

In **back**
beat

Billy Joel: Up from Piano Man * The Wizards of Arp

HIGH FIDELITY

JANUARY 1978 \$1.95
and musical america.

ICD # 08398

Ten Lab/Listening Reports

Acoustic Research AR-15 speaker
ADC LMF-1 tone arm
Bang & Olufsen U-70 headset
Genesis 3 speaker
Goldring G-900SE pickup
Heath AD-1304 audio processor
Mitsubishi DP-EC1 turntable
Nakamichi 630 tuner/preamp
Pioneer Spec-4 amplifier
Russound SP-1
switching/patching center

The Unknown Recordings of
Vladimir Horowitz



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THERE'S AT LEAST
ONE THING MUSIC LOVERS
ALL OVER AMERICA
AGREE ON.

PIONEER STEREO RECEIVER MODEL SE-860



PIONEER'S SX 650 RECEIVER. THE #1 RECEIVER WITH PEOPLE WHO CARE ABOUT MUSIC.

If you're about to buy a good high-fidelity receiver, Pioneer would like to suggest that you follow the advice of a highly select group of experts: music lovers.

This year, music lovers will buy more Pioneer SX 650's than any one of the other 162 high-fidelity receivers on the market.

Mainly because this year, for the second year in a row, the SX 650 will offer better features, better sound, and better value than any similarly priced receiver.

PEOPLE WHO CARE ABOUT MUSIC WANT TO HEAR IT REPRODUCED PERFECTLY.

The goal of every hi-fi receiver is to reproduce music with all the excitement and clarity of a live performance.

The SX 650 comes a lot closer to reaching this goal than some hi-fi receivers costing hundreds of dollars more.

Take distortion, for example.

With some hi-fi receivers, you're simply expected to tolerate a certain amount of distortion.

Not with the SX 650, however.

The 650 comes with an advanced power section designed to limit distortion at high volumes. Plus a pre-amp that features a phono overload level of 200 millivolts—enough to handle the loudest section of one of today's most dynamic records without distorting.

Together, these things work to give the SX 650 a virtually *inaudible* total harmonic distortion level of less than 0.3%, from 20 to 20,000 cycles per second.

Which brings us to the question of frequency response.

Where the average adult ear can hear music from approximately 40 to 14,000 cycles per second, the human body can feel music at much higher and lower frequencies.

By designing the 650 to reproduce music at these frequencies (20 to 20,000 cycles per second), the 650 can not only reproduce every note of music the human ear can hear, but it can also reproduce the feelings and emotions that until now you could only experience at a live performance.

In other words, the chills that used to run up and down your spine at concerts can now run up and down your spine in the privacy of your own home.

POWER TO SPARE

When a piece of music reaches a crescendo, it tends to put a tremendous strain on the power section

of a receiver.

Some receivers clip the signal and distort.

The SX 650 merely goes on reproducing beautiful music.

Its 35 watts* per channel are more than powerful enough to fill the average room with clean, clear undistorted sound. And yet still have enough power in reserve to handle sudden surges of low or high frequencies.

So a full orchestra will sound just as crisp and undistorted as a single singer.

AN FM SECTION THAT DOESN'T SOUND LIKE A RADIO.

At Pioneer, we've always believed that the FM section on the SX 650 sounded more lifelike than many \$600 separate tuners.

This opinion was recently confirmed in an article by Julian Hirsch in *Stereo Review Magazine* about our TX 6500 tuner. A tuner that features the same basic front-end as the SX 650's.

For all practical purposes, the frequency response, channel separation, noise level, and distortion...are the equal of most tuners selling for two or three times its price.

And who are we to argue with one of the leading experts in the hi-fi industry?

PEOPLE WHO CARE ABOUT MUSIC ALSO CARE ABOUT MONEY.

With a price of less than \$325* we think the SX 650 offers an incredible value among today's medium priced hi-fi receivers.

Especially when you consider that similar 35 watt receivers by Yamaha or Sony could cost you almost \$100 more!

But don't take our word about any of this. Go compare the sound and value of the SX 650 to any other medium priced high-fidelity receiver at your nearest audio dealer.

We think you'll find it's the perfect receiver for people who appreciate great value as much as they appreciate great sound.

PIONEER
WE BRING IT BACK ALIVE

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*The value shown in this ad is for informational purposes only. Actual dealer prices will vary by the individual Pioneer dealer in the region.

CIRCLE 19 ON READER SERVICE CARD

PIONEER STEREO RECEIVER MODEL SX-650



*35 watts per channel minimum continuous power output at 8 ohms, from 20 to 20,000 Hz, with no more than 0.3% total harmonic distortion.

"Not the loudest sound in town, but the best quality" claims WXRT, Chicago, longtime Stanton user. . .



Daniel Lee, President and General Manager, discussing Stylus Replacement Policy with Howard Williams, Chief Engineer and Ken Rasek, Audio Engineer.

WXRT is a progressive rock, FM station that is unique in many ways. Its whole operation, including Administration, Sales, Engineering, Programming, Broadcasting, Transmitting (even the tower itself), is located in one place . . . a highly unusual set-up for a major market.

In a market crowded with as many radio stations as Chicagoland, the excellence of sound can make or break the station, especially a station like WXRT . . . which plays no tapes . . . has no recorded commercials . . . and goes totally with disc-to-air and live copy.

Since WXRT uses no limiters and no compression to magnify the level of their signal, their turntables and cartridges are absolutely crucial to the quality of their sound.

For over 10 years, the station has used the Stanton product in its turntables. Today, it even uses the 681 Triple-E for disc-to-air playback and, although this stylus was not designed for back-cueing, the engineers and announcers report no problem (they even use them on their AM operation, WSBC).

Leading radio stations around the nation depend on Stanton 681 Calibration series cartridges, because they offer improved tracking at *all* frequencies . . . they achieve perfectly flat frequency response to beyond 20 kHz. Its stylus assembly, even though miniaturized, possesses greater durability than had been thought possible to achieve.

Each 681 Triple-E is guaranteed to meet its specifications within exacting limits, and each one boasts the most meaningful warranty possible . . . an individual calibration test result is packed with each unit.

Whether your usage involves recording, broadcasting or home entertainment, your choice should be the choice of the professionals . . . The Stanton 681.



John Bell hands new record to Scott McConnell.



Air personality, John Bell prepares to play a record.

For further information, write to:
Stanton Magnetics, Terminal Drive,
Plainview, N.Y. 11803.

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These should not be your first loudspeakers.

The longer you've lived with other kinds of sound, the more you'll appreciate Tannoy.

The difference in Tannoy loudspeakers involves a dual concentric design that is quite unlike any other in the world.

Simply put, this design means that the high-frequency driver is physically integrated with the low-frequency driver. The positioning is such that the sound emerges not just phase corrected, but also phase coherent.

And that coherence is maintained throughout your listening room.

We're not new at this, of course. In fact, we've been refining our design for over 30 years. We've refined it so expertly that Tannoy dual concentrics are now the most widely-used studio monitors in Britain.

And the speakers we sell to professionals are the same speakers we offer to you.

Tannoy loudspeakers are available in five models — from the shelf-sized Eaton to the imposing Arden. Call toll-free 800-645-7166 for the name of your nearest dealer, so that you can arrange to audition a pair.

But don't be hasty. Only experience will tell you how good they are.

TANNOY[®]

The world's most refined speaker design.

We build in what the others leave out.

Super ANRS KD-95 STEREO CASSETTE DECK

1 Super ANRS (Super ANRS) gives you efficient noise reduction, with the added plus of extra-low distortion at high-level high frequencies. And you can switch to our regular ANRS for making recordings to be played using other noise reduction systems. **2** In addition, our extra Recording/EQ switch helps you to precisely adjust the high frequency response of your deck to match any tape you care to use.

3 The entertaining LED's you see on our decks actually help you make better recordings. They're easier to read than VU meters by themselves, so you can record at higher levels without fear of tape saturation.

4 And our SA (Semi-Alloy) Heads offer the sensitive performance of permalloy, plus the long life of ferrite in one design. Those heads are so excellent in their performance and durability that other manufacturers are buying them from us to use in their decks.

There are a variety of other features to simplify your cassette recording. And our specifications are equal to or better than machines that cost much more.

Once you've seen the things we build in, you'll wonder why the others leave them out.

JVC America Company, Division of US JVC Corp., 58-75 Queens Midtown Expressway, Maspeth, New York 11378 (212) 476-9300. Canada JVC Electronics of Canada, Ltd., Scarborough, Ont.

For your nearest JVC dealer, call toll-free (outside N.Y.) 800-221-7502.

CD-5000

KD-95

KD-75

KD-35

KD-15

CD-1770

CD-180E

KD-Z

CIRCLE 21 ON READER-SERVICE CARD

Only JVC gives you improved recording with Super ANRS, Recording/EQ switch, 5 Peak Reading LED's and SA heads.

The measure of fine cassette deck performance is the sound of the recordings you make. JVC's extensive line of high fidelity decks features these exclusive contributions to cassette deck technology.

1 Our Super ANRS gives you efficient noise reduction, with the added plus of extra-low distortion at high-level high frequencies. And you can switch to our regular ANRS for making recordings to be played using other noise reduction systems. **2** In addition, our extra Recording/EQ switch helps you to precisely adjust the high frequency response of your deck to match any tape you care to use.

3 The entertaining LED's you see on our decks actually help you make better recordings. They're easier to read than VU meters by themselves, so you can record at higher levels without fear of tape saturation.

4 And our SA (Semi-Alloy) Heads offer the sensitive performance of permalloy, plus the long life of ferrite in one design. Those heads are so excellent in their performance and durability that other manufacturers are buying them from us to use in their decks.

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For your nearest JVC dealer, call toll-free (outside N.Y.) 800-221-7502.

*Not all features on all decks.

JVC

You can record and playback in both directions,
fade in and out while you listen
and install it six different ways.

And that's just the introduction
to the innovative new Dual 939 cassette deck.

The more experience you've had with tape decks, the more you're likely to appreciate the Dual 939's performance and versatility.

Apply the most demanding musical tests: sustained piano tones for flutter; extreme highs and lows for frequency response; soft passages for signal-to-noise ratio—and you will hear no difference between the original disc and a tape made on the 939. All of which brings to life the 939's impressive specifications for wow and flutter (0.05%), signal-to-noise (65dB) and frequency response (20-17,000 Hz.)

Now we'd like to take you through the 939's astonishing array of design and operating features.

Auto/reverse playback, bi-directional record.

The 939 reverses automatically in playback—a C-90 will play 90 minutes without interruption. There's continuous play too.

Recording is bi-directional. When the tape reaches the end, you just reverse direction.

With any other deck you either live with unwanted sounds on a tape or erase them abruptly—without hearing what you're doing until it's too late.

With the 939's unique fade/edit control, you can fade out those annoyances gradually, smoothly and permanently. And then fade back into the music. While listening. Because it's all done during playback.

LED record-level indicators.

Meter needles can't move fast enough to keep up with musical signals. Which is why the 939 uses instantaneous reacting LED record-level indicators. And they tilt to the best viewing angle.

Still more operating features.

Line/microphone mixing; Dolby™ NR plus Dolby FM decoding; memory stop; output and headphone level controls; and an overload limiter that doesn't compress dynamic range.

Drive system and tapeheads like no other.

Dual's powerful Continuous-Pole/synchronous motor, two capstans and two drive belts maintain speed accuracy within 0.5%.

A C-90 cassette fast-winds in just over a minute, the time other decks need for a C-60.

Hard permalloy tapeheads are used for their extended life and superior magnetic linearity. The four-track record/playback head switches electronically when the tape changes direction; it never shifts position. The result: perfect tape alignment in both directions at all times.

Six ways to install.

You can install the 939 for front load or top load, plus three other angles. And you can also hang it on a wall.

The last word.

You've probably noticed that we haven't attempted to lean on Dual's reputation for fine turntables. The 939 will build its own reputation, on its own merits.

Price: less than \$550.*

*Actual resale prices are determined individually by and at the sole discretion of authorized Dual dealers.

Dual

United Audio

120 So. Columbus Ave., Mt. Vernon, NY 10553



If the union members are indeed "being reasonable," at least by management's standards, there remains the problem of quality, the solution to which is one of automation's strongest selling points.

Recording that Ended WWII

Faubion Bowers' article, "The Recording that Ended World War II" [October], was most interesting, filling in much detail on an event that most of us know only in outline. He omitted one very important point, however: the fate of the recording. Was it preserved? If so, where is it?

Edwin R. Kammin
Toronto, Ont.

The recording survived the war and is now part of the Imperial Household Archives in Tokyo.

In Defense of Bruckner

I must protest Harris Goldsmith's statement that Bruckner's Symphony No. 5 is "turgid" and a "monstrosity." These words, gratuitously used in a review of a recording of Schubert's Symphony No. 5 [October], reveal nothing except the reviewer's own prejudice.

I have long since accepted the fact that not every music lover is capable of appreciating Bruckner's art. Critics of his music tend to address themselves to the "Brucknerite," as if only a few fanatics cared about it. Perhaps it is this attitude on the part of those with a public voice that has predisposed many people to a negative view of Bruckner.

Thomas Ulicky
Cleveland, Ohio

Callas: In Memoriam

The loss of Maria Callas is more than the loss of a great artist; it is the loss of a great teacher. Her legacy on records, both commercial and private, will contribute to understanding what the potential of opera is, a potential too rarely realized. Although Callas herself is gone, her uncompromising search for dramatic truth will live on in younger artists who will learn from her.

Jay Kauffman
Philadelphia, Pa.

Right Conductor, Wrong Orchestra

In "The Tape Deck" for October, R. D. Darrell errs: The performances of Liszt's *Tasso*, *From the Cradle to the Grave*, and *Mephisto Waltz* he mentions are played by the *Orchestre de Paris* under Sir Georg Solti's direction, not the *Chicago Symphony*. It is easy to understand why Darrell was misled—the playing is polished and virtuosic.

Edward D. Wladars
Chicago, Ill.

The Big Bands

In recalling the era of the big bands ["The Lees Side," September], Gene Lees either forgot to mention or is too young to remember Detroit's *Jean Goldkette Graystone Ballroom Orchestra*, the prototype of big bands in the early '20s. Among its members were Jimmy and Tommy Dorsey, Frankie

Trumbauer, Joe Venuti, Russ Morgan, Bix Beiderbecke, Gene Krupa, Glen Gray, Bob Chester, and others—like Paul Mertz, a pianist who participated in a jazz festival at Carnegie Hall last year—less well known but equally "on the ball." This pacesetter band earned the right to a place in the annals of the Swing Era.

Stephan Pasternacki
Los Angeles, Calif.

Critics' Circle

This letter is occasioned by the comments of Stephanie von Buchau in your "Letters" column [October]. I do not in the least agree with Kenneth Furi's assessment of Janet

Baker's vocal resources, but he did express his reservations about this widely admired artist in temperate language. It is Ms. Von Buchau's own published efforts, more than anything else I have recently read, that deserve the accusations of "lofty, inaccurate judgment" and "hubris" that she levels at *HIGH FIDELITY*.

I would be foolish to expect critics in any publication to recapitulate my personal preferences, but I do expect reviews to be thoughtful, analytical, cogently argued, and based on a thorough knowledge of the music in question. These expectations are usually met by your magazine.

Daniel Morrison
New York, N.Y.

"SPECTACULAR" and other comments from audio critics about Ohm L loudspeakers:



Comments from Stereo Review:

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

The upper mid-range and high frequencies were virtually perfect. The balance between lows and highs was excellent...Blindfolded, one would never guess its compact dimensions." (*Copyright 1977 by the Ziff-Davis Publishing Company. Reprinted from Stereo Review, June 1977, by permission. All rights reserved.*)

Comments from The Complete Buyer's Guide to Stereo/Hifi Equipment:

"Ohm was among the first companies to take advantage of A.N.Thiele's research into vented loudspeakers, with some pretty spectacular results...In listening to the Ohm L, the immediate reaction is one of surprise at the openness of the sound. In addition, the frequency response of the speaker is exemplary. And the midrange, which is often a weak point in speakers of this size and price, is very good. There is no sense of strain, and voices sound utterly natural."

241 Taaffe Place, Brooklyn, N.Y. 11205

CIRCLE 23 ON READER-SERVICE CARD

FOR
EVERY
SYSTEM
WORTH
MORE THAN
\$500



If you've invested \$500 or even \$5000 in your high fidelity system, read on. Because what we have to say can have a lot to do with the quality of sound you're hearing.

Unfortunately, one of the most overlooked components in a fine sound system is the cartridge. And all too often, it can be the one place where you skimped on quality. (Out of sight, out of mind, as they say).

We sincerely believe that an investment in a Sonus cartridge will truly surprise you with the way it improves the quality of your record reproduction. The analytical quality of the Sonus brings out the inner voices of complex musical passages clearly and cleanly. Listening fatigue disappears. And a Sonus introduces no extraneous coloration of its own.

But what we're talking about is said even better by Sonus owners. "Excellent clarity," "more fulfilling sound," "open, airy 3-D sound," "superb depth and definition," "clean, accurate and transparent sound," are typical of thousands of enthusiastic comments we have received from owners of Sonus cartridges.

Make sure your cartridge matches up to the rest of your system. Write us for further information and the name of the Sonus dealer nearest you.

Manufactured in the U.S.A. by:

SONUS RESEARCH, INC.,

27 Sugar Hollow Rd., Danbury, Conn. 06810

SONUS

High Definition Phono Cartridges

CIRCLE 32 ON READER-SERVICE CARD

The
Lees
Side



12. The Dotage of American Radio

by Gene Lees

WITHIN TWO OR THREE YEARS of the introduction of commercial television, both baseball and movie attendance were declining, the latter to the point where the National Association of Theater Owners became concerned whether "hardtop" theaters (meaning those with roofs) could survive. Many of course did not, and the quarters in which they were housed were turned to other uses. Suddenly the U.S. was presented with the curious architectural spectacle of supermarkets with marquees.

The peak business year for movies was 1946, when box-office grosses reached \$1,692,000,000. That was the year television broadcasting, which actually began in the 1930s and continued on a reduced scale during World War II, resumed at an accelerated pace. In 1947, large-scale production of television receivers for the public got under way—and motion-picture grosses dropped immediately by \$100 million. From there on, attendance at the movies and other types of out-of-the-home entertainment dropped steadily. Not until thirty years later was the film industry able to equal the grosses of 1946; the '74 box-office figures, in fact, exceeded them with \$1,725,000,000, and in 1975 the take was \$2,117,000,000. But these figures are decep-

tive. Since the value of the dollar has fallen enormously since 1947, the film industry is actually making less money than it did then. Further, with the price of a ticket having climbed from 50 cents or \$1.00 to \$3.00 or even \$5.00, it is obvious that far fewer people go to the movies than in 1947, despite an increase in the population of nearly 50%.

But most profoundly affected by the coming of television was radio. Radio did not die, of course; but it changed radically, and its transmutation was to have far-reaching effects on American music.

As the networks, finding television more profitable (and more glamorous to their advertisers), let their national radio programming fall into desuetude, local stations, no longer able to depend on high-quality shows piped from New York, Chicago, and Los Angeles, perforce relied more and more on records. In turn, the music industry, unable to look to network radio for exposure (and ignored for the most part by television on the doubtful theory that music isn't "visual"), became dependent on the airplay of records by local stations. The disc jockey became critically important in the sales chain of the record industry.

Some of the disc jockeys, such as

It's time for everybody else to start playing catch-up. Again.

From the very beginning, experts have acclaimed the performance and feature innovations of Yamaha receivers as nothing less than spectacular.

But now, we've outdone ourselves.

Yamaha is introducing a new line of receivers with such unprecedented performance, it's already changing the course of audio history.

Real Life Rated.™ While traditional laboratory measurements provide a good relative indication of receiver performance, they simply don't tell you how a receiver will sound in your living room in actual operation. So Yamaha developed a new standard for evaluating overall receiver performance under real life conditions. It's called **Noise-Distortion Clearance Range (NDCR)**. No other manufacturer specifies anything like it, because no other manufacturer can measure up to it.

We connect our test equipment to the phono input and speaker output terminals, so we can measure the performance of the entire receiver, not just individual component sections like others do. We set the volume control at -20dB, a level you're more likely to listen to than full volume. We measure noise and distortion together, the way you hear them.

On each of our new receivers, Yamaha's Noise-Distortion Clearance Range assures no more than a mere 0.1% combined noise and distortion from 20Hz to 20kHz at any power output from 1/10th watt to full-rated power.

Four receivers, one standard. On each of our four new receivers, Yamaha reduces both THD and IM distortion to new lows—a mere 0.05% from 20Hz to 20kHz into 8 ohms. This is the kind of performance that's hard to come by in even the finest separate components. But it's a single standard of quality that you'll find in each and every new Yamaha receiver. From our CR-620 and CR-820 up to our CR-1020 and CR-2020.

What's more, we challenge you to compare the performance and features of our least expensive model, the CR-620, with anybody else's most

expensive receiver. You'll discover that nobody but Yamaha gives you our incredibly low 0.05% distortion and -92dB phono S/N ratio (from moving magnet phono input to speaker output).

You'll also discover that nobody else starts out with such a variety of unique features. Independent Input and Output Selectors that let you record one source while listening to another. A Signal Quality Meter that indicates both signal strength and multipath. The extra convenience of Twin Headphone Jacks. Or the accurate tonal balance provided at all listening levels by Yamaha's special Variable Loudness Control.

More flexibility. It's consistent with Yamaha's design philosophy that you'll find the same low distortion throughout our new receiver line. Of course, as you look at Yamaha's more expensive models, it's only logical that you'll find the additional flexibility of more power, more functions, and more exclusive Yamaha features.

For example, there's a sophisticated tuner, with unique negative feedback and pilot signal cancellation circuits (patents pending), that makes FM reception up to 18kHz possible for the first time on a receiver. Plus other refinements like a Built-In Moving Coil Head Amp, Fast-Rise/Slow-Decay Power Meters, and Yamaha's own Optimum Tuning System.

Now's the time to give us a listen. Our new receiver line is another example of the technical innovation and product integrity that is uniquely Yamaha. And your Yamaha Audio Specialty Dealer is an example of uncommon dedication to faithful music reproduction and genuine customer service. It's time you heard them both.

If your Yamaha Audio Specialty Dealer is not listed in the local Yellow Pages, just drop us a line.



YAMAHA

Audio Division, P.O. Box 6600, Buena Park, CA 90622
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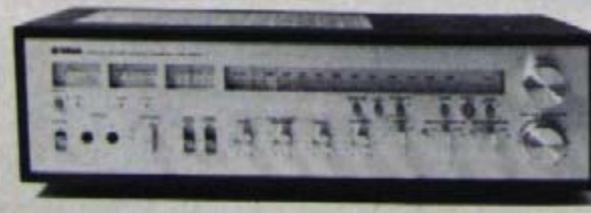
Real Life Rated



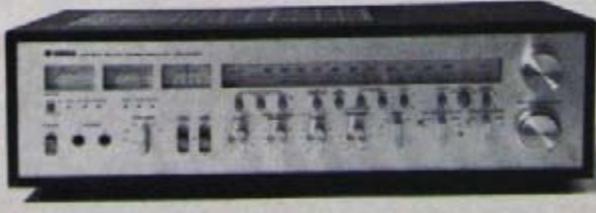
CR-620 0.05% THD 0.05% IM



CR-820 0.05% THD 0.05% IM



CR-1020 0.05% THD 0.05% IM

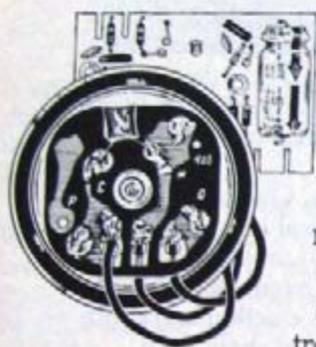


CR-2020 0.05% THD 0.05% IM

Why you should consider the new Garrard GT35 if you're thinking Dual or B.I.C.

We'll say it straight out. The new Garrard GT35 is the best all-around turntable anywhere near its price. Let's do some direct comparing.

Start with the motor. The Dual 1245 features a fine 8 pole, synchronous motor and the B.I.C. 981, a 24 pole, synchronous unit.



The new Garrard GT35 incorporates a servo-controlled, DC motor.

Servo control provides absolutely steady speed. The motor, (and thus the rotation of the platter), is immune to fluctuations in household voltage or frequency. Len Feldman, writing in *Radio Electronics*, reviewed it as a "significant breakthrough" superior to the "synchronous motor however many poles it might have." The GT35 is the only, belt-driven, single/multiple play turntable in the world with a servo-controlled, DC motor.

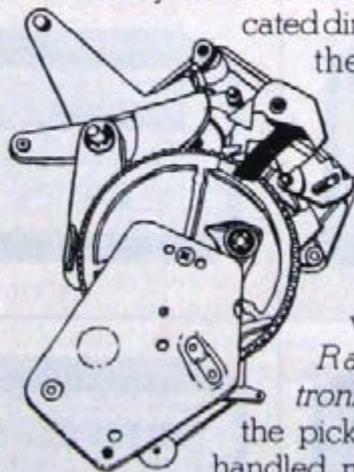
Chalk one up for the new Garrard GT35.

Now for the tonearm. Remember that the delicate stylus, as it traces the groove, bears the full weight of the tonearm. The heavier the tonearm, the greater the wear on the record and stylus. Light is right. The effective mass of the GT35

tonearm (measured with a Shure M95ED cartridge, tracking at 1¼ grams) is a mere 20.4 grams. That's lighter than the tonearm of the Dual 1245 at 27.5 grams or the B.I.C. 981 at 25.6 grams. In fact, the new Garrard GT35 has the lightest tonearm of any single/multiple play turntable.

Chalk up one more for the new Garrard GT35.

The Dual, B.I.C. and Garrard all protect your records as only fully automatic turntables can. And all provide the convenience of multiple play. But only the new GT35 boasts the patented Delglide® system. Unlike the Dual and B.I.C. automatic mechanisms, Delglide is driven by its own belt and is located directly under the tonearm.



Tonearm control is by simple rotary action. It's no wonder that *Radio Electronics* said, "... the pick-up arm is handled more gently than could be done by the steadiest of hands." We make

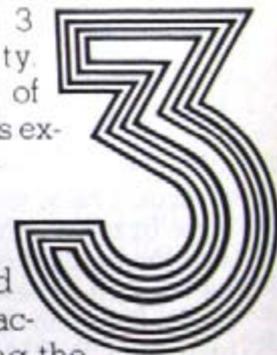
this claim: Delglide is the smoothest and quietest automatic system ever incorporated in a turntable—of any kind.

That's still another one for the new GT35.

There's more. The Dual 1245 and the B.I.C. 981 are warranted for 2 years. The new Garrard GT35 carries an unprecedented 3 year warranty. That's our way of underscoring its exceptional reliability.

Finally. The price advertised by the manufacturer. Including the base and dust cover, the Dual 1245 is \$240 and the B.I.C. 981, \$237. The price of the new Garrard GT35: just \$200.

The GT35: a "breakthrough" motor, the lightest tonearm, the smoothest and quietest automatic system and a 3 year warranty. Consider the GT35. If you're thinking Dual, or B.I.C. Or Technics. Or Pioneer. Or Sony. Or...



Garrard
The turntable specialist.

For a free brochure, write:
Garrard, Division of Plessey Consumer Products, Dept. B
100 Commercial Street, Plainview, N.Y. 11803

CIRCLE 19 ON READER-SERVICE CARD



A30XL

Perfect becomes Perfection

What more could be asked? Dyna's famous A-25 is surely the most popular quality speaker system in the world—the perfect choice for more than 900,000 ears. But now we've gone 3 better. The next step closer to perfection for all Dyna owners is the great new A-30XL—Dyna's first 3-way bookshelf speaker. A deeper low-end, more efficient and smoother over-all, Dynaco again sets the standard.

Perfectionists on a budget will pick the all new A-25 Mark II. For overall value, it's the perfect answer. With refinements like higher efficiency to couple best with the popular receivers (or Dyna's fantastic SCA-50 integrated amplifier) it's sound quality puts it worlds apart from the usual package choices.

For those whose critical taste far outreaches their wallet; choose the new D-XL's, at a down-to-earth price that is as sure to please you as the listening.

3 from the leader in sound value.

Ask for a demonstration and don't settle for anything else. If your dealer doesn't have them, call Dynaco collect at 609/228-3200.

dynaco

Dept. HF-1, Box 88, Blackwood, N.J. 08012

D-20XL

A-25 Mark II

CIRCLE 11 ON READER-SERVICE CARD

Dave Garroway in Chicago, Fred Robbins and Martin Bloch in New York, Ed (Jack the Bellboy) Mackenzie in Detroit, Jimmy Lyons in San Francisco, Steve Allen and Al Jarvis in Los Angeles, Dick Martin in New Orleans, and Phil McKeller in Windsor, Ontario (whose clear-channel station reached much of the U.S.), fought what in the light of history can be seen as a hopeless rearguard action in behalf of the higher achievements of American popular music up to that time. It was hopeless because the owners and operators of radio stations were making the pragmatic discovery of an essentially simple truth: More people like bad music than like good music.

Fine art demands something of the audience: attention, sensitivity, curiosity, and critical judgment, among other things. Since most Americans apparently are unwilling to expend much energy on matters involving their very well-being and perhaps even physical survival, is it reasonable to expect them to expend any on their nation's aesthetics, which they fail to see as involving any vital personal interest?

The mass of any culture's art will inevitably be ordinary. It is impossible that it be otherwise. For if all its art became by some miracle exceptional, we would automatically redefine the exceptional. Thus the great artist is an exception to the standards of his profession. And the genuinely perceptive audience is also exceptional. It is, by definition, a minority.

The tragedy of American art is the extent to which control of it has been turned over to business; and business is interested in the largest market. In the case of radio broadcasters, the governing factor of their existence is what they call cost-per-thousand—the cost to the advertiser of reaching a thousand persons. Thus, to a radio station in a given market, it becomes of paramount importance to be (or try to be) the station that reaches the widest audience. And to do that, stations in the 1950s began emphasizing music that was the equivalent of dime-store prints of stags against polychrome sunsets. After 1950, the decline in the quality of popular music on radio accelerated. But it took a quantum plunge when Todd Storz dreamed up his "jukebox of the air."

Storz, of the New Orleans-based Storz broadcasting stations, observed that the same songs were played over and over again on jukeboxes. He theorized that a format involving a limited playlist of constantly repeated hit

Discwasher, Inc. is a small company dedicated to unusual audio accessories of ultimate quality. Products in the Discwasher Group contain no frills, no duplication or confusing choices. Discwasher, Inc. believes that the most satisfying consumer relationship is achieved when our products are presented with:

1. The most detailed, honest and complete scientific research;
2. Knowledgeable product development from the "consumer staff" of Discwasher, Inc.—some of the world's most addicted audiophiles; and
3. Education and communication of these products with unusual, informative advertising.



©By Discwasher, Inc. 1977

The Discwasher System™

The superior record cleaner is the D3 system. The D3 Discwasher System has a specially-designed brush mounted on a milled, hand-finished walnut handle which also stores the D3 fluid bottle.

All records attract micro-dust when exposed to air, and this dust becomes welded into the groove walls by stylus pressure during playing. The patented Discwasher fabric with

rows of micro-fibers is unchallenged in its ability to *pick up* rather than *line up* dust, and to physically absorb micro-dust into the fabric backing of the Discwasher brush.



\$15.00

The exclusive D3 fluid has cleaning ability that is chemically "directed" at fingerprints and common disc contaminations. D3 has exclusive chemical protection and buffering to protect critical vinyl additives necessary for long-term record wear, and D3 has a chemical "release system" that pulls dirt away from micro-grooves and into the patented Discwasher fabric.

All these characteristics are combined with a secret non-adhering static reduction system within D3 fluid to produce the DISCWASHER SYSTEM of fluid and brush that has become synonymous the world over with superior record care.

groove walls and channels, and
 —REMOVAL OF CONTAMINATION
 with a non-adhering fluid.



SC-1™ —The Only Stylus Cleaner

Discwasher, Inc. research has found that when a record is "played", the delicate



\$6.00

diamond stylus accumulates a glazing or coating of contamination and dust that is not apparent to the naked eye. The stylus then becomes a grinding, abrasive instrument rather than a precision tracking instrument. Both record life and stylus life are dramatically reduced.

A stylus cleaning brush must be stiff enough to remove these waxy coatings, but gentle enough to avoid damaging the delicate cartridge assemblies.

The SC-1 Stylus Cleaner uses nylon bristles bound together in a specific, calculated density to provide enough cleaning tip surfaces and proper stiffness to perfect the cleaning operation. Two drops of D3 fluid give extra cleaning action to the SC-1 by solubilizing waxy accumulations without hardening (as alcohols do) the rubber damping polymers within the cartridge shell.

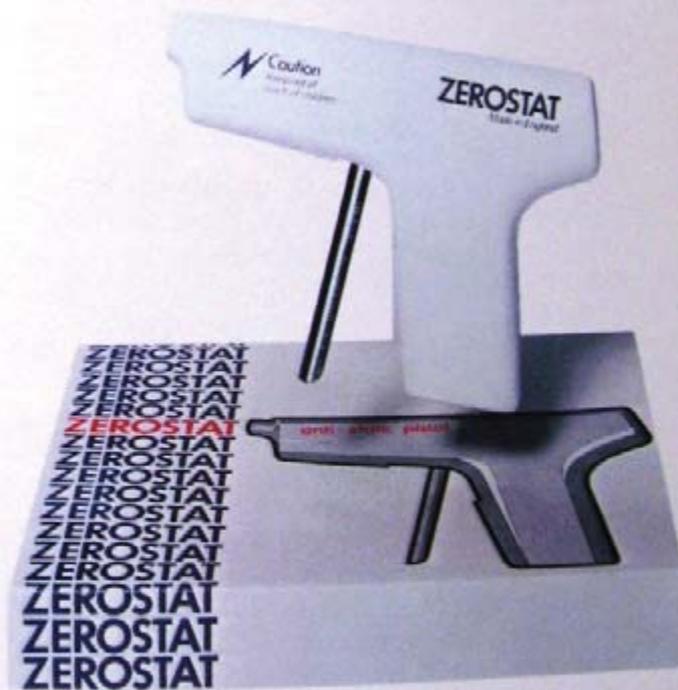
In addition, the SC-1 has a magnifying mirror opposite the brush for convenient inspection of stylus, cantilever and cartridge alignment. The brush and mirror retract protectively into an attractive walnut case for convenient storage.

Zerostat™

Zerostat is the ultimate anti-static device. This device is a piezoelectric pistol that emits positive and negative charges on squeeze and release of the large trigger. These ions shower a large working area and neutralize electrostatic charges on any surface. Zerostat eliminates dust-attracting static from records, dust covers, photographic film and any other surface of interest.

Arm/cover attraction decreases the actual tracking force of cartridges during winter months of high static/low humidity. Zerostat can eliminate the static charge between dust covers and tonearms. By actual measurement, all records possess an internal static charge—and only Zerostat effectively reduces this charge for optimized dust release, cleaning, and long-term playing quietness.

Zerostat is a truly effective, safe instrument for audiophiles and photographers. There is no cartridge to replace, nothing to plug in, and no potentially harmful radioactivity.



\$20.00

rigorous adhesion. How many layers
can you see?

static device.
ic pistol that
charges on
large trigger.
working area
charges on any
dust-attracting
ers, photographic
of interest.

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othing to plug
l radioactivity.



Gold-ens™

Gold-ens are perfectionist audio connector cables with gold-plated contacts for the optimum transfer of electrical signals. Gold, as a metal, has one-third the bulk resistivity of other standard connector metals (cadmium, zinc, tin). But in addition, other contact metals have surface films which are 1,000 to 2,000 angstroms in thickness. The surface film on Gold-ens connector cables is only 5 angstroms thick. Since gold will not tarnish



or corrode like other metals, it has become the ageless metal. Gold-ens are the perfect connectors to transfer electrical signals in high quality audio applications.

The new Gold-ens feature ultra-low capacitance cables with stranded center wires, individually soldered connections, and steel spring strain relief at each end. Gold-ens are available in one-meter, two-meter, DIN-to-four-phono lengths, and female/female connector plugs.

(1 meter pair)	\$ 8.00
(2 meter pair)	\$10.50

DIN/5 to 4 RCA Connector (1 meter)	\$18.00
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RCA PIN- RCA PIN CONNECTOR (Pkg. of four)	\$12.80
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D-Stat II TM

D-Stat II is a soft, felt-like turntable mat which, according to the Swedish Test Institute, is twice as good as the original D-Stat in actually reducing electrostatic charges on the turntable. The uniquely conductive fibers of D-Stat II equalize static "hot spots" and thereby eliminate bothersome pops of static discharge.

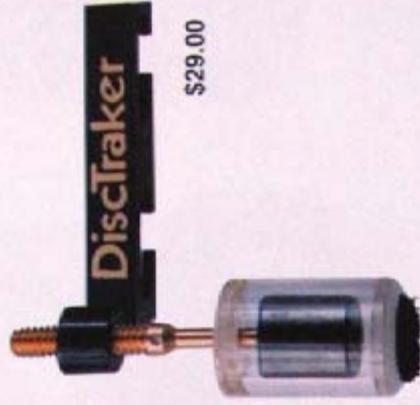


\$7.95

In addition, recent research has shown that a cartridge sets up sonic resonances between a playing disc and a hard turntable surface. This artificial additive causes many turntables to have "flavors" of sound. D-Stat II buffers the subtle warps of records against hard platter surfaces and allows the true characteristics of an audio system to be perceived.

Disctraker TM

Disctraker is a revolutionary tonearm/cartridge damper that precisely cushions the cartridge from record warps (all records contain measurable warp). Disctraker is a pneumatic piston device that attaches to virtually any headshell. The damper is essentially friction-free, and possesses a shock absorbing value derived from both experimental and mathematical models.



\$29.00

Weighing less than one gram, Disctraker allows warped records to be played without stylus and audio system trauma. Disctraker eliminates subsonic woofer flutter and reduces the low frequency resonance peaks in all tonearm/cartridge combinations by as much as 18 dB. Disctraker improves trackability and reduces record/cartridge wear. Technical paper is free on request.



\$24.00

Pro-Disc TM

Pro-Disc is a total system which creates an environment for treating records with a dry, micro-film lubricant. Pro-Disc is a freon-free system. Pro-Disc perfectly distributes a micro-deposition of friction-reducing protection on valuable recordings. Pro-Disc lowers playback distortion and vastly extends record life.

Pro-Disc requires no forceful buffing, and one module of compound treats more than 80 record sides, with economical refills available. A Pro-Disc treatment lasts essentially for the life of a disc, and a convenient, small marking tab is available to indicate those records protected with Pro-Disc.

Pro-Disc has proprietary and important lubricant characteristics. In addition, the Discwasher, Inc. laboratories have formulated the Pro-Disc compound to contain a special heat transfer characteristic which literally vents into the air the tremendous, traumatic heat generated by pressure during stylus playback.

Pro-Disc—only for important records—for the rest...

As you would expect from LUX, our new R-1050 tuner/amplifier "is no mere run-of-the-mill receiver."

When LUX Audio entered the U.S. audio scene in 1975, we brought with us a worldwide reputation for excellence. But since we also brought only our separate amplifiers and tuners, relatively few audiophiles could enjoy the special qualities of LUX performance.

Now, everyone who would like a LUX tuner, preamplifier and power amplifier—on a single chassis—can have them just that way. We choose to call these new models "tuner/amplifiers," although you probably think of them as "receivers." What's more important is how Hirsch-Houck Labs described the R-1050 in *Stereo Review*:

"Given its features, appearance and performance, this is no mere run-of-the-mill receiver. . . . The excellent audio-distortion ratings . . . obviously place it among the cleanest of the currently available receivers. . . . every aspect of the receiver's operation and handling was as smooth and bug-free as its fine appearance would suggest."

Typical of the circuitry and features that result in such fine performance are these: a dual-gate MOSFET front end for high sensitivity, and a special linear-phase filter array for high selectivity, low distortion and wide stereo separation. The preamplifier section has a two-stage direct-coupled amp for accurate

RIAA equalization and a good phono overload capability. And the power amplifier is direct-coupled DC, in a true complementary symmetry configuration, for excellent transient and phase response.

Operating features include a six-LED peak level indicator for each channel; tape-to-tape dubbing with simultaneous listening to other program sources; turn-on time delay speaker protection plus automatic overload shutdown.

The sound of the R-1050 has been appreciated as much in England as here. For example, the British magazine *HiFi at Home* said: ". . . treble quality was light and delicate, something LUX engineers always seem to achieve. . . . bass output seemed plentiful and strong, as is often the case with enormous, low impedance power supplies."

If we've encouraged you to experience the sound of a LUX tuner/amplifier, your next step is to visit one of our carefully selected dealers. We'll be pleased to send you the names of those in your area.

Luxman R-1050: 55 watts per channel, THD 0.05%. Suggested price \$595. Other Luxman tuner/amplifiers: R-1040, 40 watts per channel, THD 0.05%. Suggested price, \$445. R-1120, 120 watts per channel, THD 0.03%. Suggested price, \$895. (Power ratings are minimum continuous output per channel, with both channels driven simultaneously into 8 ohm loads, from 20 to 20,000 Hz, and no more than quoted total harmonic distortion.)

LUX Audio of America, Ltd.

160 Dupont Street, Plainville, New York 11803 • In Canada: White Electronics Development Corp., Ontario



songs would be successful on radio. The selection of songs would be not according to such vague standards as aesthetic value, but strictly according to a commercial criterion: popularity, as determined by such indicators as the charts published in *Billboard*, the record industry trade paper. His format soon was being emulated by radio stations throughout the country. Whereas network radio had presented *Your Hit Parade*, a weekly compendium of the most popular songs, the Storz stations and those that imitated them began broadcasting a "hit parade" of forty songs around the clock, seven days a week. Thus Top 40 radio was born. As the years went on, stations tightened the playlist until some played only fifteen.

By 1970, computerized "jukeboxes of the air" had come into existence. To visit such a station is a disturbing experience. Banks of tapes on large machines sit there in silence. Suddenly one of the tapes will start turning, triggered by a computer and play a song over the air. Then it will stop and another will start. One tape may contain current hot pop tunes, another a collection of "golden oldies." Some songs are described as they begin to play, others will be "back announced"—all according to commands from computer to tape. The computer also is programmed to play commercials. And on the hour, it will play a prerecorded segment of the news. Not that the station owners want it to, but the Federal Communications Commission requires it.

The FCC hardly constitutes a burden to automated radio. Whereas it prohibits a single company from owning more than seven AM and seven FM stations (to prevent too much control over public communications from gravitating into a few hands), nothing in its regulations restricts the number of stations for which one company may provide programming. Thus an outfit in Los Angeles may determine what is heard on fifty or more stations throughout the country, some of them in major cities with huge audiences.

Nor has the FCC ever taken a stand on Top 40 (or Top 15) radio, which is by its very nature censored radio. By the fiat of a station's owner, everything except that predetermined number of songs that are the most commercially successful at the moment is, in effect, banned from the air.

Federal regulatory agencies have come under increasing fire in recent years for being in bed with the very industries they are charged with overseeing. None of them is more deserving of this criticism than the FCC, which I will examine in more detail in the next issue.

If your cartridge is more than three years old, don't replace your stylus!

Don't get us wrong. There is nothing worse than playing your records with a worn stylus. And no better way to restore your old unit to its original glory than a new diamond.

But frankly, there have been significant strides made recently in the phono cartridge field. And the new cartridges of today stand head and shoulders above even the finest of a few short years ago.

Here's the choice: Get fresh—but outdated—performance with a replacement stylus, or enjoy all the benefits of modern cartridge research and development for just a few dollars more. You'll find that you can update your system for far less than you might imagine. It's probably the *most dramatic single improvement* you can make.

For instance, Audio-Technica offers Universal™ cartridges equipped with a genuine Shibata stylus and our uniquely effective Dual Magnet™ system beginning at just \$75.00 list. Or you can replace your present cartridge with a fresh new Audio-Technica cartridge with highly-polished elliptical tip for as little as \$45.00 list.



AT11E
\$45.00

AT12Sa
\$75.00

AT13Ea
\$65.00

AT15Sa
\$125.00

Are these new models worth the difference? Absolutely. You'll be amazed at what you hear from *today's* generation of phono cartridges. Improved frequency response. Lower distortion. Better separation. Less record wear. Truly better sound.

A new Audio-Technica cartridge.
Your best value in hi-fi.



audio-technica.
INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 18H, 33 Shiloh Avenue, Fairlawn, Ohio 44131
Available in Canada from Superior Electronics, Inc.

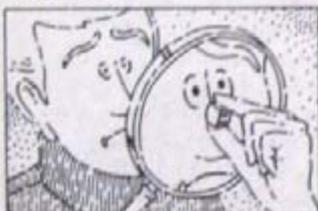
CIRCLE 4 ON READER SERVICE CARD

ARE YOU BLAMING YOUR TAPE RECORDER FOR PROBLEMS CAUSED BY YOUR TAPES?

Every day people all over the country go into hi fi dealers with complaints about their tape recorders.

When in reality what they should be complaining about is their tapes.

Because the fact is, a lot of the problems that plague tape recorders can be attributed to bad tape.



HEAD WEAR IS CAUSED BY YOUR RECORDER. OR IS IT?

If you have to clean your tape heads more than usual, for example, it could be your tape doesn't have a special nonabrasive head cleaner.

Maxell has one.

If your recorder jams, it can be any number of things. Maxell does something to prevent all of them.

We make our cassette shells of high impact polystyrene. And then so they won't crack



JAMMING IS CAUSED BY YOUR RECORDER. OR IS IT?

even after years of use, we finish them to tolerances as much as 60% higher than industry standards.

Inside, we use free rolling Delrin rollers so the tape doesn't stick.

And finally, we screw instead of weld everything together because screws make

for stronger cassettes.

If your recorder frequently suffers lapses in sound, it could be the tape is of inferior quality. And nobody's bothered testing the tape for dropouts before it leaves the factory.



DROPOUTS ARE CAUSED BY YOUR RECORDER. OR ARE THEY?

Maxell tape is made of only the finest polyesters. And then every



POOR TRACKING IS CAUSED BY YOUR RECORDER. OR IS IT?

step of the way it's checked for even the slightest inconsistencies.

So if you're having problems with your recorder, try a Maxell cassette, 8-track or reel-to-reel tape.

You might find there's really nothing wrong with your tape recorder, just with your tape.



MAXELL. THE TAPE THAT'S TOO GOOD FOR MOST EQUIPMENT.

Maxell Corporation of America, 130 West Commercial Ave., Moonachie, New Jersey 07074

Barcus-Berry's Mysterious Glass Plate

On a recent trip to California we stopped in to see Barcus-Berry, not because of that company's estimable musical-instrument line and related products, but because of a recent development that may make it as well known in music reproduction as it is in music making: the AudioPlate. It is a high-frequency driver consisting of a glass plate (about 5 by 7 inches) with an attached transducer.

The driver does not behave like a normal piston—a diaphragm like that on dynamic or electrostatic speakers that moves in and out to "push" the air. Even the folks at Barcus-Berry express some doubt about how it really does work and say they expect its active principle to be the subject of considerable debate. Their tentative explanation is that the energy propagated within the plate and transferred to the air of the listening room behaves more like a shock wave than like a normal acoustic wave, and that the shock wave then, in a sense, "breaks down" progressively in the air to become sound. Evidence cited for this phenomenon is that the propagation does not seem to follow the inverse-square law—perceived levels close to the driver often seem surprisingly subdued, those at great distances surprisingly loud.

Another surprise for those used to conventional drivers is that the response range apparently cannot be extended downward by increasing driver area. According to Barcus-Berry, the useful range of the AudioPlate extends from about 2 kHz to beyond audibility. In this range, however, it claims exceptional performance and a true omnidirectional radiation pattern—depending, of course, on how it is mounted. Since the device does not push the air, it is not inherently bipolar (like cones, domes, electrostatics, Heil drivers, or others with true diaphragms); the positive "shock" of its propagation appears to be produced simultaneously from the front and back of the device, rather than alternately at front and back as with diaphragms, since the plate itself does not move.



We were ruminating on these properties of the design as Mr. Barcus turned on his equipment for a demonstration. The AudioPlates in use were add-on units in wood cases—prototypes of a product that should be appearing in stores about the time you read this—with a built-in 2-kHz crossover. Lacking controlled conditions, we could form only a tentative opinion of the tweeter. What we heard did suggest, however, that the company's enthusiasm for its "find" has some basis. The output of the tweeter seemed unusually smooth, extended, and distortion-free, with superior depth and placement in the stereo image and freedom from objectionable beaming or off-axis nulls.

The AudioPlate is, according to Barcus-Berry, being examined by a number of companies that might incorporate it (under license) into full-range systems. B-B itself already offers a number of speakers with the AudioPlate for sound-reinforcement and musical-instrument use; the add-on tweeter represents its first foray into the home high fidelity market.

CIRCLE 141 ON READER-SERVICE CARD

SQ Leads Matrix Competitors in FCC Quad Study

As a prelude to a decision by the Federal Communications Commission to create a standard for quadriphonic broadcasting, the FCC's Laboratory Division conducted a series of listening tests. These tests have established that the audition panel generally preferred four-channel reproduction of music via the CBS SQ matrix system to that offered by the BBC's H matrix and Sansui's QS. In the same tests, SQ trailed discrete quadriphony, as realized by means of a four-channel tape, by a slight margin. But the report

pointed out that, despite superior aural performance, the discrete systems—which require more complex transmitting and receiving equipment—"might be precluded from adoption . . . because of other technical factors and/or economic considerations. They may be forced to survive only as audio systems for the theater or home."

In tests for compatibility with stereophonic and monophonic reproduction, SQ was preferred over all systems, including discrete. The most notable area in which the CBS

No other speaker has ever looked like this, no other speaker has ever been built like this. And we believe no other speaker, regardless of size or price, can recreate the impact and feel of live music like the Bose 901 Series III.

It is a speaker unlike any other.



BOSE
Better sound through research.

In one page we cannot begin to describe the 901 Series III and the technology behind it. So we've put together a comprehensive literature package that includes a detailed 16-page color brochure, a 20-page owner's manual, and a copy of Dr. Amar Bose's paper on "Sound Recording and Reproduction," reprinted from *Technology Review*. To receive this literature, send \$1.00 to Bose, Dept. HF10, The Mountain, Framingham, Mass. 01701. Patents issued and pending. Cabinets are walnut veneer.

The luxury receiver with a difference: Dolby.*

Sansui's new 9090DB top-of-the-line receiver adds Dolby to its other luxury credentials — big power, an extremely fine tuner section and great versatility. The Dolby circuitry will not only decode Dolby FM broadcasts: it can also encode and decode tape

recordings for reduced noise and hiss.

And, of course, with the Sansui 9090DB you can creatively determine just how you like your music. In addition to bass and treble controls, with turnover selectors for 150 Hz/300 Hz and 1.5 kHz/3 kHz respectively,

there is also a midrange control. High and low filters. A tone defeat for bass and treble. A loudness switch and 20 dB audio muting switch. For added creative freedom, two tape monitors and a mic mixing circuit with separate level control. Two tuning meters,

as well as twin power meters that also serve for Dolby tone calibration.

Listen to the 9090DB. Handle its superbly smooth controls. See how they respond to your slightest command. We know you will fall in love with Sansui.

The Sansui 9090DB.

AUDIO SECTION

POWER OUTPUT
125 watts per channel, min. THX.
Both channels driven into 8 ohms from 20 Hz to 20,000 Hz, with no more than 0.1% total harmonic distortion.

FM SECTION

FM SENSITIVITY
9.8 dB (1 pV)
SELECTIVITY
Better than 45 dB

SIGNAL TO NOISE RATIO
Better than 70 dB

SPURIOUS RESPONSE SECTION

Better than 85 dB

*Dolby is a trademark of Dolby Laboratories Inc.

Simulated woodgrain cabinet



A whole new world of beautiful sound.

Sansui

SANSUI ELECTRONICS CORP.

Woodside, New York 11377 • Gardena, California 90247

SANSUI ELECTRIC CO., LTD., Tokyo, Japan • SANSUI AUDIO EUROPE S.A., Antwerp, Belgium • In Canada: Electronic Distributors

Circle 53 on Reader Service Card

The sound and the theory.



© 1977 Koss Corp.

Introducing a speaker system with a sound so fantastic that it took a whole new theory of loudspeaker design to produce it . . . the Koss CM 1010 loudspeaker. It's the ultimate in 2 bandpass speakers, with an extended bandwidth response, high efficiency and incredibly low distortion that's unmatched by any other 2 bandpass speaker at any price.

To achieve such remarkable performance, Koss engineers set critical parameters for cabinet size, frequency response and efficiency. Then the computer-programmed Koss Theory furnished not only construction specifications for the woofer, tweeter, passive radiator and crossover network, but also the optimum position in the cabinet for each component to create maximum structural rigidity and optimum dispersion and phase coherency.

The result is an all-embracing quality of sound. The 10-inch passive radiator reinforces the lower 2 octaves

while the special 8-inch woofer also handles midrange to 3500 Hz. With the radiator's unique alignment mass in place, the CM 1010 reproduces a maximally flat response from an f_3 of 35 Hz on outward. However, for more acoustic energy in the 50 to 80 Hz range, the alignment mass can be removed to create an f_3 of 60 Hz and a low bass ripple of $1\frac{1}{4}$ dB centering on 60 Hz. The CM 1010's high-energy, 1-inch dome tweeter linked to an acoustic transformer increases the high bandpass headroom by an incredible 6 dB. With performance so superior, the CM 1010 is clearly the ultimate speaker in its price range.

For a free, color brochure of Koss CM loudspeakers, write to Fred Forbes, c/o the Koss Corporation. Or ask your Audio Dealer for a live demonstration of the Sound of Koss, and hear the Koss Theory in action. Once you've listened to the revolutionary CM 1010, you'll agree: hearing is believing.

KOSS CM 1010 SPEAKER SYSTEM
hearing is believingTM

KOSS CORPORATION, 4129 N. Port Washington Ave., Milwaukee, Wisconsin 53212
Koss International: London, Dublin, Paris, Frankfurt • Amsterdam • Koss Limited, Ontario • Koss K.K., Tokyo

matrix showed weakness was in localization tests, where it settled into last place, albeit not far behind other matrices. Comments from the auditors, however, indicated some distaste for all "surround sound" effects in comparison with a presentation in which the back channels carry ambience or reverberated sound only, presumably because the latter more closely simulates the concert hall experience. The testers note, significantly, that requirements for "front plus ambience" reproduction can be met adequately by matrix systems.

The report warned the commissioners that "in any event, extreme care must be exercised in choosing the system for FM Broadcast Service so that future developments in multichannel sound will not be stifled." Amen.

Also . . .

Superscope, whose Pianocorder was discussed in our September 1977 issue, is negotiating to acquire Grand Piano Company of Morganton, North Carolina. A previously announced agreement in principle with the Aeolian Corporation, also a piano manufacturer, has been terminated.

Philips and MCA say they have developed a new type of optical video disc that can be played on both sides to give a

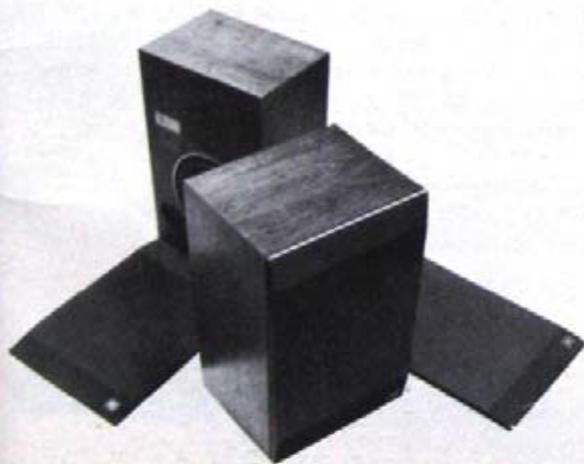
total program time of one hour or more. The new disc is thicker than the earlier version so that modifications to the player are necessary in order to accommodate it. These are currently being made at N. V. Philips and at Magnavox, a subsidiary of North American Philips Corporation. Regional marketing, with players, is planned for next fall.

TDK announces that its sometime league-leading SD series of cassette tapes has been dropped from the line, "victim of major technological advances" in the D cassette tape, which—though it remains relatively inexpensive—appears to have closed the performance gap with SD.

Audio-Technica will begin distribution of Sonic Arts direct-to-disc recordings in addition to the Umbrella discs it currently markets. The first two releases are "Piano Fireworks," with Russell Stepan playing works of Chopin, and "The Piano," on which David Montgomery plays Beethoven, Brahms, Schubert, and others. A Tellarc release—"Michael Murray at the Great Organ at Methuen"—also is planned by Audio-Technica.

DBX now has a version (Model 193) of its noise-reduction system specifically engineered as an add-on for Nagra IV-S portable stereo recorders.

Equipment in the News



A bookshelf speaker from JBL

JBL's newest two-way speaker system, the L-40, is a bookshelf model that uses a 10-inch woofer and 1-inch tweeter. Low-frequency damping is provided by an acoustic-resistance shell whose physical parameters match those of the woofer. The basket-shaped fiberglass shell, which is held in place behind the speaker, does not restrict normal cone movement. JBL credits the shell with attenuating energy rise in the lower frequencies, resulting in uniform response down to the limits of the L-40's range. The tuned bass reflex enclosure is finished in black walnut, and the grille is available in brown, rust, and tan. The L-40 costs \$207.

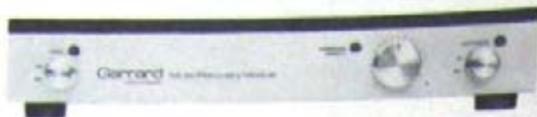
CIRCLE 142 ON READER-SERVICE CARD

Lexicon's low-cost digital delay system

The Delta-T Model 92 is a digital time-delay system designed for sound-reinforcement applications in small halls such as churches and theaters. There are two independently controllable output channels, each offering up to 120 milliseconds of delay. Other features include automatic bypass, a five-position LED headroom indicator, and XLR input and output connectors. The Model 92 requires only 3½ inches of rack space and operates on 115–230 volts AC, 50 or 60 Hz. Frequency response is rated at +1, -2 dB from 20 Hz to 12 kHz. Suggested list price is under \$2,000.

CIRCLE 143 ON READER-SERVICE CARD





Garrard enters noise-suppression field

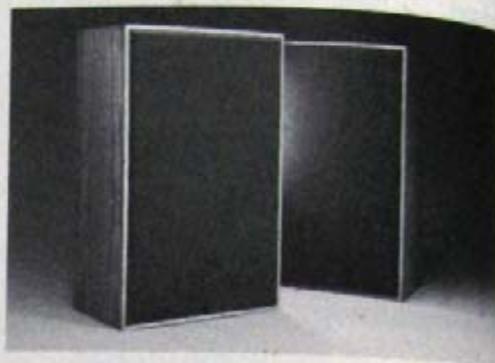
Garrard's first venture into noise reduction is the Music Recovery Module, a device that can be used in a component system to filter disc noise impulses, especially on scratched records, and allow only the music to pass through. A time-delay circuit in the MRM gives the detector enough time to distinguish the characteristics of noise impulses; musical transients are not affected. The switchable suppressor circuit can also be adjusted for intensity of scratch damage: More heavily scratched records receive a greater degree of suppression. The Music Recovery Module includes a phono preamp and sells for \$199.95.

CIRCLE 144 ON READER-SERVICE CARD

Evolution in a speaker from AEI

Audio Engineering International has announced the availability of Evolution 1, an acoustic-suspension, two-way speaker system. The 10-inch woofer has an impedance control for accenting low frequencies, and the 1-inch dome tweeter has a high-frequency control, allowing the user to compensate for absorption characteristics of the listening room. The minimum power requirement is rated at 15 watts (11 3/4 dBW) per channel into a 4-ohm load. Crossover occurs at 1.5 kHz and rated frequency response is +1 1/2 dB, -2 dB, 35 Hz to 17 kHz. The Evolution 1 comes in two finishes: The walnut model costs \$156, and the vinyl model is \$137.

CIRCLE 145 ON READER-SERVICE CARD



Tapco enters the power-amp marketplace

The fan-cooled two-channel CP-500 professional power amplifier uses a Power Sentry circuit to control distortion that can be caused by clipping and to protect tweeters. The CP-500 is rated at 150 watts (21 3/4 dBW) into 8 ohms or 24 dBW (255 watts) per channel into 4 ohms, with THD below 0.009%, and the Power Sentry's operating level is adjustable in each channel. Also available is the CP-120 for biamped and triamped systems. The CP-500 costs \$649.

CIRCLE 153 ON READER-SERVICE CARD

Furman Sound's tunable crossover

Model TX-2 from Furman Sound is a tunable crossover and bandpass filter designed for use with either stereo biamped or mono triamped systems in studio, public address, and home setups. The unit is tunable from 20 Hz to 20 kHz and features separate level controls for the two filter bands and one input gain control. The TX-2 incorporates Butterworth filters with a rolloff of 12 dB per octave for smooth frequency handling. Cost of the unit is \$250.

CIRCLE 147 ON READER-SERVICE CARD



Superscope introduces cassette decks

Superscope is distributing its three new stereo cassette decks, among which is the Model CD-310. Some of the features of this front-loading machine are Dolby noise reduction, calibrated VU meters, and separate bias and equalization switches. It also offers automatic shutoff, separate recording level controls for maximum flexibility, and a peak limiter switch. The price of the CD-310 is \$149.95. The other models in the line, the CD-304 and CD-303, are top-loaders costing \$139.95 and \$99.95.

CIRCLE 146 ON READER-SERVICE CARD

HIGH BIAS.

These cassette deck manufacturers use SA
as their reference for the High(CrO₂) bias/EQ setting:

AIWA • AKAI • CENTREX • JVC
KENWOOD • MERITON • NAKAMICHI
OPTONICA • PIONEER • ROYAL SOUND
SANSUI • SHARP • TEAC • TOSHIBA
UHER • YAMAHA

And are joined by these
in recommending SA for use in their decks:

BANG & OLUFSEN • DUAL • FISHER
HARMAN/KARDON • LAFAYETTE
SANKYO • TANDBERG
AND MANY OTHERS.



There's been a quiet revolution going on in the cassette world. □ Leading makers of quality cassette decks have adopted TDK SA as their reference standard tape for "High" (CrO₂) bias and equalization settings. Why TDK SA? Because TDK SA's advanced tape formulation and super precision cassette mechanism let them (and you) take full advantage of today's advanced cassette deck technology. □ In addition, a growing number of other companies are recommending SA for use with their machines. □ So for the ultimate in cassette sound and performance, load your deck with SA and switch to the "High" or "CrO₂" bias/EQ settings. You'll consistently get less noise, highest saturation and output levels, lowest distortion and the widest dynamic range to let you get the best performance from any quality machine. □ But you needn't believe all this just because we say so. All you have to do is check our references.

 **TDK**

The machine for your machine.

A new turntable from Kenwood

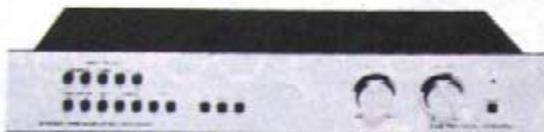
Kenwood's new direct-drive turntable, the KD-2070, has a brushless DC motor coupled to the platter for smooth rotation. According to Kenwood, the result is a wow and flutter figure of 0.04%, with rumble at -65 dB. The KD-2070 comes with an S-shaped tone arm whose tracking error is rated at ± 1.5 degrees. The turntable is also equipped with anti-skating and viscous-damped cueing. A built-in strobe facilitates setting of speeds, and a single control sets pitch for both 33 and 45 rpm. The KD-2070, with base and dust cover, costs \$140.



A&E's precision preamp

To minimize waveform alteration, the A&E SCA-2000 preamplifier holds phase shift to within 3 degrees and total harmonic distortion to 0.01% across the audio band, according to the manufacturer. The two phono inputs have, in addition to switch-selectable input impedances, separate high- and low-frequency feedback networks in the equalizer section that result in a response said to be within ± 0.2 dB of RIAA specs. Other features include a 32-point attenuator volume control and a full complement of inputs selectable via pushbuttons. A product of A&E Technical Research, the SCA-2000 is priced at \$950.

CIRCLE 148 ON READER-SERVICE CARD



On the beam with BIC

British Industries Company's Beam Box is an indoor antenna designed to eliminate the problem of faulty FM reception. Front-panel controls allow the user to select signal direction and desired frequency. The Beam Box's passive electronic circuit then aims its sensitivity pattern in the specific direction without actually moving the antenna. The results are said to be improved separation and reduced interference. Electronic direction of reception patterns, according to BIC, is especially helpful in areas where outdoor antennas are impractical, such as apartment buildings. The Beam Box, which also has a bandwidth control, uses no house or battery current and costs \$89.95.

CIRCLE 149 ON READER-SERVICE CARD



Musictronics' new octave divider

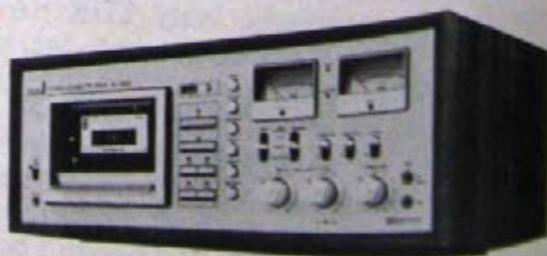
The Mu-tron Octave Divider, designed for use with guitar, voice, and keyboards, produces a sub-octave that, according to Musictronics, retains the character of the original signal. A fuzz effect is achieved via a toggle switch marked RINGER, and there are rotary pots for MIX and TONE. This footswitch-activated device sells for \$160.

CIRCLE 150 ON READER-SERVICE CARD

Sansui's top-of-the-line Direct-O-Matic deck

As with the other models in Sansui's current line of cassette decks, the SC-5100 features the new Direct-O-Matic loading and tape lead-in. A two-motor design, the SC-5100 has memory and repeat functions, a timer for unmanned record and playback, Dolby noise reduction and a Dolby-FM switch, and mike and line mixing capability. A peak LED, averaging meters, separate three-position bias and equalization switches, and peak limiter round out the front-panel features. Rated frequency response, with normal tape, is ± 3 dB, 30 Hz to 13 kHz. The price of the SC-5100 is \$600.

CIRCLE 151 ON READER-SERVICE CARD



TODAY MORE THAN EVER AR SPEAKS THE TRUTH

LOUD & CLEAN

Amazing.

The hottest new name in the speaker business seems to be AR.

Because we've been busy making a few changes. But we haven't forgot what made us



famous.
Quality.
Accuracy.
Performance,
loud and clean.

Yes, we've broadened the AR line. Now it includes 7 models designed to sell from about \$65 to about \$450.

Yes, we've improved AR power-handling capacity with an important innovation. The liquid-cooled speaker. All our high-range drivers for '77-'78 will use magnetic fluid (it costs nearly \$3000 per gallon) to position and cool voice coils.

Yes, we've refined logos, cabinet styling and several other neat little touches.

We've even improved distribution. Henceforth you'll find AR only in quality high-fidelity stores.

What hasn't changed is AR quality and quality control. And that's the reason every AR speaker system is covered by the most impressive warranty on construction *and* performance of any major speaker.

For information and "specs" pick up our new catalog from your high fidelity dealer or write to us at the address below.

TELEDYNE ACOUSTIC RESEARCH
15 BARKER DRIVE, WILMINGTON, MASSACHUSETTS 01890
IN CANADA: A. C. DUBOIS & SONS LTD.

CIRCLE 1 ON READER-SERVICE CARD



One great sound

The famous PRO/4AA is a tough act to follow. After all, its wide dynamic frequency response with a deep rich bass and crystal clear highs made it the world's most asked for stereo headphone. But our audio engineers had a few innovative ideas on how to develop a whole new pro. One that sounded so fantastic, you'd almost think your old records and tapes had turned into a whole new music library. And one that was so comfortable, you'd never want your records or tapes to end.

The result is a totally new standard in stereophones: the PRO/4 Triple A. Because the new Koss PRO/4 Triple A

expands the realm of pure sound with a freshness and life-like intensity every music lover will want to hear. Indeed, with a frequency response from 10 Hz to 22kHz, the Triple A offers a full bandwidth dynamic sound of Koss that makes every note blossom to its fullest harmonic growth. Add to that the human-engineered, contoured, "Pneumalite" cushions that provide both comfort and a flat, low bass response to below audibility, and you've got a whole new state-of-the-art stereo headphone. And while the new Triple A's extra large voice coil, and oversize diaphragm mix the music in

your head, its extra light construction and unique "Pneumalite" suspension duct headband let you float, hour upon hour, unconfined through your private realm of listening pleasure. Ask your favorite Audio Dealer to show you the new Koss PRO/4 Triple A. And write c/o Virginia Lamm for our free full-color stereo catalog. But if you really want to see how great the new Triple A is, take your favorite records or tapes with you to your Audio Dealer and listen to them thru the new Koss PRO/4 Triple A. The difference you hear is why we say: "hearing is believing."

© 1977 Koss Corp.

 **KOSS** stereophones
hearing is believing™

KOSS CORPORATION, 4129 N. First Washington Ave., Milwaukee, Wisconsin 53212
Koss International: London, Canada, Paris, Frankfurt, Amsterdam, Koss Limited, Burlington, Ontario, Koss S.p.A., Tokyo

CIRCLE 30 ON READER SERVICE CARD



Here's another Empire 698 Turntable dashing off the assembly line.

It takes 15½ hours to make an Empire turntable.
Each one stands over 80 separate inspections before
it reaches the end of the line.

And after the assembly is done, we test it some more.
Wow and flutter, rumble, and speed accuracy are
electronically confirmed to meet specifications before
final approval.

It's not a fast way to finish a turntable, but it's a great
way to start one.

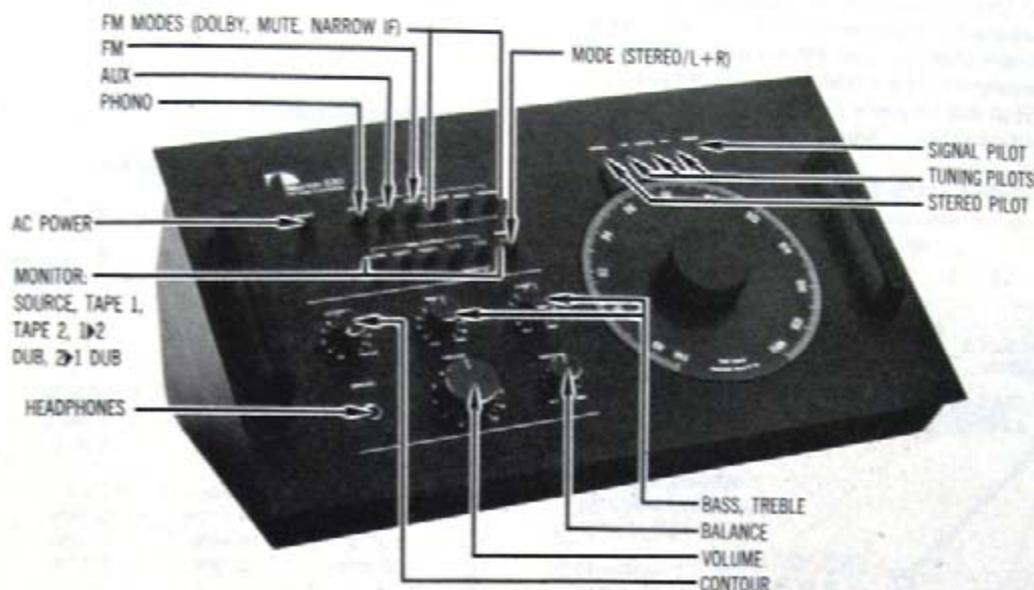
EMPIRE

Empire Scientific Corp., Garden City, New York 11530

Preparation supervised by
Robert Long, Harold A. Rodgers,
and Edward J. Foster
Laboratory data (unless otherwise noted)
supplied by CBS Technology Center

A CONSUMER'S GUIDE

New Equipment Reports



Another "Rare Bird" from Nakamichi

The Equipment: Nakamichi 630, a stereo tuner/preamplifier in metal case capable of rack mounting. Dimensions: 15 $\frac{1}{4}$ by 9 $\frac{1}{4}$ inches (main panel); 6 $\frac{3}{4}$ inches high, 9 $\frac{1}{2}$ inches deep. Price: \$630; optional walnut cabinet, \$45. Warranty: "limited," three years parts and labor. Manufacturer: Nakamichi Research, Inc., Japan; U.S. distributor: Nakamichi Research (U.S.A.), Inc., 220 Westbury Ave., Carle Place, N.Y. 11514.

Comment: In the high fidelity aviary, the tuner/preamplifier is an odd bird—neither a full receiver nor a totally separate tuner. It surprised us a bit that Nakamichi's first FM equipment should appear as part of such a combination. But then, this is quite in character for a company that prides itself on innovation.

The 630 tuner/preamplifier follows the styling of the remainder of the 600 series, itself a departure from tradition. The cabinet is wedge-shaped; with the 630 placed on a shelf or table, the control panel slants upward and to the rear, placing all controls at a convenient angle. (Alternatively, this unit can be mounted with its brethren in the Nakamichi System One equipment rack.) Nor does Nakamichi use the traditional slide-rule tuning dial, opting instead for a jumbo (5 $\frac{1}{2}$ -inch diameter) rotary dial that, straightened out, would amount to more than a foot of

scale across the FM band. The extremely accurate dial is linearly calibrated every 0.1 MHz. More than eleven turns of the knob are required to sweep the band, and the action is light, super-smooth, and totally without backlash.

Even more surprising for Nakamichi, long known for generously sized meters on tape equipment, is the total absence of meters from the 630. The channel centering is indicated by three LEDs: the central red one for exact tuning, the green outer ones indicating mistuning and the direction of the error. This setup is as sensitive and as accurate as any meter we have used. An amber indicator glows progressively brighter as the signal strength increases. We did not find it nearly as convenient as a meter for orienting an antenna. And, as with the rest of the Series 600, we

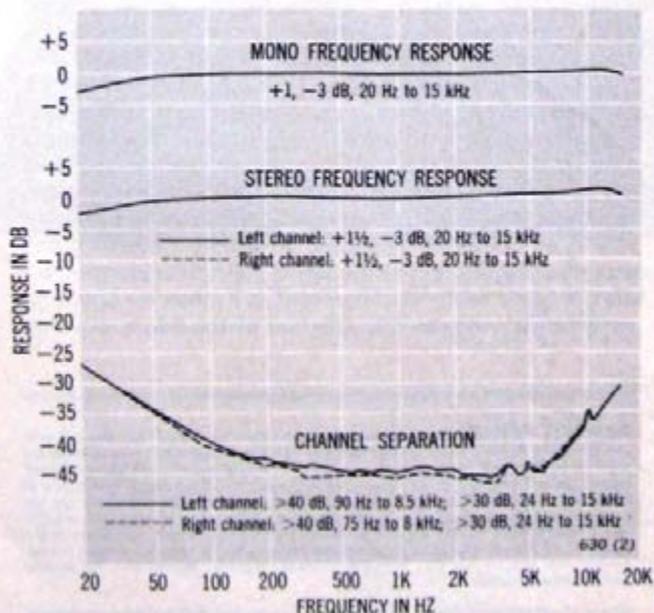
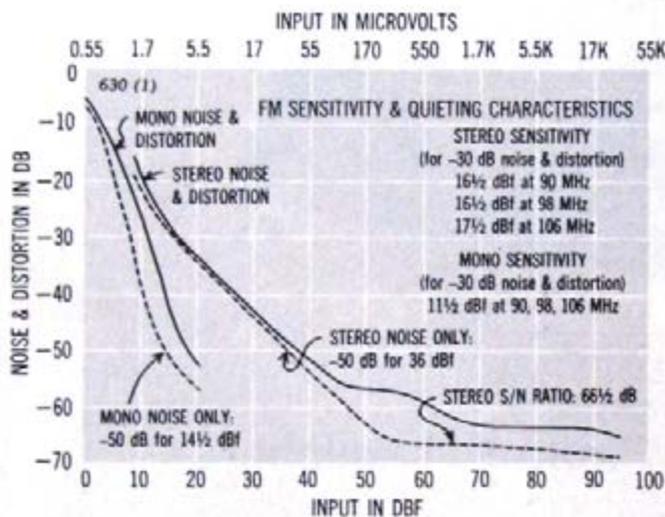
REPORT POLICY Equipment reports are based on laboratory measurements and controlled listening tests. Unless otherwise noted, test data and measurements are obtained by CBS Technology Center, Stamford, Connecticut, a division of Columbia Broadcasting System, Inc., one of the nation's leading research organizations. The choice of equipment to be tested rests with the editors of *HIGH FIDELITY*. Manufacturers are not permitted to read reports in advance of publication, and no report, or portion thereof, may be reproduced for any purpose or in any form without written permission of the publisher. All reports should be construed as applying to the specific samples tested, neither *HIGH FIDELITY* nor CBS Technology Center assumes responsibility for product performance or quality.

found it difficult to tell at a glance for what mode the 630 is set since it is controlled by a series of small black pushbuttons that are virtually camouflaged by the black panel.

The tuner offers both standard operation and Dolby decoding via a full built-in decoder, plus a choice between narrow and wide intermediate-frequency bandwidths. FM muting is there as well. Provisions are made to accept one phono input (with a three-position back-panel sensitivity switch), an aux input, and two tape decks, between which dubbing can take place in either direction.

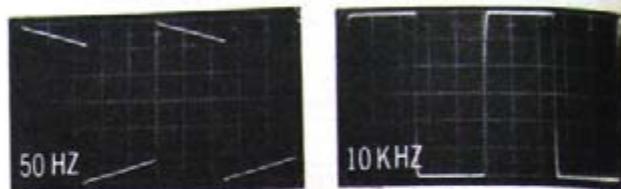
In addition to eleven-position, switched bass and treble controls and the normal volume and balance controls, an eleven-position CONTOUR switch acts as loudness-compensated volume control. (You set VOLUME for "full" listening level, then adjust gain with the CONTOUR, which automatically equalizes for average hearing characteristics at reduced levels.) This technique is far superior to the conventional nonadjustable loudness switch, in our opinion, though we found that the discrete volume settings limit flexibility somewhat. The tone controls, whose range (about ± 9 dB at the frequency extremes) is smaller than usual, are subtle in their operation and, for our tastes, superior to most.

The upper portion of the back panel is replete with sepa-



rate signal-flow diagrams for the tuner and the preamp sections. A pair of switched convenience outlets is provided, but the total rating (essentially 350 watts) is relatively limited. (The Nakamichi 620 power amp, for example, draws twice this figure in flat-out operation.)

Lab data taken at CBS Technology Center attest to the 630's very high level of performance both as a tuner and as a preamplifier. The tuner's 50 dB-quieting figures bode well



Square-wave response

Nakamichi 630 Additional Data

Tuner Section			
Capture ratio	1½ dB		
Alternate-channel selectivity	41 dB wideband 78 dB narrowband		
S/N ratio (mono, 65 dBf)	74 dB		
THD (wideband)	Mono	L ch	R ch
80 Hz	0.065%	0.090%	0.078%
1 kHz	0.061%	0.066%	0.065%
10 kHz	0.15%	0.25%	0.21%
THD (narrowband)	Mono	L ch	R ch
80 Hz	0.070%	0.18%	0.17%
1 kHz	0.10%	0.12%	0.12%
10 kHz	0.15%	0.71%	0.57%
IM distortion	0.1%		
19-kHz pilot	-66 dB		
38-kHz subcarrier	-68½ dB		
Preamp Section			
Output at clipping	L ch: 7.0 V R ch: 7.0 V		
Frequency response	±0 dB, below 10 Hz to 40 kHz +0, -¼ dB, below 10 Hz to 100 kHz		
RIAA equalization	±½ dB, 60 Hz to 20 kHz +½, -2 dB, 20 Hz to 20 kHz		
Input characteristics (for 2 volts output)	Sensitivity S/N ratio		
phono, 1 mV	1.7 mV	79 dB	
phono, 2 mV	3.4 mV	83 dB	
phono, 5 mV	8.2 mV	85 dB	
aux	170 mV	92½ dB	
tape 1, 2	170 mV	94 dB	
Phono overload (clipping point at 1 kHz)	1-mV sensitivity 60 mV 2-mV sensitivity 120 mV 5-mV sensitivity 290 mV		
THD (for 2 volts output)	L ch 0.0037%, 20 Hz to 20 kHz R ch 0.0031%, 20 Hz to 20 kHz		
IM distortion	0.008%		

for fringe-area reception, especially considering that these measurements were made in the wideband IF position—as were all the lab data not specified as “narrowband.” Capture ratio is good; so are the signal-to-noise ratios and 19- and 38-kHz suppression ratios.

The frequency response is within 1 dB of spec and is very good by any standard. Stereo separation is excellent; alternate-channel selectivity is better than average in the narrowband mode and remains good even in the wideband position. That should make the 630's wideband mode much more frequently useful than that of most tuners with such an adjustment. Distortion in the wideband setting, about as low as any we've measured, increases little in the narrowband mode.

As a preamplifier, the 630 shares much of the circuitry of the Nakamichi 610 and 410 preamps. Both THD and intermodulation distortion are vanishingly small. (The THD figures shown appear to represent noise rather than true distortion.) The frequency response from high-level inputs is ruler flat from 10 Hz to 40 kHz; the phono equalization is excellent. Signal-to-noise ratios also are excellent across the board, varying somewhat with the sensitivity (phono-gain) setting, as is to be expected. The phono overload point also varies with the gain setting but seems to be well related to the respective sensitivities. Note that nominal

sensitivities (1, 2, and 5 millivolts) are very close to the values required for a 1-volt output, though the unit can manage the more familiar 2-volt output level (at which the lab tested it) with ease. In the most sensitive setting, S/N ratio is equivalent to 94 dB, using the common 10-millivolt reference level.

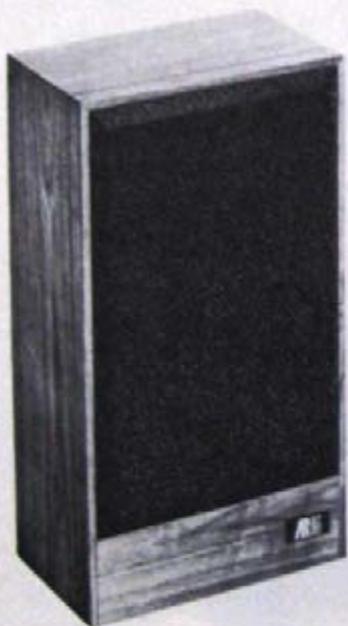
The 630 is an exceptionally clean FM tuner—in the narrowband mode as well as in the wideband one. We found it difficult, in fact, to distinguish between the two on most stations. Only on closely spaced channels is the narrow setting required, and only on exceptionally good stations is the wider setting called for. The quality of this tuner is most readily heard in the treble, where we have found few that match its clarity. The sensitivity proves adequate for moderate fringe-area use, although it is not exceptional.

Tuning is very easy, and the FM mute adequately suppresses interchannel hash without totally squelching the output. It works without thumps but takes the better part of a second to “unmute” once a station has been tuned in.

Although high- and low-cut filters are absent, the contour and tone controls of the 630 strike us as especially felicitous. Even more impressive is the phono preamp: utterly quiet, very clean, and with stupendous detail. Considered in toto, the Nakamichi 630 is a fine component.

CIRCLE 135 ON READER-SERVICE CARD

AR-15: A Good Speaker for a Small Room



The Equipment: AR-15, a bookshelf loudspeaker system in walnut cabinet. Dimensions: 11 3/4 by 21 1/2 inches (front, intended for vertical use); 7 3/4 inches deep plus 3/4 inch for foam grille. Price: \$130. Warranty: “full,” five years parts and labor. Manufacturer: Teledyne Acoustic Research, 10 American Dr., Norwood, Mass. 02062.

Comment: Many loudspeakers—like many people—make a striking impression at first. It takes further association to reveal their flaws. Not so with the AR-15, one of the smallest and least expensive of the Acoustic Research line. Perfect it is not, but honest it certainly is. A two-way system using an 8-inch woofer and a 1-inch dome tweeter in a small sealed enclosure, the AR-15 is limited in its maximum sound level capability, especially in the lowest octave. But at a reasonable input level it gives quite a good account of itself.

Data taken in the anechoic chamber at CBS Technology Center reveal an essentially uniform average omnidirectional response over most of the band ($\pm 2\frac{1}{4}$ dB from 63 Hz to 8 kHz; $\pm 3\frac{1}{4}$ dB from below 63 Hz to 12.5 kHz) at the 0-dBW (1-watt) power level. Below 63 Hz the response falls off rapidly. A certain forward character is added to the sound by a 3-dB prominence in the midband region (500 Hz to 3 kHz).

The impedance curve is fairly smooth and quite well contained; it reaches a high of about 14 ohms. Nominal impedance measures just under 6 ohms. The lowest impedance (4 1/2 ohms) is reached at a frequency of 2,200 Hz, where some types of music—compressed rock, synthesized music, etc.—may contain appreciable energy. And average impedance is closer to 6 ohms than to the manufacturer's rating of 8. Thus caution is advised: Pairs of these speakers in parallel may overload typical amplifiers.

Efficiency is on the low side, with an average sound pressure level of 79 3/4 dB delivered from a 0-dBW (1-watt) input of pink noise, 250 to 6,000 Hz. Despite its small size, the AR-15 handles a full 20 dBW (100 watts) of sine wave power at 300 Hz without distress, delivering 102 dB SPL at

1 meter on axis. On a pulsed basis, it took the full power that the amplifier could deliver (28 dBW or 630 watts) for a peak sound pressure level of 109¼ dB. Pulse response is fairly good with just a bit of hangover.

Distortion for a 0-dBW input generally remains at or below 0.75% between about 70 Hz and 10 kHz, but in the midrange the third harmonic content generally is above the second—a less fortuitous state of affairs than the reverse. Below 70 Hz, the distortion increases sharply, but not as sharply as one might expect, reaching 2% at 50 Hz and 7% at 30 Hz. With about 20 dB more input—a 98 dB sound pressure level at 300 Hz—the distortion remains below 1.75% from 70 Hz to 10 kHz, with second and third harmonic content about equal. Not surprisingly, the distortion at this power level increases more sharply below 70 Hz and exceeds 10% at 50 Hz.

We found AR's recommended placement—midway up the wall—apt for the smoothest bass response. (At the wall/floor intersection, there is a bit more bass reinforcement but with a loss of some smoothness.) A three-way toggle switch drops the tweeter response by about 4 or 8 dB above the 1,700-Hz crossover frequency; we preferred the 0 dB (highest) tweeter level setting. (The switch is located in a rear panel recess adjacent to the binding-post connectors.)

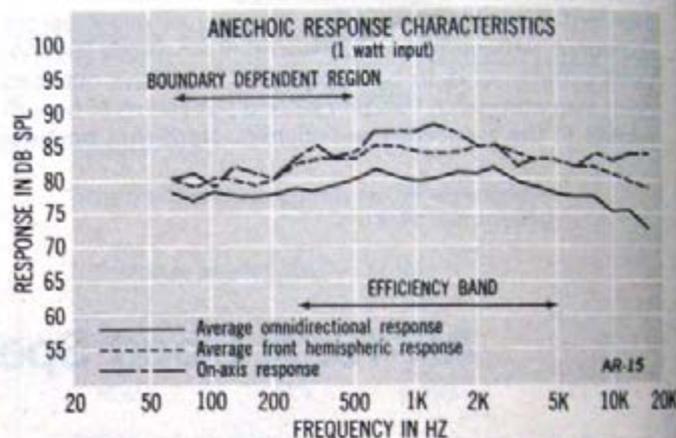
The AR-15's sound is pleasantly forward, and the stereo imaging is wide and stable, if somewhat shallow. There is a definite prominence directly on axis, but once one is off axis by about 30 degrees (a common listening position) the dispersion becomes quite good. The transient response is good and the bass fairly tight, at least at moderate listening levels. The woofer cone motion remains well controlled even on moderately warped records.

Solo instruments—especially violins—are well rendered, but diminishing bass response becomes apparent in the

lower registers of the piano and, of course, the organ. On orchestral compositions requiring greater dynamic range, the limitations of the small system become more evident. The sound becomes somewhat harsh on woodwinds, and violins get a bit steely; brass chords excite enough intermodulation to detract from the clarity.

But these effects occur mainly when the system is forced to strain. At moderate sound levels and in fairly small rooms, the AR-15 is capable of excellent reproduction—remarkably so for a two-way system. And the speaker doesn't try to slip anything by; the limitations apparent at first are the ones you'll hear after extended listening. Such admirable forthrightness makes it unlikely that the speaker will begin to burn your ears (and pride) a few months after purchase. AR can be justly proud of the Model 15—particularly when price (and the five-year warranty) is considered.

CIRCLE 139 ON READER-SERVICE CARD



Sophisticated Automation in Mitsubishi's Premier Turntable

The Equipment: Mitsubishi DP-EC1, a two-speed (33, 45 rpm) automatic single-play turntable assembly, with tone arm, base, and dust cover. Dimensions: 18¼ by 14½ inches (base); 6 inches high with cover closed, 16½ inches high fully open. Price: \$590. Warranty: "limited," two



There are certain other instruments every serious musician should know how to play.

The implements used in every art form except music both create and preserve the art. If music isn't captured at the time it's created, it's gone forever.

But the instruments used to capture music can also be used to alter, refine and improve it.

Instruments like the A-2340SX and A-3340S 4-channel tape recorders with Simul-Sync for multitrack recording and over-dubbing, as well as mastering decks like the A-6100 and A-3300SX-2T for mixing down multichannel tapes to stereo.

Instruments like the Model 2A Mixing Console with an

MB-20 Meter Bridge for control of volume, tone, blend and spatial positioning. There are also microphones for every recording need along with accessories like the PB-64 Patch Bay and cables to help organize the process.

TEAC is the leader in multitrack. Less than a decade after multitrack equipment was introduced to the professional industry, TEAC introduced it to people serious about their music. Today, thousands of musicians and recordists are getting many of the important elements of the studio experience but without the studio bill. And TEAC continues its

commitment to multitrack excellence.

To find out more about the adventure of multitrack recording and to hear the quality of music that can be made on TEAC multitrack equipment, send \$2 to Dept. 37 for our "Home Made With TEAC" Album.* Or, if you can't wait to get your hands on the instruments every musician should know how to play, see your TEAC dealer now.

TEAC®

First. Because they last.

Multitrack

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*Offer good while supplies last. Void where prohibited by law. TEAC Corporation of America, 7733 Telegraph Road, Montebello, California 90640 • In Canada TEAC is distributed by White Electronic Development Corporation (1966) Ltd.

The Sony 7800 Receiver. It'll put you on the receiving end of a lot more than compliments.



Even before you switch on the STR-7800SD receiver, it'll be receiving. Receiving coifs and aghs. After it goes on, the accolades will really come in.

After all, it is the finest receiver ever designed by Sony. The 7800 puts you on the receiving end of the most tomorrow-looking technology available today.

You'll receive a feeling of power

The 7800 brings power to the power-hungry, and can even make the mild-mannered lust for power. Rated

at 125 watts per channel, it's powerful enough to drive any speakers—satisfy any need.

The 125 watts, minimum RMS at 8 ohms, is from 20 to 20k-Hz— with no more than 0.07% Total Harmonic Distortion.

And that's Sony's conservative rating. How this combination of power and low distortion was achieved, is an example of Sony's engineering muscle. Let's start with the toroidal coil transformer. A more efficient structure, it fully exploits the high-perform-

ance power amp. As do two over-sized capacitors, each 22,000uF.

So the feeling of power throughout the frequency range is unmistakable.

That'll leave you swooning

FM circuitry found usually in separates appears in the 7800.

Pardon our initials, but MOS FET's are used in the FM RF amplifier. The result: good linearity, low noise and high sensitivity.

For you FM Dolby listeners, a complete FM Dolby noise reduction system, to minimize noise and over-

load distortion. And there's a new local oscillator circuit. Plus our uni-phase IF filters are so advanced, a computer designed them.

A Multipath switch and meter indicate optimum antenna orientation, thereby reducing distortion. An LED dial pointer doubles in length when an FM signal is received for easy tuning.

You'll receive a pre-amp that's pre-eminent

High marks for our low emitter concentration (LEC) transistor. Designed, made by, and exclusive to

Sony. It guarantees low noise, and a wide dynamic range. It also keeps RIAA equalization to within $\pm 0.5dB$.

You'll receive to control it.

The pre-amp section also gives you the control you need to keep all that power in line.

A presence switch is a special present: it lets you equalize the mid-range.

Importantly, the 7800 was built with a Professional Attenuator Main Volume Control. It eliminates gain error between channels.

Nor have we overlooked a special loudness network, or an audio muting switch.

Some input on the inputs: Phono 1, Phono 2, External Adaptor, Auxiliary, two tape decks—and tape-to-tape dubbing facilities.

Certain pieces of machinery simply ooze quality and power. Such is true of the 7800SD. It's put you on the receiving end of the line end.

SONY

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You deserve a Citation.



Here's this year's line-up, all brand-new.

Citation 16a Power Amplifier (shown). 150W min. RMS per channel into 8 ohms from 20Hz to 20kHz, with less than 0.05% THD. Frequency response from below 4Hz to beyond 120kHz +0, -3dB. Twin Powered. Instant-reading LED displays.

Citation 16s Power Amplifier. Professional version of the 16a, without LED displays.

Citation 19 Power Amplifier. 100W min. RMS per channel into 8 ohms from 20Hz to 20kHz, with less than 0.08% THD. Frequency response from below 5Hz to

beyond 140kHz, -3dB. Twin Powered. Instant-reading LED displays.

Citation 17 Preamplifier. Frequency response from below 3Hz to beyond 270kHz, -3dB. Less than 0.001% THD, phono preamp less than 0.002% THD. Five-band active equalizer.

Citation 17s Preamplifier. Same performance specifications as Citation 17, without active equalizer.

Citation 18 FM Tuner. 50dB Quieting Sensitivity, better than 17dBf. Audio frequency response, 10Hz - 50kHz. Patented Quieting Meter.

Citation. The ultimate. Period.
Harman Kardon, 55 Ames Court,
Plainview, N.Y. 11803.



harman/kardon
wide,
open sound

years parts, one year labor. Manufacturer: Mitsubishi, Japan; U.S. distributor: Mitsubishi Audio Systems, Melco Sales, Inc., 3030 E. Victoria St., Compton, Calif. 90221.

Comment: With so many fine turntables available, how does a relative newcomer to the U.S. high fidelity market carve out a niche for itself? Mitsubishi's answer is the DP-EC1, a deluxe automatic two-speed single-play turntable and arm combination in which the emphasis has been placed on convenience and safety features but with due attention to performance.

Take the tone arm, for example. With most of today's designers striving for ever lower tone-arm mass, Mitsubishi seems to be going counter to the trend. The tone arm of the DP-EC1 is fabricated of stainless steel—obviously much more dense than aluminum or carbon fiber. But Mitsubishi's research has led it to the conclusion that typical tone arms exhibit a counterweight resonance in the region of 150 Hz as well as spurious resonances at other frequencies. The tubular stainless steel arm, with its counterweight isolated by Butyl rubber, essentially is credited with eliminating these vibrational modes.

The turntable is direct-driven by a servomotor—quite common these days, though Mitsubishi uses a motor of higher torque than is customary. The platter therefore accelerates more rapidly and, since the servo control has the matter well in hand, attains a stable speed without overshooting the mark. The turntable mat is extra thick and formed of a combination of natural and synthetic rubbers to reduce vibration to a minimum.

The real novelty of the DP-EC1 comes in its logic control. Embedded in the platter are nine "light pipes" that protrude through holes in the turntable mat. Organized in three groups of three, they pick up a light beam that is reflected from a prism across the surface of the turntable. The mat is formed with three radial depressions in its top surface so that, when no record is in place, all the light pipes pick up and direct the beam to three photocells below the platter. This tells the DP-EC1 logic that no disc is on the platter. Under these conditions, the arm is prevented from lowering.

If a 7-inch disc is placed on the table, the innermost group of light pipes is covered. When the start button is pressed, the turntable automatically chooses 45 rpm and moves the arm to the 7-inch lead-in groove position. A 10-inch disc covers both innermost groups of pipes, the platter speed is set at 33, and the arm is cued appropriately; a 12-inch disc blanks all photocells, with obvious results. For those relative rarities—the 12-inch 45-rpm record and the 7-inch LP—the platter speed can be altered to suit by a touch of the SPEED RESET button. The platter speed, indicated by a pair of lamps next to the button, is monitored by an illuminated strobe visible through a window on the surface of the deck. A speed control range of somewhat more than $\pm 3\%$ (about a quarter-tone either way) is provided by

a flush-mounted control, and CBS found that, once either setting has been selected, the speed is precise over the line-voltage span (105 to 127 volts). Similarly, locking in 33 rpm sets 45 rpm as well and vice versa.

Power is applied as soon as the arm is moved away from its lock. A light push on the START/CUE button initiates the automatic play cycle; if the button is held down, the arm continues to move toward the center and will lower to commence play as soon as it is released. A built-in mute that kills the cartridge output until the arm is fully lowered is very effective in preventing thumps from the speaker.

At the end of the side, the arm lifts and returns to the rest position. Touching the STOP/LIFT button gently causes the arm to lift and return at any time during the cycle; if this button is held down until the arm is fully lifted, however, the arm will maintain its position above the record. Pressing START/CUE then lowers the arm into the same groove. A lamp near START/CUE lights while the arm is rising or lowering; if the button is released while the lamp is lit, the logic system will interpret this as a command to retract the arm. Thus the system requires a bit more patience than conventional cueing levers do. The REPEAT button can be pressed at any time during the cycle for automatic replay of the disc, canceled by a second press of the button or use of STOP/LIFT. A pilot beside REPEAT indicates when the function is activated.

Tests at CBS Technology Center indicate an excellent flutter figure, averaging $\pm 0.035\%$ ($\pm 0.060\%$ maximum), and an ARLL-weighted rumble that is adequately low—62 dB. The tone-arm resonance, with a Shure V-15 Type III cartridge installed, is only moderate (3 dB) and falls at 8.5 Hz—a trifle on the low side, reflecting the relatively high arm mass. A less compliant pickup thus might be a better choice.

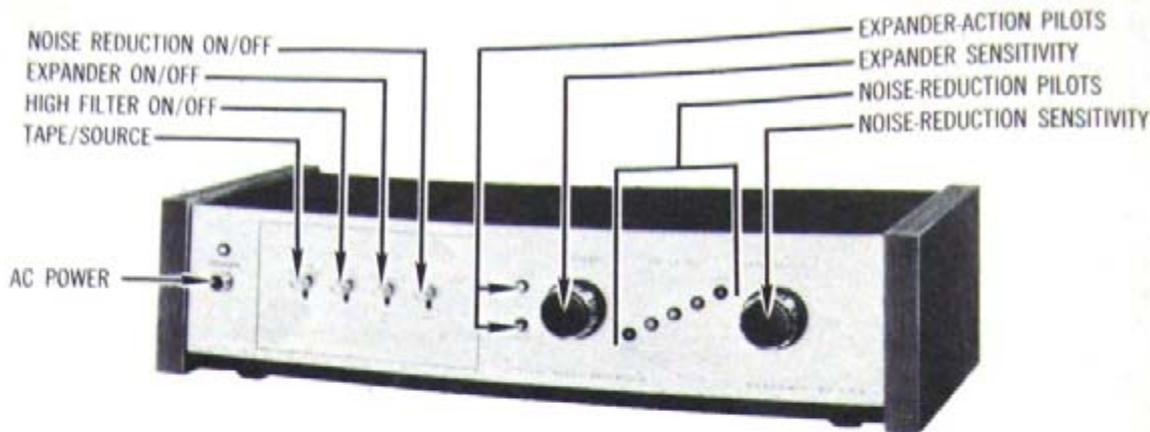
Setting up the Mitsubishi DP-EC1 is a relatively straightforward task, facilitated by following the excellent instructions given in the owner's manual. The included stylus position gauge sets overhang and stylus height. In use, the DP-EC1 had no difficulty tracking a normal assortment of records at a VTF of 1 millinewton (equivalent to 1 gram) using the Shure V-15 Type III, though the lab found that the actual VTF is 0.1 gram low at the gauge's 0.5-gram setting, 0.2 gram low at other half- and full-gram settings. (The scale is calibrated in 0.1-gram increments to 3 grams.) Rumble and flutter are inaudible, and the shock isolation is good. The integral, pivoted dust cover can be lowered into place after the start button is pressed without upsetting the operation.

The DP-EC1's logic works flawlessly, we are pleased to report. We especially like the lock-out feature that prevents operation when no record is on the platter: It should prevent many an accident. With the full logic control already in hand, the next step might be a remote-control option. It seems a natural on so sophisticated a turntable.

CIRCLE 138 ON READER-SERVICE CARD

REPORTS IN PROGRESS

Altec Model 19 loudspeaker
Harman Kardon Citation 19 power amplifier
Ortofon M20FL Super phono cartridge



A "Smart Black Box" from Heath

The Equipment: Heath AD-1304 Active Audio Processor, a stereo expander/denoiser in kit form, in metal case with wood end panels. Dimensions: 17½ by 4½ inches (in front), 7½ inches deep plus clearance for controls and connections. Price: \$199.95 (kit only). Warranty: "full," ninety days parts (and labor, where appropriate). Manufacturer: Heath Company, Benton Harbor, Mich. 49022.

Comment: While the legend "Active Audio Processor" on the front panel of the Heath AD-1304 may not be specific about what the device is intended to do, the restrained, even austere styling communicates the fact that here is a solid, no-nonsense item of electronic gear. The processor is, in fact, designed to remove high-frequency noise from and increase the dynamic range of program material routed to its inputs. The two actions are performed in separate modules of circuitry and can be individually defeated by front-panel switches. Two additional switches provide fixed high-cut filtering (for very noisy sources with limited high-frequency content) and a tape monitor to replace the one through which the AD-1304 is connected to the system. The back-panel convenience outlets (switched and unswitched, each 300 watts maximum) represent a thoughtful extra touch.

The expander section, which Heath says is capable of raising the gain through the unit by 4 dB and lowering it by 3 dB, for up to 7 dB of dynamic-range expansion, works on the whole signal and is not particularly fancy. But Heath's engineers seem to have set the detector time constants just about right. With program material that is not too noisy, this section of the AD-1304 is as hard to "catch out" audibly as any signal-processing device we know. Achievement of such performance depends, of course, on whether the user sets the expansion threshold correctly, but this is not hard to do by ear with the aid of the LED indicators that show upward or downward expansion. We got the best results with the threshold fairly high.

When signals are too noisy to be enjoyed, the noise-reducer section of the AD-1304 can be called into play. The action of this stage is monitored by a diagonal string of five LEDs. The lowest and leftmost LED, which is green, turns on when the noise reducer is inactive; the remaining (red) ones turn on progressively until the highest and rightmost indicates that operation is at maximum.

A high-cut filter with a variable cutoff is the main compo-

nent of the noise reducer. Filtering becomes progressively more severe as the signal level drops off, apparently on the theory that soft musical sounds contain fewer audible high-frequency components and that whatever highs are present under those conditions are likely to be noise. A sensitivity control lets the user set the levels at which the various degrees of filtering take place.

Once again, the time constants seem well chosen, for it is very difficult to hear any anomalies as the filter passband grows and shrinks. All one is very much aware of is, first, that the music emerges from a background of near-silence and, second, that soft passages are relatively devoid of highs. The sound remains reasonably plausible, but switching the noise reducer in and out makes it clear that bona fide high-frequency information is removed along with the noise—and to a degree that obscures a lot of musical detail.

This, as far as we can tell, results from making the device filter aggressively enough to cope with really noisy program material. Here details are probably swamped already, making it unnecessary to worry about them. In many instances, however, we found the noise preferable to the side effects of the reduction system—as we have with comparable devices.

The sample of the Active Audio Processor supplied to us for review was preassembled, but our perusal of the kit-building manual uncovered nothing that would lead us to expect unusual problems in doing the job ourselves. Heath's instructions have their accustomed clarity, and a moderately experienced builder should even find assembly enjoyable. In any case, the AD-1304 is commercially available at present only as a kit.

While we remain basically unconvinced that corrective measures of this sort can ever undo with total success the ills they are designed to combat, we have to admit that at times they are very useful. This unit from Heath uses an approach different—in detail at least—from others on the market and thus has its own strengths and weaknesses. In particular, we find that the expander circuit in the Heath rates high marks in comparison with other single-band expanders. It gives a subtly enhanced dynamic range that sounds quite natural while remaining unobtrusive in operation. The noise reducer, while not as self-effacing in operation, should also prove useful to many listeners depending on the source material it is asked to deal with.

CIRCLE 138 ON READER-SERVICE CARD

B&O's Smartly Styled Headset

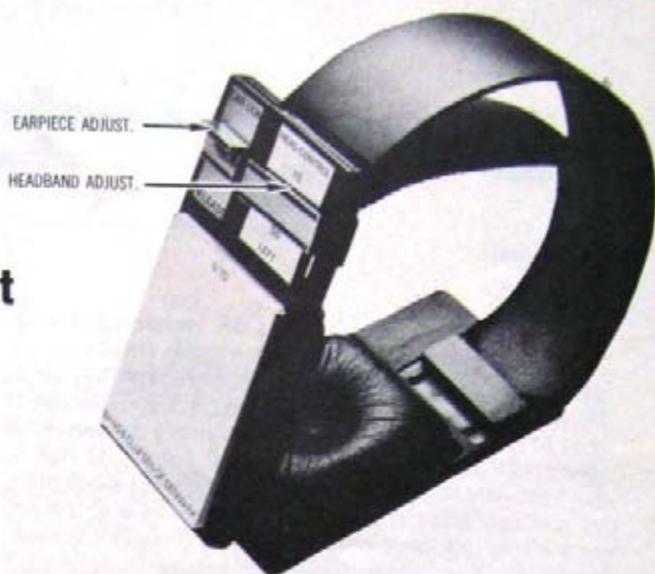
The Equipment: B&O Model U-70, a stereo headset with 9-foot straight cable. Price: \$85. Warranty: "limited," one year parts and labor. Manufacturer: Bang & Olufsen, Denmark; U.S. distributor: Bang & Olufsen of America, Inc., 515 Busse Rd., Elk Grove Village, Ill. 60007.

Comment: Consistent with the traditions of Bang & Olufsen products, the new U-70 stereo headset is an unusual (to traditionalists, perhaps slightly oddball) design with a unique and pleasing appearance. Not incidentally, the U-70, in which the earpieces can be rotated individually about the axes running front to back and top to bottom and fixed in the desired positions, turns out to be highly functional as well.

When the phones are in position, most of their 11-ounce weight (excluding the 9-foot cord) is supported by an adjustable leather band that passes across the top of the wearer's head rather than by the spring that presses the earpieces to the outer ears. Tension of the spring is not readily adjustable and is a bit on the high side, which results in positive ear coupling but makes it hard to forget that you are wearing headphones. They are quite comfortable nonetheless—thanks, in large measure, to their many degrees of freedom for adjustment and subtly conceived front-to-back balance.

Impedance of the headset is given by the manufacturer as 140 ohms. No attempt was made to confirm or deny this through measurement, but we did observe that a power amp capable of delivering enough output voltage to drive 5 to 10 watts into an 8-ohm load was able to make the U-70 as loud as we would ever want. Since the voltage from tape-deck monitor outputs is normally less than this, the B&O phones are better suited to use for entertainment than as workhorses for the recording buff.

Though the U-70 may not offer the ultimate in sensuous contact with the outer ear, it more than makes up for this with its sound. The unstrained ease with which the unit reproduces music makes its personality quite unspectacu-



lar—almost as if it should be taken for granted. This quality, which is rare (and is best appreciated after extended listening), helps to keep aural fatigue at a minimum—an important criterion.

From a more analytic point of view, it seems that the U-70 has an unusually well-integrated sound in which all aspects are consistent. Other headsets may have sharper transient response, for example, but the result of that often is a falsification that gives a "clinical" quality to the sound. Low distortion is audibly another strong point of this model. Bass tones, in particular, are free of the traces of buzziness sometimes imparted by headsets.

As usual in headphone listening with material not binaurally recorded, the stereo image is less than entirely plausible, but the U-70 does as well here as one might reasonably expect in yielding an image that does not vary in sharpness or stability with the type of ensemble or program material. Once again, the imaging seems "of a piece" with the other audible parameters.

Absolute judgments upon headsets are out of the question, ears being as individual as they are. (Even left and right ones on the same head do not usually match perfectly.) We can say that we found the Bang & Olufsen U-70 a great pleasure to use and that it succeeded in seducing us away from our loudspeakers (which we dearly love) for longer than was strictly required for testing. Not many headsets achieve that.

CIRCLE 133 ON READER-SERVICE CARD

ADC's Stylish, Capable Tone Arm

The Equipment: ADC LMF-1, a carbon-fiber tone arm with integral, nonreplaceable headshell. Price: \$205; LMF-2, with replaceable headshell, \$215. Warranty: "limited," one year parts and labor. Manufacturer: Audio Dynamics Corp., Pickett District Rd., New Milford, Conn. 06776.

Comment: Carbon fiber, a material with an extraordinary

ratio of tensile strength to mass, is an obvious choice for use in a tone arm and has been employed by a number of designers. In the ADC LMF-1 and LMF-2, however, the usual tubular construction has been abandoned in favor of a tapered profile of minimum mass. The principal difference between the two models is that the LMF-1 is built as a single unit whereas the LMF-2 has a detachable headshell.



Lab testing performed at the CBS Technology Center confirms that ADC has achieved a notably small mass in the new design; the low-frequency resonance of the LMF-1, fitted with the Shure V-15 III pickup, is 9.3 Hz, which is close to ideal and one of the highest figures we can recall seeing with this cartridge. The 4.3-dB amplitude rise at this frequency may seem somewhat large, but since discs are relatively silent in the range from about 9 to 14 Hz, there is little chance of exciting the resonance in any case. (With ADC's own ZLM cartridge, the resonance is at 12.7 Hz with an amplitude rise of 7.0 dB. For the same reason, this need elicit no concern on the part of a user.)

Bearing friction in the LMF-1 is negligible in both horizontal and vertical planes. The stylus-force gauge and antiskating mechanism are exact within the lab's limits of measurement. Antiskating force is set at one-tenth the vertical tracking force, which appears to be a commonly accepted value. The maximum setting for vertical tracking force is 1.5 grams (equivalent to about 15 millinewtons), which could make the arm unsuitable for some moving-coil pickups. But these, with their relatively stiff suspensions and high mass, are not very likely to benefit from the use of a low-mass tone arm.

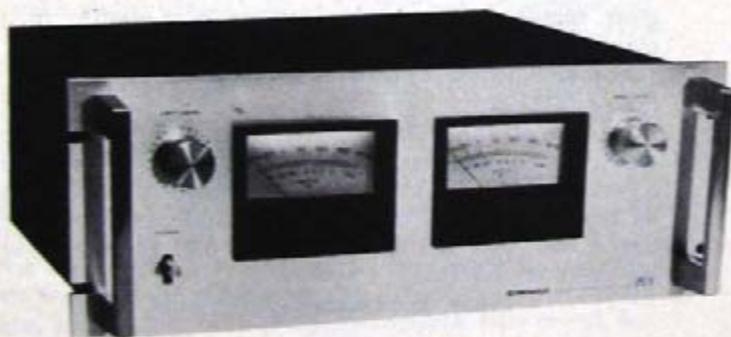
Installation of the tone arm is about par for the course in difficulty—which is to say that it is not an experience to be relished. But fortunately it need be done only once, and ADC's instructions are helpful enough to ameliorate the

pain considerably. A mounting template is provided to help the user locate the pivot point and get the overhang correct. Whatever you do, don't lose the template; it is the only overhang reference given, and you will need it when changing pickups. The three counterweights included in the package make it easy to balance almost any cartridge.

When it comes to playing records, the LMF-1 will reward you handsomely for the effort required to set it up. The cueing action is well damped and quite accurate in its operation, and tracking of warped discs is excellent. One of the main advantages of the ADC and other low-mass tone arms is, in our opinion, that the rapid fall in amplitude response below resonance acts as a built-in subsonic filter—and ahead of the phono preamp, where it will do the most good. We would point out to purists who claim that subsonics add realism to some instruments, such as pedal harpsichords, that such signals would have to be felt, not heard. Since it is doubtful that anyone but the player is in a position to do this, and even more doubtful that speakers can reproduce subsonics at anything even close to natural levels, we'll opt for the filtering effect and save our speakers; as well as the headroom in our electronics.

The ADC LMF-1 is not cheap, but then neither are its materials and workmanship. It does its job very well indeed and would certainly be at home in a state-of-the-art music system.

CIRCLE 132 ON READER-SERVICE CARD



Pioneer Spec-4, an Amp for Persnickety Ears

The Equipment: Pioneer Spec-4, a stereo power amplifier in metal case appropriate for rack mounting. Dimensions: 19 by 7 inches (front panel); 17½ inches deep. Price: \$700. Warranty: "limited," two years parts and labor. Manufacturer: Pioneer Electronics Corp., Japan; U.S. distributor: U.S. Pioneer Electronics Corp., 85 Oxford Dr., Moonachie, N.J. 07074.

Comment: In their quest for ultraclean sound, Pioneer's engineers seem to have spared few, if any, pains to reduce distortion and noise to negligible levels in the Spec-4.

Some authorities would claim that the distortion has been made several times lower than amounts generally considered inaudible. We can only note that, as amplifier distortion has been driven to ever-lower levels, so have the minima that, according to research, can be perceived.

In the data measured at the CBS Technology Center, the worst total harmonic distortion encountered (in one channel at 20 kHz) is 81 dB below the desired signal at full power (21¼ dBW, or 150 watts). More typically, distortion products are suppressed by 86 dB, almost independent of level. The best distortion readings at low levels (1¼ dBW or

CIRCLE 2 ON READER-SERVICE CARD

RECORD
DOLBY NR

TAPE COUNTER
2 1 6



+7dB

+3dB

PEAK

ENTER RESET

MEMORY

METER

INPUT SELECTOR DOLBY NR (MPX)

OFF ON

VU TAPE TIME

LINE MIC/DIN

OFF ON (MPX ON)

3 Minute Warning from AIWA

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

Wow and Flutter: Below 0.05% (WRMS)

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

The AIWA AD-6550.
Be forewarned.

AIWA

LH BIAS FINE (%)



Bias Fine Adjustment

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



*Dolby is a Trademark of Dolby Laboratories, Inc.

Distributed in the U.S. by: MERITON ELECTRONICS, INC., 35 Oxford Drive, Moonachie, N.J. 07074
Distributed in Canada by: SHRIRO (CANADA) LTD.

Total Energy Response:

The reason why Jensen Lifestyle speakers sound better than any comparable speaker.

Just what is Total Energy Response?

Total Energy Response is the uniform radiation of sound throughout the whole listening area—at all frequencies. And it makes an unquestionable difference in the stereo sounds you hear.

Most speakers are to one degree or another directional. That is, part of the room in front of the speaker gets the full sound. Bass, treble and midrange. While parts of the room to the sides of the speaker get just a fragment of the sound. (See Fig. A)

It's precisely this fault we set out to correct. Because others may tell only part of the story. Often with just one response curve measured from just one position—their optimum position.

However their results don't look so favorable when the test microphone is moved "off-axis," that is, to the side instead of directly in front of these speakers.

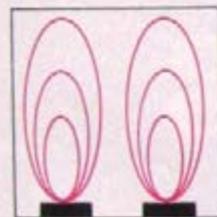


Figure A Ordinary Speaker Dispersion

Figure B illustrates this. It is a Total Energy Response curve, taken with test microphones in all positions. When comparing the Jensen (blue line) with a comparably priced "flat" speaker (red line), you can see how deficient the other speaker is in total radiated energy in the mid and mid-high frequencies. This midrange deficiency is unfortunately very common amongst speakers, and gives many so-called "flat"

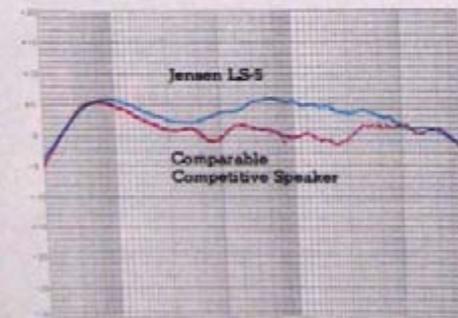


Figure B Total Energy Response Curve

response speakers a very "thin" sound. The Jensen Lifestyle speaker, on the other hand, demonstrates true Total Energy Response. Uniform radiated



power—at all frequencies—throughout the whole room.

These speakers were conceived, designed and tested for this. Tested from every spot in anechoic "dead" rooms, reverberation "live" rooms, and simulated living rooms.

Our finished products: remarkable dispersion for the hard-to-disperse high frequencies... 160° or 170° wide, depending on the model. Also expanded dispersion of the critical midrange response. And full, rich bass that still perfectly matches the other frequencies for accurate sound reproduction. The way it's supposed to be heard.

You can see how the sound from a Jensen is distributed much more evenly throughout a room. And when you're in your own listening room... you can hear it.

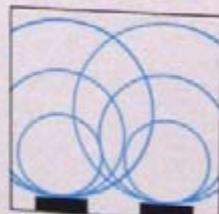


Figure C Jensen Lifestyle LS-5 Dispersion

What does all this mean to you?

1. It means that with Jensen Lifestyle speakers, you'll be able to hear all of the frequencies, all of the time, in almost any

part of the room. Not just the bass if you're to the side of the speakers. And not just the treble if you're in front of them.

2. Excellent stereo imaging. You hear everything that both speakers are putting out. Almost anywhere in the room. Unlike listeners of other speakers, who can fall victim to gaps in the response characteristics, or "hole-in-the-middle" stereos.

3. Excellent balance. Many other speakers are hot on treble, or bass, or both. But all that really means is that the midrange is often neglected. Jensen sends the all-important midrange throughout a room every bit as much as the highs and lows.

4. Total Energy Response is achieved in Jensen speakers without any loss of efficiency. Which means a moderate output amp or receiver is still all you need for great performance. Not a big super-amp

What gives Jensen Total Energy Response?

A number of features. First, the extremely wide dispersion of the Lifestyle Tuned Isolation Chamber™ midranges.

Especially important are Jensen's two tweeters: a 160° dispersion cone direct radiator; and the 170° dispersion Mylar® Sonodome® tweeter. The sound input to each of these drivers is precisely monitored by Jensen's exclusive Comtrac® crossover network, which insures uniform energy transfer between the woofer, midrange, and tweeter.

For final command of the Jensen Lifestyle's sound, behind-the-grille controls are featured. These controls let you adjust the treble, and in some cases, the midrange, to the characteristics of your individual room.

And with Total Energy Response... there's more music to control.

Hear the difference yourself...

Stop by your local Jensen dealer and hear for yourself the difference. Total Energy Response makes it the reason why Jensen Lifestyle speakers sound better than any comparable speaker.

JENSEN

LIFESTYLE SPEAKER SYSTEMS

1.5 watts) approximately equal the noise floor of the amplifier, which means that actual distortion may be lower still. Intermodulation distortion at 8 ohms is on a par with THD; it runs somewhat lower at equivalent voltages into 16 ohms and roughly 10 times higher into 4 ohms. Even at 4 ohms, however, an output in excess of 23 dBW (200 watts) is available before IM reaches 0.1%.

The frequency response of the Spec-4 looks more like data measured on a fine preamp than that of a power amp. The unit is flat down to at least 10 Hz (the lowest frequency measured in the CBS test), and response is down by a scant 1/2 dB at 100 kHz (the upper limit). Damping factor, at 177, is off the upper end of the scale of what is usually deemed necessary. (The extremely low output impedance implied by this is, we suspect, more a result of the multiple output devices used than extremely high levels of negative feedback.) Nothing that was found in either the lab or the listening room suggests any difficulties with transient distortion.

Despite the fact that Pioneer calls the meters on the front panel of the amp "peak-reading," they give only a rough approximation of the peaks that can be read from an oscilloscope connected to the amplifier output. They do, however, keep a good handle on what is being demanded of the loudspeakers. The scope, incidentally, showed peaks equivalent to about 350 watts into 8 ohms without clipping, which represents peak headroom of better than 3 dB—certainly an excellent figure, though we do not have comparable data for most competing amps.

In the listening room, the Spec-4 sounds clean and transparent at both high and low levels, even retaining its composure when pushed to occasional clipping. With the gain controls set wide open, noise is virtually undetectable at listening positions more than an inch or so from a tweeter. Interestingly, the greater interchannel isolation provided by the dual-power-supply construction does seem to impart extra crispness to the stereo image. In that respect, if no other, the Spec-4 strikes us as an audible improvement over Pioneer's earlier Spec-2 (see HF, April 1977), rated at 24 dBW (250 watts) per channel.

This may suggest—correctly—that we are in doubt as to whether the super-low distortion and ultrawide passband of the Spec-4 offer benefits that the ear can hear. The lab data show that the amp can do what Pioneer says it will and then some. Its basic sound is about as good as that of any amp we have heard, and its separation seems especially good. Any other special quality that the amp may have could be expected to be very subtle and to reveal itself slowly—over weeks or even months of careful listening. Should you be the type of relentless perfectionist who will not rest until you hear the Spec-4 for yourself, the price will probably come as a pleasant surprise.

CIRCLE 140 ON READER-SERVICE CARD

Pioneer Spec-4 Amplifier Additional Data

Power output at clipping (channels driven simultaneously)

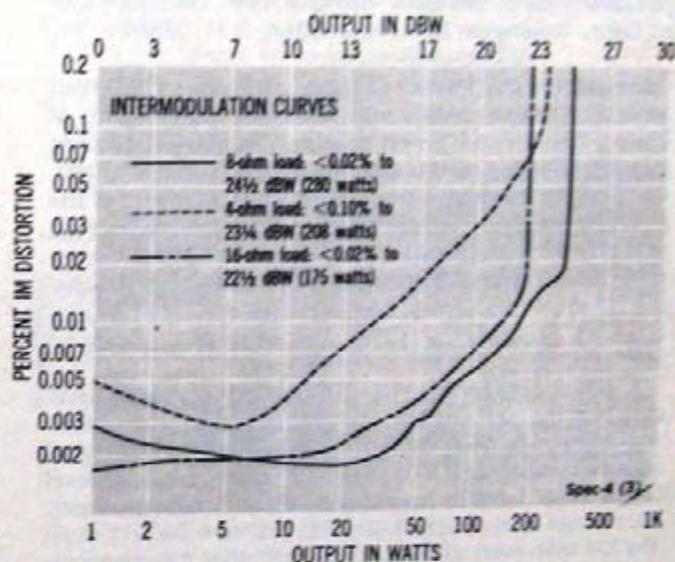
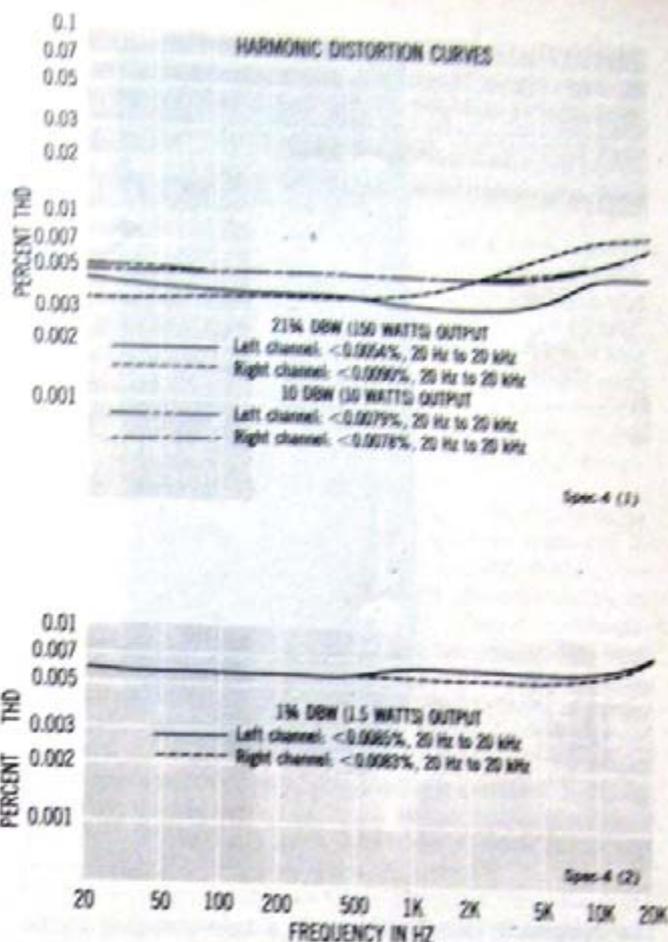
L ch 22 1/4 dBW (168 watts)
R ch 22 1/4 dBW (168 watts)

Frequency response ±0 dB, below 10 Hz to 20 kHz
+0, -1/2 dB, below 10 Hz to 100 kHz

Input characteristics (for rated output at full gain)

Sensitivity	Noise	S/N ratio
740 mV	-80 1/4 dBW	102 dB

Damping factor at 1 kHz 177



Square-wave response



Genesis Does Its Thing Again— Simply and with Elegance

The Equipment: Genesis Model 3, a floor-standing loudspeaker system in wood cabinet. Dimensions: 14½ by 37¼ inches (front), 11½ inches deep; supplied base: 2½ inches high. Price: \$299. Warranty: "limited," lifetime (original purchaser) parts and labor. Manufacturer: Genesis Physics Corp., Newington Park, Newington, N.H. 03801.

Comment: Genesis Physics Corporation is one of the latest generation of loudspeaker manufacturers in the vicinity of Boston. The company's first offerings, the Genesis Models 1 and 2, were interesting and reasonably successful two-way designs, the first using a sealed-box woofer and the second a woofer/passive-radiator system for increased bass efficiency. In the Model 3, Genesis has added a midrange driver (for a total of one passive and three active diaphragms) and moved into a loudspeaker class that is characterized generally by some very difficult engineering problems.

Anechoic data taken at the CBS Technology Center indicate that the high efficiency often associated with vented enclosures has been traded for extended response and relative compactness. The 76½-dB sound pressure level produced at 1 meter from a pink-noise input signal with an average level of 0 dBW (1 watt), 250 to 6,000 Hz, is on the low side, even allowing for the fact that this measurement is now taken omnidirectionally. This—together with the 5-ohm nominal impedance and an overall impedance curve that, though reasonably smooth and well controlled, dips below 4 ohms right around 600 Hz—means that the Model 3 will do its best with a fairly hefty amp that likes to deliver current. Very few amps would appear ready to accept parallel operation of two sets of these speakers.

The Genesis 3 does not have the loudest voice we have heard but is capable of producing quite realistic levels in rooms of moderate size. Its continuous power-handling capability is somewhat limited (audible breakup occurs with an input of 17¼ dBW or 61 watts), but the acoustic output

is a respectable 101 dB SPL at 1 meter on axis. On pulses, the unit will tolerate something more than a peak power of 28½ dBW (720 watts—the limit of the test amplifier) without evidence of clipping, delivering a peak sound pressure level of nearly 112 dB at this input.

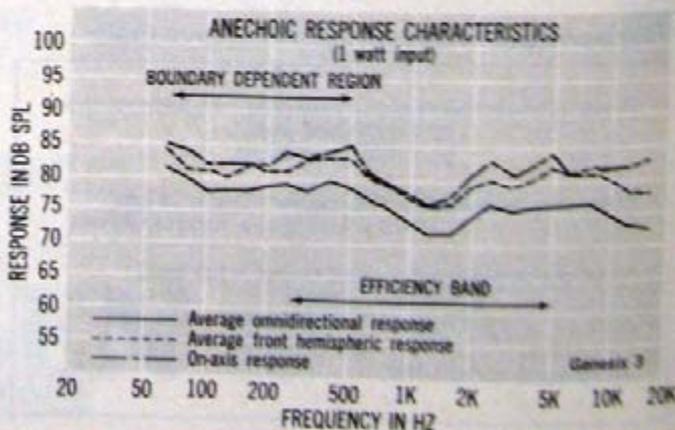
Performance of the Genesis with respect to distortion is fine indeed. From about 80 Hz up, both the second and third harmonics measure below—mostly well below—1%. At an SPL of 98½ dB, the second harmonic content rises appreciably but the third harmonic (the real "bad guy") does not. From 80 Hz down, distortion increases rather rapidly (and predictably) as increased excursions are demanded of the woofer and passive radiator.

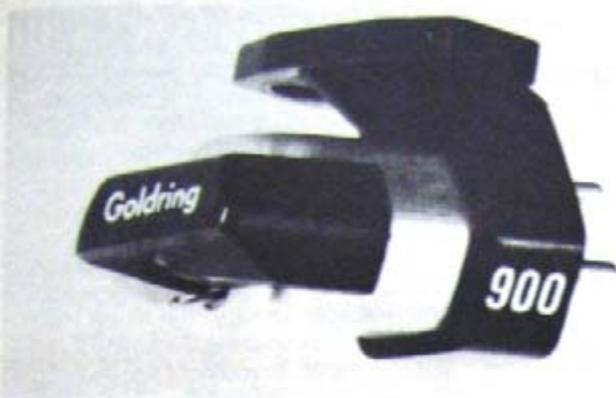
Average omnidirectional frequency response of the Model 3 is fairly flat and extended. The relative positions of the on-axis, front-hemisphere, and omnidirectional curves suggest good dispersion with no serious tendency toward beaminess—a suggestion confirmed by listening. All three curves show a dip in the upper bass and lower midrange, which, it turns out, is just about eliminated by flipping the midrange balance switch to the INCREASE position. (The midrange switch can give about 3 dB of boost and 1 dB of cut with reference to NORMAL between 500 and 2,000 Hz; the tweeter control allows 3 dB of boost and 2 of cut from 2,000 Hz up.) Pulse reproduction shows quick startup and little hangover.

The sound of the Genesis (with the midrange set to INCREASE) is generally neutral and, as one would expect from the distortion data, clean. There is enough dynamic range to allow two of these speakers to reproduce the sound of Harry James's band from a direct-cut disc (Sheffield LAB-6 [SL23/SL24]) with no apparent strain. Bass response is particularly good. The stereo image is solid and plausible, although not exceptional in depth. Overall, the system performed well with any music we used to challenge it.

Our conclusion is that Genesis has once again found an elegant and not too costly solution to the problems it has undertaken. The Model 3 represents a truly fine achievement—especially for such a young company.

CIRCLE 137 ON READER-SERVICE CARD





The Featherweight at the Top of the Goldring Line

The Equipment: Goldring G-900SE, a stereo phono cartridge with elliptical stylus. Price: \$120. Warranty: "limited," one year parts and labor. Manufacturer: Goldring, England; U.S. distributor: Hervic Electronics, 14225 Ventura Blvd., Sherman Oaks, Calif. 91423.

Comment: Goldring pickups—though as well known as, say, Pickering's or Shure's in their native Britain—were little known here before Hervic started importing them. The reputation that precedes them is one of good value in the moderate price range, though the present premium model (presumably, in part, because of importation costs) is above what we would generally consider "moderate" price.

It appears to be designed around the concept that mass is, in general, inimical to phono cartridges in at least two ways: First, a pickup that resembles a plumb bob in weight can undo the artfulness of the tone-arm designer in seeking good warp immunity and tracking; second, too much mass at the stylus tip can cause high-frequency resonances to fall well inside the audible range. The engineers at Goldring have, in the G-900SE, produced a pickup with a rated stylus-tip mass of 0.32 milligram and an unusually low total mass (4 grams) as well.

With a vertical tracking force of 9.8 millinewtons (exactly equivalent to a 1-gram weight) the Goldring was able to pass CBS labs's tortue test successfully. This value, which the manufacturer recommends, and which lies near the center of the nominal range ($\frac{3}{4}$ to $1\frac{1}{2}$ grams), was used for the remaining tests. Sensitivity at 1 kHz is 1.05 millivolts per centimeter per second for the left channel and 1.02 for the right, which in addition to being moderately high represents an excellent match (within about $\frac{1}{4}$ dB) between channels. Second harmonic distortion is good and perhaps a trifle lower than average from 1 to 3 kHz, but it rises somewhat at higher frequencies, the rise being particularly sharp in the left channel. Intermodulation distortion is considerably higher than average in both the lateral and vertical planes.

The vertical tracking angle measures out at 26 degrees, a value considerably higher than usual. The low-frequency

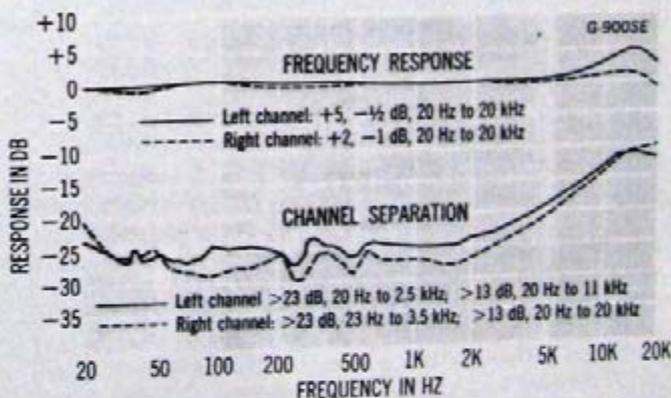
resonance measured in the SME 3009 tone arm is 8.9 Hz, which is not far from the ideal and should be still closer to it with typical arms of lower effective mass. Maximum tracking levels are about par for a top-of-the-line cartridge. The stylus has an elliptical contour and shows good polish and alignment; tracking radii for the left and right sides match within about 4%.

Frequency response of the right channel is fairly close to flat, exhibiting a broad ripple on the order of 1 to $1\frac{1}{2}$ dB. The left channel is somewhat flatter through the bass and midrange but has a $4\frac{1}{2}$ -dB peak centered at about 15 kHz. The points 3 dB down on the skirts of the peak lie at 8 kHz and beyond 20 kHz. Channel separation at 1 kHz exceeds the manufacturer's claim of 25 dB but decreases rapidly at high frequencies. Square-wave reproduction shows some overshoot and undershoot on the leading and trailing edges but good damping otherwise.

In listening tests, the forte of the Goldring seems to be its notably warm midrange, which is most apparent in moderate to soft passages. As is the case with many other pickups, the sound of the G-900SE can be affected by its interface with the preamp, the most obvious manifestation being the relative brightness of the treble. The high end displays an etched-out quality that tends to be a little edgy as the music becomes quite loud. The bass is generally solid and reasonably tight, although in complex orchestral passages the relative brightness of the upper treble can make it sound comparatively subdued. Breakup is barely audible on some of the louder piano transients found on directly cut discs. The stereo image is not the most stable we have heard but is adequate.

Like numerous high fidelity products, the Goldring seems likely to please a good many people—but not everyone. It has its strong points and its foibles, and the bottom line for any particular listener will probably depend on how the various parameters of judgment are weighted. Once again, the ear—your ear—is charged with delivering the final verdict.

CIRCLE 131 ON READER-SERVICE CARD



Goldring G-900SE Pickup Additional Data

Maximum tracking levels (10 millinewtons VTF; re RIAA-0 VU)

300 Hz	+12 dB
1 kHz	+6 dB
10-20 kHz	-5 dB

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Technics SL-1000MKII. A rare combination of audio technology. A new standard of audio excellence.

*Technics recommended price, but actual retail price will be set by dealers.

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by Panasonic

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And quadrature detectors that can handle even a 300% overmodulated signal and still produce clean, accurate sound.

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Power output: SU-8600—73 watts. SU-7700—50 watts. SU-7300—41 watts. All per channel, min. RMS, both channels driven, into 8 ohms from 20 Hz—20 kHz with no more than 0.08% total harmonic distortion.

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Unprotected



With Sound Guard

Magnification shows the record vinyl wearing away.

Same magnification shows no record wear.

You can see how the picture has changed.

Independent tests* show that records treated regularly with Sound Guard preservative keep the same full amplitude at all frequencies, the same absence of surface noise and harmonic distortion as records played just once in mint condition.

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preservative maintains sound fidelity by reducing record wear. And with its built-in, permanent anti-static property, it resists dust accumulation.

And now, two new Sound Guard products:

1. Sound Guard™ record cleaner, developed from extensive research into record cleaning problems and

methods, removes all common record contaminants—from dust particles to oily fingerprints.

And whether your records need a light cleaning to remove surface dust or a thorough cleaning to remove deep-seated contaminants, Sound Guard record cleaner does both.

2. Sound Guard™

Total Record Care System puts Sound Guard record preservative and Sound Guard record cleaner in one package—for the best possible total care for all of your records.

Available in audio and record outlets.

*Tests available on request.



Sound Guard keeps your good sounds sounding good.



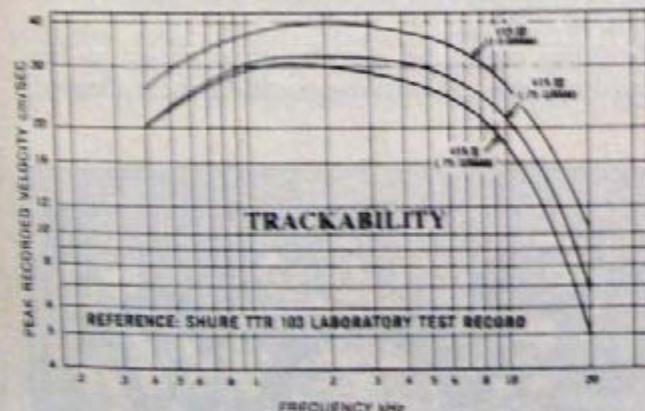
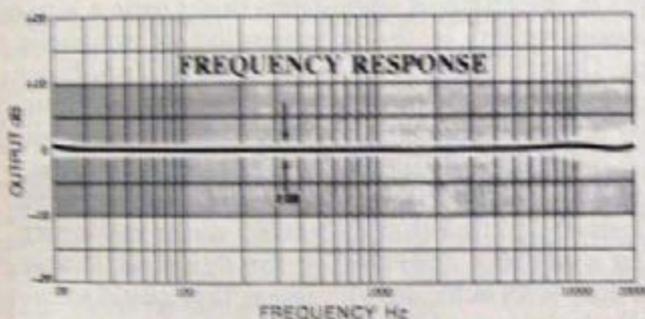
Sound Guard preservative—Sound Guard cleaner—Sound Guard Total Record Care System
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Shure cartridges perform like Shure “critics’ samples.”

Whether you purchase your Shure cartridge in Evanston, Illinois or Evanston, Wyoming, in Osaka, Sydney, London, Lima or Casablanca . . . you can be confident it will perform well within its stated specifications. Independent critics around the world buy Shure cartridges off dealers’ shelves and subject them to rigorous tests. We have built our reputation on an unwavering uniformity and strict adherence to the high standards of our Master Quality Control Program.



OUR “BEST” IS OUR TYPICAL

Shure’s painstaking Master Quality Control Program insures that every Shure cartridge and stylus will perform as well as our laboratory reference units. And each cartridge must meet or exceed its published specifications. All critical performance tests are imposed on 100% of all Shure V15 Type III cartridges and styli, including (a) frequency response for each channel, (b) output level, (c) channel balance, (d) crosstalk between channels, (e) trackability, and (f) anti-collapse assurance. Fact is, Shure quality control is state-of-the-art.

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Every Shure V15 Type III cartridge must display exceptionally flat frequency response over the audible spectrum. Each is individually tested to be within $\frac{3}{4}$ dB from flat frequency response for each channel. This limit is actually more demanding than the envelope shown. Those that fail this stringent frequency response test are rejected. And only those cartridges that pass Shure’s intensive Quality Control Tests make it to your local Hi-Fi Store.

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Shure pioneered the trackability concept over a decade ago in response to the need for a single relevant measurement of total cartridge and stylus performance. Trackability has been accepted by audio authorities as the definitive measure of how well a cartridge and stylus perform on today’s increasingly “hot” recordings. Every Shure V15 Type III cartridge must pass extensive trackability tests.

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V15 TYPE III

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Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

CIRCLE 31 ON READER-SERVICE CARD

Why Micro-Acoustics 2002-e owners enjoy music more than you do.

If you're listening to music with any of the other high-quality stereo phono cartridges on the market today, there's a very good chance you're missing something. Something that's earned us unanimous praise from 2002-e owners: *a significant improvement in sound quality* which can only come from major advances in cartridge design.

Twin-pivots/dual-bearings. Perhaps the most unique feature of the 2002-e is its direct-coupled transducing system, which was granted U.S. Patent No. 3952171. Unlike conventional single-pivot cartridges, which can only be optimized for tracking or transient ability, our unique twin-pivot/dual-bearing design is optimized for both characteristics — which are equally vital for precise reproduction.

Twin pivots insure superior transient ability, enabling the 2002-e to accurately follow even the most complex waveforms. And dual bearings maximize tracking ability, so that even difficult high-level passages can be accurately tracked at very low stylus forces.

Beryllium cantilever. The 2002-e's precisely formed cantilever is made of beryllium — an exotic space-age substance that is 35% lower in mass than conventional stylus bars. As a result, the cartridge boasts far lower moving mass, contributing further to its superior transient ability and unusually 'transparent' sound. By dramatically reducing moving mass, the 2002-e also reduces record wear to vanishingly low levels.

Low cartridge body weight. More and more tone arm designers are discovering the importance of cartridge weight, especially in tracking warped

records. Since over 95% of today's records are warped to some degree, a lighter cartridge means more effective tracking at lower stylus forces. At less than half the weight of most high-end cartridges, the 2002-e enables you to enjoy records that couldn't be tracked by other cartridges.

The mismatch problem: solved. Until now, an exact match between phono cartridge and preamp (or receiver) input impedance was required for flat frequency response. The 2002-e's built-in passive microcircuit eliminates mismatch problems by automatically controlling output impedance. This microcircuit also makes the cartridge immune from the effects of cable capacitance, so the 2002-e may be used with all types of tone arms — even those lacking low-capacitance cables.

Critical acclaim/popular acceptance. Few contemporary high-fidelity products have received such unanimous critical acclaim. And no other stereo phono cartridge has been so successful in satisfying the critical demands of today's sophisticated, dedicated music lovers.

But don't take our word about why 2002-e owners enjoy music more than you do: the proof is waiting at your Micro-Acoustics dealer. Or contact us for more information.

Hear the difference. To help you evaluate and compare cartridge tracking and transient abilities, we've developed a unique demonstration/test record which is itself enjoying widespread critical use and acclaim. (For a postpaid

copy, send \$3.95 to the factory.)
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Plaza, Elmsford NY 10523. In Canada,
H. Roy Gray Ltd., Markham, Ont.

ma
Micro-Acoustics

"Because good tracking isn't enough."



"I thought they'd laugh at me."



"I go around with this group of people. They're into equipment. Turntable snobs I call them. They still believe what they learned years ago... that a manual turntable is the way to go.

So I thought they'd laugh when I started looking at a "bee-eye-cee."
(Actually Ramon did snicker when I told him.)

For some reason my friends insist on the pain and inconvenience of changing records themselves every few minutes.

Not me. I'm into the music. And preserving my record collection.

So all I want is a turntable that's perfectly quiet... trouble-free... handles one record like a manual turntable when I want... and more than one when the occasion arises.

My turntable snob friends? Slowly but surely they're coming around.

I wonder why they're still laughing at me?"

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"BEE EYE-CEE" TURNTABLES SELL FROM ABOUT \$85 TO ABOUT \$289. FOR DETAILS AND SPECS GET OUR "5 TURNTABLES" FOLDER FROM YOUR DEALER OR WRITE US: BIC, WESTBURY, LI, NY 11590. ©1977 BRITISH INDUSTRIES CO. A DIVISION OF AVNET INC.

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What more proof do you need than rave reviews by a major audio magazine? Stereo Review (April 1977) says "The SA-2000 can deliver as much power, with as little distortion, as will ever be required by the vast majority of its users." 55 watts per channel, minimum RMS at 8 ohms from 20-20,000 Hz, with no more than 0.3% total harmonic distortion. Our tone controls "are among the better ones we have seen," says Stereo Review. They give you a choice, by boosting or cutting bass at 125 or 400 Hz and treble at 3 kHz or 7 kHz. It's almost like

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king you love to hate and it marvelously—because all. The suggestion of the Ba-fondness for strong drink is libretto before he even en-makes the most of it. I have frequent reserva-arnoncourt's tempos and where his theoretical ground-ces often misfire in practice. ny of his tempos strike me) The freshness and clarity performance will certainly ation to anyone whose no-'s oratorios is still condi- massive choral societies of most of us have already What we now need are per- ue to the music's inherent its sound world, which this only intermittently. J.N.

h—See Bach: Christmas

Kabanová.

Elisabeth Söderström (s)
Nadežda Kniplová (s)
Libuše Márová (ms)
Jitka Pavlová (ms)
Gertrude Jahn (ms)
Petr Dvorský (t)
Vladimír Krejčík (t)
Zdeněk Světlík (t)
Jaroslav Souček (b)
Dalibor Jedlička (bs)

era Chorus, Vienna Philhar-
Charles Mackerras, cond.
on, prod.] LONDON OSA
(two discs, automatic se-
OSA5 12109, \$15.95.

ational Theater Supra. 50781/2

k's six major operas have
il, they haven't maintained
tion in the American cata-
ion, only the second, stereo
nůfa (Angel SBL 3756) is
wn, where it is now joined
átya Kabanová—the first
to be recorded outside of
The other four operas, in
upraphon form, are fairly
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ls, although SCHWANN does

r one of the operas is per-
ountry, it arouses consider-
n (e.g., the New York City
oulos Affair, the Met's Je-
t recently, San Francisco's
husiasm that so far hasn't
ried over into persistent
he reason for this, I suspect,
terrelationship of two fac-
language, and Janáček's par-
of musical and dramatic

hand, most serious Ameri-
ners have probably acquired
ing familiarity with German,
Italian (probably building on
age training in one or more of
with the structural and etymo-
ities between these languages
they have some handholds on
pers in these tongues (includ-
her things, a fair grasp of te
y words).

ew listeners can deal with



The Ultimate Receiver

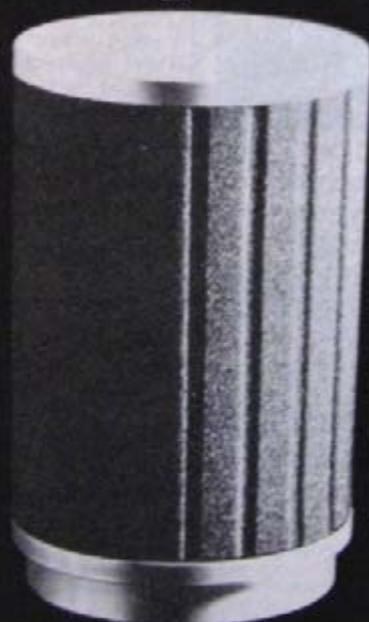
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CIRCLE 42 ON READER-SERVICE CARD

dbx

which even so does I bring... appreciating Janáček's pro... us are to Wagner's or Verdi... leave enough of the mind fr... the longer-range growth and... music. (This was brought ho... forcefully on listening to a r... excerpt from *Káťa* sung... though I've recently spent a... time with the opera's origin... English translation, I found... of the passage came throug... directly in the language I kn... of than it ever had in Czec...

Still, it isn't quite that... *Boris Godunov* has made... in a number of recordings, a... in Russian—a language not... miliar to most opera listen... And here we have to tak... Janáček's approach to comp... an approach in which the m... posefully, plays a more mo... the works of his nineteenth... cessors or those of his cont... the Italian verists, Richar... Schoenberg and Berg)—a tr... Mussorgsky, for all his nat... cies, certainly belongs in... spects.

In that older tradition, th... music—whether in the ope... voice—asserts itself far mo... ček; indeed, it often domi... not only what the characte... to some degree what we... about him or her. To an ev... gree in his mature operas... that Romantic subjectivit... less stylized, more effacin... a subtly inflected "convey... a more conversationally p...

Thus, to the extent th... Janáček's music derives fr... the continuing interplay a... who are often more speci... their words and actions th... sic, that music isn't as inde... sible as is the music of, s... You will doubtless get mor... if you know what the wor... it's possible to derive m... merely from the curves of... symmetry and shaping of... sorgsky shares a good deal... aesthetic, and it's worth n... his most "naturalistic" p... the *Boris Godunov* scene... are those found least abso... age listener without acces... significance of the Russia...

Janáček's interest in li... his fidelity to the intonat... language, with its poverty... thus of sustained sounds... quence a decidedly limi... profound dependence on t... erative force behind both... and longer-range continui... its way his language is a... (notably in its reliance on... can hardly imagine an "... Words" record devoted to... *From the House of the Dea...* certainly music in *Boris* tha... own weight in such a treat...

Of course, all America... stage presentations of Janá...

THE INSIDE STORY ON THE PERFECT COUPLES.

INTEGRATED AMPLIFIERS

AM-2800: Power output meters w/100 or 3 watt Scale Selector. Low and High/Low Loudness Control. High & Low Frequency Filters w/Alternate Levels, Audio Mute (-15 dB or -30 dB). Bass, Midrange and Treble Controls. 2 phono inputs, 2 tape inputs. Power Bandwidth (IHF): 7 Hz to 40 kHz/8 ohms. Residual Noise: less than 0.5 mV at 8 ohms.

AM-2600: Power output meters w/80 or 3 watt Scale Selector. Low and High/Low Loudness Controls. High & Low Frequency Filters w/Alternate Levels, Audio Mute (-15 dB or -30 dB). 2 tape inputs, 2 phono inputs. Power Bandwidth (IHF): 7 Hz to 40 kHz/8 ohms. Residual Noise: less than 0.5 mV at 8 ohms.

AM-2400: Bass and Treble Controls w/Two Step Turnover Controls, Audio Mute Control, High & Low Frequency Filters, 2 tape inputs. Power Bandwidth (IHF): 7 Hz to 40 kHz/8 ohms. Residual Noise: less than 0.5 mV at 8 ohms.

AM-2200: 20 watts per Channel Continuous Output Power, min. RMS at 8 ohms from 20-20,000 Hz with no more than 0.5% T.H.D. High & Low Filters, Loudness Control, 2 tape inputs, detent volume control and tape monitor. Power Bandwidth (IHF): 10 Hz to 45 kHz/8 ohms. Residual Noise: less than 0.8 mV at 8 ohms.

All Units: S/N (IHF): Phono—better than 75 dB, Aux—better than 95 dB.

STEREO AM/FM TUNERS

AT-2600: PLL MPX Circuitry, High Blend Switch, Signal Strength/Deviation and FM Tuning Meters, Output Level Control and Automatic Frequency Controls, Variable FM Muting. Sensitivity (IHF): 1.7 μ V; Capture Ratio: 1.0 dB; Stereo Separation: more than 45 dB (1 kHz).

AT-2400: PLL MPX Circuitry, FM Mute Switch, High Blend Switch, Separate Signal Strength and Tuning Meters, Output Level Control and Automatic Frequency Controls. Sensitivity (IHF): 1.8 μ V; Capture Ratio: 1.0 dB; Stereo Separation: more than 42 dB (1 kHz).

AT-2200: PLL, FM Mute Switch, Separate Signal Strength and Tuning Meters, Output Level Control. Sensitivity (IHF): 1.9 μ V; Capture Ratio: 1.3 dB; Stereo Separation: more than 40 dB (1 kHz).



AKAI INTRODUCES THE PERFECT COUPLES.

Choosing a tuner and integrated amplifier is a lot like choosing a mate. You look for things like compatibility, performance, appearance and, of course, fidelity.

Now AKAI makes matching component separates foolproof with a whole new line of amps and tuners. Paired on the grounds of total compatibility. And priced to be affordable.

Take the AT-2600 and the big AM-2800 amp, with a solid 80 watts, RMS per channel, 8 ohms, 20-20,000 Hz at .08% Total Harmonic Distortion.

Or the AM-2600 amp at 60 watts, RMS per channel, 8 ohms, 20-20,000 Hz at .1% Total Harmonic Distortion. And

pair it with the AT-2600 tuner.

Or the AM-2400 amp at 40 watts, RMS per channel, 8 ohms, 20-20,000 Hz at .15% Total Harmonic Distortion. And the AT-2400 tuner.

No matter which perfect AKAI couple you choose, you get specs and features not found on all-in-one receivers in the same price category. Improvements you can hear.

Hear them today at your AKAI dealer. And live in perfect harmony.

AKAI



ART COLLECTORS:

For an 18" x 24" reproduction of this Charles Bragg etching suitable for framing, send \$2 to AKAI, Dept. HF, P.O. Box 6010, Compton, CA 90224, ATTN: Couples.

ONKYO'S QUARTZ-LOCKED ...ACCLAIM BY IMITATION



You know how much you count when people start imitating you. That's happening now with Onkyo's unique Quartz-Locked Tuning System. Since Quartz-Locked has proved to be about the best tuning system in the business, some big names are trying to equal our success.

You might, of course, be better off if they did copy the Onkyo Quartz-Locked. Then you'd have the system which Hirsch-Houck Labs said, "...was virtually impossible to mistune..."* A statement other independent labs have agreed with.

Onkyo's Quartz-Locked Tuning System is controlled by a Sentry Circuit which reacts to your touch on the tuning knob, unlocking Quartz-Locked when you touch it for tuning; locking it when you release the knob.

The system works through a quartz crystal controlled reference signal in constant comparison to the IF frequency. Quartz-Locked detects and corrects off-frequency conditions so fast you never even know it's happening. The result...continuous maximum reception that's rigidly stable.

Of course, we've had Quartz-Locked in our labs for years before putting it on the market. And, in the little more than a year it's been out, Quartz-Locked has made a name for itself... and a lot of audio fans

who appreciate the way it does what it's supposed to do.

In addition to Quartz-Locked receivers, Onkyo also has a Quartz-Locked tuner for up-grading your system. And a few more Quartz-Locked components coming off the drawing board now.

The best way to be sure of getting the Quartz-Locked system that set the standard is to be sure it says "Onkyo Quartz-Locked Tuning System."

Perhaps it can be imitated. We doubt it can be equalled.

ONKYO QUARTZ-LOCKED AUDIO EQUIPMENT

TX-4500 Quartz-Locked AM/FM Stereo Receiver

Power output 55 watts per channel, minimum RMS at 8 ohms, both channels driven from 20 Hz to 20 kHz, with no more than 0.1% Total Harmonic Distortion.

TX-8500 Quartz-Locked AM/FM Stereo Receiver

Power output 110 watts per channel, minimum RMS at 8 ohms, both channels driven from 20 Hz to 20 kHz, with no more than 0.1% THD. Dual Power supply.

T-9 Quartz-Locked AM/FM Stereo Tuner

Dual Gate MOS FET 4-Gang Variable capacitor front end with Usable Sensitivity 1.7 μ V; 50 dB Quieting Sensitivity of 3 μ V; Harmonic Distortion: Mono 0.15%, Stereo 0.3%; Stereo Separation 40 dB at 1 kHz.

*POPULAR ELECTRONICS AUGUST, 1976

Artistry in Sound

ONKYO®

Eastern Office: 42-07 20th Avenue, Long Island City, NY 11105 (212) 726-4639
Midwest Office: 935 Sivert Drive, Wood Dale, Ill. 60191 (312) 595-2970

West Coast Distribution Center: Damark Industries, Inc., 20600 Nordhoff Street, Chatsworth, California 91311 (213) 998-8501
Canada: Sole Distributor, Tri-Tel Associates, Ltd., Willowdale, Ontario, Canada M2H 2S5

CIRCLE 24 ON READER-SERVICE CARD

Ultimately

Now, professional 3-head monitoring in a cassette deck.

Up to now you had to choose between a cassette deck for convenience. Or, reel-to-reel or professional recording features. Now have it both ways in the Marantz 5030 cassette deck.

Here's how:

The Marantz 5030 has separate record and playback heads... the same as reel-to-reel. This gives you an instant check of the quality of your recording as you record. And, like some of the most expensive reel-to-reel decks, the record and playback heads on the Model 5030 are super-hard permalloy—a long-lasting metal alloy that gives better frequency response and signal to noise ratio than Ferrite material.

For precise azimuth alignment, both the playback/monitoring and record heads are set side-by-side within a single metal enclosure. They can't go out of tracking alignment.

Complementing this outstanding "head-technology" is Full-Process Dolby® Noise Reduction Circuitry. It not only functions during record and playback... but during monitoring as well.

What drives the tape past the heads is every bit as important as the heads themselves. For this reason the Model 5030 has a DC-Servo Motor System. The headiest, most

accurate tape-transport method. Speed accuracy is superb, with Wow and Flutter below 0.05% (WRMS).

To adapt the Model 5030 to any of the three most popular tape formulations, press one of the three buttons marked "Tape EQ and BIAS." There are settings for standard Ferric-Oxide, Chromium Dioxide (CrO₂) or Ferri-Chrome (FeCr) tape.

With Mic/Line Mixing, two sources can be recorded at the same time, combining line and microphone inputs. The Master Gain Control lets you increase or decrease the overall volume of the total mix.

What else could we pack into a front load cassette deck?

More features. Like a 3-digit tape counter with memory function. Viscous Damped Vertical-load Cassette Door. Switchable Peak Limiter. Fast-response LED Peak Indicators. 3" Extended-range Professional VU Meters. Locking Pause Control for momentary shut-off in record or play... and Total Shut-off in all modes when the tape ends.

And, of course, the unbeatable Marantz 5030 is front loading. Easy to stack or fit on a shelf. The styling is clean and bold. The sound is the truest recreation of what was put on tape. Your Marantz dealer has Model 5030 as well as the full line of Marantz cassette decks.

If you want the best—then do what you really want to do—go for it.

Go for Marantz.



MARANTZ
We sound better.

It's Marantz. Go For It.

