inputs for each channel, one a direct DC connection, the other "normal" (meaning a DC blocking capacitor).

There is one set of speaker outputs for each channel.

Only a power switch is provided. The volume level is controlled by the associated equipment.

Overall dimensions are 19 in. wide x 5½ in. high x 12¾ in. deep. Weight is 35.2 lbs.

PERFORMANCE: The power output per channel at the clipping level with both channels driven into 8 ohms measured 95 watts RMS. The frequency response at 95 watts/8 ohms measured ruler flat from 20 to 20,000 Hz at a distortion no higher than 0.0085% THD at any frequency. The signal-to-noise ratio referenced to a 10-watt output was 95 dB wideband.

The rated output of 80 watts/8 ohms was attained with a 1-volt input. ▲

PREAMPLIFIERS



Circle No. 146 On Reader Service Card

MITSUBISHI DA-C7 TUNER/PREAMPLIFIER

This dual-purpose component may be docked with any of three Mitsubishi power amplifiers to form a complete ensemble. Its performance meets our expectations without problems, with a special mention going to an unusually quiet AM tuner section. \$360, in metal cabinet.

DESCRIPTION: A combination AM/FM stereo tuner-preamplifier featuring a stereo beacon, FM center channel and AM/FM signal strength tuning meters,

wide and narrow FM IF selectivity, a subsonic filter, automatic dubbing from/to either of two recorders, speaker selection/control for a matching associated power amplifier through a special patch cable, and an FM mute (always on in the auto stereo/mono mode, and off when the FM tuner mode is set for mono).

Though the unit can be used as a separate component, it is also constructed to mechanically dock with one of three matching power amplifiers to form an integrated receiver.

There are inputs for two magnetic phono, aux, and two tape. Outputs for line and two tape, and phones.

There are controls for tuning, volume, balance, left bass, left treble, right bass, right treble, and input selection. Switches for power, AM/FM tuner mode, left tone control defeat, right tone control defeat, subsonic filter, mono/stereo, tape monitor selection, tape duplicate selection, wide/narrow FM selectivity, FM muting, speaker system A, and speaker system B.

The FM antenna input is 75/300 ohms. A rod antenna and external connection are provided for AM. Two switched and two unswitched AC outlets are provided. A speaker control outlet is also provided.

Overall dimensions are 16¾ in. wide x 6¾ in. high x

TEST REPORTS / PREAMPLIFIERS

11½ in. deep. Weight is 16.5 lbs.

PERFORMANCE—FM TUNER: For 300 ohm and "tee" antennas: Full limiting was attained with 8 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 10 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 75 μ V. Full mute release was attained with 6 μ V.

At standard test level, the stereo frequency response measured +0.5/-2.5 dB from 20 to 13,000 Hz; down 4 dB at 15,000 Hz. In the wide IF mode, the monophonic distortion measured 0.13% THD; stereo distortion was 0.4% THD. In the narrow IF selectivity mode the monophonic distortion was 0.25% THD; stereo distortion was 0.7% THD. The signal-to-noise ratio measured 63 dB. Stereo separation was 40+ dB. Selectivity in the narrow mode was very good; in the

wide mode it was fair.

PERFORMANCE—AM TUNER: Notably quiet. One of the best we've seen.

PERFORMANCE—PREAMPLIFIER: Note: Tests were conducted at the rated output of 1-volt.

The frequency response measured +0/-1.5 dB from 20 to 20,000 Hz at a distortion no higher than 0.02% THD at any frequency. The output clipping level measured 11 volts.

The tone control range measured \pm 12 dB at 50 Hz; +11/-10 dB at 10,000 Hz.

The subsonic filter had an effect of only -0.6 dB at 20 Hz.

The magnetic input hum and noise measured 66 dB; stereo separation was 47 dB. ▲

CASSETTE DECKS



Circle No. 145 On Reader Service Card

HARMAN/KARDON hk3500 CASSETTE DECK

A three-head cassette deck that's jam-packed with features. Among its convenience features are microphone and line input mixing, bias trim (fine-tuning) adjustment with 8 kHz calibration oscillator, 400 Hz oscillator for Dolby calibration, and automatic end-of-tape stop/disengage. Its price is about \$549, including a metal cabinet.

DESCRIPTION: A front-loading three-head system (simultaneous record/playback) Dolby cassette deck featuring: microphone and line input mixing; left and right peak reading level meters; left and right LED peak record level indicators; bias and equalization selectors for low noise, ferrichrome, and chrome tapes; a "bias trim" adjustment; an 8 kHz calibration oscillator for the bias trim; left and right Dolby record level calibration adjustments; a 400 Hz oscillator for the Dolby calibration; a (record) subsonic filter; a record mute (disables input signal while tape feeds); a memory reset counter, screwdriver-adjust controls for tape speed, and Dolby play calibration (requires accessory Dolby calibration tape); concentric "markers" for the line and microphone level controls; and automatic end-of-tape stop/disengage.

There are inputs for microphones, normal line level and low line level (extra amplification). Outputs are provided for line and phones.

Controls are provided for concentric-clutched left

and right line level, concentric-clutched left and right microphone level, bias trim, and concentric-clutched output level. There are recessed screwdriver-adjust front panel controls for left and right Dolby record calibration. Switches for power, bias, equalization, Dolby/bias test tone, Dolby/Dolby with mpX filter, subsonic filter, tape/source monitor, record mute, and counter memory on-off. The rear apron has recessed screwdriver-adjust controls for tape speed and left and right Dolby play calibration.

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

Overall dimensions are 16-13/16 in. wide x 7¾ in. high x 11-5/16 in. deep.

PERFORMANCE: The playback frequency response from a standard test tape with a 40 to 12,500 Hz frequency range measured +1/-2.5 dB.

Using TDK-AD tape: without Dolby, the record/play frequency response measured +0.8/-0 dB from 50 to 15,000 Hz, rising to +6.5 dB at 30 Hz. Distortion at the meter-indicated 0-dB peak record level was 1.5% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 45 dB. With the Dolby active, the record/play frequency response measured essentially the same, as did the distortion and headroom. The signal-to-noise ratio measured 49 dB wideband; 59 dB narrowband.

Using Sony ferrichrome tape: with Dolby, the record/play frequency response measured +0/-2 dB from 25 to 8000 Hz, down 3 dB at 10,000 Hz. Distortion at the meter-indicated 0-dB record level was 1.6% THD with 5 dB headroom to 3% THD. The signal-to-noise ratio measured 50 dB wideband; 64 dB narrowband.

Using Scotch Master II tape: with Dolby, the record/play frequency response measured +2/-3 dB from 20 to 13,000 Hz. Distortion at the meter-indicated 0-dB record level was 1.8% THD with 6 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 55 dB wideband; 64 dB narrowband.

The maximum output level corresponding to a 0-dB record level was nominally 1.1 volt maximum.

The subsonic filter had an unusual effect: down 3 dB at 25 Hz, up 1.5 dB at 15 Hz, down 2 dB at 12 Hz,

down 3 dB at 10 Hz. (We cannot understand the rise at 15 Hz, or the 3 dB attenuation at 25 Hz.)

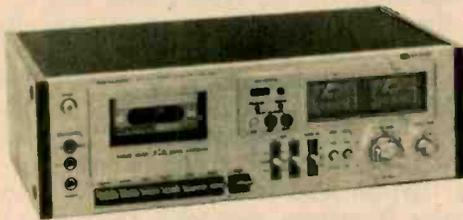
The peak record level indicators illuminate sharply when the signal is 3 dB higher than the meter-indicated 0-dB level.

Wow and flutter measured 0.12% steady.

The bias calibration system has two inconveniences. First, the calibration point is at a -20 dB meter reading and is supposed to be set within 3 dB of the mark. There's no way anyone can accurately estimate within

3 dB at the -20 dB mark, and error can sharply affect performance. Secondly, for some reason the bias trim can produce a -20 dB reading when set too low: the meter looks correct but performance is way out of line. For most effective performance, the bias trim should be set coming down from the high side.

The speed control adjustment provided a range of adjustment of $\pm 10\%$; it has a detent "stop" at the normal setting. ▲



Circle No. 144 On Reader Service Card

REALISTIC SCT-30 CASSETTE DECK

A front-loading, dual capstan, three-head, Dolby cassette deck whose features include a user-adjustable bias level control (on rear apron) and an unusual, but effective, Dolby calibration system. Its price: \$380, including metal cabinet.

DESCRIPTION: A front-loading, dual capstan, three-head system (simultaneous record/play) Dolby stereo cassette deck featuring left and right calibrated peak-reading record level meters, bias and equalization selectors for Normal, Ferrichrome, and chrome type (high bias) tapes, a user-adjustable bias level control (uses interstation noise from an FM tuner as the reference tones), front panel left and right Dolby calibration adjustments, rear apron left and right FM Dolby calibration adjustments, a test oscillator system for the Dolby, friction-held position markers concentric with the record and output level controls, automatic end of tape stop/disengage, and a reset counter.

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

There are controls for concentric-clutched left and right record level, and ganged output level. Switches for power, bias, equalization, Dolby/FM Dolby, tape/source monitor, microphone/aux input selection, and Dolby test oscillator on-off. Screwdriver-adjust controls are provided on the front panel for the Dolby calibration, on the rear apron for the FM Dolby calibration (using the test tone transmitted by the Dolby station). The rear apron includes the bias level adjustment.

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

Overall dimensions are 17-15/16 in. wide x 5-11/16 in. high x 10 in. deep. Weight is 8.5 lbs.

PERFORMANCE: Note: Though we tested three types of tape the manufacturer suggests that you decide on one particular type of tape, optimize performance for that tape, and then use that tape only.

The playback frequency response from a standard test tape with a 40 to 12,500 Hz frequency range measured ± 2 dB.

Using TDK-D tape: without Dolby, the record play frequency response measured +0.5/-1 dB from 30 to 15,000 Hz, down 2 dB at 20 Hz. Distortion at the meter-indicated peak record level of 0-dB was 1.1% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 45 dB.

With the Dolby active, the record/play frequency response was +0/-2 dB from 20 to 14,000 Hz. (Excellent Dolby tracking.) Distortion and headroom remained the same. The signal-to-noise ratio referenced to 0-dB record level was 47 dB wideband, 57 dB narrowband.

Using TDK-SA tape (high bias): with Dolby, the record/play frequency response measured +2/-1.5 dB from 30 to 15,000 Hz, down 2.5 dB at 20 Hz. Distortion at the meter-indicated 0-dB record level was 1.0% THD with 9.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 47 dB wideband, 62 dB narrowband.

Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured ± 2 dB from 20 to 15,000 Hz. Distortion at the meter-indicated 0-dB record level was 1.1% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 42 dB wideband, 58 dB narrowband.

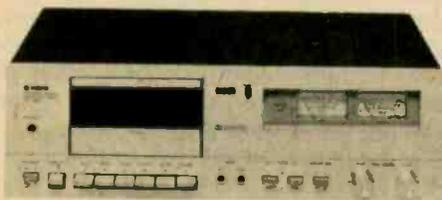
The maximum output level corresponding to a 0-dB record level was nominally 620 mV.

Wow and flutter was a notably stable: 0.08%.

The peak reading meters are calibrated to a VU standard rather than to 3% THD, so relatively speaking there is excessive headroom. In order to enhance signal-to-noise ratios, recording levels may be pushed as close as possible to 0-dB, allowing considerable peaks into the "red area." The pointer decay is very slow, almost a "peak hold," permitting quite accurate level optimization when recording if you can get a chance to make a level check.

The bias adjustment is very broad, permitting optimization to a broad range of tapes. Proper use of the Dolby calibration system yields excellent results from budget priced tapes. Trying to set the bias by matching the playback "tone" of FM interstation noise to the recorder input (source monitor) is somewhat of a tiresome job, but it does work quite well. Optimum Dolby tracking is attained if the playback of the test oscillator is 1 dB higher than specified in the manual. Overall, notably excellent results can be attained for a moderate price if you follow the instruction manual and optimize for one type and brand of tape. ▲

TEST REPORTS / CASSETTE DECKS



Circle No. 143 On Reader Service Card

YAMAHA TC-320 CASSETTE DECK

A two-head Dolby cassette deck which is a Spartan's dream. Not a single extra frill will pester you, yet you'll get superb electrical alignment and outstanding performance at a very reasonable price. \$240, in a metal cabinet.

DESCRIPTION: A front-loading Dolby stereo cassette deck featuring bias and equalization selectors for LH (normal) and chrome tapes, calibrated left and right 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 record level, and right record level. Switches for power, bias select, equalization select, and Dolby.

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

Overall dimensions are 17½ in. wide x 5½ in. high x 11¼ in. deep. Weight is 12.6 lbs.

PERFORMANCE: The playback frequency response from a standard test tape with a 40 to 12,500 Hz range measured +1/-0.6 dB.

Using Maxell UD tape (for LH): without Dolby, the record/play frequency response was almost ruler flat from 80 to 15,000 Hz, down 2 dB at 40 Hz. Distortion at the meter-indicated 0-VU record level was 1% THD with 9 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 47 dB.

With the Dolby active, the record/play frequency response measured +0.5/-2 dB from 40 to 14,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.8% THD with 10 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 52 dB wideband; 59 dB narrowband.

Using TDK-SA tape (chrome bias): with Dolby; the record/play frequency response measured ±1.5 dB from 40 to 14,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.9% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 52 dB wideband; 61 dB narrowband.

The output level corresponding to a 0-VU record level was nominally 450 mV.

Wow and flutter measured 0.09%.

Overall performance would be considered exceptionally good even for a machine double the TC-320's price. It has one of the finest electrical alignments we have seen regardless of price. ▲

REEL-TO-REEL



Circle No. 142 On Reader Service Card

AKAI GX-267D REEL-TO-REEL DECK

An unpretentious reel-to-reel machine which delivers outstanding sound quality and is also the easiest machine to operate that we've seen in quite some time. Detailed discussions may be found in the Spotlight On: Akai feature elsewhere in this issue. \$800, in a wooden cabinet.

DESCRIPTION: A two-speed (7.5, 3.75 ips), three-head system, two motor, 4-track stereo/mono reel-to-reel

tape deck featuring manual and automatic reversing for both play and record; also, continuous play. Unit accommodates reel sizes to 7-inches, and reel locks are built in. The capstan is centered between two independent sets of heads so that the tape is always pulled—rather than pushed—across the heads regardless of tape direction. Automatic reverse functions are controlled by sensing foil applied to the tape by the user.

Other features include: microphone/line mixing with concentric control markers; left and right calibrated VU meters; independent left and right record selectors; a record mute (disables input signal) with an associated indicator lamp that provides timing pulses spaced approximately 1 second apart; a timer-control selector; 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 concentric-clutched microphone level, concentric-clutched line level, and ganged output level. There are switches for power, tape/source monitor, left record selector, right record selector, tape speed, tape type (low noise and wide range with associated tape chart), forward/reverse/continuous tape drive, record mute, and timer-controlled start/record.

The tape mechanism has touch-buttons for the record interlock, REW, left tape drive, stop, right tape drive, FF, and pause/record muting off. In the record mode, the tape records forward and reverse and stops when set for "continuous play," thereby preventing overrecording of the first track(s).

Overall dimensions are 17.3 in. wide x 18.5 in. H x 9.8 in. deep. Weight is 45.5 lbs.

PERFORMANCE: At 7.5 ips, the playback frequency response from a standard test tape with a 50 to 15,000 Hz range measured $+3/-0$ dB. At 3.75 ips, the playback from a standard test tape with a 50 to 7500 Hz range measured $+1/-1.5$ dB.

Using Maxell UD/35-90B tape: at 7.5 ips, the record/play frequency response measured $+1/-1.5$ dB within the specified frequency range of 30 to 20,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.38% THD with 10 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 52 dB.

At 3.75 ips, the record/play frequency response

measured $+0/-2$ dB from 50 to 20,000 Hz, down 3 dB at 43 Hz. Distortion at the meter-indicated 0-VU record level was 0.65% THD with 7 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 52 dB.

The maximum output level corresponding to a 0-VU record level was nominally 750 mV.

Wow and flutter measured 0.03% steady at 7.5 ips; 0.05% to 0.07% at 3.75 ips. (Same performance in reverse direction.)

Though the signal-to-noise ratio of 52 dB is not spectacular, keep in mind that there is at least 7 dB of headroom, allowing the levels to be crammed as close as possible to 0-VU without fear of peak signal distortion. Also, the noise is relatively broad-spectrum, rather than concentrated to the band of frequencies to which the ear is most sensitive, and recordings sound to the ear less noisy than those made on many machines having more impressive signal-to-noise ratio measurements. ▲

RECORD PLAYERS



Circle No. 141 On Reader Service Card

SANYO TP 1012 SEMI-AUTOMATIC RECORD PLAYER

A two-speed turntable whose motor starts when the tonearm is moved off its rest. Tonearm is returned to its rest and shuts off automatically either at the end of play or when the *reject* button is pressed. No overhang gauge is provided which makes phono pickup installation difficult. Extra care must be taken to insure that the stylus is not damaged during installation. However, the unit also has higher than average resistance to external shock and vibration—the stylus stays in the groove even under adverse conditions and its performance in the lab is quite respectable. \$140, including integral base and dust cover.

DESCRIPTION: A two-speed (33, 45 rpm), electronically-controlled record player with integral base and dust cover. Features automatic tonearm return and shut-off

(after the end of play or when the *reject* button is depressed). The motor starts when the tonearm is moved off its rest. Other features include full-time illuminated 33 and 45 strobes around the rim of the platter, and separate 33 and 45 rpm pitch (fine-speed) controls.

There are controls for speed selection, 33 pitch, 45 pitch, reject, and tonearm lift.

The tonearm has a micrometer-adjust counterweight that also serves as a 0 to 4 gram vertical tracking (VTF) adjustment calibrated in 0.25-gram increments. There is a calibrated anti-skate. The pickup mounts in a universal plug-in carrier for which no overhang gauge is provided; only a measurement in the manual indicates the correct distance from the center of the spindle to the stylus. The tonearm rest has a locking device. The output cable capacity was 125 pF.

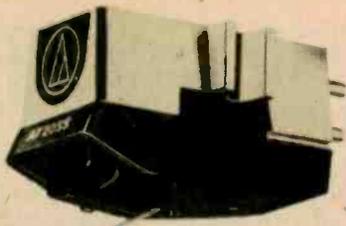
PERFORMANCE: Both speeds held constant over an applied test range of 90 to 140 volt with complete immunity to transient line voltage variations. The pitch control ranges measured $+4.8/-5.7%$ at 33 rpm; $+2.8/-4.7%$ at 45 rpm. Wow and flutter measured 0.04% with peaks to 0.18%.

The tonearm's VTF calibrations were within 0.1-gram accuracy.

Note: This record player has higher than average resistance to external shock and vibration; the stylus tends to stay in the groove. Lack of an overhang gauge, and the use of a spindle stylus measurement for overhang, makes proper adjustment of the pickup in the carrier difficult. Take extreme care not to damage the stylus when making the adjustment. ▲

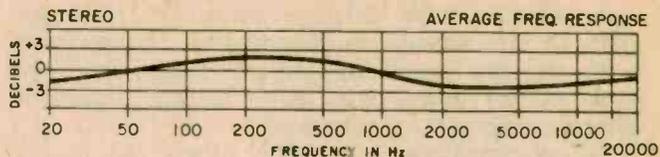
Readers often ask what we mean when we say that the performance of a piece of equipment is *average*. We have established high critical standards for all pieces of equipment that are reviewed on these pages. After all, we are concerned with high fidelity components—not just any gear that produces sound. An *average* rating means that the component meets our rigid performance standard and is a good buy in its price range.

TEST REPORTS / PHONO PICKUPS



AUDIO TECHNICA AT-20SS PHONO PICKUP CARTRIDGE

Offers very good overall sound quality, slightly on the mellow side when compared with other high performance/high compliance pickups. \$195.



DESCRIPTION: A magnetic phono pickup with a "Shibata" stylus. The manufacturer's recommended VTF is $\frac{3}{4}$ to 1 $\frac{1}{4}$ gram, with the 1 $\frac{1}{4}$ -gram value specifically recommended.

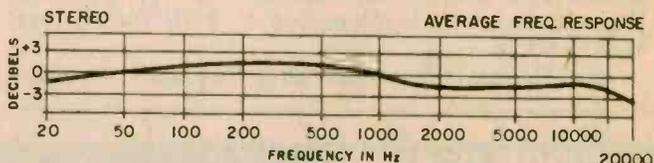
PERFORMANCE: The frequency response measured within ± 2 dB from 20 to 20,000 Hz with essentially perfect channel balance. The worst-case stereo separation measured 25 dB at 1000 Hz; 23 dB at 15,000 Hz. ▲



Circle No. 140
On Reader Service Card

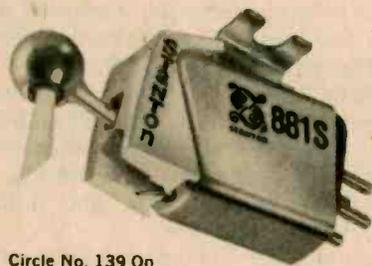
SONUS SILVER E PHONO PICKUP CARTRIDGE

An exceptional value for the price. Sound quality is right up there with the very best. Delivers superior reproduction of plucked string instruments. \$70.



DESCRIPTION: A magnetic phono pickup. No information is supplied on the stylus configuration. The manufacturer's rated VTF is 1 to 1.5 grams and essentially similar results were attained at all values.

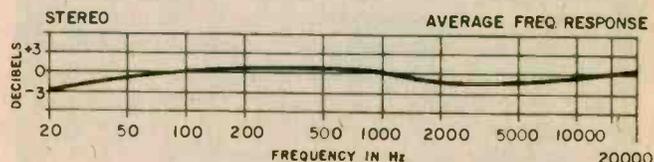
PERFORMANCE: The frequency response measured nominally within ± 2 dB from 20 to 20,000 Hz. Overall channel balance was within 2 dB from 20 to 13,000 Hz, with a right channel rise of 5 dB at 20,000 Hz. The worst-case stereo separation was 18 dB at 1000 Hz; 19 dB at 15,000 Hz. (While the measured performance is not necessarily outstanding, the sound quality is outstanding. It's a pickup which offers excellent value for its price.) ▲



Circle No. 139 On
Reader Service Card

STANTON 881S PHONO PICKUP CARTRIDGE

Highest sound quality. At this level of performance you must look for your own nuances in performance. Creates a "live" sound of the highest definition. \$150.



grams, 1 gram recommended. A built-in dust brush tracks ahead of the stylus. It applies a 1 gram negative tracking force that is compensated by applying an extra gram of VTF. If the VTF adjustment indicates 2 grams, the actual VTF is 1 gram.

PERFORMANCE: The frequency response measured within ± 2 dB from 20 to 20,000 Hz with a channel balance of 1 dB or better at all frequencies. The worst-case stereo separation measured 25 dB at 1000 Hz; 19 dB at 15,000 Hz. (The dust brush is the same type that's been used on most Stanton pickups for years, and is probably the best "groove sweeper" available. Its action keeps the stylus entirely free of accumulated dust and is one reason for the long-term constancy of sound quality from a Stanton pickup.) ▲

DESCRIPTION: A magnetic phono pickup with a "Stereohedron" stylus having a rated VTF of $\frac{3}{4}$ to 1 $\frac{1}{4}$

buy cheap. Stretch your budget to the next-step model within a total system whenever possible. For example, if it's a matter of spending \$225 for a 20 wpc starter receiver in a given product line, versus the next-step 30 wpc model at \$50 more, buy the latter—even if it means waiting a week or two until your budget can accommodate it. If your choice boils down to any two or three particular units (whatever the equipment might be), have the salesman point out what additional benefits you're likely to get for the somewhat larger investment for the step-up model(s).

All of the companies whose products we've delineated are in competition with each other. Therefore, their marketing strategy is one of providing the most for the dollar in order to meet competition. Thus, you'll find that, by and large, prices for a given piece of equipment with comparable features, power, etc., will be pretty much the same regardless of brand name. For example, a check of a directory shows the price spread for a 50 wpc receiver in five of the above brands ranging from \$400 to \$430.

A Final Consideration. Suppose your choice of brands works down to two or three that offer the right selection of equipment for your needs, tastes and

budget. How do you make the final choice? Flip a coin? That is a possible solution, but a better one would be to pick the brand that has the handiest or most convenient product service setup. While you're not likely to need it under ordinary circumstances, the need for servicing *could* arise. It will prove to be important to own equipment made by a company with local service facilities where you can bring a unit in for attention, rather than owning equipment whose service facility is 500 miles distant. The latter would require packing and shipping of a unit to that facility, and be fraught with potential for damage in transit, etc., and possibly a longer wait for the equipment to be returned. There's no need to put yourself in such a position. ▲

ON OUR COVER

The three speakers on our cover this issue are the Wharfedale E-70, the Wharfedale XP-80 and the Leak 3020 (counterclockwise from the back). Prices are as follows: E-70, \$525 each; XP-80, \$210 each; 3020, \$145 each. For additional information on these circle Reader Service No. 136 for the E-70, 137 for the XP-80, and 138 for the 3020.



Sony Corporation offers a complete line from which you could choose a one-brand system. One possible system could be the STR-V4 receiver, the TC-K-60 cassette deck, the PS-X40 fully automatic turntable, and a pair of SSU 1070 speakers. For further information on Sony's line, circle Reader Service No. 94.

CAR STEREO INSTALLATION

(Continued from page 45)

both a wiring kit that plugs into the radio and a wiring pictorial. Splice the wiring kit to the existing car wires, as illustrated in the pictorial guide, and then plug the connectors into the radio. Check for an AM antenna sensitivity adjustment before installing the radio in its compartment. Radio-only models, and some radio-cassette models, have a sensitivity adjusting screw at the rear which must be set before the radio is installed. Tune the radio to a weak high-end AM station and adjust the screw for maximum volume. Then install the radio. Some cassette models have the AM adjustment screw accessible through the front tape slot.

After the radio is secured, replace the dash cover and then secure the decorative trim plate supplied with the radio over the dash cover, securing everything in place with the supplied mounting nuts and washers.

Now what do you do if your current car doesn't have a radio? You can either cry, (you'll see why) or take extra time to select equipment for which there is an installation kit. With many of the mo-fi dealers a request for an

installation kit will get you a vacant stare, and perhaps the assurance that "you don't need one" or the suggestion that you pay from \$50 to \$100 for a professional installation.

An installation kit, at its minimum, consists of the support plate, special installation instructions for your particular car (a station wagon can be a real headache without the kit), and possibly rear deck grills for rear deck speakers if your car didn't come with factory cutouts or slots. Virtually every major reputable mo-fi dealer supplies installation kits; most fly-by-nighters don't. Among the biggies that will supply custom installation kits (if you need one) are Clarion, Jensen, and Audivox. You may find though that many dealers who carry brand names that do supply installation aids give you the old "blank stare".

Don't be daunted. If your dealer will not order an installation kit for you, go see another dealer. If your car doesn't have an in-dash unit now, you need an installation kit.

One note of warning. Almost all imported radios have instructions on

how to install a radio from inside the dash, and supply the necessary hardware. This is fine for imported cars, since many take rear mounting radios, as do older American cars. But if your car also has air conditioning, and takes a rear mounting radio, let someone else do the job (unless you're unusually adept at using tools while lying on your back with your legs over the back of the front seat and your head squished behind the dash, while you clench a flashlight in your teeth).

As we mentioned earlier, installing rear deck speakers is a snap. If you're not replacing existing speakers it's no great effort to snake speaker wires from the dash to the trunk. But the front speakers installed in the dashboard are a whole new ballgame. If you have a recent model of a GM or Chrysler car, you might find that the already-installed mono speaker was a 4 x 10-type, but the stereo cutouts under the dash measure 3½ inches in diameter. Most 3½s simply cannot handle more than 3 watts, even less if you have the

(Continued on page 68)

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HI-FI STEREO BUYERS' GUIDE INDEX TO ADVERTISERS

READER SERVICE NO.	ADVERTISER	PAGE NUMBER
4	Audio Technica	4
5	Bose Corporation	CV3
9	Discount Music Club	28
-	Discwasher	CV2
11	Electro-voice	14
12	Finney	22
37	G. C. Electronics	8
29	Hitachi	25
34	Jensen	20, 21
13	J&R Music World	28
38	JVC	16, 17
17	McIntosh	6
15	Mitsubishi-Home	10, 11
16	Mitsubishi-Car Audio	13
18	Nikko	18
19	OHM	7
20	Panasonic	CV4
39	SAE	34
23	Sansul	23
41	Sanya	9
24	Shure Brothers	13
35	Shure Brothers	38
25	Sony	26
36	Sound Guard	3
-	Speaker Labs	8
21	Stanton	33
28	TDK	19
10	TEAC	15
-	United Audio	1

bass boost turned up. However, they are also very efficient and literally drown out the rear speakers. Best bet is to use top-notch 3½-inch speakers. The Jensen C-9870s are well recommended (they carry a 12 watt rating which I have trouble believing). With a front-rear fader you can balance the sound so that you get the bass from the rear, and midrange and highs from the front—a nice pleasant balance. If your radio has bi-amping capability, throw the highs to the front 3½; it sounds very good and takes the bass power off the small speakers, which sharply reduces distortion

You might have to punch out the dash cover so that the sound from the stereo speakers can get past the metal. Small add-on speaker grills are available. They are often supplied with the radio installation kits.

Summing Up. Virtually any factory- or dealer-installed car radio can be upgraded with better equipment to achieve really good, if not outstanding sound. The only real problem you face with mo-fi components is separating the wheat from the chaff, and there's

a lot of chaff in the marketplace. Believe no one but yourself and what your ears are telling you about the sound you're evaluating. Try to hear the equipment that interests you under real-life circumstances, that is, actually installed in a car—not just installed in some multi-speaker and radio-showroom demonstrator panel. Some dealers will give you the names of satisfied customers. If you can't get a car demo, at least try to listen to the equipment you will purchase for an extended time period—at least 15 minutes at normal car volume. (Car volume is a roar in a showroom.) Check to make sure you don't feel edgy after 15 minutes of non-stop listening. Finally, though there are exceptions as we said earlier, you'll probably get the best quality from brands which have long been associated with home hi-fi, or quality autosound.

The actual installation, while not necessarily difficult, can be time-consuming. The photographs of an actual user installation of Jensen and Epicure products will give you some idea of what to expect

OPERA: MARILYN HORNE

(Continued from page 30)

Met seasons Miss Horne has taken on two of these roles, Amneris in *Aida* and Eboli in *Don Carlo*. In both she has seemed oddly pale, without the thrust and power required, which only testifies all the more to the precise nature of her voice as one suited to the work of the earlier composers.

A few misjudgments to the contrary, hers is one of the greatest opera careers, and one of the very greatest American ones. And on records she is represented in strength. An opera uniquely suited to her—which will be revived next fall at the Metropolitan—is Meyerbeer's *Le Prophete*, which she first sang there in January of 1977. At that time it was issued in a recording that used the complete Metropolitan cast, plus the less than ideal conducting of Henry Lewis, who also led the work at the Met (Columbia M4 34340). The role of Fides gives the mezzo every chance to be expressive—especially in "Ah mon fils" in which she descends to the very bottom of her range—and florid. The big aria, "O Pretres de Baal," can be sampled from Miss Horne twice—once on the complete recording and again on a brilliant record called "Presenting Marilyn Horne" (London 25910) made some 15 years ago. In both she has control over the highs and the lows and everything in between, and she infuses it with drama

Another great success for her at the Metropolitan took place in the fall of

1972 when she opened the house (and the post-Bing era) with a new production of *Carmen*, led by Leonard Bernstein. Though the maestro only conducted five performances of the opera at the Met, his interpretation with the original cast was caught on a fine recording (DG 270 9043) that shows Miss Horne's *Carmen* to be a sexy, powerful and fascinating gypsy. She may not handle the French with the built-in sensuousness of Régine Crespin, but she sings the role marvelously and creates her own character which has some of the slut, some of the adventuress and a lot of the playful young woman.

The exact opposite of *Carmen* in feeling is Gluck's *Orfeo*, a role which Miss Horne also did at the Metropolitan in a very unsuccessful physical production and without a great conductor. That *Orfeo* was not a success can only be attributed to the difficulty the modern public had in accepting the restraint and classicism of Gluck; certainly her performance on records with Sir Georg Solti in the pit (London 1285) is a masterpiece of singing—florid details, tragic grace and dramatic conviction. I would hope that she will return in this role with James Levine conducting at the Met.

Her two most recent phonographic forays deserve applause. Vivaldi's *Orlando Furioso* (RCA ARL 3-2869) gives a chance for the public to hear

the most amazing coloratura technique for a mezzo in our lifetime in unusual repertory that is perfectly suited to her. Listening to the first record of the album, with Claudio Scimone leading I Solisti Veneti and a cast including Victoria de los Angeles and Sesto Bruscantini, confirms the fact that nothing more need ever be said about Miss Horne's vocal capacities. It is pure vocalism of an amazing order. The rest of the recording is first rate. The buyer should know that Vivaldi gets a bit repetitive, but this is the Venetian composer at his best.

The other recording is the first modern pressing of Ambroise Thomas' *Mignon* (Columbia M4 34590). Miss Horne is arguably too massive of personality for the fragile heroine, but I for one love to hear the way she sings the role. Thomas' music sounds better to me than the more popular French music of the period. It has a trace more Italian warmth to it and less sugary vacuity. The recording could have had much stronger conducting than from Antonio de Almeida, but it has in Alain Vanzo a good Wilhelm Meister and in Frederica von Stade a fine Frédéric. Miss Horne sings with power and thrust and her treatment of the final trio as well as the big show-stoppers command respect.

Though Puccini did not care for

mezzos—in his mature work the voice type is absent—he did create one powerful role for contralto in the cruel Princess, the aunt of Sister Angelica. It is she who brings word of the death of Angelica's child that causes her niece's suicide. Throughout her appearance, the old Princess offers not one shred of kindness or Christian charity. She is all establishment, unyielding and hypermoralistic. On Columbia's recording (M 34505) Miss Horne, working with the brilliant Angelica of Renata Scotta, has the low range for the role and gives a commanding, unforgettable performance. Though it is the kind of repertory, like Verdi, that could get her out of her depth, the old Princess shows no problems on records.

Miss Horne's Metropolitan Opera debut in 1970 featured her as Adalgisa in Bellini's *Norma*, and can be heard in a recording made during the late '60s with Joan Sutherland as the Druid priestess (London 1394). Here Miss Horne's fantastic line, her ease in any bel canto and her marvelous combination in terms of approach and vibrato with the great Australian can be heard. Unfortunately, the whole recording, due to Miss Sutherland's lack of experience of the role onstage at the time (and the placid conducting of Richard Bonyngé), is dull. But as far as the singing quality is concerned, it is com-

PELLING WORK. Better and equally remarkable is Miss Horne's performance with Miss Sutherland in Rossini's *Semiramide* (London 1383), one of those trouser roles (that is, playing at being a man) for which Miss Horne is so famous. It is exciting singing and shows off her high register and her ability to characterize vocally.

Mistakes, such as her Zerlina in a badly cast and badly directed *Don Giovanni* (London 1434) and Laura in *La Gioconda* (London 1388), do not lower the level of accomplishment. On disc, too, her Verdi is better than it has been in person. Neither Amneris nor Eboli can be found on record, but her Azucena is the brightest light of a recording of *Il Trovatore* (London OSA-13124), which has Miss Sutherland miscast as Leonora and Bonyngé as an ineffective conductor. Miss Horne, conceivably assisted by the engineers, has the power that has not been hers in Verdi in the opera house, and she brings to Azucena a rare mellifluousness and an absence of coarseness. But Azucena is central in Verdi's last almost purely bel canto opera, and a heavy singing tradition notwithstanding, may be best suited to her of any of his roles.

Time and performance may tell, but one fact is almost unarguable: give Marilyn Horne bel canto to sing and she is a living legend. ▲

SPEAKER MYTHS

(Continued from page 42)

for problems, but as long as a single driver can't handle the job, we have no alternative. The idea is to use the *minimum* number of drivers that will handle the spectrum adequately.

Speaker-Placement Mythology. Our next pair of myths relate to speaker placement. Most people think that corner placement enhances the bass response, and that bookshelf speakers sound better when placed on the floor. Again there is a grain of truth in each contention, but there lie pitfalls for the unwary.

When a loudspeaker is placed near a hard surface, the sound that is radiated towards that surface reflects from it and bounces back into the room. Because of the time it takes for the sound to reach the reflector and return into the room, the reflected sound is not quite in step or "in phase" with the direct radiation from the speaker. The time lag, of course, depends upon the extra distance the sound must travel. To this extent, placing a loudspeaker near a reflecting surface—for example, placing it in the corner or on the floor against a wall—increases the bass output.

However, at higher frequencies, in

the mid-bass, the wavelengths are shorter, and, by the time the reflected sound gets back, the original sound has changed phase quite a bit. The reflected sound progressively gets more and more out of phase and, at some frequencies, is 180-degrees out of phase. At these frequencies, the reflected sound tends to cancel the direct sound, and there is a reduction in sound-pressure level, which will show up as dips in the frequency-response curve.

So, placing a speaker near a reflecting surface may create more powerful deep bass but it may also result in an irregular mid-bass frequency response. The speaker engineer *should* take these reflections into account when designing the system. Of course, to do so, he must know where the speaker will be located vis-à-vis reflecting surfaces. He controls this by advising you how to place his product in your listening room. To get the best results, you should heed the advice and not arbitrarily put a speaker in the corner or on the floor if it was not designed for such placement.

Speaker/Amplifier Mythology. Our final pair of speaker myths relates to

the speaker/amplifier interface. There is a common misconception that a speaker is more likely to be damaged by a more powerful amplifier than by one of limited capacity. Usually this is *not* the case, but, again, there is a grain of truth to the myth.

Insofar as a more powerful amplifier can deliver more oomph to the speaker if something goes wrong, it can cause damage to the speaker system. However, this is likely to occur only if you abuse the system in some way. If an output transistor should short-circuit, the more powerful amplifier delivers more current to the speaker and so is more likely to burn it out. Similarly, the transient created by dropping the stylus onto a record can be greater with a more powerful amplifier than with a less powerful one. But these are cases of misuse, and you can protect the speaker by fusing it properly.

In general, the woofer in a decent loudspeaker system can take a great deal of abuse. Not so the tweeter. It is quite delicate and will burn out readily. The speaker engineer relies upon the fact that the amount of energy in the high-frequency region is quite limited in typical music. Thus, the tweeter

need not be able to handle as much power as the woofer or midrange. However, if an amplifier is driven into clipping, it generates a lot of high-frequency power. In fact, it may oscillate at a supersonic frequency when driven beyond its limits. You may not hear the oscillation but your tweeter will know it's there and won't be able to take it. So it burns out.

The more powerful the amplifier, the less likely it is to be driven beyond its ratings when producing the power required for listening. So it is less likely to generate spurious, high-frequency, high-power overtones, and the tweeter is less likely to be driven to the brink.

Even a ten-watt amplifier is perfectly capable of blowing a tweeter if the full ten watts is sent to the tweeter.

Speaker Efficiency. Our final myth concerns speaker efficiency. Many audiophiles think that loudspeaker efficiency is totally unimportant. If you have money to burn and can afford a real super-power amplifier, perhaps you needn't be concerned with efficiency. But amplifier power costs money and speakers vary widely in efficiency. If you can buy Speaker A with twice the efficiency of Speaker B for a few bucks more, you're way ahead of the game. For the same listening level, you need only half the amplifier power, and that

can save you a bundle. Speaker efficiency is often unrated, but you can easily tell which speaker is more efficient by an A/B test. Just listen to each, driven from the same amplifier with the same volume setting. The louder speaker is the more efficient one.

Perhaps the day will come when the sound of a speaker can be fully characterized by its specifications. When that happens, we'll probably find far fewer misconceptions. Until then, speaker myths are bound to crop up, and it's important to understand what parts of the myths contain a grain of truth and what parts you should ignore entirely. ▲

JAZZ: SONNY ROLLINS

(Continued from page 22)

died in an auto crash. Roach and Rollins continued together under the drummer's leadership for another year, with Kenny Dorham filling Brown's chair.

Rollins' first session, under the burlesque vocalist Babs Gonzales, was not memorable; but it is available on an anthology entitled *Strictly Bebop* (Capitol). His first significant sessions were with trombonist J. J. Johnson and Bud Powell. One of the Johnson dates is out of print, but the other is available on *Mad Bebop* (Savoy). Several of the Powell selections are on the two volumes of *The Amazing Bud Powell* (Blue Note), but all are found under trumpeter Fats Navarro's name on *Prime Source* (Blue Note).

The Rollins-Miles Davis relationship was documented by Prestige Records, and thus most of it is available in different packagings. One oddly depressing set from early 1951 is only on *Early Miles* (Prestige). Much better, and from the same year, was a date with altoist Jackie McLean; this is on *Conception* (Prestige), and is also part of the two-record *Dig* (Prestige). A subdued set with Charlie Parker sitting in (on tenor!) is on *Collector's Items* (Prestige), as is the last Davis-Rollins collaboration from 1956. Best among the Davis selections, however, are the 1954 items with pianist Horace Silver, including "Oleo" "Doxy" and "Airegin". These cuts are on *Oleo* (Prestige) along with another Davis session without Rollins, while on *Tallest Trees* (Prestige) they are part of a two-record miscellany.

Rollins with Monk is also on Prestige, and has often been repackaged. But the listener with access to two essential Monk twofers—*Thelonious Monk* (Prestige) and *Brilliance* (Milestone)—has the essence of their work together. The *Brilliance* LP contains such pieces as "Brilliant Corners," "Pannonica" and "Ba-lue Bolivar Ba-lues-are."

The earliest dates with Rollins as a leader are on *First Recordings* (Prestige). These include a 1951 date with Art Blakey and 1954 selections with the first version of the Modern Jazz Quartet. In the following year, it was *Jazz Classics* (Prestige), along with the Davis-Horace Silver session discussed above, that announced the beginning of Rollins' maturity.

Rollins' work with Max Roach began appropriately with *Worktime!* (Prestige), an audacious record with many experimental features behind its humorous warmth. *Brown and Roach at Basin Street* (Trip) brings Clifford Brown in, and despite the high level of musicianship a certain competitive nervousness enters as well. By the time of *Sonny Rollins Plus Four* (Prestige)—actually by the Brown-Roach group—the nerves are gone; this is the mellowest Brown-with-Rollins. *Live at the Beehive* (Columbia), only recently out for the first time, finds the Rollins-Roach-Brown team at the height of its power. And without Brown (but before his death), Roach and Rollins made the grandly contemplative *Saxophone Colossus* (Prestige), with "St. Thomas," "Moritat," "Strode Rode" and

the justly admired "Blue Seven."

Rollins and Roach continued after Brown's death with the lackluster *Sonny Rollins Plays for Bird* (Prestige). *Max Roach Plus Four* (Trip) is much better, and Rollins' playing on "Ezz-Thetic" points clearly to the later John Coltrane, whom Rollins had met shortly before on *Tenor Madness* (Prestige). Part of *Tenor Madness* and part of *Worktime!* are on *Takin' Care of Business* (Prestige), a two-record set which has the only available issue of the incredibly up-tempo Rollins-Roach selections of December 1956.

The Rollins-Roach canon closed in 1958 with the exceptionally well-integrated "Freedom Suite," an extended work included on the LP entitled *Freedom Suite Plus* (Milestone) along with shorter works of varying quality. (The "Suite" session is also available alone under its own title on Japanese Riverside.) Apart from *Freedom Suite Plus*, few of the twofer packagings of the previously mentioned Rollins-led Prestige dates are worthwhile. *Sonny Rollins* (Prestige), *Saxophone Colossus and More* (Prestige) and *Takin' Care of Business* (Prestige) all contain material from Rollins' best sessions, but each was compiled in a more or less haphazard fashion.

In the year-and-a-half following his departure from Roach's working group in 1957, Rollins recorded furiously, almost at the rate of a record per month. These records, along with the Rollins works of the 1960s and 1970s, will be the subject of a future column. ▲

METAL TAPE

(Continued from page 49)

such product that was announced—3M's Metafine—has a coercivity of 1000 oersts and a retentivity of 3400 gauss!

What makes the metal or metal-alloy tapes so different? Whereas all previ-

ous magnetic tapes were formulated from oxides of a metal—the metal chemically combined with oxygen—the metal tapes are formulated from pure metal.

Work on pure-metal tapes dates back

at least to the early '60s. Fabricating and controlling the metal particles during the manufacture of the tape was the stumbling block. Pure metals have a great propensity to combine with oxy-

LITERATURE LIBRARY

302. Maxell's booklet entitled, **What Everybody Assumed You Already Knew About Tape Recording But Never Told You** discusses tape recording, machines, how they work, bias and equalization and how each relates to accurate recordings, tape recorder care, how recording tape is made, and what types of tape are available from Maxell.

303. JVC offers a booklet which suggests eight different ways to assemble **JVC component systems**. Each suggested combination system includes a turntable, a cassette deck, a pair of speakers, and either a receiver, an integrated amp/tuner ensemble, or a preamp/power amp/tuner combination. All include a rack for housing the components.

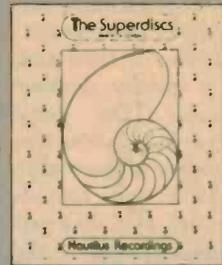
304. Audio Technica will send you a **Cartridge Buying Guide** which explains the importance of the phono pickup in your system, the advantages of magnetic cartridges, the different types of styli, how to evaluate specifications, and how to go about choosing a cartridge that's matched to your system. Also included is a complete rundown of the phono pickup cartridges and record care items that are available from Audio Technica.



305. Sound Concepts' brochure on its SD550 Ambience Restoration System includes two full pages which explain how **time delay units** can add a sense of space to your high fidelity system's current capabilities. Detailed information on the SD550 is included, too. If time delay units interest you, this pamphlet supplies useful preliminary information.

306. Mitsubishi will send you a 36-page **product brochure** which gives detailed information on all its components, including its micro-component line.

307. Nautilus Recordings supplies a booklet called **The Superdiscs—There is a Difference**. It explains in detail the differences between analog-to-disc recording (used to make most records), direct-to-disc recordings, and digital-to-disc recordings. The sonic advantages of direct-to-disc and digital-to-disc recordings are explained—questions about their limitations and relatively high cost are answered.



308. Altec Lansing's brochure on its **Model 14 speaker** includes tips on choosing a speaker which you might find helpful when shopping for speakers. It outlines 5 Myths About Speakers which should be dispelled before you choose.

309. AIWA's **complete product line** is described in detail in the brochure called Upgrade to AIWA. Each product's features are discussed in detail in this well-illustrated booklet.

310. H.H. Scott will send you a 4-color brochure which will bring you up to date on the **controlled impedance loudspeaker systems** that are currently in their line of products.

315. TEAC has designed a 16-page brochure which serves as a good introduction to the principles of multi-track recording. It's called *Are You Ready For Multi-track?* and it describes in detail the steps involved in making a good multi-track recording, delineates the equipment needed, and examines such common recording stumbling blocks as the use of studio and PA microphones.



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gen; laymen call the process "rusting." The finer the metal particles, the more surface area is exposed, and the quicker they rust. When you start talking about particles as tiny as those required in formulating a tape, the "rusting" can take place with explosive rapidity. (You've heard of flour mills exploding? Same deal.)

Obviously, the manufacturing techniques have been developed. 3M announced Metafine in 1978 and, by that winter, had a goodly number of cassettes available. TDK demonstrated their metal-particle-fabrication procedure to a number of journalists in November of 1978 and provided them with test samples. Fuji was handing out samples to press people at the Winter Consumer Electronics Show in January of 1979.

So, apparently metal tape is here, but is it *really* here? Just as was the case with cobalt-modified-ferric tapes, metal tapes can be concocted with a choice of coercivity. When TDK introduced SA, they decided not to rock the boat. They designed the product to be "chrome compatible." No one has yet decided to toss away the potential of metal tape and bring it down to the level of chrome, but they haven't yet decided what the characteristics of the "best" metal tape should be.

**Will the Real Metal Tape
Please Stand Up**

The idealist would think that that is no problem. Make it with the greatest

combination of coercivity and retentivity possible. In Utopia, that indeed would be the answer. In the practical world, it's not. The utopian metal tape would have such a high coercivity that present-day recording heads wouldn't make a dent on it.

Ordinary decks are unable to record even on the 1000-oersted Metafine, itself a compromise with reality. And their inability to do so is not merely a matter of needing a bit more bias, record and erase current as was the case with chromium dioxide. Generating more current is easy; the problem lies with the record and erase heads. Most present-day heads cannot handle the flux levels required to record and erase metal tape. Combination record/play heads—the type used on two-head decks—must have a very narrow gap to resolve the high frequencies on playback. They make very inefficient record heads and even with the best materials in present-day use, cannot hack it with high-coercivity metal tape. So those few metal-capable decks that are available are virtually all three-head types with separate record, play, and erase heads. That, of course, runs up the price of the hardware. Even with these, special head materials must be chosen to accomplish the recording. If the coercivity of the metal tapes is raised much above 1000 oersteds, even the best of the three-head decks would be incapable of recording or erasing the product.

Obviously, there is a dilemma. Should metal tapes with reasonably low coercivity—low enough to be handled by present-day heads—be introduced now? Or should the "ideal" tape be concocted and held in the wings until magnetic-head technology catches up? And even if a compromise tape is introduced now, what should its characteristics be? Coercivity? Retentivity? Coating thickness and remanence?

A Japanese standards group is studying the problem—presumably in consultation with the hardware manufacturers to find out what can be done with the magnetic heads. Standards were to have been forthcoming by the end of 1978. As of the time of this writing, they're not here yet.

Whichever way it all comes out, one thing is certain. Metal tape will have a major impact on the industry—more earthshaking than the introduction of chrome.

A new generation of cassette tape decks with both record and erase heads and bias and equalization for metal tape are making their way to the marketplace and if you're in the mood for a little experimentation and are in the market for a new cassette machine you might consider keeping your eyes peeled for these new machines. Then as the metal tapes emerge, you'll be prepared for play.

Just keep in mind that metal tape is here today, but, to coin a pun, it is in a state of flux. ▲

SPOTLIGHT ON: REALISTIC

(Continued from page 54)

deck had a built-in bias calibration system, as illustrated in Figs. 1A and 1B. Figure 1A is the non-Dolby frequency response of TDK-D (a low-cost high fidelity tape) after we spent some ten minutes adjusting the bias. Better than this you'd be hard pressed to get from most high performance decks. (The low frequency head bumps are unusual but can't be heard as coloration.)

Figure 1B is the frequency response using TDK-AD tape. This took almost 20 minutes to get the adjustment right because the tape's normal high end rise adds a slight coloration which we tried to reduce to zero. Instrument alignment, or judge-by-ear, this is one heck of a performance level. We cannot see where it would be any better if there was a built-in test system. Basically, with this machine you substitute your time and effort for a relatively expensive bias adjustment system. The fact that there is only one bias adjustment, instead of one for each tape type, also contributes to the relatively moderate cost of the SCT-30.

(If you're looking to cut costs all around, stick with the TDK-D type

tape; on this machine its performance is almost the equal of higher priced tapes.)

Using the built-in Dolby test system and adjustments, the Dolby tracking was excellent, among the very best we've run across. We found optimum results were attained when the Dolby test playback meter reading was 1 dB higher than that specified in the instruction manual.

In this machine, as in others we've seen recently, the manufacturer has referenced the peak reading record level meters to some value other than tape saturation (we will never understand the logic behind this thinking). With the SCT-30, any decent brand or type of tape has at least 8 to 10 dB headroom above the 0-dB record level. This results in a somewhat less than usual signal-to-noise ratio "on paper," but some outstanding fidelity, particularly in terms of peak signal distortion, when recording directly from microphones.

The maximum output level corresponding to a 0-dB record level was nominally 620 mV. As with the record

level controls, the output level adjustment has a friction-clutched concentric "marker." After you find the control setting that gives optimum results you can rotate the marker so it points at the control's "normal" setting. (No big feature, but a decided convenience if you make the effort to standardize your tape and recording technique.)

The FM Dolby calibration controls on the rear apron must be adjusted to the FM Dolby station's calibration tone, which is supposed to be equal to 50% modulation. Normally, Dolby stations transmit the tones two or more times a day. The trick is to find out when the tone is transmitted; (phone the station and ask to speak to the Chief Engineer).

Wow and flutter measured a rock-steady 0.08%, a notably excellent value for cassette equipment, particularly a model priced well under \$500.

Another tape transport feature we liked, other than the low wow and flutter, was an easily removable door that exposed the entire tape path for cleaning with ordinary Q-tips. By the way, this is another area where costs

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were saved. The transport does not appear to be as rugged as most of those used in high performance decks, which are usually solenoid operated. The SCT-30 has a manually operated mechanism which we judge to be representative of those used in moderate priced

decks, and this, more than anything else, best illustrates how Radio Shack was able to pack high performance sound quality into a moderately priced deck. They simply provided only the features needed to insure high fidelity sound and avoided the costly features

that the budget-minded stereophile could probably do without.

All in all, the Realistic SCT-30 is an outstanding value for its price. For more information on this unit circle Number 32 on the Reader Service Card. ▲

SPOTLIGHT ON: AKAI

(Continued from page 46)

or play. When the timer turns off the power source, the machine disengages the tape drive. (Or the drive will disengage when the tape runs out.)

Most of the controls, switches and jacks are on a strip running across the bottom of the machine. From left to right they are: the headphone monitor jack, concentric-clutched left and right output level controls, the tape/source monitor switch, the timer start switch, tape speed selector, Low NOISE/WIDE RANGE tape-type selector, left record selector, right record selector, and the left and right microphone input jacks. The line level inputs are on the rear along with the line level outputs.

Directly above the control strip are two calibrated VU meters, concentric-clutched left and right line level controls and concentric-clutched microphone recording level controls. The line and mike inputs can be mixed. Memory markers around each set of

controls allow the user to mark the normal or desired control adjustments.

As shown in the test report elsewhere in this issue, performance is strictly first class. Using Maxell UD tape—one of the various brands specified in the instruction manual—the frequency response at 7.5 ips measured +1/-1.5 dB within the specified frequency range of 30 to 20,000 Hz. At 3.75 ips, the response was within +0/-2 dB from 50 to 20,000 Hz, down 3 dB at 43 Hz.

Distortion at the meter-indicated 0-VU record level was considerably below average, 0.38% THD at 7.5 ips, 0.65% THD at 3.75 ips, providing a substantial headroom (for example, 10 dB at 7.5 ips).

Wow and flutter in both directions measured only 0.03% at 7.5 ips; 0.05% at 3.75 ips.

The signal-to-noise ratio figures for this non-Dolby machine, when referenced to 0-VU record level, were 52

dB wideband for both speeds. While not spectacular values, the noise level reference is some 10 dB below peak record level (which means you can add another 7-10 dB to the quoted S/N for the effective noise ratio), and the frequency distribution of the noise is rather broad, rather than being concentrated within the frequencies to which the ear is most sensitive. The total effect of level and noise spectrum is an unusually quiet background that belies the 52 dB signal-to-noise ratio.

Overall the sound quality is outstandingly clean and crisp.

Summing Up. Just about everything worked out right with the GX267D. The sound is first rate, the reversing mechanism works exceptionally well, and the machine is extremely easy to use. In short, an absolute delight.

The GX-267D is priced at \$800.00. For additional information circle No. 122 on the reader's service coupon. ▲

SOUND PROBE: OHM I

(Continued from page 29)

rare among omni-directional designs. Another 1-inch dome tweeter faces upward from the top and lends spaciousness to the overall sound spread. Together they provide a smoothly balanced upper-frequency spectrum. A third high frequency soft cloth dome driver—the “low” tweeter—is located on top, too. It has a generous 32-ounce magnet and is cooled by magnetic fluid, which prevents thermal deformation of the voice coil under high loads and thus helps with power handling. The two top-mounted tweeters share the upper surface with an extra upward-facing 8-inch woofer, which assures adequate vertical dispersion of a critical segment of the lower spectrum. The woofer has its own sturdily braced internal resonating space—isolated from that of the sub-woofer—with its own 4-inch vent on the front. The crossover frequencies between this awesome array of drivers lie at 100, 2000, and 10,000 Hz, and the overall range is 32 to 21,000 Hz within 3.5 dB.

This arrangement offers another useful option: the speaker can be bi-amplified; i.e., the sub-woofer may be driven by a separate bass amplifier if the ultimate in bass definition is de-

sired. A simple switch near the input terminals lets you select this alternate mode of operation, giving the Ohm I a flexibility rarely found among speakers even in this price range. Other control facilities consist of four multi-position slide switches on the top panel, permitting the frequency contours of the various drivers to be individually adjusted to any of three settings: flat, -3 dB, and -6 dB. This switching array also permits different response adjustments for front and top radiation and enables the Ohm I to become comfortably acclimated to almost any acoustic environment. In short, this speaker is solid in every way.

Performance

Let's skip the superlatives and just say this is one of the finest speakers we've ever heard. There is nothing it couldn't do and do it superbly. We expected a speaker of this class to handle tonal earthquakes with cool competence. So it came as no surprise when it thundered out the lowest pipe-organ pedal notes in a way that made us feel we were sitting in a great cathedral. The operative word here is “feel.” I mean we *felt* it.

The real surprise lies in the subtle-

ties. Playing Schubert songs, we marveled at the delicacy of vocal timbre and wispy nuances of piano touch that we hadn't heard before. Choral passages that had seemed opaque to us on other occasions suddenly cleared up, revealing the interwoven strands of the musical texture. On strings, the treble filled the room with a spacious sweetness that seemed—we're reaching for a word—downright seductive.

After hearing the tremendous bass the Ohm I elicited from our organ records, we worried a bit whether the low end might not be obtrusive in chamber music and other light-textured material. Our concern proved groundless. When appropriate, the bass was discreet. It was all there, without saying “Here I am.”

In sum, here is a de-luxe loudspeaker for all seasons and all uses. It will bring out the best from any program material now available and will also do justice to the coming glories of digital recording. That's an important consideration, for you don't want a \$1200 investment in a pair of these to grow stale and obsolescent. But this is clearly a speaker with a future—for the future. ▲



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You're looking at three small sonic wonders that prove components no longer have to be big and bulky to sound big and beautiful. The Micro Series by Technics.

Take our power amp, the SE-C01. It has a high-speed switching power supply with filter capacitors that recharge 40,000 times a second instead of the usual 120. That's just one reason for the SE-C01's low distortion and clean, tight bass response. Direct coupling is another. With it, bass response goes all the way down to DC (0 Hz).

With an amplifier like this, you want power meters that measure up to it. 24 LED's provide true peak-power indication with extremely fast attack time.

Another big surprise is the SU-C01 preamp. It's one preamp but it works like two. Because it has a built-in preamp for moving coil cartridges. It also has gold-plated connections to maximize signal transfer.

To add the finishing touch, there's the ST-C01 tuner. It gives you great FM specs and great FM sound. And that's a big achievement considering its small size.

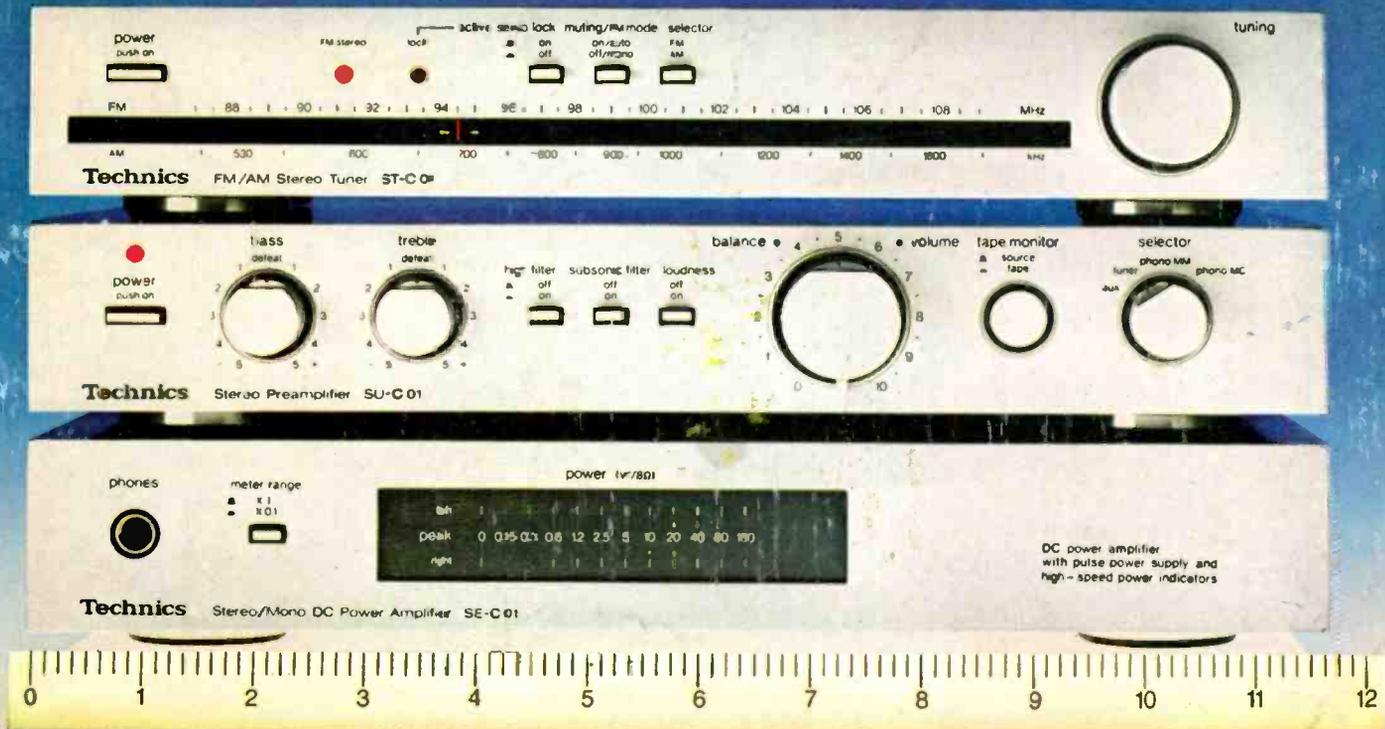
It's also a breeze to tune. Instead of conventional separate tuning meters, the center-of-channel indicator is on the tuning dial, where it's easy to see. Two LED arrows point you in the right direction for fine tuning.

Experience the Micro Series. Once you do, you'll agree: The big thing about them is definitely not their small size.

Technics micro series

SE-C01			SU-C01			ST-C01			
Continuous power per channel into 8 ohms 20 Hz - 20 kHz	Total Harmonic Distortion	Signal to Noise Ratio	Total Harmonic Distortion	Phono Signal to Noise Ratio	Frequency Response	FM Sensitivity 50 dB (stereo)	FM Selectivity	Stereo Separation (1 kHz/ 10 kHz)	Total Harmonic Distortion (stereo)
40 watts	0.03%	110 dB	0.005% (phono) 0.003% (ALX)	90 dB (MM, 2.5 mV) 78 dB (MC, 250 μ V)	3 Hz - 100 kHz, -1 dB	38.3 dB	75 dB	45/35 dB	0.15%

With performance this big, the last thing you expect is components this small. The Micro Series by Technics.



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