

**CAR STEREO**

CC 02367

MAY-JUNE 1979 \$1.35

# hi-fi stereo

## BUYERS' GUIDE

### OUTSTANDING NEW PRODUCTS

WE FOCUS ON THE INNOVATIONS YOU'LL BE SEEING IN THE STORES AND TELL YOU WHAT WE THINK

### CAR STEREO '79

IN-DASH UNITS OR SEPARATES WHICH CHOICE IS RIGHT FOR YOU?

### SPEAKER

NEW FRONT

### INGS

DECKS  
S  
NES

FDM02PPIE1380 CC-0 01 160M0V79  
FRED D. AMOUR  
138 PLEASANT ST  
AUBURN ME 04210



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

**WITH PRIORITY TECHNOLOGY:**

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

**WITH PROVEN VALUE:**

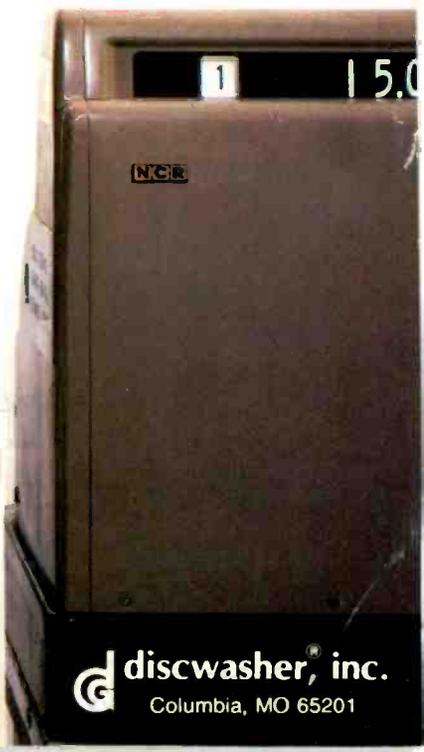
The uniquely styled Discwasher handle is constructed of hand-rubbed walnut which will long outlast "plastic wonders". This easily held handle is lightweight because of an integral cavity which conveniently holds the D3 Fluid bottle. A special brush to clean the directional-fiber Discwasher pad is included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

**WITH GENUINE SATISFACTION:**

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

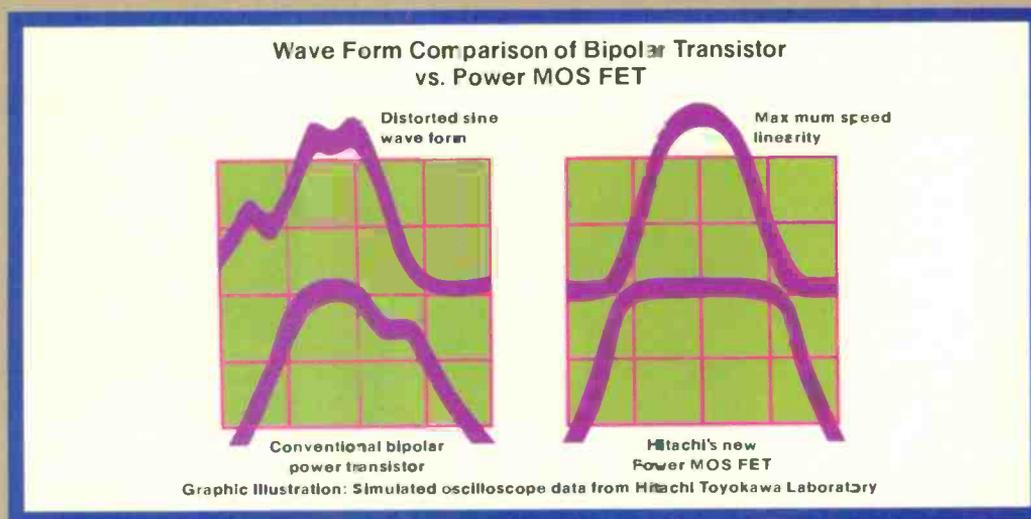
Seek out the Discwasher System, by name. Only Discwasher delivers technology, value and satisfaction.

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



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

# The world's fastest power amplifier

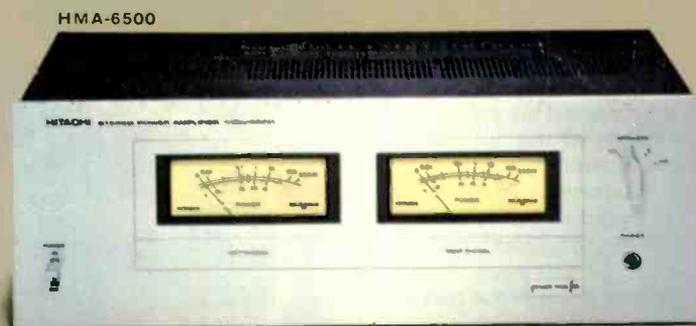


## Hitachi Power MOS FET

Hitachi's HMA-6500 Stereo Power Amplifier with the incredible Power MOS FET offers ultra-high switching speed to dramatically reduce output and frequency distortion. At 50 watts output from 20 Hz to 20 kHz, there's no more than 0.02% total harmonic distortion. And the HMA-6500 has such wide linearity that it refuses to distort even when confronted with the most intense dynamic peaks. Frequency response is ruler flat from DC to 100 kHz, with no crossover distortion.

Add the performance-matched HCA-6500 Stereo Control Amplifier and the FT-8000 Digital Synthesizer Tuner. Both are sleek and stylish performers. The HCA-6500 gives you total control without adding any audible noise or distortion. The FT-8000 is nothing short of an electronic miracle, with digital frequency readout, all-electronic front end, clock function and six station memory.

The HMA-6500, HCA-6500 and FT-8000 – the fastest and the finest from Hitachi.



 **HITACHI**  
A sound investment

Audio Component Division, Hitachi Sales Corp. of America, 401 West Artesia Boulevard, Compton, CA 90220. (213) 537-8383, Extension 228

Circle No. 47 On Reader Service Card

# When you Test-drive the best speakers from Britain you'll drive home with real sound.

You're a confirmed audiophile and nobody can fool you with a lot of promises.

You're ready for the ultimate test and only your ear will be convinced.

When you test-drive the best from Britain we know we'll have your ear and maybe a lot more.

When you're ready, take a variety of recorded music into your dealers. (Use direct disc recordings so you can put our speakers to the real test.)

We know you'll be amazed at the accuracy.

And we'll have turned another confirmed audiophile into a dedicated Anglophile.

We've been convincing lovers of sound in Britain for over half a century. And we've earned our reputation as the leader by not compromising.

We don't rely on gimmicks. Every speaker in our completely new line of systems is based on sound engineering principles and tested thoroughly.

As you know, with everything in audio, it's the end result that counts, not the means to get there.

But we don't neglect the means either. To get your ear, we use our English craftsman's pride in carefully putting together the right components for delivering a broad range of sound smoothly and uniformly so you get the flattest response possible.

When you take a look at the specs you'll see what we mean.

We've shown the Ditton 662, but all three new Ditton speakers, besides being technologically superb and precision engineered, are beautifully styled and assembled in the fine English cabinet-making tradition, to fit into any decor.

And we've used a completely different design concept for each of them to satisfy your individual taste and budget.

So now that you've grown up to real sound, you can test-drive your choice of the best sound from Britain.

But you won't be able to find them at just any dealer. For our select list of shopkeepers who carry Celestion, simply drop us the coupon and we'll send you the list by return post.

But don't delay, the traffic may be heavy.



First we'll start with the Ditton 442—made for the music lover, who wants full bass sound.

Large presentation for hi-power system. Sealed box design—inside, a second sealed infinite transmission line enclosure for the mid-range unit.

Drive units: FC 121, 330 mm bass unit with 46 mm voice coil.

FC 61, 130 mm mid-range with 25 mm voice coil.

HF 2001 treble unit with 19 mm voice coil.

Controlled by 14 element dividing network with fuse protection for the treble unit.

What you get is less restriction, overall balance openness with no coloration.



Then move up to the Ditton 551

For outstanding dispersion—tight sound.

A vented box design with improved bass response from a smaller bass unit.

Drive units: PC 101, 290 mm bass unit with 50 mm voice coil.

MD 701 mid-range with 46 mm voice coil.

HF 2001 treble unit with 19 mm voice coil.

Controlled by 15 element network with fuse protection and failure light for the treble unit.

Also level controls for treble and mid-range up to 2 dB boost and 6 dB cut.



And finally, the top of the line, the Ditton 662.

Our passive radiator (ABR) system gives solid bass, smooth response and dispersion, and stereo imaging. Use with all power amplifiers.

Has 3 active drive units and passive radiator.

Drive units: FC 122 bass unit, 330 mm passive with double suspension for pure axial movement.

MD 501 mid-range with 52 mm voice coil.

HF 2001 treble unit with 19 mm voice coil.

Controlled by 14 element network with fuse protection for treble unit.

Mail to:

Celestion Industries, Inc., Dept. B-59  
Kuniholm Drive  
Holliston, Ma. 01746

Gentlemen: I'm ready to test drive the best speakers from Britain. Please send me more information on:

Ditton 662  Ditton 551  Ditton 442  
 Name of nearest Celestion dealer

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Name of speakers you currently own \_\_\_\_\_

## Celestion.

Nobody sounds better than the British.

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HI-FI/STEREO BUYERS' GUIDE

# hi-fi/stereo

## BUYERS' GUIDE®

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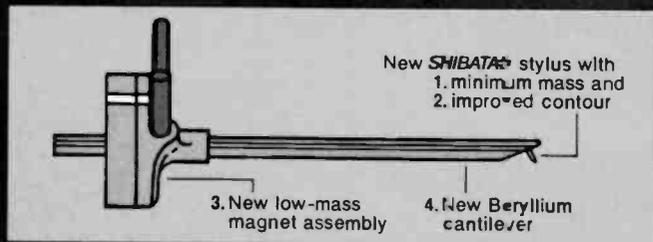
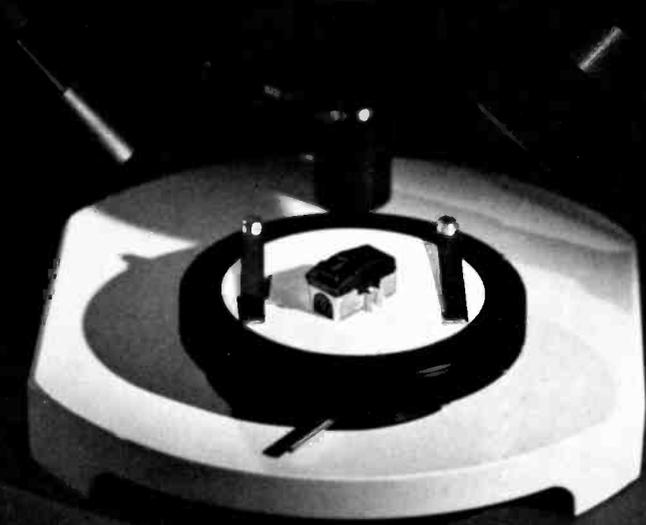
Cover photo by Dave Niles.

For details on the host of new products on the cover, see page 75.

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# Announcing four tiny advances with room-filling benefits!



In the tiny world of the stereo cartridge, microscopic differences in dimensions are all-important. Which is why the extremely low moving mass of the new AT15SS is a major achievement in stereo technology.

For instance, to the best of our knowledge our new stylus is the smallest whole diamond used in series production. In cross-section, it's 36% smaller than our best previous model. It is also nude-mounted to further reduce mass at the record surface. And the square-shank design insures exact alignment with groove modulations.

All this is so small you'll need a microscope like the one above used by many A-T dealers to see the details. If you look very closely you'll also see we've slightly revised the contour of the Shibata tip. The combination of minimum mass and new contour which we call Shibata+ offers outstanding stereo reproduction, especially of the latest high level recordings.

But there's more. Extremely low distortion results from a new ultra-rigid

Beryllium cantilever which transmits stylus movement without flexing. And flatter response plus better tracking is achieved by a new method of mounting our tiny Dual Magnets to further minimize moving mass.

Four tiny differences, yes. But listen to the new AT15SS or the hand-selected AT20SS for ultra-critical listening. You'll find out that less IS more. At your Audio-Technica dealer now.

Note: If you own a current AT15Sa or AT20SLa, you can simply replace your present stylus assembly with a new "SS" stylus assembly to bring your phono system up to date.



Model AT15SS  
\$200.00

Model AT20SS  
\$250.00



**audio-technica**  
INNOVATION □ PRECISION □ INTEGRITY

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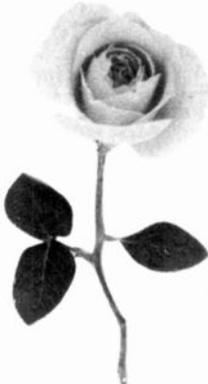
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HI-FI/STEREO BUYERS' GUIDE



Clean look,  clean sound.

That clean, open look of these new Crown components is intentional. The *Power Line One* amp and the *Straight Line One* pre-amp are designed for people who delight in accurate sound reproduction, whose joy is in listening, and for whom simplicity of operation is important.

They are obviously easy to operate, yet all the basic controls you need for accurate reproduction and monitoring of fine quality sound are there.

But your greatest enjoyment will surely come from the unusual sonic accuracy of these units. They are acoustically as transparent as can be imagined.

Achieving that purity of sound and function wasn't simple. We've had 27 years experience in building state-of-the-art audio components, such as the world-famous DC-300A high-power amp and the newer DL-2 digital logic pre-amplifier. We've learned a great deal about what can and cannot be done with circuit design, with transistors and with IC's.

That experience is reflected in new computer-aided circuit designs. In the *Straight Line One* phono pre-amp section, for instance, internal noise is so low that thermal noise from your cartridge will be the dominant source of noise.

This circuit technology has also made possible other features you're bound to enjoy. The phono pre-amp is a separate module, much like the system developed by Crown in the DL-2. It eliminates troublesome RFI. Note also that Crown put distortion indicators on *both* units. The amplifier has both the unique Crown IOC circuit plus new peak output voltage LED's. Front-panel speaker switching and a new concept in DC speaker protection provide flexibility of layout and security of operation at high levels.

Please don't take our word for all of this. Visit your Crown dealer soon. Listen to the clean, full range sound of the *Straight Line One* and the *Power Line One*. That experience should simplify your buying decision.

## SPECIFICATIONS

	Frequency Response, 20 Hz-20 KHz	Phase Response 20 Hz-20 KHz	Hum and Noise dB below rated output		IM Distortion at rated output, Max.	Total Harmonic Distortion at rated output 20 Hz-20 KHz, Max.
			unweighted	"A" weighted		
Straight Line One 2-channel pre-amplifier Switching module	±0.1 dB	±10°	97	101	0.00055%	0.0009%
Phono pre-amp (RIAA)	±0.5 dB	±5°	88	94	0.0005%	0.002%
Power-Line One 2-channel amplifier	±0.1 dB	+10° to -15°	110	115	0.00095%	0.05%

Power rating: 50 WATTS/CH. MIN RMS INTO 8 OHMS, 20 Hz-20 KHz, THD 0.05%.  
80 WATTS/CH. MIN RMS INTO 4 OHMS, 20 Hz-20 KHz, THD 0.05%.

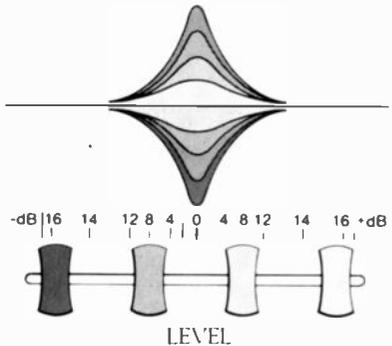
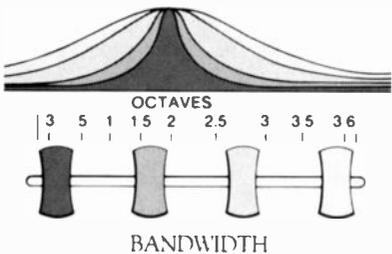
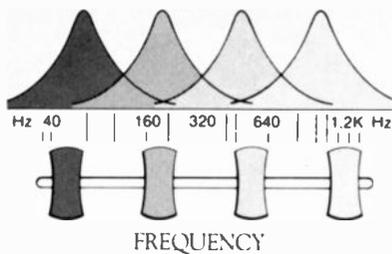
CROWN products are available outside the U.S.A. under the brand name AMCRON.



# CROWN

1718 W. Mishawaka Road, Elkhart, Indiana 46514

*American innovation and technology...since 1951.*



## The graphic reason to buy our parametric.

With the graphic equalizer, you have a limited number of chances to correct an infinite number of potential problems in a recording or listening environment. You're dealing with fixed bandwidths and fixed frequencies. You can only increase or decrease the level. When boosting or cutting frequencies, you have to settle for the nearest one or two octaves. It's a compromise. With the parametric, you're provided an infinite number of solutions. Bandwidth, frequency and level are each determined by you. Any musical problem can be isolated and corrected. And that's what all the excitement's about.



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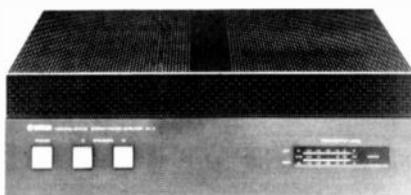
Scientific Audio Electronics, Inc.

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

## 120 Watt Power Amplifier

Yamaha's Model M-4 "Natural Sound" power amplifier, having a rated output of 120 watts per channel, carries a suggested retail price of \$650. For that outlay you get such special design features as: closely-paired, newly-developed high power transistors to provide sufficient power gain over a broad frequency band; a high capacity transformer plus a pair of 15,000  $\mu$ F chemical capacitors to ensure stability even at very low frequencies; voltage amplifying stages with their own left/right separate local current-voltage supplies to help minimize intermodulation distortion and crosstalk resulting from common impedances; DC detection device to cut off the speaker from the



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amplifier the moment DC voltage is generated in the amplifier's circuits. Other features include: peak level meter, over-drive indicator, AC/DC input switch selection, front panel speaker switches, separate left/right input level controls. Specifications: power band width, 10 to 100,000 Hz; signal-to-noise ratio 118 dB; total harmonic distortion, less than 0.005% (8 ohms, 20 Hz to 20 kHz, 120W); IM distortion, less than 0.002% (60 watts); damping factor, 200 (8 ohms, 1 kHz).

## Speaker Switching System

Scientific Audio Electronics (SAE) says this Model 4200 speaker switching system was designed to provide switching capabilities often absent in many



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and- to high-end separate component speakers. The unit can accommodate up to three pairs of speakers, three sets of headphones, or any combination of the two. The third headphone jack is a direct output capable of handling the most inefficient types of conventional headphones as well as electrostatic headphones. The unit measures 1.75 inches high by 19 inches wide and is mountable in any EIA standard component rack. Suggester retail price is \$75.

## Empire Phono Cartridge

Empire Scientific's model EDR.9 "Extended Dynamic Response" phono cartridge is claimed to employ new proprietary principles "never before used in cartridges." For example, the electrical elements of the EDR.9 have



Circle No. 108 On Reader Service Card

been designed to remain unaffected by any normal variations in load capacitance or resistance, so that smooth frequency response and accurate transient reproduction can be had with any music system, regardless of loading conditions. The stylus has been redesigned to provide better contact with record grooves. The stylus shape is termed "L.A.C." to indicate a "large area of contact." Specifications: frequency response, 10-50,000 Hz; (20-35,000 Hz  $\pm$  1 $\frac{1}{2}$  dB); range of tracking force,  $\frac{3}{4}$  to 1 $\frac{1}{2}$  grams; output voltage, 4.5 mV at 5 cm/sec; recommended load capacitance, 100 pF; recommended load resistance, 47 ohms; total weight, 5.2 grams; mounting centers,  $\frac{1}{2}$  inch; vertical compliance, 28 x 10<sup>-6</sup> cm/dyne. Price: \$200.

## Three-Way Loudspeaker System

This Celestion Ditton 662 loudspeaker system uses a passive radiator in addition to three active drive units to provide a frequency response of 38 Hz to 20,000 Hz  $\pm$  3 dB into 2 pi steradians (half space). To provide an inert cabinet for optimum low frequency response, the cabinet walls are made of

(Continued on page 8)

# Ohm's Law 7:

## Big bass sound can come from small bookshelf loudspeakers.

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

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

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

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

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



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

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

**High Fidelity Magazine:**

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



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

from the speakers."

**Sound Advice:**

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

**Stereo Review:**

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

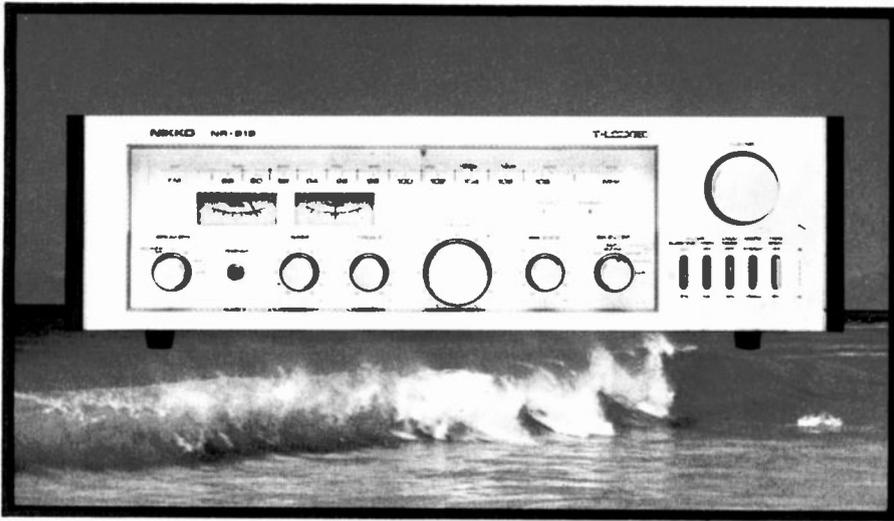
mission. All rights reserved.)  
**Sound (Canada):**

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



For 13 complete reviews, and full specifications, please write us at Ohm Acoustics Corp., 241 Taaffe Place, Brooklyn, N.Y. 11205.

**Ohm**  
**We make loudspeakers correctly.**



## Enter the world of exciting receivers.

The Nikko NR-819 AM/FM Stereo Receiver — just the right combination of superb performance and useful features to put excitement back into music.

The NR-819 gives you enough clean power for comfortable music listening levels with almost any home loudspeakers, virtually distortion-free. It delivers 45 watts per channel, minimum RMS, both channels driven into 8 ohms 20 to 20,000 Hz with no more than 0.05% total harmonic distortion.

FM tuning is a breeze with the NR-819. Center tuning and signal strength meters tell you exactly what's happening. Nikko exclusive T-Locked FM, infinitely more precise than manual tuning, automatically locks in the best reception possible.

Useful features, without unnecessary frills, make the NR-819 an outstanding value. Auto muting to eliminate annoying noise between FM stations, loudness contour, 2-system speaker switching, mono/stereo mode control and tape monitoring combine to allow maximum flexibility.

FM pilot signal cancellation circuitry extends FM frequency response and assures clean FM tape recordings. The subsonic filter helps eliminate distortion due to turntable rumble or warped records, and a high filter reduces record and tape hiss.

Well-designed and carefully assembled circuitry, protected by exclusive Nikko circuit breakers, deliver solid, stable operation. Our 3-year limited warranty is your assurance of Nikko reliability.

Best of all, you won't get blown away by the price. See your Nikko Audio dealer. Write to Nikko Audio for additional information and specifications or call toll-free (800) 423-2994 for the name of your nearest Nikko dealer.



Nikko Electric Corp. of America  
16270 Raymer St., Van Nuys, CA 91406 (213) 988-0105  
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In Canada: Superior Electronics, Inc.

# Nikko Audio

For those who take their stereo seriously.

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## AUDIO SHOWCASE

18-mm high-density particle board veneered on both sides; there also are two bracing shelves to reduce resonances, and the enclosure is lined with 50 mm thick foam to damp out standing

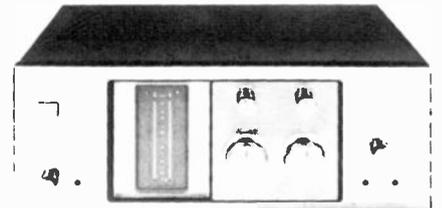


Circle No. 95 On Reader Service Card

waves. Other specifications: power handling capacity, 160 watts continuous music program; crossover frequencies, 700 Hz and 4500 Hz; efficiency, 2.9 watts pink noise for 90 dB SPL at 1 meter; cabinet size, 41.6 inches high by 15.7 inches wide by 11.8 inches deep; weight, 74.8 lbs. Price: \$749.50.

### Digital Audio Processor

Sony claims a "first" with this PCM-1 consumer model digital audio processor that carries an impressive list price of \$400. The unit uses Pulse Code Modulation (PCM) technology to produce



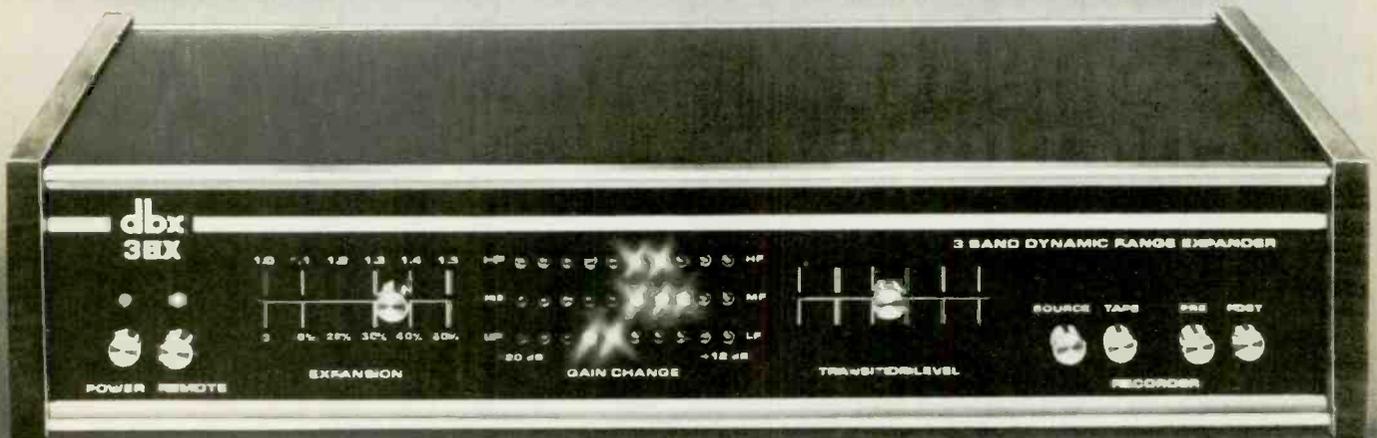
Circle No. 94 On Reader Service Card

audio tapes of higher quality than those produced by the best analog recorders, according to Sony. Basically, the PCM-1 encodes a live sound source and converts it into a dense group of variable pulses. The signals can be recorded on a videocassette recorder (such as Sony's Betamax) so that 13 bits of information go on each channel to provide the equivalent of 1.4 million bits of data per second. The advan-

(Continued on page 11)

HI-FI/STEREO BUYERS' GUIDE

# Restore the impact of "live" ...easy as 1-2-3.



No matter how accurate your stereo system is, it's only as good as the records and tapes you play on it—and they leave much to be desired. The recording process does some terrible things to live music, and one of the worst is robbing it of dynamic range, the key element which gives music its impact.

Fortunately dbx has developed a whole line of linear dynamic range expanders which can restore lost dynamic range.

**1BX.** The 1BX is the most sophisticated one-band expander on the market. Its RMS level detector incorporates an infrasonic filter to prevent mis-tracking caused by turntable rumble and record warp.

**2BX.** The 2BX divides the frequency spectrum into two bands and expands each separately. It doesn't allow the bass to influence the vocals or mid-range instruments, and in strongly percussive music, that's important.

**3BX.** The 3BX is the state-of-the-art, but with the introduction of the 3BX-R Remote Control option, it's more flexible and more fun than ever. The 3BX divides music into three frequency bands. Low bass will not influence the midrange. And midrange crescendi will not boost low level highs, so operation is virtually inaudible. For complex musical material, the 3BX is the best way to restore dynamic range.

All dbx expanders have design features in common. All utilize true RMS level detection. All feature a program-dependent release time, for natural, life-like sound. All are true stereo expanders that maintain rock-solid stereo imaging. And all dbx linear expanders have a pleasant benefit—up to 20 dB of noise reduction.

The 3BX is still the standard. But now there is a family of dbx expanders designed to bring any system one step closer to "live."

**dbx**  
**UNLOCK YOUR EARS.**

# EYE FIDELITY.

Any audio professional will tell you. The fidelity of your recording depends on the quality of your recording level meter.

That's why Sony Audio created the fastest, most accurate, most versatile, most reliable, brightest, and easiest-to-read recording level display meter in tape deck history.

Period.

Our Liquid Crystal Peak Program Meter IC responds in an incredible 1 millisecond. That gives you the quickest measurement possible, even on the most sudden transient signals.

To demonstrate, clap your hands in front of a microphone.

Watch any ordinary VU meter as it tries to respond. Not very much will happen. Now try the same thing with our LCD meter and you'll see that total burst of sound completely displayed.

And speaking of displays, you get a Double Indication System which displays peak levels in two ways: Auto mode, which holds peak levels for approximately 1.7 seconds, or Manual mode, which maintains peak level readings over the entire length of your recording.

Unlike other displays, our LCD meter gives you 33-step accuracy over a wide -40 to +5dB range. It changes color above 0dB, so you never miss an overload reading. And it even has an element life span of more than 50,000 hours.

Finally, the tremendous brightness and logical design of the LCD meter make precise comparisons between left and right channels easier. In any kind of light.

But not only does Sony Audio have the LCD meter. We've got the cassette deck to deserve it.

The TC-K60.



With our own hesitation-free brushless/slotless BSL motor, our own newly developed Dolby\* IC, our own Ferrite-and-Ferrite head, and our own microprocessor-controlled Automatic Music Sensor that lets you preselect any of up to nine recorded program segments.

Enough talk. The TC-K60 with Liquid Crystal Peak Program Meter is one Sony Audio product you've got to see for yourself.

So look.

Then listen. You'll never be satisfied with anything less.

## SONY<sup>®</sup> AUDIO

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\*TM Dolby Laboratories Inc.



# AUDIO SHOWCASE

tages: wow and flutter, distortion, tape hiss and speed deviation are virtually eliminated; a dynamic range of 85 dB is achieved; quiet passages are completely free of conventional tape hiss; high-level peaks are recorded clearly. An ingenious error-correcting code automatically corrects for tape "drop-outs" and for time distortion before it is ever heard. Response range is from 2 Hz to 20,000 Hz.

## Belt and Direct Drive Turntables

Visonik's two new turntables offer a choice between direct drive and belt drive models, each with a low-mass, straight tonearm with integral control assembly. The straight arm is said to reduce weight and mass and thereby provide greater tracking accuracy as well as prolonged stylus and record life. The VT-5300 direct-drive unit, priced at \$215, is servo-controlled and features an internal frequency generator that constantly monitors motor speed and makes continuous adjustments to compensate for small fluctuations in line frequency and platter load. This model also offers variable pitch control



Circle No. 100 On Reader Service Card

and strobe speed adjustment. Wow and flutter is put at less than 0.08% (DIN) and unweighted rumble (DIN B) is 67 dB. The VT-3300 belt-drive turntable retails for \$165. It features a heavy-duty hysteresis synchronous motor, and an exclusive "isolastic" suspension system (also on the VT-5300) to help eliminate acoustic feedback and external vibrations. Wow and flutter is 0.09% (DIN) and the unweighted rumble is 65 dB (DIN B). Both units feature viscous-damped cueing and soft-touch controls, low-profile integral base, dust cover with "free-stop" hing-

es, low resistance head shell, mounting hardware and 45-rpm adaptor.

## A "First" in Two Speed Cassette Decks

B.I.C. says this model T-4 two-speed cassette deck is the first such machine to offer metal tape capability. So-called "broadband electronic circuitry" plus special heads permit recording, playback and erasure of all metal particle tapes. The specially designed erase head has a saturation level 10 dB higher than that of common sendust heads. You have a choice of two tape speeds, the conventional 1½ ips and



Circle No. 65 On Reader Service Card

also 3¾ ips which provides "guaranteed" frequency response beyond 20-22,000 Hz  $\pm 3$  dB, and a signal to noise ratio (with metal tape) of better than 72 dB (weighted, reference 3% THD). Other features: 3 heads; dual capstan controlled tension support; two-motor full-logic solenoid control with tachometer feedback DC servo motor for capstan drive and a DC motor for spooling; index counter with three-digit electronic readout; programming capability for automatic selection of sections of recorded material; peak indicating LED bar graph display; mic/line mixing; pitch control for  $\pm 5\%$  variation of either tape speed. Also individual output and headphone level controls, adjustable Dolby calibrations, record safety/mute switch, switchable multiplex filter, four complete Dolby circuits for simultaneous encode/decode, and Dolby FM copy. Price of the T-4 is \$849.95.

## Speaker With Honeycomb Woofer

Mitsubishi's Model MS-20 speaker system features a woofer with the one material constructed of aluminum honeycomb sandwiched between two layers of glass-fiber reinforced plastic. The honeycomb material is said to be very lightweight and extremely rigid, hence it provides powerful bass response with excellent definition and clarity, according to the company. The honeycomb material is similar to that used in radar domes, and is 15 to 20 times more expensive than paper compositions used in conventional cone designs. The MS-20 also features: an orifice, vent tweeter

structure to reduce reverberation within the chamber and to render it less frequency-dependent; overload protection circuit; acoustically transparent net grille; edgeless cabinet for wider dis-



Circle No. 78 On Reader Service Card

persion; recess-mounted speaker units and level controls; black finished baffle board and natural, oiled walnut cabinet finish. Suggested retail price: \$250.

## "Fastest Responding" Preamp

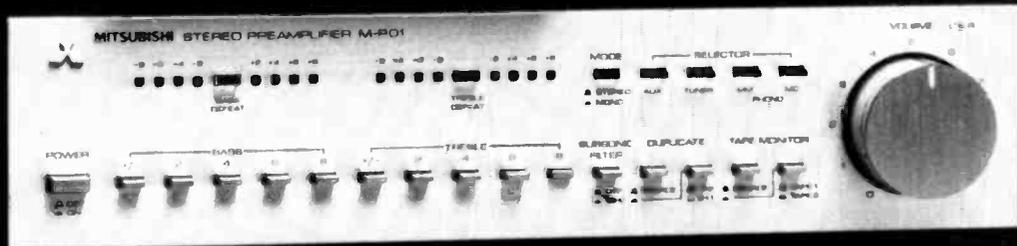
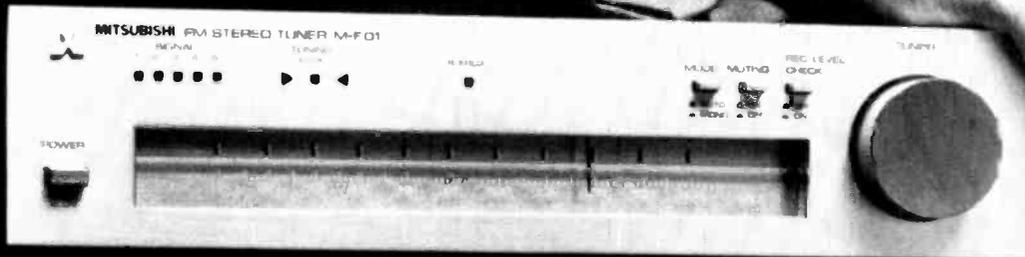
Sansui claims that the company's new CA-F1 preamplifier "is the fastest-responding preamplifier on the market" by virtue of its 50 V/ $\mu$ Sec slew rate and 0.6  $\mu$ Sec rise time. An exclusive Sansui Diamond Differential DC (DD/DC) circuitry used in the phono equalizer of the unit is claimed to contribute to "outstanding performance." The preamp handles regular moving-magnet phono cartridges with an RIAA accur-



Circle No. 89 On Reader Service Card

acy of  $\pm 0.2$  dB from 20 to 20,000 Hz, a 90-dB signal-to-noise ratio, and a 350-mV overload capacity; and there's a switch-selectable input that directly accepts the low-output, moving-coil pickups often favored by advanced audiophiles. Inputs at the Aux, Tuner and either of the two switch-selectable sets of tape jacks have a frequency response from 5 to 600,000 Hz, and a 100 dB signal-to-noise ratio. The main outputs from the CA-F1 can be fed to either or both of two power amplifiers. Also included: click-stop treble and bass controls (with defeat switch), switchable subsonic filter, loudness-contour functions. Suggested retail price: \$495.

(Continued on page 14)



# Introducing The Itsy Bitsy Mitsubishi.

Mitsubishi has put big audio performance into a series of precise little packages. Microcomponents.

Stereo components that are compact. But can hardly be called compacts.

They have the same high-performance characteristics as our regular size components. They have to. They're Mitsubishi.

The Micro FM tuner, for one. It's the teeniest tuner in the world. A mere  $10\frac{5}{8}$ " x  $2\frac{3}{4}$ " x  $9\frac{3}{4}$ " big. However, few tuners can measure up to its standards. It has, among other

things, a quartz-PLL synthesizer tuning system so sophisticated that it has absolutely no drift. Zilch.

We were no less frugal with features on our Micro Cassette Deck. It has an Automatic Spacing Pause System, Dual Capstan Drive, Separate 3-way Bias and Equalization Feather Touch Controls and of course, Dolby.<sup>®</sup> Yet measures only  $10\frac{5}{8}$ " x  $5\frac{1}{2}$ " x  $9\frac{5}{8}$ "

For power, the Micro Amp is unbeatable at this size. The little "direct coupled" powerhouse puts out 70 watts per channel. Total harmonic distortion is only 0.01%. For 30 watts per channel, it's an infinitesimal 0.004%.

Our Micro Preamp is made to complement the

amp. And faithfully conduct any signal source that goes through it. It has a built-in moving-coil head amplifier. With a signal-to-noise ratio of 77dB even for  $100\mu\text{V}$  input and 0.005% THD, it obviously does the job better than components twice its size.

Small wonder the final touch was to finish them with Champagne Gold face plates.

The new Mitsubishi microcomponents.

Now bigger isn't better. Only bigger.



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## "A Technological Masterpiece..."



McIntosh C 32

### "More Than a Preamplifier"

McIntosh has received peerless acclaim from prominent product testing laboratories and outstanding international recognition! You can learn why the "more than a preamplifier" C 32 has been selected for these unique honors.

Send us your name and address and we'll send you the complete product reviews and data on all McIntosh products, copies of the international awards, and a North American FM directory. You will understand why McIntosh product research and development always has the appearance and technological look to the future.

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If you are in a hurry for your catalog please send the coupon to McIntosh. For non-rush service send the Reader Service Card to the magazine.

Circle No. 16 On Reader Service Card

# AUDIO SHOWCASE

## Precision Digital Timer

Pioneer's DT-400 precision digital timer for audio use is a "noiseless" electronic device used to turn on and off connected audio components at any pre-selected time. Two AC outlets are provided to enable connecting, for example, a tape deck to a tuner or receiver for unattended recording. A cool, blue time indication is by means of a non-flicker fluorescent tube, and the

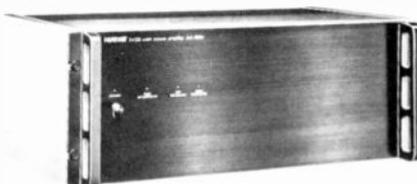


Circle No. 85 On Reader Service Card

24-hour display can be set for 12 hours with AM or PM indicated. Timer operation is based on one-minute intervals, automatic shut-off is in 59 minutes from the set time, and there is of course automatic turn-on. Accuracy is put at +0.02 second from set time. Second counting is from 0 to 60 seconds. Rated capacity, 500 watts maximum. Power consumption only 7 watts. Price: \$100.

## "Professional Style" Components

Heath offers the company's first in a series of "professional-style" stereo components suitable for rack mounting. The AA-1600 amplifier (mail order kit priced at \$359.95) has an output rating of 125 watts, minimum RMS, per channel into 8 ohms with less than 0.05% total harmonic distortion from 20 to 20,000 Hz. It's designed with a flat-black front panel, and features an eight-second turn on delay, thermal circuit breaker and high temperature LED indicator plus preassembled amplifier and power supply circuit boards for ease of construction. The unit may be installed in an optional oak finish case (model AEA-1800-1, \$27.95)

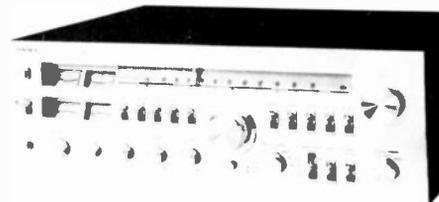


Circle No. 31 On Reader Service Card

rather than being rack mounted. The second unit is the AD-1701 (\$189.95) Graphic Output Indicator that is designed to provide more accurate and precise indication of stereo system output than is obtainable with conventional meters or displays. Two rows of 15 LEDs provide a graphic indication of system output. Response time is said to be extremely fast with a peak-hold circuit giving displays of even the shortest musical transients. A peak/average switch allows display of either music peaks or average level of the system output.

## High-Powered Stereo Receiver

Optonica's Model SA-5901 FM/AM stereo receiver is the company's most powerful model, delivering 125 watts minimum RMS per channel at 8 ohms from 20 to 20,000 Hz with no more than 0.02 percent THD. The unit combines a unique "Delta Power" system with a paralleled push-pull output stage structure to achieve broad band power. The DC power amplifier circuitry is protected by a five-way automatic protection circuit that works with the receiver's FET-type equalizer amplifier to



Circle No. 81 On Reader Service Card

ensure freedom from distortion. Features include: PLL MPX circuitry; variable FM air check calibrator; 41-position detented four-gang volume control; record output selector; switchable FM muting; -20 dB audio muting; loudness contour switch; high and low filters; five-position speaker selector; mode switch and hi-blend switch. Specifications: FM section usable sensitivity, 9.8 dBf (1.7  $\mu$ V); selectivity, 85 dB; stereo S/N ratio, 75 dB; amplifier section power, 125 watts per channel. Suggested retail price: \$800.

## Front Loading Cassette Deck

Aiwa's Model AD-6600 U front-loading stereo cassette deck features a bias adjustment knob that permits obtaining a "flatter-than-ever" frequency response with any LH/Normal tape, according to the company. A nine-point peak indicator system is used to obtain optimum recording levels, and an exclusive peak hold facility is also incorporated into the deck to assure that the highest levels can be precisely gauged. Other

(Continued on page 16)

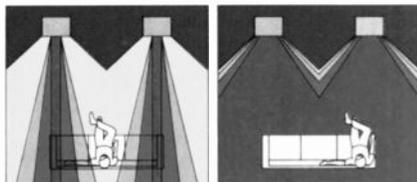
HI-FI/STEREO BUYERS' GUIDE

# How Audio History is made.



A lot of speakers claim to be audio breakthroughs. Our new Model 14 really is. In fact, it's so unique, that before we could create it, we first had to invent a whole new family of components.

We began with a new type of horn. The Mantaray.<sup>™\*</sup> It's the first "constant directivity" horn ever created. Conventional horns,



*Conventional beaming narrows listening area. Mantaray expands listening sweet spot.*

cones and domes (including so-called omnidirectional and reflective speakers) tend to "beam," that is, narrow their angle of sound radiation at higher frequencies. This effect causes the stereo image to lose strength off the center axis and to actually wander.

Mantaray, on the other hand, delivers a clearly-defined sound wedge that keeps its strength regardless of the music's changing frequencies. You get the full spectrum of sound and the most solid three-dimensional stereo image you've ever heard. And since the sound doesn't diminish off center axis, the

Model 14 enlarges your listening area, your "stereo sweet spot."

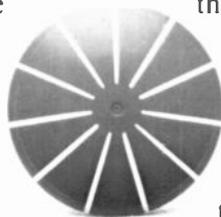
As an extra benefit, Mantaray's precise sound focusing means your music goes in your ears — not in your drapes, walls and ceilings. Consequently, it's more likely than other speakers to sound the same in your home as it does in your dealer's showroom.



*Power Control*

Then to give you even higher highs, we developed the first radial phase plug, the Tangerine.<sup>®\*\*</sup>

In contrast to conventional phase plugs with two equidistant circular slots that block some frequencies, the Tangerine's tapered slots permit a free flow of high frequencies to beyond 20 KHz.



*Tangerine*

Equally important to all this is our new Automatic Power Control System.

Unlike fuse-type devices or circuit breakers, the system keeps track of the power pumped into the speaker, let's you know with a blinking light when power exceeds safe limits, and then reduces overloads automatically,

but without shutting the speaker off. It's quite a system.

In addition, the Model 14 offers you super-efficiency, high-power handling capacity and exceptional dynamic range, plus a new vented enclosure with a 12-inch bass driver for a tighter, crisper low end. So that's how audio history is made. And it's all yours at a price that means the best sound value available for your home today.

For a free brochure and the name of your local dealer, write: Altec Lansing International, 1515 South Manchester Avenue, Anaheim, CA 92803.



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\* U.S. and foreign patents pending  
\*\*U.S. Patent No. 4050541

Extend your listening distance with a *new* **FINCO...** auto FM amplifier



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**FINCO's self contained top of the line Auto FM Amplifier with variable gain control**

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- No Adverse Effect on AM Reception
- Extends FM Reception Range
- L.E.D. Indicator Light
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**Highest gain FM auto amplifier available... write for catalog**

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Circle No. 12 On Reader Service Card  
 16

## AUDIO SHOWCASE

features include a tape-remaining time meter and rec-mute. Specifications: power consumption, 14 watts; frequency response, 20-15,000 Hz (LIH tape)



Circle No. 96 On Reader Service Card

or 30-13,000 Hz  $\pm 3$  dB; signal-to-noise ratio, 65 dB (Dolby on, FeCr tape); wow and flutter, 0.04% WRMS; fast forward and rewind time, 90 seconds for a C-60 tape; motor, 38-pulse FG servo; input sensitivity/impedance, 50 mV/50k ohms for line in and 0.3 mV/200 ohms (10k ohms) for mic; output level/impedance, 0.77V/50K ohms for line in and 3.4 mW/8 ohms for headphone. Price: \$490.

### Video Cassette Kits

Nortronic's Record Care Division offers a new series of maintenance products specifically designed for taking care of new video cassette recorders. Model VCR-211 (\$39.00) is a video bulk eraser that is designed to erase both Beta II and VHS-format cassettes



Circle No. 112 On Reader Service Card

"down to the level of virgin tape." Model VCR-85 (\$10.50) Foam 'N' Cleaner combines cellular foam cleaning swabs with spray cleaner. Model VCR-505 Foam Swabs (\$8.00) include 25 professional-quality swabs for cleaning the most delicate video cassette machine parts. VCR-95 Video Cassette Maintenance Kit (\$12.80) "contains all of the important products required for regular VCR maintenance."

### Direct Drive Turntable

BSR's 1750 DD quartz direct drive turntable is the twin of the company's 1700 DD introduced last year, the only difference being the elimination of the



Circle No. 113 On Reader Service Card

tonearm which brings the price down to \$179.95 (compared to \$249.95 for the 1700 DD model). The new unit accepts the ADC LMF tonearm plus SME, Infinity Black Widow, Grace and other high quality tonearms. The totally inert non-resonance base is said to eliminate bumps, blanks and other vibrating noises. Additionally, the ADC turntable is mounted on energy-absorbing, resonance-tuned suspension feet. Other features include: direct-drive quartz phase-locked-loop motor; micro-switch electronic controls; electronic speed and pitch controls; digital speed display; die-cast aluminum platter; removable hinged dust cover.

### Controlled Impedance Loudspeaker

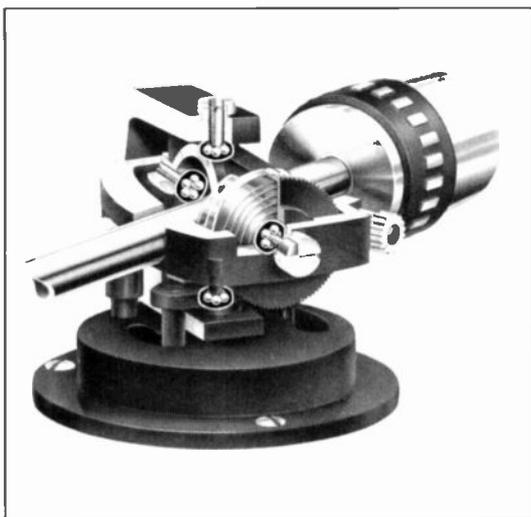
H. H. Scott gets into the small speaker market with this new 166 Controlled Impedance Speaker that is designed



Circle No. 90 On Reader Service Card

to handle power amplifiers up to 100 watts and to deliver lower and flatter frequency response than is attainable with other small speakers on the market, according to the company. The 166 is rated at 8 ohms and impedance values are said never to drop below 7 ohms at any frequency. The 166s, unlike most other small speakers, may be safely used as satellite speakers in parallel with main speaker loads without amplifier power loss or instability. The speaker handles power amps from 10 to 100 watts and delivers a signal level of 92.5 dB SPL for 1 watt input  
*(Continued on page 18)*

# We'd sell even more Dual turntables if they didn't last quite so long.



At a time when "planned obsolescence" is an unhappy fact of life, it may be reassuring to know that Dual turntables continue to be produced with the same dedication and manufacturing precision that has made Dual so highly respected throughout the world.

Dual turntables are made in the legendary Black Forest where meticulous craftsmanship remains a way of life. And the company is still owned and personally managed by the family that founded it more than three-quarters of a century ago.

But more than tradition is responsible for Dual's leading position in a lineup of some fifty competitive brands. The performance provided by Dual's precision engineering has always exceeded the demands of either the record or cartridge.

For example: the tonearms of every current model, including our least expensive one, are mounted in four-point gyroscopic gimbals, a design widely acknowledged as the finest suspension system. Bearings are machined and finished to specifications that exceed the demands of aerospace components. And frequently ignored problems such as those caused by resonance are solved by our exclusive anti-resonance filters. (Dual engineers have earned more than seventy international patents related to record playback equipment.)

The manufacturing process is of the same high order. For example: every fifth step is a quality-control check. Fully assembled turntables undergo separate and lengthy mechanical, electrical and acoustical examinations. Later, quality-control auditors open and recheck one out of ten finished, packed and sealed models in order to inspect the quality of the quality control.

Perhaps this explains why such Dual classics as the 1009 and 1019 (produced in the early 1960's) are still in service. If you still own one of these models, you may find it's worth more in trade today than you originally paid for it.

If you insist on the finest in turntables—as we do—ask your audio dealer to demonstrate one of our new Duals. He will be pleased to do so. After all, reliability is as important to him as it is to you.

The Dual CS1237, illustrated, is priced at less than \$180. Other Dual turntables are priced up to \$440. For a complete description of all Dual turntables, please write to United Audio at the address below.



*For the life of your records*



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

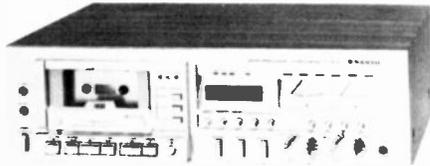
Write directly to Manufacturer for Literature.

# AUDIO SHOWCASE

pink noise at 1 meter. Frequency response is 55 to 20,000 Hz  $\pm$ 4 dB. The 166 has a 6½-inch high-power-construction woofer with heavy duty voice coil wound around a phosphor bronze form, and a 1-inch textile dome tweeter protected against burn-out. Measurements: 13 inches by 7½ inches by 6½ inches. Price: \$119.95.

## Cassette Deck With Microprocessor

Sanyo Model RD5372 new top-of-the-line stereo cassette deck, which operates with the aid of a microprocessor,



Circle No. 106 On Reader Service Card

features vertical front load design and three-head Sendust combination cassette mechanism, with two motors and two-plunger soft-touch operation.

There are also solenoid controls for tape transport functions, built-in LED tape counter, auto rewind and continuous auto repeat, and tape selector for normal, CrO<sub>2</sub>, FeCr and the new metal tape. Wow and flutter is kept at 0.04% WRMS and signal-to-noise ratio is 64 dB. Frequency response is said to measure 30 to 19,000 Hz using metal tape. Additional features include: automatic end-of-tape stop; memory digital counter; separate coaxial left and right input and output level controls; limiter switch with LED indicator and built-in timer for automatic record and playback; separate left and right VU meters with LED peak indicators; separated LED function indicators for level meter, pause, play, record, auto repeat, auto rewind, Dolby on, MPX filter, limiter, and tape choices. Suggested retail price: \$499.95.

## Moving Permalloy Cartridge

Osawa's Model 110MP Moving Permalloy cartridge is a step-up from the least expensive model in the series and features a precision-ground bonded elliptical stylus. The new cartridge has an induced magnet design that utilizes a Permalloy magnet said to be much stronger than conventional magnets of the same size. The extra magnetic strength gives the cartridge unusually



Circle No. 114 On Reader Service Card

high output, even from lowest recorded levels, to counter noise in the music reproduction chain, according to Osawa. A synthetic butyl rubber cantilever damper is used, and a screw in the front of the cartridge permits precise positioning of the magnet against the armature. Specifications: frequency response, 20 to 20,000 Hz; separation, 15 dB at 50 Hz, 25 dB at 1 kHz, and 15 dB at 15 kHz; static compliance, 20 x 10<sup>-6</sup> cm/dyne; dynamic compliance, 8 x 10<sup>-6</sup>; tip mass, 0.85 mg; cartridge mass, 5.5 grams. Price: \$45.

## Lower-Priced Speaker

Wharfedale's new E-30 speaker is priced lower than the company's popular E-70 and E-50 speakers. High efficiency, wide dynamic range and frequency response, and low distortion characteristics are retained, despite the lower price, according to the company. Spe-

Even the best recordings played on the best component stereo systems fail to fully recreate the ambience of music performed live. That's because most listening rooms are small and

**gives music**  
**room**  
**to be heard**

acoustically dead.

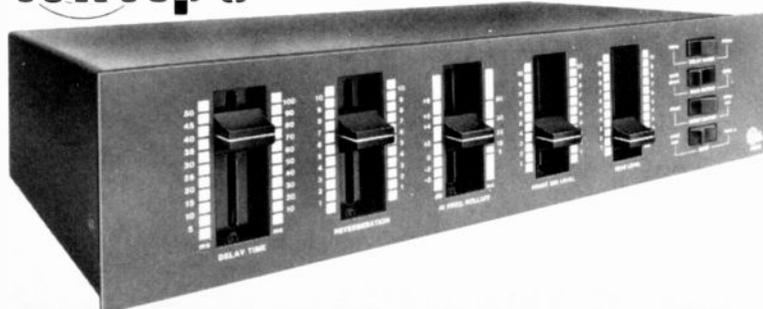
The SD-550 Ambience Restoration System recreates the environmental envelope of music performed live by recovering the natural ambience and distributing

sound throughout the room. This ambience restoration produces a musically valid listening experience irrespective of room limitations.

To hear ambience restoration for yourself, take your favorite record to your Sound Concepts dealer and ask for a demonstration. For complete information and the name of your dealer, please write to us.



27 Newell Road, Brookline, MA 02146 • (617) 566-0110



Circle No. 28 On Reader Service Card



Circle No. 115 On Reader Service Card

fications: frequency response, 63 to 18,000 Hz  $\pm$ 3 dB; sensitivity, 94 dB SPL/1W/1m; peak power handling, 100 watts; nominal impedance, 8 ohms; overall dimensions, 22.8 inches high by 13.2 inches wide by 10.3 inches deep. The E-30 uses two 6.7-inch bass/mid-range drivers complemented by a horn tweeter fitted with a level control. Suggested retail price \$300.

## Anti-Resonance Disc Stabilizer

Most records are somewhat warped  
(Continued on page 22)

# The standard bearers.



# The high bias standard.

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

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



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

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

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

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

**TDK**  
The machine for your machine.

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

Circle No. 30 On Reader Service Card



# Bravo!

## That's the Jensen R430 Car Stereo Receiver. That's the thrill of being there.

Bravo indeed for the superlative performance of the 60 watt Jensen R430 Car Stereo Receiver. The top-of-the-line of six receivers that boast a compliment of features found only on better home receivers.

Features like a separate trunk-mounted Power Amplifier unit as well as a twin amplifier section in the main unit.

The advanced Bi-Amp capability of the R430 makes it possible to selectively send high frequency power information to a car's front speakers, and low frequency info through the Power Amp to the rear speakers. This bi-amplification allows for greater volume and less distortion.

Jensen has refined the R430 with other unique features like feather-touch electronic switches. And an automatic tape alarm.

Dolby® Noise Reduction processes out tape hiss and improves the dynamic range of Dolby-encoded tapes and FM broadcasts.

A Fader control adjusts levels front to back; separate Balance control adjusts left to right. There's even a Loudness Compensation function and for the extra-sensitive FM tuner, Interstation Muting.

But all the features in the world don't mean a thing if they don't combine to do one thing a receiver is built to do... recapture and deliver to you all the power and intensity that went into the original performance.

That's the thrill of being there.

That's the Jensen R430 Car Stereo Receiver.

# JENSEN

The thrill of being there.

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

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**Interface:D™**

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22

## AUDIO SHOWCASE

and portions of the discs do not lie perfectly flat on the turntable platter. Such unsupported areas of a disc are subject to minute resonances—subtle vibrations—that can adversely color the sound of music. The vibrations are most noticeable on super-sophisticated hi-fi systems where the equipment itself adds almost no distortion of its own. To help damp out such unwanted vibrations, Audio-Technica has come out with a Disc Stabilizer consisting of a com-



compact, solid brass disc, in a rubber jacket, that fits over the turntable spindle to hold the record closely to the platter. The Disc Stabilizer is said to exert a gentle pressure on the record label to damp the sound-coloring resonances. The nationally-advertised price is \$19.95.

### "Unconventional" Power Amplifier

RTR Industries' Monogram Model 3200 solid-state power amplifier is claimed, by the company, to represent a "startl-



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ing departure from conventional equipment in every way." Designated as class A+, the unit operates in pure class "A" up to about 17.5 watts per channel at 8 ohms, switching automatically to class AB operation when power demands exceed this level. This is said to eliminate harsh discontinuities caused by crossover notch distortion at low power levels. Heat generation is reduced, as is the bulk typical of conventional class "A" designs. Clip-

ping characteristics are "soft" and similar to that of finest tube amplifiers, rather than like the sharp, biting distortion of conventional solid state units. Useful dynamic headroom is therefore greater than with conventional amplifiers of equivalent power ratings. Specifications: minimum power at 8 ohms (continuous, both channels driven), 155 watts; frequency response, 10 to 22,000 Hz  $\pm 0.2$  dB; THD, less than 0.05%, 0.1 watt to rated output; 1M distortion, less than 0.04%, 0.1 watt to rated output; damping factor, 400 at 1 kHz at 8 ohms; hum and noise, -115 dB at rated output; input impedance, 22k ohms at min and 15k ohms at max.; sensitivity, 0.775 V RMS for full output; stability, unconditionally stable under any load condition (fan cooling below 4 ohms recommended). Suggested retail price \$995.

### Improved Direct Drive Turntables

The main drawback of most direct drive turntables is a motor-related problem called "cogging." Garrard says this problem has been solved by means of an "ingenious" new motor used in the company's model DD131 and DD132 turntables. The new motor is brushless, coreless and without slots. It creates a



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magnetic force that is constant during the entire 360-degree rotation of the platter. The turntables also include a new Time Integral Velocity (TIV) speed monitoring system and "Hall Effect" control circuitry to assure "rock steady" speed under all load conditions. The semi-automatic, single play DD131 sells for \$189.95 while the fully automatic, single play DD132 is priced "under" \$200.

### Sub-Woofer Coffee Table

Mesa Electronics says this Environ-Mesa Sub-Woofer Coffee Table is an "incredibly accurate" stereo speaker system "that will satisfy all of your musical desires and yet blend into your living room environment so well that it's almost invisible." Two Mini-Mesa  
(Continued on page 24)

# In a class by itself.



©1979 Koss Corp

There are few stereophones of any kind that can match the full-bandwidth performance of the Koss Pro/4 AAA. That's because the Triple A's oversized voice coil and extra large diaphragm reproduce recorded material with a lifelike intensity and minimal distortion never before available in dynamic stereophones.

With a frequency response from 10 Hz to 22 kHz, a highly efficient element and a perfect seal for low bass response to below audibility, the Triple A lets every note blossom to its fullest harmonic growth. You'll hear so much more of your favorite music, you'll think you're listening to a whole new recording.

Unlike other stereophones, the ear-cushions developed for the Pro/4 Triple A represent a breakthrough in both comfort and acoustical engineering. Through extensive studies on how stereophones are actually worn, Koss engineers were able to reduce lateral pressure with a direct contour Pneumalite<sup>®</sup> earcushion that not only offers soft pliable comfort, but also creates an ideal environment for minimizing the linear excursion of the driver. Thus, the driver is able to produce any volume level without distortion. So you'll hear all the fundamental and harmonic frequencies exactly as they were recorded.

In addition, Koss has designed a

special Pneumalite<sup>®</sup> dual suspension headband that creates a feeling of almost weightlessness even over periods of extended listening. It makes wearing the Triple A's as pleasurable as listening to them.

Why not stop in at your audio specialist and see why the Koss Pro/4 Triple A belongs in a class by itself. Or write for our free, full-color catalog c/o Virginia Lamm. Better still, listen to a live demonstration of the incredible Sound of Koss with your favorite record or tape. We think you'll agree that when it comes to the Pro/4 AAA and other Koss Stereophones and CM loudspeakers: hearing is believing.

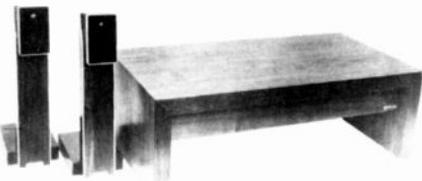
 **KOSS<sup>®</sup> stereophones/loudspeakers**  
**hearing is believing<sup>™</sup>**

**KOSS CORPORATION**, 4129 N. Port Washington Ave., Milwaukee, Wisconsin 53212 International Headquarters Milwaukee/facilities Canada · France · Germany · Ireland · Japan  
**MAY/JUNE 1979**

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# AUDIO SHOWCASE

30's are used to provide clear highs, midrange and upper bass response. To these are added a giant sub-woofer featuring the company's Bass Reciprocator™ design that utilizes two woofers, one 10-inch primary driver with 1½-inch double voice coil, and one 12-inch bass reciprocator. The frequency response is said to go down to 18 Hz. The sub-woofer is designed into a sleek,



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low-profile genuine walnut veneer coffee table. Suggested retail price of the Environ - Mesa Sub - Woofer Coffee Table is \$745, and the three-piece set retails for \$894 plus \$119 a pair for optional solid walnut and aluminum pedestal stands to hold the Mini-Mesa 30's.

## "Modestly Priced" Phono Cartridge

Signet's "most modestly priced" moving magnet phono cartridge sells for \$55. It offers a thin-walled tubular cantilever and a 0.3 by 0.7-mil elliptical



cal diamond stylus, nucle-mounted for low mass and high tracking ability. The TK3E accepts the entire range of optional Signet stylus assemblies featuring carbon fiber, beryllium, titanium and boron cantilevers—each available with either a conical or elliptical or Shibata stylus. The stylus options permit audiophiles to experiment in efforts to achieve best sound, says Signet.

## Sherwood Cassette Deck

Sherwood's vertical front loading cassette deck, Model CD-200 CP, is priced at \$325 and comes with an alloy Sen-

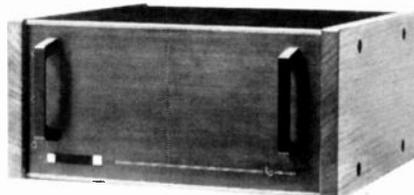


Circle No. 92 On Reader Service Card

dust head for record and playback, and a ferrite head for erase. Tape drive is with an FG servo DC motor that provides the conventional 1½ ips tape speed and fast forward/rewind time in the order of 95 seconds for a C-60 cassette. Specifications: track system, 4-track (2-channel); frequency response, 30 to 17,000 Hz ±3 dB with CrO<sub>2</sub> or FeCr tape; harmonic distortion, 1.2% at 1000 Hz, 0dB; input sensitivities, 0.4 mV (100k ohm) for mic, 90 mV (100k ohm) for line, 2.0 mV DIN; output levels, 720 mV (100 ohm) line fixed (0-720 mV variable), 720 mV DIN (100 ohm), and 0 to 140 mV variable for phones; bias frequency, 100 kHz; erasure factor, 60 dB at 1k Hz; Mic overload capability, 100 mV (-20 dBV).

## Hybrid Class A Power Amplifier

Vacuum tubes are back! At least in Infinity's "Hybrid" class A power amplifier which features vacuum tubes in



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the input stage "for their sense of reality," and transistors in the output stage "for their reliability." Other claimed attributes: class A operation for sonic purity, and an absence of unneeded meters and controls. Power is conservatively rated at 150 watts per channel RMS into an 8-ohm load with total harmonic distortion no more than 0.2 percent (or 280 watts into 4 ohms, or 400 watts into 2 ohms). The tubes used in the input stage are 10,000-hour high-transconductance pentodes operated as triodes. VI limiting is unnecessary, high- and low-frequency phase shift has been eliminated, and the amplifier may be coupled directly to speakers without the need for a transformer. Internal logic circuitry automatically protects the amplifier and speakers in case of overheating, excessive DC at the output terminals, or a blown fuse. VU meters or peak level LEDs to warn of clipping are not needed. Prices: \$3950 west of the Mis-

issippi and \$4050 east of the big river.

## Record Rack

Discwasher, Inc., offers a "precision" record rack called DiscKeeper at a price of \$65. The rack features a compression bar to hold records perfectly flat and upright to eliminate shelf-warp. The compression section pulls forward to permit paging-through albums. Made of solid walnut and custom-formed anodized aluminum. Simple wall-mounting hardware is included. The DiscKeeper may also be



installed in multiples, on audio equipment racks, or attached back-to-back for greater capacity.

## Companion Amplifier and Preamp

Crown's new audio amplifier and pre-amplifier are designed to function in home systems of medium power ratings with high signal reproduction quality. The Power Line One audio amplifier sells for \$479, and is rated at 50 watts per channel RMS, both channels operating into 8 ohms, 20 to 20,000 Hz. The amp output is 80 watts per channel with a 4-ohm load. A rear panel switch permits instant conversion to monaural mode with a 160 watts into 8 ohms output. Specifications: frequency response, ±0.1 dB, 20 to 20,000



Circle No. 104 On Reader Service Card  
Hz; signal-to-noise ratio, 115 dB below rated output, A weighted; THD,

(Continued on page 74)

# The new Sansui rack-mountable receivers:



## An uncommon combination.

It used to be that if you wanted the advantages of rack-mounted components, you had to have a professional's knowledge of complex equipment connections. And be rich enough to afford near-professional prices.

Sansui has changed all that. We've combined the convenience and sophisticated look of rack mounting with the value and all-in-one simplicity of receivers, to produce two very uncommon components.

The new *TA-500* rack-mountable receiver, so good that we call it a tuner/amplifier, is distinguished by its pure DC power amplifier section, with wide frequency response and low TIM — assuring you the most realistic music reproduction in its power/price class. Power rating is an ample 50 watts per channel, min. RMS, both channels driven into 8 ohms from 20-20,000Hz. And total harmonic distortion is inaudible — no more than 0.05%.

In performance, appearance and overall "feel" the *TA-500* seems much more expensive than it is. The FM section, for example, has

a sensitivity of 10.8dBf (1.9 $\mu$ V IHF T-100) and a 75dB signal-to-noise ratio, outperforming most separate tuners in its class.

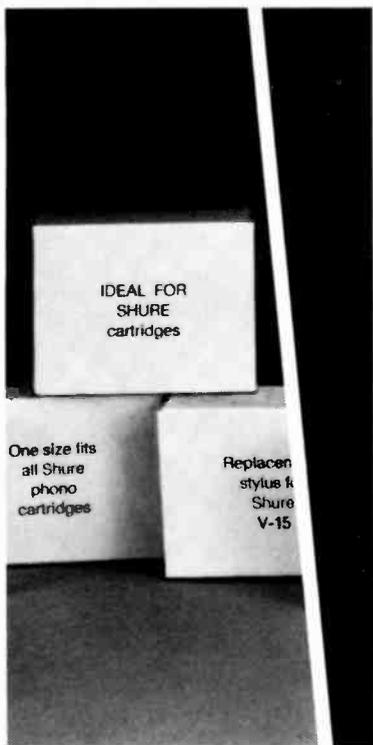
Sansui is also introducing the new *TA-300* receiver, at 30 watts per channel with no more than 0.06% THD under the same conditions. With specifications and features that are highly competitive with other receivers in its power/price class, plus its rack mounting advantages, the *TA-300* is sure to be one of this year's most popular components.

Both models are luxuriously designed with the same styling and satin black finish used in Sansui's most expensive professional products; and they perfectly complement our full range of useful and exciting rack-mountable accessories, from tape decks to mixers to microphone drawers. To get an earful of our rack-full, visit your nearest Sansui authorized dealer.

### SANSUI ELECTRONICS CORP.

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

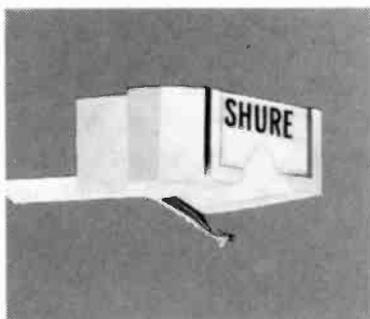
Circle No. 24 On Reader Service Card



## Needle in the hi-fi haystack

*Even we were astounded at how difficult it is to find an adequate other-brand replacement stylus for a Shure cartridge. We recently purchased 241 random styli that were not manufactured by Shure, but were being sold as replacements for our cartridges. Only ONE of these 241 styli could pass the same basic production line performance tests that ALL genuine Shure styli must pass. But don't simply accept what we say here. Send for the documented test results we've compiled for you in data booklet # AL548. Insist on a genuine Shure stylus so that your cartridge will retain its original performance capability—and at the same time protect your records.*

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



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

Circle No. 26 On Reader Service Card  
26



## Lester Young / by J. R. Taylor

□ Twenty years have passed since an ailing Lester Young debarked from a Paris-New York flight, returned to his room at a midtown Manhattan hotel, and died there within twenty-four hours. Even in the jazz world of 1959, tenor saxophonist Young was already in eclipse. Predictably, Young was less lionized in his last years than Sonny Rollins and John Coltrane, the innovative standard-bearers of a new generation. But he was also far less acclaimed than his immediate predecessors, Coleman Hawkins and Ben Webster, and several of his immediate descendants, including Zoot Sims and particularly Stan Getz. Indeed, there were many such descendants, for Young's original vision had altered the face of a music.

Born in Mississippi in 1909 into a travelling family band, Young spent his childhood and adolescence touring through the Midwest. At first he played drums, then alto saxophone, then tenor. By 1932-1935, he was good enough to play with the best of the "territory bands"—the Blue Devils, Bennie Moten, Andy Kirk—and briefly with Fletcher Henderson. In 1936, he joined Count Basie and was Basie's principal soloist for the next five years; meanwhile, he worked as Billie Holiday's obbligatist and co-soloist on an impressive series of records.

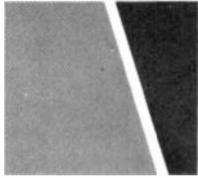
Young's career took no particular direction after he left Basie,

and he rejoined the pianist in 1943, only to be drafted after less than a year. Army life was hard on Young; as a result of a real or invented breach of discipline, he was court martialled and imprisoned for nearly a year. Returning to civilian life as a notably changed man, Young was able to flourish creatively and financially as a bandleader into the early 1950s. But as that decade wore on, his vitality was eroded by depression, physical illness and excessive drinking, leaving him an easy prey for the harsh competition and fast-changing fashion of the music business.

Young was inspired early in his career by Frank Trumbauer, the alter ego saxophonist of cornetist Bix Beiderbecke; and in contrast to most tenor saxophonists of the 1930s and before, he played with an even and almost vibratoless tone, the aspect of his playing most often imitated and refined by others. Yet this "cool" sound was balanced by Young's subtly rationed vocalizations—the tonguings and false fingerings of a single note, the "moaning" glissandi. Similarly, Young's unbroken flow of even eighth-note melodic lines was balanced by his

*(Continued on page 80)*

J. R. Taylor is the coordinator of the National Endowment for the Arts' Jazz Oral History Project at the Smithsonian Institution. He was formerly curator of the Institute of Jazz Studies at Rutgers University.



# fact: dramatic freedom from distortion comes to a mid-priced cartridge: the new Shure M95HE...



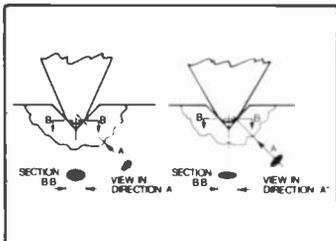
## an affordable, audible improvement

One of the critically acclaimed advances introduced in Shure's incomparable V15 Type IV pickup is its revolutionary and unique distortion-reducing Hyperelliptical stylus. Now, you can enjoy this standard of sound purity in a new, ultra-flat frequency response, light tracking, high trackability cartridge that will not tax your budget: the new Shure Model M95HE.

## the Hyperelliptical stylus tip



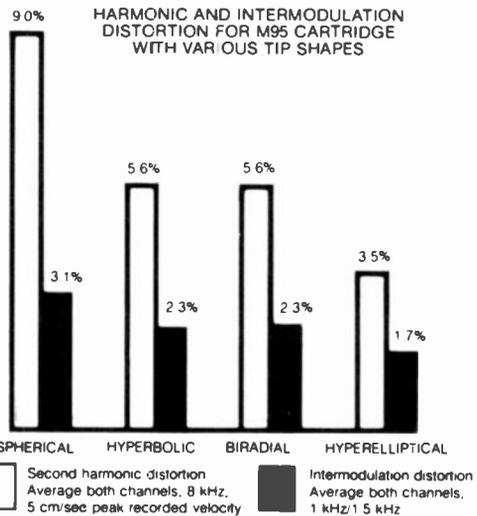
BIRADIAL (ELLIPTICAL) STYLUS SUCH AS IN M95E



HYPERELLIPTICAL STYLUS OF THE M95HE

The Hyperelliptical nude diamond tip configuration represents a significant advance in tip design for stereo sound reproduction. As the figures show, its "footprint" (represented by black oval) is longer and narrower than the traditional Biradial (Elliptical) tip-groove contact area. Because the Hyperelliptical footprint geometry is narrower than both the Biradial and long-contact shapes such as the Hyperbolic, it is pre-eminent for reproduction of the stereo-cut groove.

SEND FOR FREE BROCHURE AL600:



## a measurable drop in distortion

As a result of the optimized contact area of the Hyperelliptical tip, both harmonic distortion (white bars in graph above) and intermodulation distortion (black bars) are dramatically reduced.

**upgrade your present M95** If you already have a Shure M95 Series Cartridge, you can improve its freedom from distortion right up to the standards of the new M95HE cartridge simply by equipping it with a Model *N95HE* stylus. The cost is extraordinarily low — yet the difference in sound will be immediately apparent. Takes only seconds to install — requires no tools whatsoever.

## M95HE cartridge & N95HE stylus



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 Manufacturers of high fidelity components, microphones, sound systems  
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# pop discs

## A review of the latest popular music releases

by KEN IRSAY

**Elvis Presley: "A Legendary Performer, Vol. 3." RCA CPL1-3082. \$8.98.**

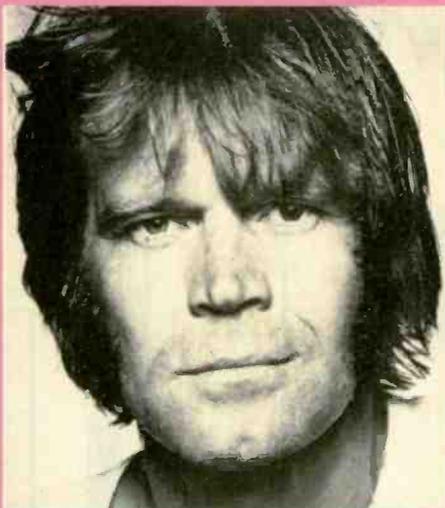
Finally RCA is letting loose some of Elvis' previously unreleased material. The album is for the most part a treasure trove for collectors, for it includes not only music but a booklet containing photos of RCA internal documents and memos relating to Elvis in addition to old newspaper clips and other memorabilia. Foremost among the cuts is an alternate take of one of Elvis' most



beautiful ballads, "Fame and Fortune," recorded on March 21, 1960 during an all-night session in Nashville just after his release from the army. "Danny" was recorded for the film, "King Creole," but never used. A few years later it was a hit for Conway Twitty under the title, "Lonely Blue Boy." According to Elvis' last record producer, Felton Jarvis, there are boxcars full of unreleased material to come. This is a valuable start.

**Glen Campbell: "Basic." Capitol SW-11722. \$7.98.**

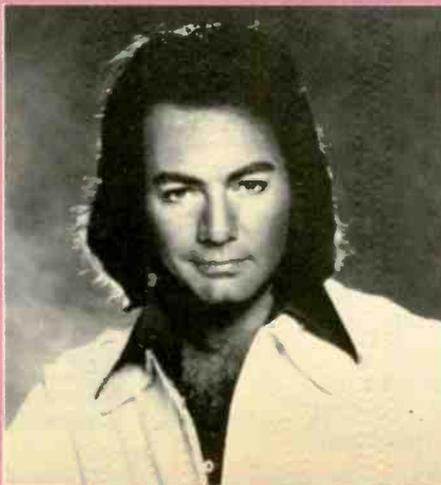
Glen Campbell once told an interviewer that he's a country boy who sings, not a country singer. It's taken a while for some people to accept him as a superb all-around musician, but his appeal is now universal. This album, his 35th, has Glen moving easily from upbeat rockers like "Sing It Nice and Loud, Sonny" to "Never Tell Me No Lies," a moving love ballad. Now that



he has mastered nearly all forms of contemporary pop music, the fringes are fair game, and his bagpipe solo on the instrumental "Grahaidh M'è Thu" is an intriguing start. The album includes frills like the aforementioned as well as a string quartet, but it's essentially basic Glen Campbell—truly entertaining.

**Neil Diamond: "You Don't Bring Me Flowers." Columbia FC-35625. \$8.98.**

In his best album since "Serenade," Neil Diamond flashes genius in his sometimes gritty, often tender vocals on these ten tracks produced by Bob Gaudio. Background voices and strings augment the eight-piece band featured on



the disc. In addition to his duet with Barbra Streisand on the title cut, Neil glitters on "Diamond Girls." It's classic Neil Diamond with strong rhythm and a choral hook that really snares.

**Dan Hartman: "Instant Replay." Blue Sky JZ-35641. \$7.98.**

The title cut, in its extended version, was one of last year's biggest disco hits. The album spotlights a pop-oriented disco character designed to appeal to those turned off by the sledgehammer



approach. In fact, the mood gets downright mellow on "Time and Space" and "Love Is a Natural." Hartman started in the Edgar Winter Band and his mentor appears here on sax.

**Jesse Colin Young: "American Dream." Elektra 6E-157. \$7.98.**

The Buddy Holly blitz takes form here as "Rave On," with a rockabilly beat and all. Young, whose "Get Together" with the Youngbloods was an anthem of the Sixties, devotes the rest of this disc to what he calls the "importance and energy of dreaming." "Slow and Easy" can best be called mellow disco, while "Reveal Your Dreams" has an early Beatles feel. An orchestra and chorus join the traditional five-piece rock band for the "American Dream Suite," a five-song composition which takes up all of the second side.

# WHY A LIVING ROOM CAN SOUND GREAT WITH JUST TWO SPEAKERS YET YOUR CAR REALLY OUGHT TO HAVE FOUR.



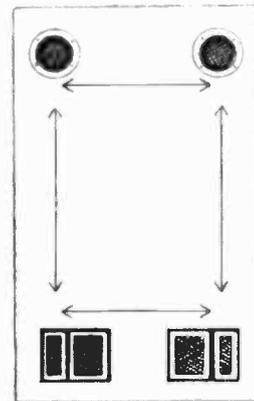
Basically, because very few living rooms have 326 cubic inch engines. Factors such as road surface, tires and an engine running at high speeds can cause the noise level in a car to reach 60-80 decibels.

Driving one pair of speakers louder and louder is not the way to overcome this problem; this would just strain even the best car amplifiers as well as most other brands of speakers.

Rather, what's needed is another source of sound to relieve some of the burden

were designed to match the rear deck installation of LS70's (a car speaker that spec for spec is almost identical to our much acclaimed EPI Model 70 home speaker) or any other high-quality speaker.

What's more, the use of ferro fluidics in the LS35's provides them with a high power handling capability which also results in significantly lower driver and system distortion.



The LCS balances sound side to side, and front to back.

to the rear speakers.

The LCS (Level Control System), however, can alleviate this problem. It allows you to balance sound, not only from side to side, but from front to back as well. And unlike conventional "fading" mechanisms, it is capable of exceptionally high power handling: up to 60 RMS per

channel of music. Furthermore, it's compatible with all automotive amplifiers.

The LS70's, the LS35's and the Level Control System. A totally integrated set of components from EPI that can make the song of the open road sound like you've never heard it before.



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



"Road noise" can reach as high as 60-80 db. placed on the main speakers and lower the overall system distortion.

The LS35's were developed to perform just this function. They

## EPI LEVEL CONTROL SYSTEM

Traditionally, another problem confronts car stereo systems whenever there are listeners in the back as well as the front seat: The optimum volume level for those in the front would simply overpower people in the back because of their proximity

We patterned the LS70 after the much acclaimed EPI 70.



Epicure Products Incorporated, Newburyport, MA 01950

# pop discs

**Rose Royce: "Strikes Again."** Whitfield WHK-3227. \$7.98.

This group plays a commercially exciting amalgam of rock, jazz and soul. They appeal to a more general pop audience than most soul-oriented groups. Part of the reason may lie in their California origins—far from the traditional Eastern centers of black music. The album is exceptionally well-



recorded, without the mushiness of many large instrumental ensembles. "Do It, Do It" has a punchy big band horn hook between vocal chants, and "Angel in the Sky" highlights Gwen Dickey's sultry lead vocal in a cushion of strings. "Let Me Be the First to Know" is a straight-on soul tune with falsetto lead vocal by trumpeter Kenny Copeland.

**J. Geils Band: "Sanctuary."** EMI SO-17006. \$7.98.

A melange of jagged, hard-nosed R&B and subdued vocal harmonies marks the long awaited return to recording of this Boston-based sextet. J. Geils' guitar hums with electricity, com-



peting for aural supremacy with Peter Wolf's aggressive vocal on the title cut. Two standouts among the less raucous tracks are "One Last Kiss" and "Teresa," a particularly fine ballad.

**Richard & Linda Thompson: "First Light."** Chrysalis CHR-1177. \$7.98.

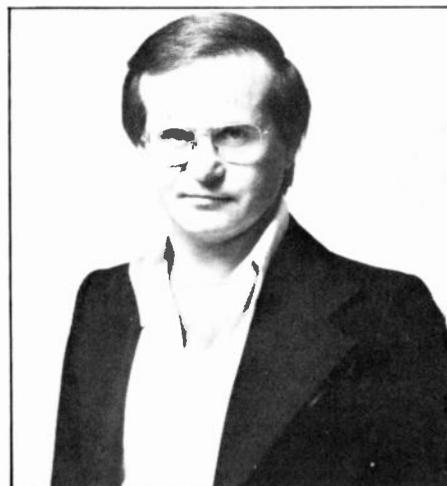
Take the traditional British folk melodies of Steeleye Span, the folk-



rock rhythms and harmonies of the Byrds and the rock solid backup of some of America's best session musicians and you have one heck of a good album. Many critics have lauded the deep and meaningful lyrics of Richard Thompson whose themes of love, death and other "agonies" are present here. But the scorching guitar work of this humble, secretive artist bears little testament to his laid-back persona. Many have found it odd that one of England's best guitarists should eschew the money and fame that could easily be his. Be that as it may, his work is preserved here for all to enjoy. Linda's vocals command attention through their unadorned simplicity.

**Meco: "Wizard of Oz."** Millennium MNLP-3009. \$7.98.

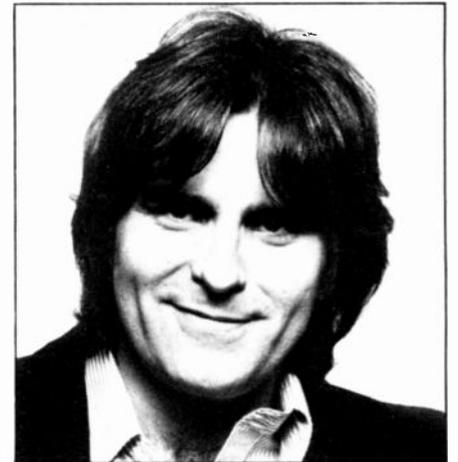
Synthesized special effects, full instrumentation, symphonic scope and choral voices combine to exquisitely capture for the disco generation the dramatic songs from the classic film.



The set, which includes spoken parts of the original dialogue, follows the movie action and musical score closely. Producer Meco Monardo calls it a disco opera. He's sure to find gold over this rainbow.

**Dane Donohue: "Dane Donohue."** Columbia JC-34278. \$7.98.

He came from out of the West, a good ol' egg hatched from the nest of the Eagles, as smooth and Pacific as the very best of the casual coasties. Many friends from the West Coast music scene, including various and sundry Eagles and Fleetwood Macs,



give super-composer Dane a big boost on his debut disc. Smooth as rum and just as heady.

**Boney M: "Nightflight to Venus."** Sire SRK-6062. \$7.98.

The disco songs here are not just synthesizer and percussion riffs loosely held together by unimportant, boring vocal lines. They're real, melodic, well-



structured tunes with vocal solos, catchy choruses and clever story lines ("Rasputin" is a standout). Some, like "Rivers of Babylon" and "Brown Girl in the Ring" mix disco, reggae and rock very effectively. Included amidst all the exotic rhythms and themes is a disco version of Roger Miller's "King of the Road" and a riveting cover of Neil Young's "Heart of Gold."

# Superb\* Awesome\*\* Outrageous\*\*\*

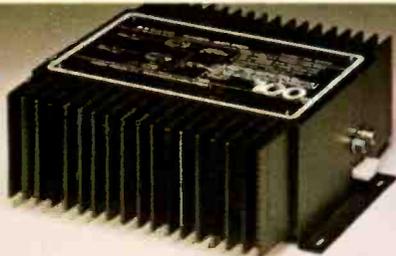
Great car stereo sound used to be an all-or-nothing affair. Either you blew a bundle, or you settled for second best. Now meet the Sanyo Expandables. Car components engineered to let you work your way up from "superb" to "outrageous." In steps that your budget can handle.

AUDIO SPEC



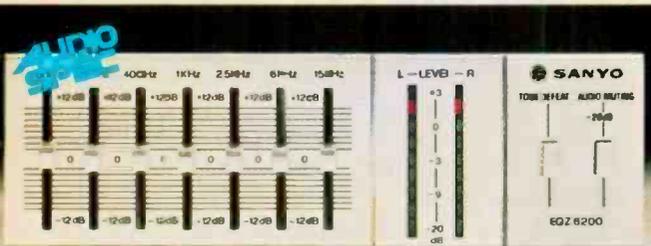
FT646 AM/FM/Cassette. Serdust Alloy head. 40-19,000Hz ( $\pm 3\text{dB}$ ) with metal tape.  $1.5\mu\text{V}$  FM sensitivity (IHF). \$219.95†

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# pop discs

FM: "Black Noise." Visa (JEM)-7007. \$7.98.

If I could combine the instrumental excellence of Emerson Lake and Palmer with the vocal pyrotechnics and arrangements of Yes into a third group, this would be the group. The trio, one of the most popular recording and touring bands in Canada, consists of Cameron Hawkins on electric keyboards, bass guitar and vocals; Nash the Slash (his parents had a sense of humor) on strings, synthesizers and vocals, and Martin Deller on drums, percussion and synthesizer. The group resists the temptation to explode "nuclearly"; the result is quite musical.

Rush: "Hemispheres." Mercury SRM-1-3743. \$7.98.

Until this album—more specifically, until the last song on this album, I could take or leave Rush, a heavy-metal trio whose energy often obscured any other reason for their commercial success. This is a concept album about the supposed battle between the crea-



tive and practical sides of the human brain. Much of the music is shouted hard rock in the usual Rush style. But a 9½-minute instrumental called "La Villa Strangiato" is symphonic in its complexity. The piece blends all sorts of guitars, synthesizers and percussion into a multi-faceted work of riveting power. Use this to demonstrate your system—or break your lease.

Firefall: "Elan." Atlantic SD-19183. \$7.98.

With two gold albums under their belt, it's safe to say Firefall has achieved mass popularity. It's easy to see why. The music they play is a mixture of mellow country rock, middle-of-the-road pop, and rock and roll. And they're not just pandering. The six members of the group have played the various

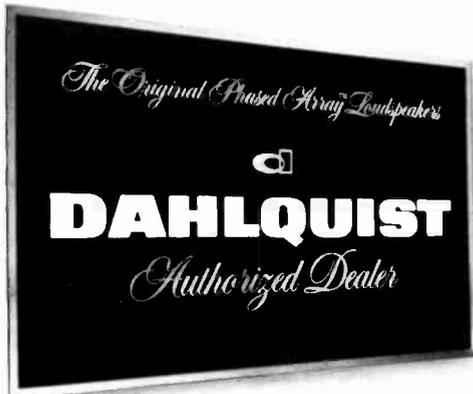


forms in prior affiliations. Most of the songs, of heavily romantic bent, were penned by guitarist Rick Roberts, formerly with the Flying Burrito Brothers. The vocals put the spotlight on Roberts while harmonies are produced by the others.

Sweetbottom: "Angel of the Deep." Elektra 6E-156. \$7.98.

Most would call their music jazz/rock fusion, but members of Milwaukee's Sweetbottom prefer "avant garde funk." Keyboard and woodwind player Warren Weigratz says the group's major influences are Yes and Queen. "We're not playing intellectual jazz music. We're more down-home rock and roll in a mainly instrumental format."

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# pop discs



It should be apparent by now that Sweetbottom's style is difficult to categorize. Weigratz points to the cut, "Electro-Strut," as typical of the quartet's form "... a combination of power chords with a light, strutting bounciness which is very danceable."

Bar-Kays: "Money Talks." Stax STX-4106. \$7.98.

This is a most unusual album by one of the pioneer soul rock groups. The basic tracks were recorded between 1972 and 1975, just as the record company was being pushed out of the business by legal and financial problems. When rediscovered by new distributor Fantasy Records, some of the tracks

terrific. Every album is better than the last. Melodic pop, the best supporting musicians and a great choice of songs for Toni Tennille's super flexible voice. But two things really struck me about this particular set. First, the list of keyboards played by Captain (Daryl Dragon). It's amazing the way these keyboard instruments keep proliferating. ARP Odyssey, Clavinet, EMU Synthesizer, EMS Vocorder 2000, Ya-



maha Electric Grand Piano, Roland Organ, Clavietta, Tack Piano, Fender Rhodes, and, oh yes, acoustic piano is buried in there somewhere. The other striking aspect of this album is the extraordinary vocal by Tennille on "If There Were Time." The song, which features a 33-piece orchestra conducted by Gordon Jenkins, displays Toni at her romantic best. It's perfect after a record reviewer's hard day of hard rock.

Buddy Holly/The Crickets: "20 Golden Greats." MCA-3040. \$7.98.

He did so much in so short a time. It's almost as if he knew he didn't have too long. If you're too young to remember Buddy Holly, this album will make you appreciate the amazing sensitivity and talent of this remarkable young man. He was impossible to pigeon-hole. His work encompassed so many styles, from rock to romantic. This collection comprises most of his best work, solo and with the Crickets. They're all



here: "Peggy Sue," "That'll Be the Day," "Maybe Baby," "Rave On," and on and on. If you grew up with Buddy Holly, the preceding testimonial is completely unnecessary. If you never knew him, know him now... the man who, in just 18 months recorded nine Top 10 singles. But he was so much more than statistics. Listen. ▲



were only partially complete and the general sound required some late 1970s updating. In a brilliant production job by Phil Kaffel, extra parts were added to the original music, including additional horns, vocals and other instrumentation. The new mix presents about as crisp and punchy a sound as you're likely to hear outside of direct-to-disc. The album is truly exciting to hear through good equipment.

Captain & Tennille: "Dream." A & M SP-4707. \$7.98.

Let me state flat out that this album is great. The Captain and Tennille are

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# A GUIDE TO RECENT STEREO RECORDINGS

by THOMAS D. KELLY

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

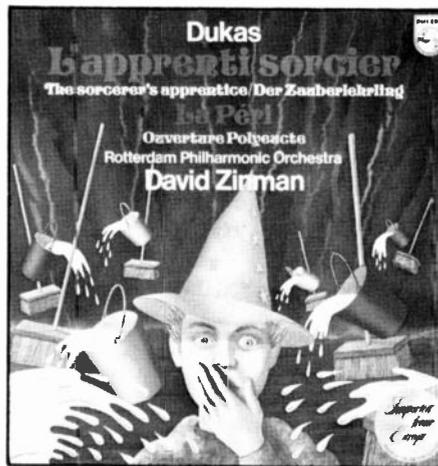
© Donizetti: *Lucia di Lammermoor*. Maria Callas (Lucia); Giuseppe de Stefano (Edgardo); Rolando Panerai (Ashton); Nicola Zaccaria (Raimondo); and others, with the La Scala Chorus and Orch., cond. Herbert von Karajan, Turnabout Opera Live THS 65144/45, two records.

It seems now that live performance recordings can be issued without legal restraint, at least in some countries. Disregarding the ethics of this, for those who were not involved in tape circles that distributed much of this material or "illegal" limited edition discs that offered it, the average collector now has available some recordings that are of incredible interest. The technical quality on many of these varies remarkably, with problems of pitch and sometimes missing notes. But on this set of "Lucia" everything is perfect. Recorded live in Berlin in 1955, it finds the Callas voice at its absolute peak of perfection; this is an interpretation second to none. Callas here takes chances and wins, and Karajan is with her all the way. The supporting cast is superb, the reproduction very well balanced mono. No libretto is supplied, with rather limited program notes provided instead. This "Lucia" is easily the prize among Turnabout's Opera Live series that also contains *Il Trovatore*, *Macbeth*, *I Vespri Siciliani*, *Nabucco*, *Medea* and *La Sonnambula*.

© Dukas: *The Sorcerer's Apprentice*, *Overture to Polyeucte*, *Fanfare*, *La Peri*. Rotterdam Philharmonic Orch., cond. David Zinman, Philips 9500 533.

Paul Dukas was an incredibly self-critical composer and destroyed many of his works. This LP contains, with the exception of the *Symphony in C*, all of

the composer's mature orchestral compositions. Perhaps of major interest is the overture to Corneille's tragedy *Polyeucte*. There are five sections, heavily influenced by Wagner, although the score is very French in atmosphere. The plot concerns the conflict of a Christian martyr whose loyalty to his faithful wife interferes with his wish for a glorious death. *The Sorcerer's Apprentice* I have always found a total delight. Imaginatively scored, it is one of the more charming examples of humor in music. The exotic *La Peri*, "poeme danse," is presented here with its noble brass fanfare. All of this music is played with enormous tonal beauty

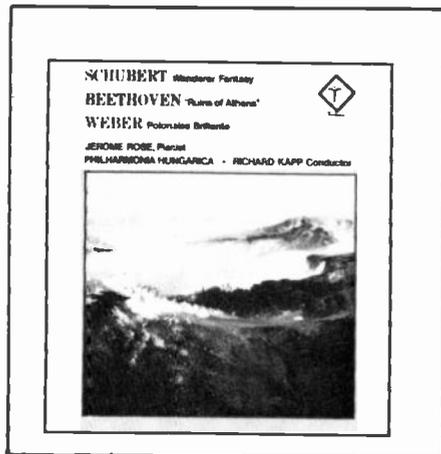


Rich tonal beauty

by the Rotterdam Philharmonic, which is in top form under Zinman's firm direction. The reproduction is resplendent in capturing the rich orchestral textures, particularly the sensuality of *La Peri*.

© Liszt: *Transcriptions For Piano And Orchestra*. Jerome Rose, pianist; Philharmonia Hungarica Orch., cond. Richard Kapp, Turnabout QTV 34708.

Here is a most welcome disc featuring two of Liszt's piano-orchestra tran-



Rediscovered recording

scriptions that are not available elsewhere, the *Fantasy on Beethoven's Ruins of Athens* and Weber's *Polonaise brillante in E, Op. 72*. Liszt was quite captivated by Beethoven's incidental music for "The Ruins of Athens," writing several arrangements for piano solo, two pianos, and piano with orchestra. The piano-orchestra version was premiered in June of 1853 with Hans von Bülow as soloist and Ferenc Erkel conducting. It is a delightful, inventive score, and it is surprising that today it is not played more often. Perhaps some collectors will remember an early Columbia 78 rpm version, made about four decades ago, with Egon Petri as soloist and the London Philharmonic conducted by Leslie Heward. A superlative performance, which is of course now unavailable. To my knowledge it has never been reissued on LP, and this new Turnabout LP will probably be the first exposure of this music for most listeners. Rose's solo performance is fine, if perhaps not quite with the authority displayed by Petri. Weber's *Polonaise* is a Chopinesque showpiece, pleasant and captivating. The major work on this LP is the much more familiar Liszt transcription of Schubert's *Fantasy in C, Op. 15*, the Wanderer-fantasy. Rose, who is in the process of recording all of Liszt's music for Vox/Turnabout, is a first-rate technician, easily handling the complexities of the solo writing, and he is given adequate support from the Hungarian orchestra directed by Kapp.

© Stravinsky: *Petrouchka*. Amsterdam Concertgebouw Orch., cond. Colin Davis, Philips 9500 447.

With this disc Davis continues his series of recordings with Holland's mighty orchestra producing the same high quality that characterized his earlier releases of Haydn and Dvorak symphonies. The recent LP of Stravinsky's *Rite of Spring* I found to be a knockout, for me the finest recording ever made of this fantastic score, capturing with uncommon fidelity the richness and warmth of the Concertgebouw, matched by orchestra playing of the highest order. This new LP of *Petrouchka*, (with a complete *Firebird* in the works), is a spectacular performance, and what a pleasure it is to hear all of those intricate woodwind solos played with such dazzling virtuosity. Sonically, I don't think *Petrouchka* is quite up to the standard of the other Davis - Concertgebouw recordings. Everything is closeup and very clear, but the bass drum in the final pages is too boomy and overpowering. Still, this is a performance to cherish, and one that I would not want to be without. ▲

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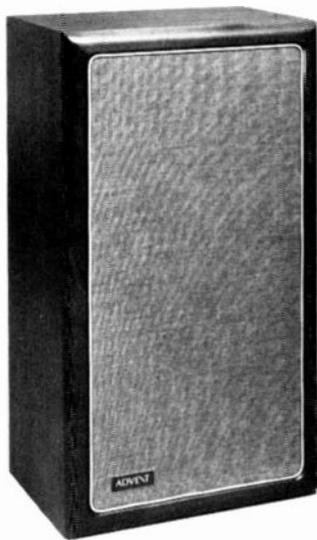
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by HANS FANTEL and CHRISTOPHER GREENLEAF

## The New Advent Loudspeaker



### Description

Ten years ago, when Advent brought out its first speaker, they never bothered to give it a model number. But that didn't hurt it any. It was instantly recognized as a standout and has become a classic since.

And with reason. It was the first speaker of middle price and size that could hold its own against just about any speaker, regardless of price and size. With all that going for it, it remained a market leader for a decade—evidence that audio fans know a bargain when they hear one.

Then why change it? Well, the company admits, regretfully, that their famous "Advent Loudspeaker" has grown obsolete in some ways. So they designed the "New Advent Loudspeaker" (still no model number) to bring it up to date while hanging on to its original virtues.

What needed revision was mainly the high end. When the original Advent speaker was designed, neither records nor broadcasts contained much in the way of high frequencies and cassettes were strictly something you took to the beach. Since then, a new generation of record-cutting equipment has made it possible to put more undistorted treble on disks, and a new generation of phono cartridges could pull those highs out of the groove. Dolby brought a similar extension of usable highs in FM signals, and even cassette tape—especially in its latest formulations—now offers more uppers (frequencies, that is) in that medium.

The New Advent brings a proven and widely admired speaker design in line with these advances. To provide more output in the region of 10 kHz and above, Advent uses a novel tweeter that combines aspects of both cone and

## JVC SK-1000



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### Description

JVC is a respected old-timer in audio electronics, turntables, and tape recorders. But in loudspeakers the giant Japanese firm is a newcomer, relatively speaking. This may account for the fact that they provide no technical information with this product other than the mere specs. Being given no hint of what the engineers had in mind when they designed this speaker or why they chose this particular approach, we can only briefly report what we've seen and heard. The SK-1000 gets good marks on both counts, which makes it all the more regrettable that we are kept in the dark as to the thinking behind its design.

As for looks, the SK-1000 is a big and hefty 3-way speaker whose woofer and midrange unit are framed in brightly finished aluminum, lending it an impressive appearance in a macho hi-tech sort of way when you pull off the grille. The cabinetry with its real walnut veneer is unquestionably elegant, and

the speaker is also available in a silver-tone finish.

Both the 12-inch woofer and the 5-inch midrange unit have cream-white cones, which has nothing to do with the way they sound but adds drama to their appearance. The tweeter is a 1-inch, jet-black plastic dome. Cross-over frequencies are located at 1000 and 10,000 Hz. Separate and continuously variable level controls for both tweeter and midrange unit are easily accessible on the front panel and seem unusually effective in varying the tonal character of the speaker to suit either the acoustics of the room or the preference of the listener. The overall frequency response is given as 30-20,000 Hz, but since it is stated without any reference to linearity within this range (no plus-or-minus decibels of response deviation) the numbers are fairly meaningless.

The basic design of the SK-1000 is that of a bass-reflex speaker, with the rear radiation from the woofer emerg-

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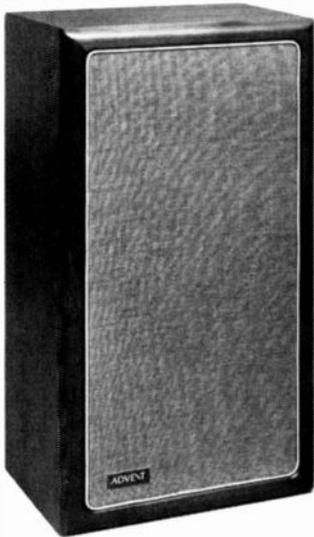
*"for those who can hear, the difference"*

Circle No. 29 On Reader Service Card

# SOUND PROBE SOUND PROBE SOUND PROBE

(Continued from page 38)

## The New Advent Loudspeaker



dome design. The diaphragm consists of an inner dome made of plastic-impregnated fabric nestled within an outer rolled ring that serves as suspension and also functions as additional radiating area. This type of construction allows exceptionally wide swings of the entire dome/cone combo. Thanks to this swinging freedom the tweeter can handle high power levels all the way down to the crossover frequency of 1500 Hz. Allowing the tweeter to go that far down into the midrange eliminates the need for a separate midrange unit. Advent engineers claim this is an advantage because it reduces mutual interference effects between multiple drivers and also minimizes distortion by making the crossover network a lot simpler.

Magnetic flux from the hefty magnet is conducted through a liquid medium in the voice-coil gap—the newly developed ferro-fluid. This also dissipates heat building up at high power levels and thus increases the speaker's power-handling capacity.

The low end is virtually the same as in the older model—good news to all those audio fans who remember the original Advent's remarkable ability to reach down into the lower regions. The 12-inch woofer, driven by a double-

wound 4-layer voice coil, operates in an acoustic suspension enclosure which accounts both for the unusual clarity of the bass and the fact that the Advent is a bit of a power-hog. It gobbles up a passel of watts before pushing out room-filling volume, and the officially claimed minimum power requirement of 15 watts may be too skimpy for large rooms. To be on the safe side feed the Advents with at least 25 watts per channel.

The company doesn't specify the other end of the wattage scale and won't say how much power the speaker will handle. But from what we have heard, it easily rides through the highest power levels you would ever want to hear in a home. If you're running a disco, you wouldn't want this sweet, natural-sounding speaker anyway.

Outwardly, the new Advent looks very much like the old one: elegant and inobtrusive, its beautiful walnut veneer molded with evident care around the curved front edges. It is a speaker that does not call attention to itself—either sonically or visually. A 3-position tweeter level control is located at the back, its settings marked *decrease*, *normal*, and *increase*. In our rather reflective room, it sounded best in the *de-*

(Continued on page 82)

## JVC SK-1000



Circle No. 74 On Reader Service Card

Equipment used in our listening sessions:  
Sony STR-5800 stereo receiver,  
Philips 212 turntable,  
Pickering XSV 3000 phono pickup.

ing from a round port in the front panel. This no doubt accounts for its relative efficiency. The SK-1000 provides a sound pressure level of 93 dB per watt at a distance of 1 meter, which means that it can be driven with relatively low-powered amplifiers or receivers and still yield ample volume levels. The company does not suggest any minimum wattage requirement but lists a power-handling limit of 85 watts RMS (continuous) or 170 watts peak. This should qualify this speaker even for most strenuous use by rock fans willing to endanger their ears with 170-watt peaks. The outer dimensions are 26 inches high x 16 inches wide x 13 inches deep, and the 53½ lbs. weight leaves no doubt that the SK-1000 is solidly built and able to handle powerful volume level without getting the jitters. Price: \$250 each.

### Performance

JVC evidently knows what it is doing. The SK-1000 is smooth from top to bottom and notable for its clear and unobtrusive treble. The very powerful bass may owe something of its richness to the efficiency of the ported enclosure—which is to say that it may get some help from the enclosure resonance, perhaps intentionally to make the bass seem bigger. At any rate, we wallowed

inas big as life deep organ pedal notes.

The dome tweeter spelled out the characteristic timbres of such telltale instruments as violin and oboe with both subtlety and precision. The treble dispersion was such that we could walk about the room without noting any changes in tone color, nor did we ever lose the sense of stereo location. A piano recording played as a transient test came off convincingly, with a lively sense of action of the hammers on the strings, yet without sounding clanky.

We had a moment's doubt when we heard the familiar voice of our favorite singer—Elly Ameling—emerging from these speakers. At first it seemed as if Elly had developed an extra set of muscles around her vocal cords. There was a honkiness to her voice we had never noticed before, and we immediately suspected that it might be due to a slight midrange hump in the speaker response. (Some manufacturers deliberately design this into their products to make the music seem more immediate.) So we fiddled a bit with the midrange control—taking it down to the 10-o'clock position—and Elly's voice cleared up beautifully. With the control in this setting, the objectionable midrange emphasis had vanished.

(Continued on page 82)

# Cleaning your records is only half the battle.

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

Friction and wear.

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

the better your equipment, the more annoying the disturbance.

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

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

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

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

Sound Guard. Everything else is a lot of noise.



Sound Guard preservative-Sound Guard™ cleaner-Sound Guard™ Total Record Care System. Sound Guard is Ball Corporation's registered trademark. Copyright © Ball Corporation, 1979, Muncie, IN 47302



\*We have the test results to prove it—write us and we'll send them to you.

Circle No. 43 On Reader Service Card

# Onkyo's T-4090 Stereo Tuner



## We LED the way to Quartz-Locked Tuning

We introduced Quartz-Locked tuning and set a new standard for precise, FM tuning. Driftless. Difficult as it is to improve on Quartz-Locked tuning, Onkyo did it by simplifying and beautifying the system with Light Emitting Diodes (LEDs).

Touch the tuning knob. Onkyo's exclusive ACCUTACT senses that touch, unlocking the system. A row of five, green LEDs indicates signal strength. The stronger the signal, the more LEDs light.

Flashing green LED arrows show whether you're to the left or right of the frequency you want. Tune until the red "locked" lights. Release the tuning knob and the Quartz-Locked system takes over and automatically tunes in the best reception.

Clean, logically placed, computer-type controls provide the refinements for utmost audio enjoyment, including Dolby\* De-emphasis. A Recording Level switch simplifies adjustment of off-air taping to avoid overloading and distortion of tape recordings. Other controls include Output Level, Muting, Stereo Noise Filter, AM/FM Selector and Sensor Switch.

Overall performance is superb with FM Frequency Response at 30-15,000Hz, +0.5, -1.5dB. Phase Locked Loop FM Multiplex provides low distortion, 0.25% (FM Stereo) and high separation, 40dB at 1kHz.

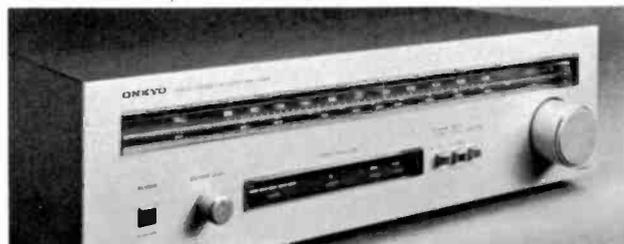
S/N ratio is equally generous at 68dB (Stereo).

Quartz-Locked tuning is best, but Servo-Locked tuning is a similar, lower cost alternative in Onkyo's T-4040 tuner with similar features. You get the same LED convenience with slight modifications. Performance is also terrific with Harmonic Distortion at 0.3% (FM Stereo); Separation of 40dB at 1kHz; S/N at 66dB (Stereo), and FM Frequency Response of 30-15,000Hz, +0.5, -1.5dB.

The only way to beat Onkyo performance, convenience and dependability is with more Onkyo, who constantly keeps...a step ahead of state-of-the-art.

Hear Onkyo at work and see the quality line of their products par excellence at your local dealer.

\* Dolby is a registered trademark of Dolby Laboratories, Inc.



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Circle No. 44 On Reader Service Card

hi-fi/stereo  
BUYER'S GUIDE  
MAY/JUNE 1979

# 1979 SUMMER FORECAST

by FRED PETRAS



**H**igh fidelity buffs who have kept their fingers on the pulse of the audio world, are aware that its pulse rate is increasing. It is a sign of excellent health, reflecting a faster pace of action and growth. This change was evident in the deluge of new audio products that were debuted at the recent International Winter Consumer Electronics Show. Among the most significant trends were the following:

- The growth of micro-components, to a point where they can now be regarded as a significant audio product category.
- The move into metal tape technology by both tape makers and equipment manufacturers—thus establishing

Background photo courtesy of Infinity Systems, Inc.

# REEL TO REEL

TEAC's new reel-to-reel mastering tape deck, the 35-2, offers optional plug-in dbx noise reduction cards, six-step bias selector and variable REC EQ control, pitch control for accurate tape speed, and 10- and 7-inch reel capacity. Its price: about \$1000. Reader Service No. 10.



Philips' first reel-to-reel tape deck with 10½-inch reel capacity is the Model N4520. Its features include before/after monitoring, headphone amp with volume and balance. \$1400. Circle No. 84.



Akai's new GX-635DB open reel tape deck features automatic reverse capability, a real time counter, variable pitch control, sound-on-sound controls, 7½ / 3¾ ips speed selection, dual Dolby noise reduction. Price: \$1095. For details, circle No. 62.



## 1979 SUMMER FORECAST

that concept as one of importance to the world of audio.

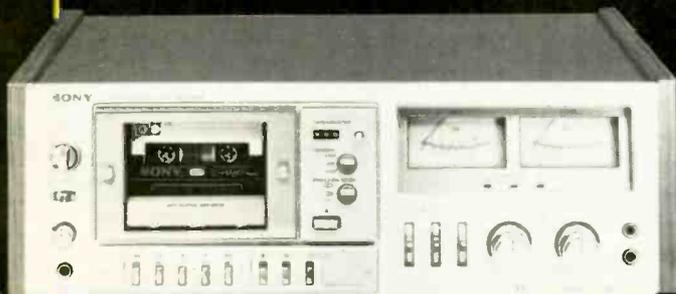
- The concern of tape equipment manufacturers with expanding the biasing capabilities of their products, to accommodate the evergrowing variety of tape formulations.
- The steadily increasing numbers of turntables featuring front controls so that the units can be played and adjusted with their dust covers down—for less dust pollution and literally "cleaner" sound. And also the growing numbers of turntables featuring anti-resonant bases and quartz control of motor speeds.
- The burgeoning of DC circuitry in amplifiers and receivers, as well as in a few preamplifier.
- The growing number of tuners providing digital readouts of station frequencies, and turntables offering digital readouts of operating speeds.
- The variety of audio equipment now offering recording and output level measurements via something other than traditional meters, namely via LED, fluorescent, liquid



Akai's CS-732D is an automatic reversing cassette deck which also offers Dolby noise reduction, four-position tape selector, and a photosensor "Quick Reverse" which provides instantaneous change of tape direction. \$400. Circle No. 62.



Hitachi's D-777 is an automatic reversing cassette deck which provides automatic azimuth adjustment to assure "full frequency response in both directions. \$500. Circle Number 72.



Sony's TC-K96R is an automatic reverse cassette deck with detachable front control panel for remote operation and microprocessor programming option. \$620. No. 94.



Sanyo's RD5008 Dolby cassette deck offers 2-position tape selector, separate left and right input level controls, LED level indicators, and automatic stop at end of tape—all for an unprecedented \$130 price. Circle Reader Service No. 106 for details.

# CASSETTE DECKS

crystal, and plasma readout systems.

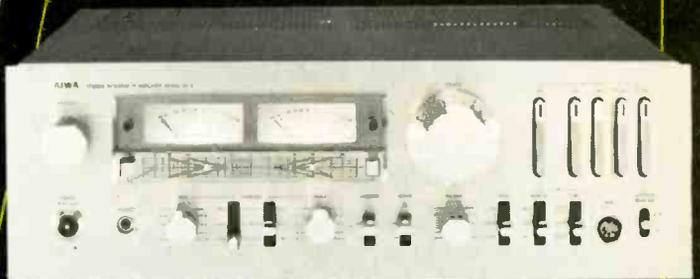
- The end of the so-called "power race" in which companies tried to outdo their competitors in terms of the power outputs of their receivers. Many firms now feel that 120 watts per channel is a sensible figure—offering plenty of "headroom" even at high listening levels, and keeping receivers modestly sized so they can still fit on a bookshelf.

- Somewhat higher product prices due to the disparity of the dollar to the yen. (However, some products reflecting higher prices also reflect greater value for that higher price—thus, in effect, cancelling out the increase.)

**Micro-Components.** Micro-components are a new category, first launched in the form of a four-unit (preamp, amp, tuner, cassette deck) separate components ensemble from Mitsubishi, and furthered by vertically-oriented compact systems from Randix and Rotel.

Randix has now added new micro-products, in horizontal configurations. The LX50 is a compact micro-system comprised of tuner, 22 watts per channel (wpc) amplifier, and a pair of mini speakers, all for \$450. A matching six-band equalizer is also avail-

Hitachi's HA-7700 integrated amplifier has a rated output of 65 watts per channel RMS with no more than .002% THD. It is the first Hitachi amplifier using power MOS FET output devices. Its price is about \$600. Features include muting, and low filter (15 Hz). Circle Reader Service Number 72 for details.



Aiwa's new AA8700U integrated amplifier has a rated power output of 75 watts per channel RMS into 8 ohms, with no more than .02% THD. Features include dual-turnover bass and treble tone controls. \$550. Circle 103.

# AMPLIFIERS

Kenwood's L-07 MII is a single-channel DC power amplifier which is part of Kenwood's Audio Purist Group. It includes a new high-speed output transistor, puts out 150 watts into an 8-ohm load with no more than .007% THD. \$600 each. For details, circle Reader Service Number 75.



## 1979 SUMMER FORECAST

able at \$60. A second compact micro-system is the LX401, consisting of micro-receiver with digital station frequency and time readouts, 15 wpc amplifier section, plus a pair of mini speakers, all for \$250. Randix also introduced what it says is the world's first vertically-styled Dolby cassette deck, Model TCD-25, priced at \$230. Its top section contains meters and electronic controls. Contained in the lower portion is the drive mechanism and its controls. Measurements are 5½ by 10 by 5 inches. Technics also has entered the micro-components field with a line of three units, all measuring 12 inches wide. Model SE-CO1 is a 35 wpc direct-coupled (DC) amplifier, priced at \$360. Model SU-CO1 is a preamp with moving coil input at \$260. Model ST-CO1 is a matching AM/FM tuner that uses three LEDs for tuning, at \$260.

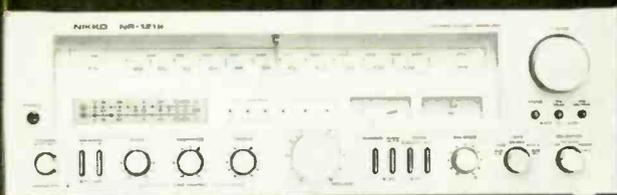
Tape. Metal tape and equipment to handle it were also in the forefront at the Show. BASF, Fuji, TDK, as well as 3M showed new metal tapes, and several tape machine manufacturers displayed cassette decks that could record on such tape. These



Crown's new FM-1 is a programmable FM tuner with digital frequency readout and control. Users may tune up and down the FM band via two pushbuttons, or may activate the automatic search-and-stop or scan features. \$995. No. 104.



Sansui's new TU-X1 tuner offers two completely separate tuning systems, one for AM and one for FM listening. Features include a calibration tone for the benefit of FM recordists. Price: \$980. Reader Service No. 89.



Nikko's NR-1219 AM/FM receiver has an output of 100 watts per channel and has DC power amplification, LED power display, subsonic filter and muting switch. \$650. Circle Number 79.



Pioneer's TX-9800 quartz-locked tuner offers AM/FM IF bandwidth selection, MPX noise filter, FM muting and tuning meters designed for easy, clear use. It sells for about \$450. For further details on this unit, circle Reader Service No. 85.

# TUNERS & RECEIVERS

were: AIWA, Eumig JVC, Lux, Nakamichi, Onkyo, Sanyo, TEAC and Technics. And B.I.C. showed a two-speed model with metal tape capability. Some of the machines are market-ready; others will not appear until later in the year. Most existing tape decks cannot be readily adapted to handle metal particle tapes. But a few can be. One such machine is the Eumig CCD priced at \$1,300. It can be modified for metal tape capability for \$200. Lux provides a factory conversion for its new Model 5K50 (\$1995) at no cost to its owners.

Another trend in the tape machine area is a strong concern with bias controls. It is evident in two ways: in machines offering automatic biasing; and in machines with individual variable controls for fine-tuning bias. These biasing methods were created in response to requests for more sophisticated tape equipment mirroring a new consumer awareness of the importance of correct biasing of the software to optimize recording results from the hardware. This equipment was also created to better enable you to use *any* kind of tape of the ever-increasing formulations coming into hi-fi stores, and to get maximum results from each type. One manufacturer said, "Now a customer can buy a less expensive tape and by fine-tuning the bias can get

# SPEAKERS

Altec's newest speaker, the Model 14, includes a power monitoring device which automatically corrects for any power overload delivered to the speaker. Minimum recommended amplifier power is 10 watts. \$495 ea. Circle No. 64.

Acoustic Research's new AR90 speaker has a minimum recommended power requirement of 50 watts per channel. Its nominal impedance is 4 ohms. \$550 per speaker. Circle No. 60.

Jensen's System B is a four-way 5-driver, vented speaker system whose optimum performance is attained when placed 1 to 2 feet from a wall. Nominal impedance is 8 ohms. \$490 each. Circle No. 105.

RTR's new 800D has a nominal impedance of 6 ohms, a recommended amplifier power requirement of 25 to 125 watts, and continuously variable level controls for tweeter, midrange, and upper bass/lower midrange drivers. \$600 ea. Circle 102.

## 1979 SUMMER FORECAST

better results than he would from a higher priced tape whose formulation could not be utilized optimally with only a basic bias setting."

Among companies offering new cassette decks with variable bias controls are AIWA (three models), Hitachi (four models), Mitsubishi, Rotel (two models), Onkyo, Technics, and U.S. Pioneer (four models). Models with automatic bias setting circuitry are available from JVC and Hitachi.

Among individual tape equipment advances is TEAC's new Model 124 Syncaset, priced at \$449. It is said to be the first cassette deck that offers true multi-track recording capability, to create "one-man duet" or "one-man trio" recordings. Although it features TEAC's proprietary Simul-Sync system, it conforms to the Philips license compatibility standards for consumer cassette and cassette tape equipment. To make cassette equipment even more convenient, a few companies have introduced automatic reversing decks. Among them were: Akai with its Models GXC-785D and

(Continued on page 75)

# See It. Feel It. Just About Taste It.



## Above All, Hear It.

Car audio has come of age. And Mitsubishi has applied its respected audio technology and experience to its new line of car audio products. There is no compromise. Reliable. Rugged. Well designed. But the proof is in the listening. That's where they shine. Be it the RX-69 or RX-7 In-Dash AM/FM Auto-Reverse Cassettes or the RS-67 AM/FM 8-track, Mitsubishi is miles ahead in car audio. In addition, three

Under-Dash Cassettes, one Under-Dash 8-track, and an ambitious array of quality car hi-fi speakers complete the line. Mitsubishi transcends the ordinary. Ready to extend your limits? Look into the entire line of car audio component separates. Get a taste of Mitsubishi Car Audio...

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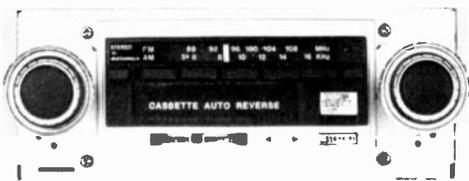
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Circle No. 41 On Reader Service Card

# Mobile High Fidelity

## THE PROS & CONS OF IN-DASH UNITS



## AND SEPARATE COMPONENTS

by TRIDAC ELECTRONICS CORP.

**M**obile high fidelity today is growing by leaps and bounds and can be a very confusing area if you're faced with making a decision on what type of gear will best serve your needs. One decision you'll have to make concerns the choice between in-dash units and separates—both have their own advantages as well as disadvantages, and this article was designed to clarify those differences for you.

One thing should be pointed out at the outset: unlike home high fidelity equipment, mobile audio (hereafter called mo-fi) has no specification standards. The Federal Trade Commission claims that it has received no consumer complaints in the mo-fi area, and hence concludes that there is no need for standards. This lack of standardized specification requirements leaves you, the consumer, in a position where you must read spec sheets very carefully when looking at mo-fi. You cannot assume that the standards used in reporting the performance of home high fidelity are operative in the mo-fi area.

In the mo-fi performance area, the two real problems are FM tuner selectivity and amplifier output power, and these two areas eventually control the overall mo-fi performance regardless of all other performance parameters.

**FM Tuner Performance.** Let's look at the FM tuner area first. Judging from the selection of currently available units we have seen (so far), the sensitivity for a mo-fi FM tuner with the usual 72 ohm coaxial input is about 5  $\mu$ V for full limiting. The sensitivity for 55 dB stereo quieting is about 25  $\mu$ V. To calculate their equivalent to the 300 ohm inputs used for home hi-fi equipment, simply double these values. (25  $\mu$ V mo-fi stereo sensitivity is equal to slightly over 50  $\mu$ V for a 300-ohm home tuner input.)

In short, engineers don't have difficulty providing tuner sensitivity. When they have the problem of overload caused by excessive signal strength from a local (down the block) FM station, they simply provide a local/DX (distant) switch, which is actually an input attenuator of about 15 to 20 dB. This provides enough attenuation to prevent strong signal overload, but not so much attenuation that it will interfere with reception of moderate signal strength stations.

All mo-fi FM receivers and tuners we have seen provide a "hard" FM automatic frequency control (AFC) so that widely ranging vehicle temperatures don't cause the station tuning to drift up and down the dial. As a gen-

eral rule, once an FM station is tuned in, it remains tuned in. It is beyond this stage of design that problems crop up.

Inexpensive in-dash units offer alternate channel selectivity in the range of about 45 dB. This would be considered fair, at best, for a home FM table radio. In a car it will usually mean that if there is a weak station on the alternate or second alternate channel next to a strong station, the tuner will probably lock onto the strong station. Even if you could adjust the tuning to receive the weak signal, on the first signal fade—which you get as the vehicle moves—the tuner will lock up on the strong signal. While we haven't yet seen a truly selective mo-fi in-dash FM radio, so many models have been announced for this year that some are certain to be comparable to better home equipment, but we haven't yet had the chance to evaluate them first-hand.

What we have seen in *separates*, however, does offer selectivity approaching, or the equal of, home hi-fi. For example, the Mitsubishi mo-fi tuner shown in the photographs has selectivity the equivalent of *very good* home equipment—65 to 75 dB alternate channel rejection.

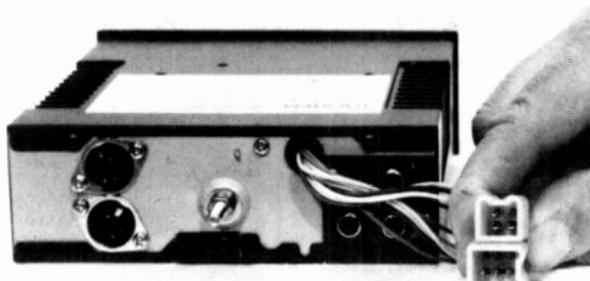
As for stereo separation, the 25 to 30

db midband separation of mo-fi, is a long way from the 40 dB to 50 dB separation of home equipment, but 25 to 35 dB is adequate for vehicles (it's actually adequate for the home too).

**Amplifier Performance.** The distortion and frequency response of mo-fi FM is determined primarily by the associated amplifier, and that brings us to a very swampy area.

First of all, unless the output power is referenced to some standard *and the total number of speakers* expected to be used, you have no idea of what you're buying. Some mo-fi equipment is referenced to total peak power output (refers to all the power they can get in the lab before the darn thing blows up), some to mid-band peak power output for a specified distortion, some range all the way up to 10% total harmonic distortion (THD), and some are actually rated in RMS power output to some given range of frequencies (which is what you are accustomed to as an experienced home hi-fi spec reader).

Regardless what the power claims are, you must divide by the total number of speakers. For example, if the manufacturer claims a 12 x 12 amplifier, meaning 12 watts output per channel (presumably for two channels) check the number of speaker outputs.



**Almost all mo-fi equipment comes with pre-wired connectors (shown here) and a speaker/power wiring harness (not shown). To hook up, just connect the free ends of the wiring harness to the speakers and power source, and plug the other end of the wiring harness into the unit's connectors.**

You might discover the amp provides for front (2) and rear (2) speakers. If so, it's possible that with all four speakers *on*, the most you can deliver to any speaker is 6 watts.

There are sometimes also the front-to-rear or side-to-side faders. Some in-dash units have standard controls in the amplifier circuits so there is no loss when these are used. Others have amplifier controls for left-right balance but speaker system attenuators for front-rear balance; when this is the case, some output power gets lost as heat in the faders.

As to how much power is needed: that depends on the number of speakers, but if you aim to keep distortion low, 5-watts runs out very fast in a

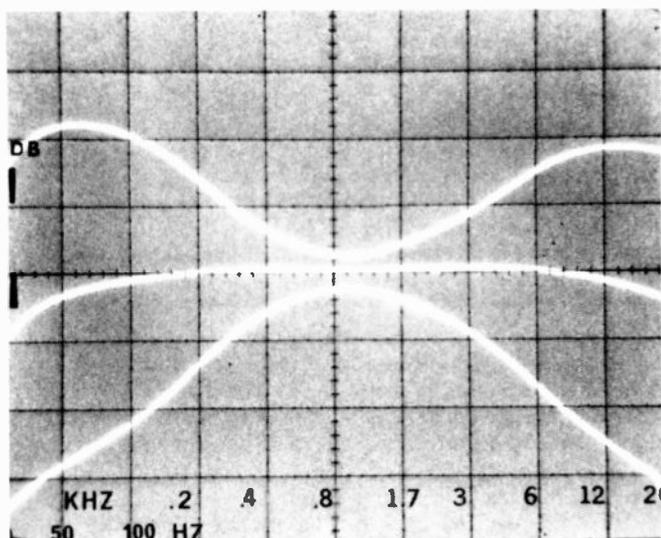
moving car if you're driving both front and rear speaker systems. It's important to remember that the more efficient the speaker, the greater the volume level for a given amplifier output power. Mo-fi speaker efficiencies range all over the lot. The same power output that produces a whisper from one set of mo-fi speakers will almost blow out the windows with other speakers. Amplifier power requirements and speaker efficiency go hand in hand and must be considered together.

**Tone Controls.** One place where the in-dash equipment diverges widely from separates

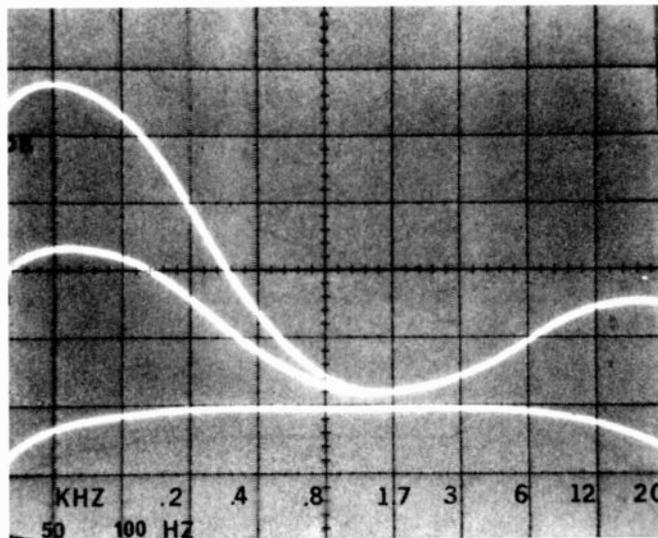
is in tone control capabilities. The typical in-dash unit has a single control that provides maximum highs and reduced bass at one extreme, normal bass with continuously reduced highs through most of its rotation, and maximum bass with attenuated highs at the opposite extreme.

The amplifier from a separates system, however, generally has individual bass and treble controls that function much in the manner of home equipment, as shown in Fig. 1. The center frequency response curve in Fig. 1 shows the response of a separate amplifier with tone control in the *flat* position. Note the roll-off at the deep bass and upper highs, characteristic of

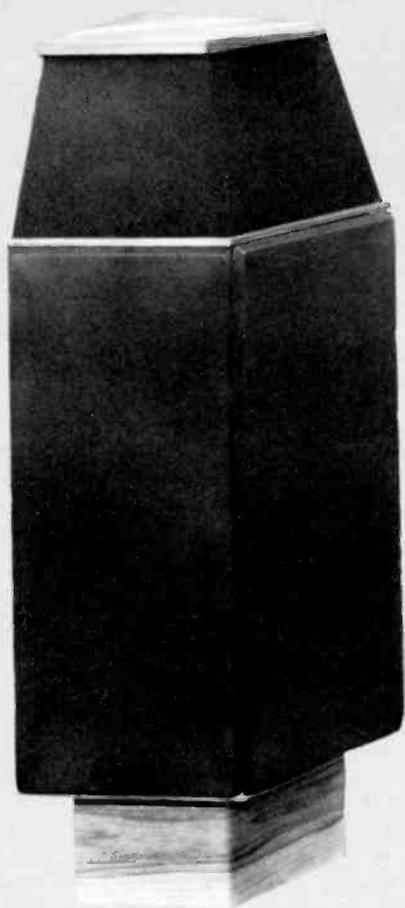
*(Continued on page 77)*



**Frequency response and maximum tone control effect of a mo-fi separate amplifier. Notice the roll-off of the deep bass below 50 Hz—this should not cause concern since this range of frequencies isn't audible from small car speakers anyway.**



**Bottom trace is normal amplifier response. Middle trace shows loudness compensation (tone controls set flat). Note the big boost in high frequencies (to overcome the car's ambient noise level). Top trace adds full bass boost to loudness compensation.**

**1****2****3**

# 1234567 8 NEW EXCITING INNOVATIVE PRODUCTS

Our author's choice of new products that are surprising and novel

by WILLIAM S. GORDON

**M**y editor sent me to the Winter Consumer Electronics Show in search of eight eyebrow-raisers—novel products which may (or may not) end up bearing the flag of the future. Here are the fruits of my search—a limited sampling to be sure, but varied nonetheless:

In this writer's opinion, the novelty-of-the-show award

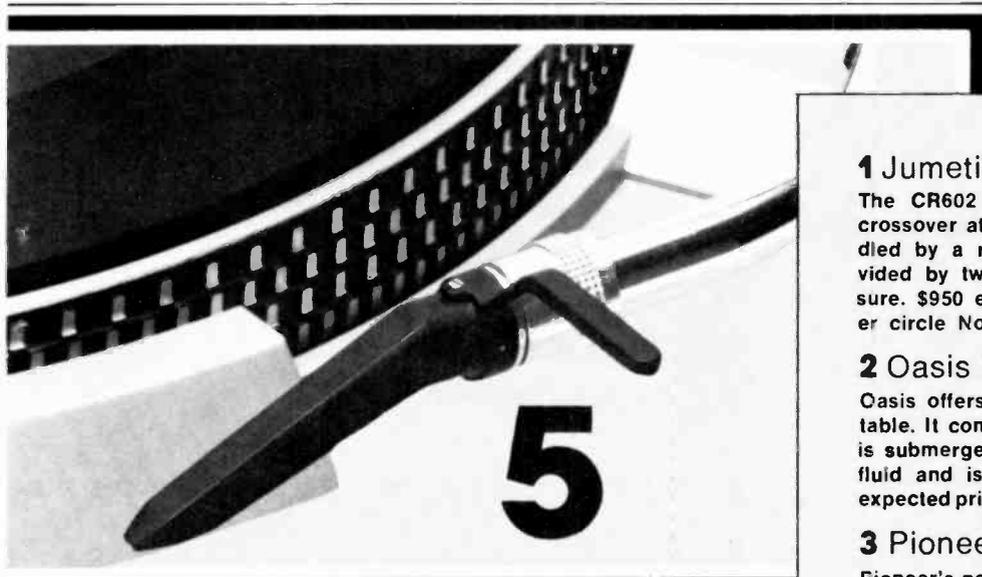
is presented equally to two products. We needn't split the prize; the same engineer-turned-entrepreneur is responsible for both entries. The engineer in question is Bob Carver—his company, Carver Corporation.

The two prize winners are the "Magnetic-Field Amplifier" and the "Sonic Hologram Generator." The Magnetic-Field Amplifier is a 200-watt-per-channel power amp in a 6½-inch cube that weighs approximately 12 pounds! Perhaps the most deceiving mighty-mite you could imagine. It is claimed to deliver that 200 watts into 8 ohms from 1 Hz (!) to beyond 20 kHz. Frequency response rating is from 1 Hz to 250 kHz. Distortion is 0.05%, and TIM (transient intermodulation distortion) is unmeasurably low. Slew rate is spec'ed at a whopping 80 volts per microsecond.

Now for some icing on the cake. The power capability is *independent of the load* (down to 1 ohm), and the amp automatically shares its power between the two channels so that, if the left channel is putting out a more powerful signal than the right, it can "borrow" some power and put out *well in excess of 200 watts* temporarily. You must agree that this is a surprising amplifier.

"Terrific" you say. "Probably has a price to match." Indeed it does; a price to match its *size* not its specs. When available, it's expected to go for about \$300—roughly half that of similarly spec'ed products!

How's it done? Well, Carver isn't saying yet—patents pending and all that. All he'll hint at is that the massive power transformer and electrolytics that are generally used



### 1 Jumetite Ribbon Speaker System

The CR602 is a two-way speaker system with a crossover at 600 Hz. The high frequencies are handled by a ribbon radiator, while the bass is provided by two ten-inch woofers in a sealed enclosure. \$950 each. For details on this unusual speaker circle No. 107.

### 2 Oasis T-1 Fluid-Driven Turntable

Oasis offers a unique drive system in its T-1 turntable. It consists of two platters. The bottom platter is submerged in fluid. The top platter floats on this fluid and is rotated by the fluid when in use. Its expected price: \$700. Circle Reader Service No. 111.

### 3 Pioneer Non-Switching Amplifier

Pioneer's new integrated amp incorporates circuitry which maintains transistors in the "on" state. Distortion created by "turn-on time" is thereby eliminated. \$750. Get details with Reader Service No. 85.

### 4 Carver Sonic Hologram Generator

In addition to its ability to create a realistic sonic image, the C4000 includes a time delay system, an auto-correlator noise reduction system, a peak limiter, among other features. \$850. Circle No. 109.

### 5 Ortofon Low-Mass Cartridge

Ortofon's new low-mass cartridge concept is available in several models. The Concorde model, pictured here, integrates both the headshell and the cartridge and is compatible with tonearms having standard connector sockets. \$165. Circle Reader Service Number 82.



to change the 110-volt AC line into a usable DC voltage have been eliminated. The conversion is accomplished with a coil, and the energy is stored in the magnetic field surrounding the coil. One thing he did say is that a conventional magnetic amplifier is *not* used: *this* is a magnetic-field amp.

Eliminating the transformer and electrolytics let Carver cut down the size, weight and cost, but that doesn't unravel the mystery. Switching power supplies now coming on the market do that too. Part of the secret is in the new amp's high efficiency—94% compared with the normal 40% to 60%. That means the magnetic-field amplifier runs cool as a cucumber *without* heat sinking.

Moving along, what is a "Sonic Hologram Generator?" In fact, what's a hologram? A hologram is an optical technique using coherent light (laser beams) to create a three-dimensional image in space. When you view a hologram, you see depth as well as length and width. It's not just trick photography that makes an image look three-dimensional on a piece of paper. The 3-D image *actually exists* in space. It's only a trick in that the object isn't there; you can put your hand through it.

Carver's Sonic Hologram Generator is supposed to create the same illusion for music by "recreating the vector sound field that was present during the original recording." The musical instruments seem to be located in space since the sound from each of them seems to come from the point where they should be. One might appear right in front of your nose, another way back beyond the

speakers. The sound doesn't appear to come from the speakers themselves at all.

Does it work? Well, I've heard it and it does. To be sure, there are some limitations. The listener must sit precisely on the center line between the speakers. Although something of the illusion is maintained off axis, you've got to stay put to get the whole picture. And if you move your head, the image changes. Obviously this isn't the toy for a wandering imbibor at a cocktail party, but, if you're willing to cooperate, the illusion is stupendous. And it works with normal stereo recordings and a normal stereo speaker set. (Carver does point out that the speakers should be a matched pair, and it's my opinion that some records will produce a better "hologram" than others. Simple stereo mixing preserves the phase character of the sound field better than heavily mixed, multi-miked recordings and apparently it's the phase information that creates the hologram.)

The Sonic Hologram Generator is part of Carver's C-4000 preamp. Everything but the kitchen sink is in that preamp; it has a built-in time delay (ambience simulation) system with a choice of 50-ms or 85-ms initial delay, five primary delays and adjustable echo density. There's a 40-watt power amp included to drive the ambience speakers—three outputs for a pair of speakers in the rear and one in the center front. There's a separate headphone amp, tone controls for each channel with adjustable

# 8 NEW PRODUCTS

turnovers. The phono preamp is accurate within  $\pm 0.1$  dB and has cartridge matching and an infrasonic filter. And to top it all off, there's a third-generation Auto-Correlator Noise Reduction System and Peak Unlimiter. Even forgetting the Sonic Hologram feature, where can you get this lineup for \$850, the projected price?

Now let me introduce you to the Oasis T-1 turntable. You know the problem with turntables—susceptibility to rumble, flutter, acoustic feedback and shock. Conventional wisdom calls for a variety of shock mounts and isolators to be used to damp the outside vibes and the platter is driven either directly from a slow-speed, low-vibration motor or via a belt to filter the jitters.

The Oasis T-1 suspends and drives the platter through a viscous-fluid bath. The lower portion of the platter is fitted with fins that pick up the fluid's motion. The fluid is spun by another set of fins coupled to a stepper-motor drive. Essentially the platter floats freely and to further damp vibration, the motor is mounted on foam.

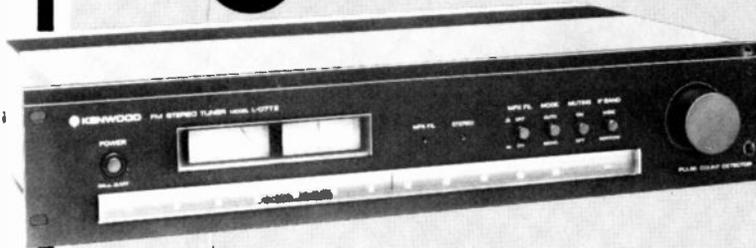
The T-1 is housed in a mahogany base which is isolated further by Audio-Technica feet. It has a remote control, operates at two speeds (with pitch control) and will accommodate two tonearms which are also double isolated from the frame.

Also, related to record-playing, I was intrigued by Ortofon's new phono cartridge. Actually, it's not a single cartridge but a series of three basically identical cartridges with different mounting provisions. While many tonearm manufacturers have been trying to reduce the effective mass of their products—just look at the ads—it hasn't seemed that much has been done to lower the mass of the cartridge. Since the cartridge mounts at the very end of the arm, its heft may make the most important contribution to the effective mass of the system.

Well, Ortofon seems to have tackled the problem head on. Their basic Low Mass cartridge weighs in at a mere 1.5 grams. Typical cartridges tip the scales at 5 to 8 grams. Since the basic Low Mass cartridge can only be mounted in a special arm, it will be available with a conventional mounting plate as well—a bit heavier no doubt but still less than the mass of the average pickup. And, since the headshell of many tonearms is heftier than need be, the Low Mass cartridge is also available as an integral unit with its own headshell—one that is compatible with the standard connector arrangement. This combination, called the Concorde Model—it has the bent-nose look of that supersonic transport—weighs 6.5 grams and is claimed to be "the world's lightest, integrated pick-up cartridge for tonearms with standard sockets."

The reduced mass of these new Ortofons promises to raise the tonearm resonant frequency above the warp region and so improve the tracking and clarity of reproduction of everyday records. The effective mass of the Fine Line diamond used on the new Ortofons has also been reduced by 30% to improve high-frequency trackability. Despite its small size, these cartridges are shielded against hum and provide normal output levels.

# 6



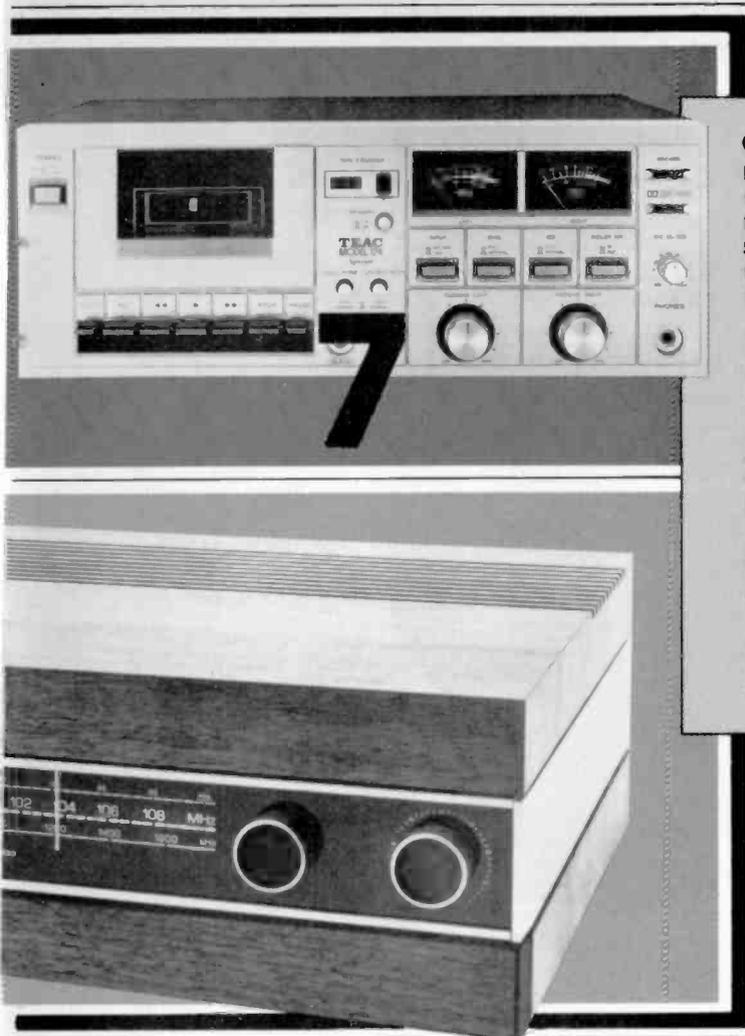
# 8



TEAC showed a new cassette deck with a novel twist. The Model 124 Syncaset provides at least the rudiments of multitrack recording in the cassette format. You can lay down one track, monitor it and overdub another; record a slide show soundtrack with voice over music or music behind narration; or, accompany yourself, sing-along style. Basically the deck lets you record on the left channel first and then, later, go back and record on the right while listening to the left. (You can't go the other way though, and the Dolby can't be used in the sync mode.) Of course, the 124 functions as a normal tape deck as well, so it meets Philips standards.

Kenwood introduced three new tuners with a novel Pulse-Count Detector. The pulse-counting-detector concept isn't new itself; it's been used for decades in telemetry discriminators where high accuracy is of paramount importance and cost is no object. But telemetry decoders function at relatively low frequencies where pulse counting is relatively easy to implement. Life is quite a bit more difficult when working with a 10.7-MHz IF frequency.

In a pulse-counting discriminator, a constant-energy pulse is generated within the tuner for every axis-crossing of the signal. These are integrated (averaged), and the total voltage then corresponds precisely to the frequency of the signal. In FM, the frequency of the signal is precisely analogous to the original music signal, so virtually perfect demodulation is achieved. Generating



## 6 Kenwood Pulse Count Tuner

Kenwood's Audio Purist Group of products includes the L-07TII tuner, which accomplishes FM demodulation with pulse-count detection technology. \$625. Same technology is incorporated in Kenwood's KT-917, KT-815, and KT-615 tuners, at \$1000, \$440, \$270 respectively. Circle 75.

## 7 TEAC Model 124 Syncaset

The 124 is a cassette deck with multi-track recording capability. The recordist may record the left channel first, then go back and record the right channel while monitoring what's been recorded on the right. Price: \$449. Circle Reader Service Number 110 for details.

## 8 Bose Spatial Control Receiver

A spatial slide control on the face of Bose's Spatial Control allows users to adjust the width of the sound image, creating spaciousness or intimate club atmosphere, in conjunction with Bose 901 loudspeakers. Circle No. 66.

takes a certain period of time for the transistor to make the switch. At high signal frequencies, this confusion time can be an appreciable part of the cycle—Pioneer estimates 10% of each half cycle at 20 kHz. During this time, distortion is generated.

Pioneer's new circuitry prevents the transistors from ever turning off fully so this turn-on/turn-off time is eliminated. Since the distortion of the basic amp is less, there is less need for massive amounts of feedback and the TIM is reduced too. The top-of-the-line SA-9800 is rated at 100 watts per channel, 10 Hz to 20 kHz, into *either* 4 ohms or 8 ohms, with no more than 0.005% THD!

Bose's Spatial Control receiver struck me as novel insofar as it includes a special control to widen or narrow the spatial image of the sound field. Be forewarned that the control does its thing only when the receiver is used with Bose 901 Series III or Series IV loudspeakers.

As Bose lovers know, the 901s incorporate nine drivers in each enclosure; one faces forward, four face to the left rear, four to the right rear. The Spatial Control receiver has *four* power amps hooked up so that *two* are used to drive each 901. The spatial slide control narrows or widens the sound image by diverting high frequencies to either the inside or outside panels. When used with conventional speakers, the power amps can be bridged in pairs to yield a 100-watt-per-channel rating.

And last but not least, is the Jumeite CR602 ribbon speaker system. High frequencies (above 600 Hz) are handled by a ribbon driver—that is, an aluminum ribbon suspended in a magnetic field. The ribbon driver is coupled with a vertical horn and a conical reflector, which directs the sound into the listening area. Ribbon driver designs of the past have always had the problem of fragility, but the CR602 incorporates an array of protective devices which are designed to protect speaker against mechanical failures and thermal overload. Speakers are covered by a two-year warranty which covers all failures other than those caused by user abuse (such as pouring liquids down the throat of horn or puncturing of the ribbon wafer assembly). ▲

controlled pulses at a rate of 10,700,000 per second (the IF frequency) is still an iffy proposition, so Kenwood converts the normal IF frequency down to 1.96 MHz where the task is a bit more practical.

In Kenwood's new tuners, distortion has been lowered by 50%, and the signal-to-noise ratio is said to be 12 dB better—0.05% THD (mono) and 90-dB S/N in mono, 84 dB in stereo. Similar techniques are employed in the stereo demodulator and result in a midband-separation figure of 60 dB with 50 dB or better available from 50 Hz to 10 kHz.

The best of the trio—the KT-917 at \$1,000—affords a choice of *three* bandwidths and *triple* meters, the third one devoted to showing deviation/multipath. For a lot less (\$440), you can get similar performance give or take 4 to 6 dB in S/N and 0.065% THD. Ask for the KT-815. And the pulse counter is even used in the \$270 KT-615.

The KT-917 has another goodie built in—a "DDL" (Distortion Detection Loop) tuning system. An inaudible test signal is injected into the front end along with the station being received. After detection, the test signal is checked for distortion, and the KT-917 is automatically tuned to the point of minimum harmonic generation.

Pioneer's three new integrated amps—the SA-9800, SA-8800, and SA-7800—sport a new output-stage design. In the conventional Class-B configuration, each of the power transistors must turn on and off on each cycle as the load current switches from one transistor to its mate. Now it

# Opera

For Today

James Levine

by Speight Jenkins

□ In American music it is doubtful whether any conductor looms as large today as the thirty-five-year-old American, James Levine. Indeed, Levine is certainly the youngest member of a select number of musicians in whom most of the power in the realm of serious music is located. Presently Music Director of the Metropolitan Opera and of the summertime Ravinia Festival in Chicago, Levine is in constant demand to conduct virtually every major orchestra and opera company in the world. Fortunately, he does not fill these requests but concentrates his energies on the Metropolitan, giving it more than six months of his time every year. His only regular opera conducting over the last few years has been at the Salzburg Festival in Austria. Levine, however, has also proved one of the most active and successful con-



James Levine contributes a rare trait to opera recordings: that of being able to make studio recordings come alive.

ductors of recordings over the last five years. Basically an RCA artist, he is in the process of conducting a complete Mahler cycle with that company and has already finished a Brahms cycle.

Symphonic music—or even his work as a piano virtuoso which has been captured on several records—is not Levine's focus nor will it be the focus of what is discussed here. Levine is making his world reputation primarily in opera, and his opera recordings grow increasingly impressive. The quality attributable to Levine comes in large part from his ability to make studio recordings of operas come alive, the rarest trait of an opera conductor on records and one that has often eluded such distinguished maestros as Sir George Solti and Herbert Von Karajan. Levine has also had the

good sense and the ability, because of his position at the Metropolitan, to put together the most impressive Italian opera team, at least for the Verdi and verismo repertory, that now exists. The three artists—Renata Scotto, Placido Domingo and Sherrill Milnes—are all extremely musical, have similar feelings about the importance of projecting an opera's text and have homogeneous voices.

All this, of course, is a part of Levine's brilliance as an interpreter. Over the eight-and-one-half years since he made his Metropolitan Opera debut leading Puccini's *Tosca*, he has conducted twenty-seven operas there, with the twenty-eighth, Wagner's *Parsifal*, coming up in April. Only sixteen of these have been Italian, with nine of them by Verdi, yet the frequency

of repetition of Italian opera at the Metropolitan has meant that his emphasis on that part of the repertory has been crucial.

His work in Italian opera also traces his development as a conductor. He has never been anything less than exciting, and from his first day in the Metropolitan pit he has had what can only be called a magical rapport with the musicians. But in his first few works, notably an early *Luisa Miller* and *Otello*, he sometimes drowned the singers with sound and occasionally rushed some passages. With his increased experience and maturity, plus a total grasp of the capacities of the Metropolitan Orchestra and the acoustic properties of the auditorium, he has learned how to balance his soloists

(Continued on page 78)



Levine belongs to a coterie of the most influential musicians in the realm of serious music worldwide.



Three artists — Scotto, Milnes, Domingo — comprise the Italian opera "team" Levine assembled.

# TEST REPORTS

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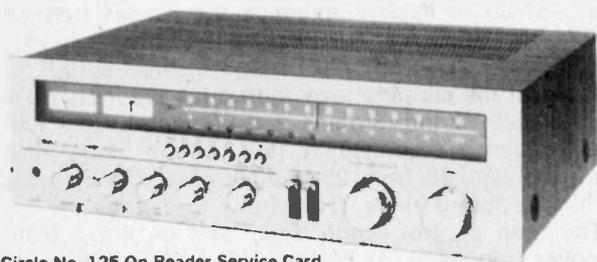
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## RECEIVERS



Circle No. 125 On Reader Service Card

### LAFAYETTE CRITERION MARK VII AM/FM RECEIVER

The top-of-the-line receiver in Lafayette's Criterion line which includes a notably quiet AM tuner section. If you're into AM listening this deserves special attention. Amplifier output is rated at 75 watts per channel. Features include bass, midrange, and treble tone controls; outputs for three speaker systems, two tape machines, and headphones; low and high filters; and automatic dubbing capability to and from either of two tape recorders. \$450.

**DESCRIPTION:** An AM/FM stereo receiver FTC rated at 75 watts RMS per channel into 8 ohms 20 to 20,000 Hz, at a distortion no higher than 0.1% THD at any frequency.

Features include: a stereo beacon; FM center channel and AM/FM signal strength tuning meters; a high-low phono sensitivity selector; a midband tone control; automatic dubbing from/to either of two recorders; and an output hold-off that prevents power supply turn-on transients from being fed to the speakers.

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

Controls are provided for tuning, concentric volume/

balance, ganged bass, ganged midband, ganged treble, input/mpx filter selection, and power/speaker selection. There are switches for tone control defeat, low filter, high filter, loudness compensation, stereo/mono, audio mute, FM muting, tape dubbing selection, and tape monitor selection. The phono sensitivity switch is on the rear apron.

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

Overall dimensions are 19 $\frac{1}{2}$  in. wide x 5 $\frac{1}{2}$  in. high x 14 $\frac{1}{2}$  in. deep. Weight is 26 lbs.

**PERFORMANCE—FM TUNER:** For 300 ohm and "tee" antennas: Full limiting was attained with 3.5  $\mu$ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 8  $\mu$ V. The stereo high fidelity sensitivity (55 dB quieting) was 75  $\mu$ V. The mute release fades out over the range of 2 to 3.5  $\mu$ V; it does not "snap" in and out as is common for the majority of tuners in all price ranges.

At standard test level, the stereo frequency response measured  $\pm 0.5/-2$  dB from 30 to 15,000 Hz. Monophonic distortion measured 0.1% THD. Stereo distortion was 0.4% THD. The signal-to-noise ratio measured 72 dB. Stereo separation was 40+ dB. Selectivity was very good.

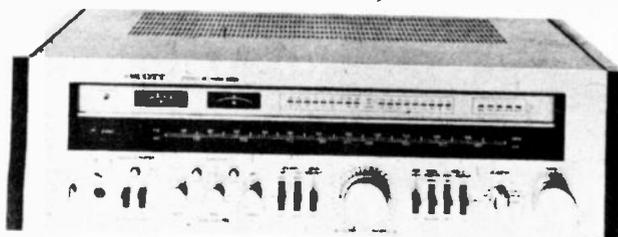
**PERFORMANCE—AM TUNER:** Sensitivity somewhat above average. Background noise is much lower than average—very quiet reception.

**PERFORMANCE—AMPLIFIER:** The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 78 watts RMS. The frequency response at 78 watts/8 ohms measured  $+0/-0.6$  dB from 20 to 20,000 Hz at a distortion no higher than 0.07% THD at any frequency.

The tone control range measured  $\pm 12$  dB at 50 Hz;  $\pm 6$  dB at 1000 Hz;  $\pm 10$  dB at 10,000 Hz.

The magnetic input hum and noise measured  $-64$  dB; stereo separation was into the noise level. ▲

## TEST REPORTS/RECEIVERS



Circle No. 144 On Reader Service Card

### SCOTT 390R AM/FM RECEIVER

Its rated output is 120 watts per channel with no more than .03% total harmonic distortion. In our lab this unit demonstrated that it was capable of surpassing those specs with ease. In addition to a host of features, it also has a notable excellent deep bass reproducing capability—you can almost feel it. Also noteworthy on this receiver are its LED power output indicators—they are peak reading, precisely calibrated, and fast-acting: you can actually observe at 10-watt output handling 120-watts peaks. \$700. Metal cabinet with wood trim.

**DESCRIPTION:** An AM/FM stereo receiver FTC-rated at 120 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.03% THD.

Features include: a stereo beacon; FM center channel and AM/FM signal strength tuning meters; 75/50/25  $\mu$ Sec FM de-emphasis; left and right 9-step LED output power indicators which are calibrated from 0.1 to 120 watts into 8 ohms (multiply by two for use with 4-ohm loads) and in dBW (0-dBW = 1-watt); dual range bass (100, 300 Hz) and treble (3,000, 8,000 Hz) tone controls; a midband tone control; "break in" accessory connections switched from the front panel; low/high sensitivity selector for the phono inputs; automatic dubbing from/to either of two recorders; and an output hold-off that prevents power supply turn-on transients from being fed to the speakers.

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

Controls are provided for tuning, concentric volume/balance, ganged bass, ganged midband, ganged treble, input selection, and power/speaker selection. There are switches for output power indicator on-off, FM muting, tone control bypass, bass turnover frequency, treble turnover frequency, low/subsonic filter, 8,000 Hz/12,000 Hz high filter, loudness compensation, accessory connections on-off, stereo/mono modes, tape copy (dubbing) selector, and tape monitor.

**Readers often ask what we mean when we say that the performance of a piece of equipment is average.** We have established high critical standards for all pieces of equipment that are reviewed on these pages. After all, we are concerned with high fidelity components—not just any gear that produces sound. An *average* rating means that the component meets our rigid performance standard and is a good buy in its price range. For example, if a \$1000 receiver is rated *average*, this means that it is the equal of other average \$1000 receivers, superior to an average \$600 receiver, and far superior to an average \$200 receiver.

selector. There are switches on the rear apron for low/high phono sensitivity and FM de-emphasis selection.

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

Overall dimensions are 22 $\frac{7}{8}$  in. wide x 6 $\frac{1}{2}$  in. high x 15 $\frac{3}{4}$  in. deep. Weight is 49 lbs.

**PERFORMANCE—FM TUNER:** For 300 ohm and "tee" antennas: full limiting was attained with 3.0  $\mu$ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 8  $\mu$ V. The stereo high fidelity sensitivity (55 dB quieting) was 70  $\mu$ V. Full mute release was attained with 12  $\mu$ V.

At standard test level, the stereo frequency response with .75  $\mu$ Sec de-emphasis measured +2/−1 dB from 20 to 15,000 Hz. With 25  $\mu$ Sec de-emphasis the frequency response was +0.7/−1.2 dB from 20 to 15,000 Hz. Monophonic distortion measured 0.21% THD. Stereo distortion was 0.24 THD. The signal-to-noise ratio measured 69 dB. Stereo separation was 40+ dB. Selectivity was excellent.

Note: The FM tuner appeared to be in precise alignment, which in itself commends the receiver overall.

**PERFORMANCE—AM TUNER:** Average.

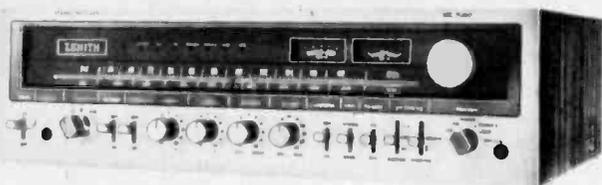
**PERFORMANCE—AMPLIFIER:** The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 130 watts RMS. The frequency response at 130 watts/8 ohms measured +1/−0.1 dB from 20 to 20,000 Hz at a distortion no higher than 0.015% THD at any frequency.

The tone control range depended on the selected turnover frequency. At 50 Hz: with a 300 Hz turnover, the range measured  $\pm$ 13 dB; with a 100 Hz turnover, it measured  $\pm$ 7 dB. At 10,000 Hz: with a 3,000 turnover, the range measured +9/−10 dB; with an 8,000 Hz turnover, it measured +4/−4.5 dB. The midband tone control range measured  $\pm$ 7 dB at 1400 Hz. The subsonic filter was down 2.5 dB at 20 Hz.

The magnetic input hum and noise was −79 dB (dead quiet). Stereo separation was into the noise level.

Though not so specified in the manual, the LED output power indicators are peak reading, and their calibration was precise within the narrow turn-on range of the individual LEDs. Because the LEDs don't snap on and off—they have a turn-on/off range of about 0.5 dB—the frequency response was effectively  $\pm$ 0.5 dB from 20 to 20,000 Hz.

Note: The meters have a high brightness combined with a very fast action and it is possible to observe program peaks in the range of 12 to 15 dB above average program power. You can actually observe a 10 watt output pulling 120 watts peaks. Very nice metering for those so interested. ▲



Circle No. 133 On Reader Service Card

## ZENITH MC7050 AM/FM RECEIVER

This is Zenith's first entry into the high fidelity components area—and its performance in our lab confirms that it is indeed worthy of being called hi-fi gear. Its rated output power is 40 watts per channel with no more than .2% THD, and its measured output exceeds that, at half that distortion. Features include 75 and 25  $\mu$ Sec de-emphasis, a monophonic microphone input, an internal FM antenna in addition to the usual external connections, and automatic dubbing to and from either of two tape recorders. \$330.

**DESCRIPTION:** An AM/FM stereo receiver FTC-rated at 40 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at no more than 0.2% THD.

Features include a stereo beacon, FM center channel and AM/FM signal strength tuning meters, 75 and 25  $\mu$ Sec FM de-emphasis, a switch-selected front panel monophonic microphone input, automatic dubbing from/to either of two recorders, an internal FM antenna in addition to the usual external connections, and an output holdoff that prevents power supply turn-on transients from being fed to the speakers.

There is one monophonic input: for a microphone. Stereo inputs for two magnetic phono, aux, and two tape. Outputs are provided for two speaker systems,

two tape, and phones.

There are controls for tuning, volume, balance, ganged bass, ganged treble, input selection, and speaker selection. Switches for power, low filter, high filter, loudness compensation, FM mute, mono/stereo, tape dub selection, and tape monitor selection. The 75/25  $\mu$ Sec FM de-emphasis selector switch is on the rear apron.

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

Overall dimensions are 19.3 in. wide x 5.5 in. high x 15 in. deep. Weight is 27.5 lbs.

**PERFORMANCE—FM TUNER:** For 300 ohm and "tee" antennas: Full limiting was attained with 3.2  $\mu$ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 12  $\mu$ V. The stereo high fidelity sensitivity (55 dB quieting) was 85  $\mu$ V. Full mute release was attained with 2.0  $\mu$ V.

At standard test level, the stereo frequency response with 75  $\mu$ Sec de-emphasis measured +0/-0.7 dB from 20 to 15,000 Hz. With 25  $\mu$ Sec de-emphasis, the stereo frequency response was +0/-0.6 dB from 20 to 15,000 Hz. At standard test level, the monophonic distortion measured 0.25% THD. Stereo distortion was 0.6% THD. The signal-to-noise ratio measured 64 dB. Stereo separation was 40+ dB. Selectivity was very good.

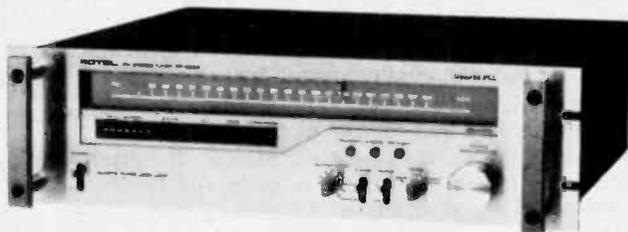
**PERFORMANCE—AM TUNER:** Average.

**PERFORMANCE—AMPLIFIER:** The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 43 watts RMS. The frequency response at 43 watts/8 ohms measured +0/-1 dB from 20 to 20,000 Hz at a distortion no higher than 0.1% THD at any frequency.

The tone control range measured  $\pm$ 14 dB at 50 Hz;  $\pm$ 11 dB at 10,000 Hz.

The magnetic input hum and noise was -67 dB; stereo separation was 57 dB. ▲

## TUNERS



Circle No. 122 On Reader Service Card

**DESCRIPTION:** An FM stereo tuner featuring conventional and digital frequency indication, and a Dolby decoder with automatic switching from 75 to 25  $\mu$ Sec de-emphasis. The digital frequency readout uses 0.3-inch LEDs and is calibrated in 100 kHz increments (98.1, 98.2, 98.3, 98.4, etc.). Other features include a stereo beacon, a quartz-locked tuning (automatic tuning correction) automatically applied when the hand

## ROTEL RT-2100 FM TUNER

An FM stereo tuner which includes both conventional and digital frequency indication, a Dolby decoder with automatic switching from 70 to 25  $\mu$ Sec de-emphasis, quartz-locked tuning, and an output which allows you to check your recorder via a 400 Hz test signal at 0.775 volts. Our listening panel reports an unusually clean, silky sound quality, which does not really show up in the measurements. Its price is about \$600 in metal cabinet with 19-in. rack panel.

is removed from the tuning knob, wide and narrow IF bandwidth, a 7-step LED signal strength indicator that also serves as a multipath indicator, an LED properly

## TEST REPORTS / RECORD PLAYERS

tuned indicator system, an LED tuning locked indicator, and a record-check output that provides 400 Hz at 0.775 volts.

There are fixed and variable line level outputs, and an FM detector output.

There are controls for tuning, output level, and mode (Dolby, auto stereo/mono, mono, only stereo stations received). Switches for power, IF bandwidth, FM mute with automatic lock, multipath/signal strength meter mode, high blend (noise filter), and record check output.

The antenna input is 75/300 ohms and a 75 ohm coaxial jack. One switched AC outlet is provided.

Overall dimensions are 19 in. wide x 5.5 in. high x 12.9 in. deep. Weight is 16.5 lbs.

**PERFORMANCE:** For 300 ohm and "tee" antennas. Full limiting was attained with 2.6  $\mu$ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 5.5  $\mu$ V. The stereo high fidelity sensitivity (55 dB quieting) was 65  $\mu$ V. Full mute release was attained with 20  $\mu$ V.

At standard test level, the stereo, non-Dolby, frequency response measured +0/-1 dB from 30 to 15,000 Hz, down 1.5 dB at 20 Hz. In the wideband IF bandwidth mode, the monophonic distortion was 0.1% THD; the stereo distortion was 0.2% THD. In the narrow IF bandwidth mode, the monophonic distortion was 0.3% THD; the stereo distortion was 0.14% THD. The signal-to-noise ratio measured 70 dB.

With the Dolby switched in, but at 100% modulation so there was no noise reduction other than the 25  $\mu$ Sec de-emphasis, the frequency response measured +0/

-2.2 from 20 to 15,000 Hz. At the Dolby activity level (low volume), the Dolby tracking appeared to be referenced to the standard 50% modulation Dolby reference level and tracking was accurate.

Stereo separation was 40+ dB. The selectivity switch had no noticeable effect on the actual IF bandwidth (it only had a moderate effect on distortion values); in either position the selectivity was very good.

The fixed output level corresponding to 100% modulation of the transmitter was 550 mV. The maximum variable output level corresponding to 100% modulation was 1.4 volts. The record check 400 Hz output level had no relationship to the claimed 0.775 volt output. It was somewhat higher than the output for 100% modulation. (There's no reason whatsoever why the level could not be factory calibrated to 100% modulation.) The user must determine how the reference level will be used with his or her own equipment.

The locked tuning system was excellent; it could not be better. It provided precise lock for minimum distortion, and could "pull" almost 100 kHz if the user adjusted the tuning considerably off the center channel. Since the digital readout is in 100 kHz increments you can actually see the tuning pull in from, say, 91.4 to 91.5 MHz. The 0.3 red LED display is the type used on many laboratory instruments, providing a bright, well defined readout.

Note: The listening panel reported an unusually clean, "silky" sound quality, not reflected in the measurements alone. This is one of those pieces of equipment that must be seen and heard to be fully appreciated. ▲

## RECORD PLAYERS



### DUAL CS 1237 RECORD PLAYER

A two-speed single and/or multiple play record player capable of handling up to six records in the multiple play mode. Performance meets with our stringent expectations for a turntable in this price range. The record changer mechanism worked flawlessly, even with records having enlarged or otherwise damaged spindle holes. \$180, including base and dust cover.

**DESCRIPTION:** A two-speed (33, 45 rpm) single or multiple play record player depending on which of two supplied spindles is used. Unit accommodates up to six records in the multiple play mode. Placing the 45 rpm record adaptor on the multi-play spindle provides continuous repeat play of a single record. Entire operation is automatic, with the tonearm recycling to the rest and power being turned off at the end of a single record or after the last record in a stack. The system can be manually started by moving the tonearm off its rest, thereby starting the motor.

There are 33 and 45 rpm strobes around the platter's rim but there is no on-board strobe illumination; the strobe pattern(s) can only be observed under fluorescent room lighting or an accessory neon lamp.

There are controls for speed select, pitch (one control for both speeds), start/stop (reject), and tonearm lift. The tonearm indexing is automatically determined by the speed selector: 12 in. for 33 rpm; 7 in. for 45 rpm.

The tonearm has a micro-adjust counterweight and an 0 to 5 gram vertical tracking force (VTF) adjustment calibrated in 0.25-gram increments from 0.5 to 1.5 grams and in 0.5-gram increments from 1.5 to 5 grams. There is a calibrated anti-skate. The pickup

mounts in a proprietary plug-in carrier which has a tilt mechanism to adjust the tracking angle for single or multi-play. A stylus overhang gauge is provided. The multi-play tracking angle is set for the center of a stack (assuming three records on the platter). The tonearm rest has a positive lock. The output cable capacity is 160 pF.

**PERFORMANCE:** Both speeds were essentially constant with total immunity to transient line voltage variations over an applied test range of 100 to 140 volts.



Circle No. 143 On Reader Service Card

## MARANTZ 6270Q RECORD PLAYER

A two-speed electronically-controlled single play turntable whose operating features are unusual, but very convenient. Users may choose between manual or automatic operation. In the manual mode, the motor is controlled by an on/off switch. In the automatic mode, the motor starts only as the tonearm is lowered and stops when the tonearm is raised (see details below). \$270 with dust cover.

**DESCRIPTION:** A two-speed (33, 45 rpm) electronically controlled automatic/manual record player with integral base and dust cover, featuring front panel operating controls.

Push-switch type controls are provided for speed selection, manual/auto mode, *Down* (tonearm drop), *Up* (tonearm lift), and power. In the manual mode, the motor is started and stopped with the power switch. In the automatic mode, the motor does not start until the

Wow and flutter measured 0.05% with peaks to 0.17% (DIN).

The pitch control range measured +4.7/-5.2% at 33 rpm;  $\pm 2\%$  at 45 rpm.

The VTF calibrations indicated consistently 0.25 grams high between 1 and 3 grams (our test limits).

The changer mechanism worked flawlessly, even with records having enlarged or otherwise damaged spindle holes. Resistance to external shock and vibration was somewhat higher than average. ▲

tonearm is lowered by pressing the *Down* control. At the end of play, the tonearm is lifted and the motor is turned off automatically. The motor is also turned off (auto mode) when the tonearm is raised with the *Up* control.

A strobe pattern, mirror-reflexed (from under the platter, serves as a *power on* indicator; it is not a speed-check strobe in the conventional sense because there are no pitch controls or other fine speed adjustments.

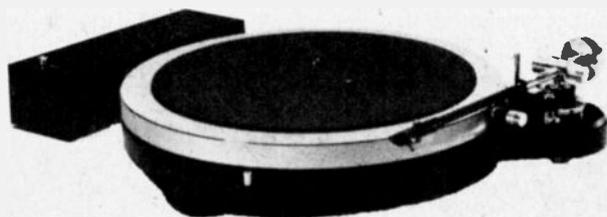
The tonearm has a micro-adjust counterweight that also serves as an 0 to 3 gram vertical tracking force (VTF) adjustment which is calibrated in 0.5-gram increments. There is a calibrated anti-skate adjustment. The pickup mounts in a universal plug-in shell; markings on the 45 rpm adaptor spindle serve as the stylus overhang gauge. The tonearm rest has a positive lock. The output cable capacity was nominally 70 pF.

**PERFORMANCE:** Both speeds held constant with total immunity to transient line voltage variations over a test range of 90 to 140 volts. The 33 rpm speed was 0.4% high. The 45 rpm speed was 0.2% high. Both values are well within tolerance for quality turntables. Wow and flutter measured 0.03% (DIN).

The tonearm's VTF calibrations were almost on the mark around 1 gram, and within 0.25-gram accuracy at 2 grams.

The tracking was unusually resistant to direct shock. Its resistance to external shock and vibration was slightly less than average.

Because the turntable always stops with the tonearm lifted, providing total stylus-protection, the player might prove an ideal choice if it is to be handled by numerous people (some less careful than others). ▲



Circle No. 124 On Reader Service Card

## MICRO SEIKI DQX-500 RECORD PLAYER

Unusual all-around, this turntable features an effective-mass adjustment for the tonearm which permits the user to increase the effective mass of the tonearm for use with low-to-medium compliance phono pickups. Wow and flutter measurements were .05% with peaks to .07%, perhaps the lowest we have ever seen. \$550.

**DESCRIPTION:** A two-speed (33, 45 rpm) electronically controlled record player with user-adjustable *effective mass* for the tonearm.

The integral base follows the contours of the platter

and tonearm, thereby forming a freeform shape for which a drop-on dust cover is provided. The electronic

## TEST REPORTS / RECORD PLAYERS

power supply for the turntable motor is in a separate cabinet that plugs into the turntable assembly. The only turntable control is a speed selector with an on/off switch and a built-in LED which indicates that the power supply is turned on. The power supply also has an LED power indicator, in addition to an on-off switch.

The tonearm assembly has an integral tonearm lift, and a height adjustment that permits the user to match the tonearm height to any pickup, thereby insuring that the tonearm is always parallel to the platter. The pickup mounts in a plug-in, non-universal-type carrier for which an overhang gauge is provided. A relative position scale for an *effective mass* weight runs the entire length of the tonearm pipe. This weight is used to increase the effective tonearm mass for low to medium compliance pickups. (A recommended scale setting for four pickups is provided; only one of these pickups, however, is in common use in this country.) The tonearm has a micrometer adjust counterweight, and a sub-weight which is required when the effective mass weight is used. There is an 0 to 3 gram vertical tracking force (VTF) adjustment calibrated in 0 to 1-gram increments. A calibrated anti-skate is also included. The

tonearm rest has a positive lock. The output cable capacity is 100 pF.

**PERFORMANCE:** Both speeds were precise, with total immunity to transient line voltage variations. Wow and flutter measured 0.05% with peaks to 0.07%. This is perhaps the lowest values we have ever measured for a record player, and we suspect that these measurements reflect the inherent wow and flutter of the test record, with the player itself having less wow and flutter than the test record.

The player was moderately sensitive to external shock and vibration, having a sensitivity we normally find in players priced about \$200. The sensitivity can be reduced by increasing the effective mass of the tonearm.

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

The user-applied effective mass weight is suggested for low to moderate compliance pickups. Since this is a rather expensive player it seems illogical to us why anyone would use anything other than the best of pickups, which are generally high compliance type.

All else aside, the unit is unique, and deserves a trip to your local audio showroom for a look-see. ▲



Circle No. 132 On Reader Service Card

### PHILIPS AF-677 RECORD PLAYER

A two-speed semi-automatic turntable, which sells for about \$150 and has surprisingly low wow and flutter measurements for this price range. Vertical tracking force gauge is built into the tonearm rest; adjustments to vertical tracking force may be made via the tonearm counterweight. A best buy.

**DESCRIPTION:** A two-speed (33, 45 rpm) semi-automatic record player with integral base and dust cover. The motor starts when the tonearm is moved off its rest and stops when the arm is returned to the rest. At the end of play the tonearm recycles back to the rest.

There are controls for 33 speed select, 45 speed select, and tonearm lift.

The tonearm has a micrometer-adjust counterweight that also serves as the vertical tracking force (VTF) adjustment. The tonearm rest, which has a positive lock, incorporates a built-in VTF gauge calibrated 0 to 3 grams in 0.5-gram increments. It automatically indicates the VTF whenever the tonearm is in the rest with the locking device off. There is a calibrated anti-skate. The pickup mounts in a proprietary (non-universal) plug-in shell for which a stylus overhang gauge is provided. The capacity of the output cables is 200 pF.

**PERFORMANCE:** Both speeds held constant over an applied test range of 100 to 140 volts with virtual immunity to transient line voltage variations. Wow and flutter measured 0.05% with peaks to 0.07%.

The built-in VTF calibrations were "on the mark."

Resistance to external shock and vibration was about average, with exceptional resistance to direct shock of the record player itself. ▲



Circle No. 129 On Reader Service Card

### PIONEER PL-518 RECORD PLAYER

The PL-518 is a two-speed electronically-controlled semi-automatic turntable whose performance overall meets our standards for units in this price range. No overhang gauge is provided, and the overhang adjustment must be made with extra care. \$199, with integral base and dust cover.

**DESCRIPTION:** A two speed (33, 45 rpm) electronically controlled semi-automatic record player with integral base and dust cover. The motor turns on when the tonearm is moved off its rest. The unit recycles and turns off after the record is played. Features include full-time illuminated 33 and 45 strobes around the platter's rim, a pitch control that serves for both speeds, a pushbutton speed selector, and a tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as an 0 to 4 gram VTF adjustment calibrated in 0.5-gram increments. There is a calibrated anti-skate and a locking tonearm rest. The pickup mounts in a plug-in universal carrier. No overhang gauge is provided; the user makes the adjustment using a metric ruler and following pictorial instructions provided in the manual. The output cable capacity is

nominally 170 pF.

**PERFORMANCE:** Both speeds remained constant with total immunity to transient line voltage variations over an applied test range of 90 to 140 volts. The pitch control range measured  $+5/-3.8\%$  at 33 rpm;  $+4.7/-3.5\%$  at 45 rpm. Wow and flutter measured 0.04% with peaks to 0.09%.

The tonearm's VTF calibrations were exact, and "in-between" values could be estimated within  $1/8$ -gram.

The record player is somewhat more sensitive to external shock and vibration than other players in the same general price range.

The overhang adjustment, using a ruler, must be made with care to avoid damage to the stylus. There is no good reason, in our opinion, why an overhang gauge is not provided for a player in this price range. ▲

## CASSETTE DECKS



### DUAL C819 CASSETTE DECK

A front-loading Dolby cassette deck whose most unusual feature is its manually controlled fade in/fade out erase feature. Wow and flutter measured a rock-steady .04%—one of the lowest values our lab has seen in cassette machines. \$430.

**DESCRIPTION:** A front-loading Dolby cassette deck whose features include microphone/line input mixing, selectors for ferric, Ferrichrome and chromium type tapes, left and right calibrated peak indicating level meters, a record level limiter, individual left and right headphone level controls, automatic tape stop/disengage, a memory reset counter, and a time-delayed user-controlled variable erase feature for fade in/fade out effects (erase takes 3 to 5 seconds to go from minimum to maximum effect).

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

Controls are provided for concentric left and right microphone level, concentric left and right line level, left headphone level, and right headphone level. There are switches for power, tape type, Dolby, limiter, counter memory on-off, and "fade." There are left and right output level controls (screwdriver-adjustable) on the rear.

The tape mechanism has lever controls for the record interlock, REW, play, FF, stop, pause, and eject. The door folds upwards, allowing complete access to the entire tape path for easy cleaning.

Overall dimensions are 17 $1/4$  in. wide x 5-13/16 in. high x 14 $5/8$  in. deep.

**PERFORMANCE:** The playback response from a standard test tape with a 40 to 12,500 Hz frequency range measured  $+1/-0.8$  dB.

Using TDK-D tape: without Dolby, the record/play frequency response measured  $+1/-2$  dB from 20 to 15,000 Hz. Distortion (at the meter-indicated peak record level of 0-dB) measured 1.1% THD with 6.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 48 dB.

With the Dolby active the record/play frequency response measured  $+1/-3$  dB from 20 to 13,000 Hz. Distortion and headroom remained the same. The signal-to-noise ratio measured 52 dB wideband, 59 dB narrowband.

Acceptable results in terms of frequency response could not be attained with Ferrichrome tape.

Using BASF Professional II (chrome bias) tape: with Dolby, the record/play frequency response measured  $+3.5/-0$  dB from 20 to 15,000 Hz. Distortion at the meter-indicated 0-dB record level was 1.4% THD with 3.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 52 dB wideband, 63 dB narrowband.

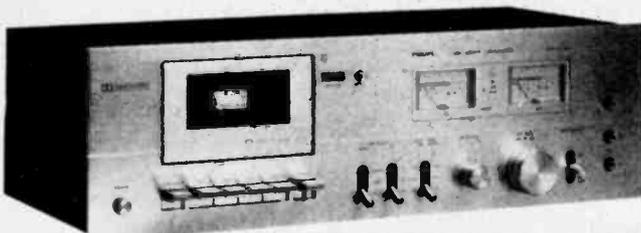
The maximum output level corresponding to a 0-dB record level was 500 mV.

The limiter cut in "hard" at  $-1$  dB, providing essentially total protection against record level overload. The peak reading meters have a fast rise and moderate (not slow) decay.

Wow and flutter measured a rock-steady 0.04%, one of the lowest values we've seen in cassette machines.

The fade in/fade out feature is most effective at removing the commercials or announcer chatter following off-the-air recordings. ▲

## TEST REPORTS / CASSETTE DECKS



Circle No. 132 On Reader Service Card

### PHILIPS N2535 CASSETTE DECK

A \$200 Dolby cassette deck which gets top-notch performance from budget-priced tapes. Bias and equalization selectors are provided for ferric (normal), Ferrichrome, and chrome (high) bias tapes. An especially good choice for those who want good sound quality which allows users to keep tape costs down to a minimum.

**DESCRIPTION:** A Dolby cassette deck featuring two calibrated VU meters, a peak record level indicator calibrated to 3 dB above 0-VU, individual bias and equalization selectors for ferric, Ferrichrome, and chrome bias tapes, a record mute that disables the input signal as long as the switch is held down, and a reset counter.

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

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

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

Overall dimensions are 18 in. wide x 5 $\frac{7}{8}$  in. high x 10 $\frac{1}{4}$  in. deep. Weight is 11 lbs.

**PERFORMANCE:** The playback frequency response from a standard test tape with a 40 to 12,500 Hz range measured +0.7/-2 dB.

Using TDK-D tape: without Dolby, the record/play frequency response measured +0.5/-2.5 dB from 75 to 15,000 Hz, down 3 dB at 40 Hz. Distortion at the meter-indicated 0-VU record level was 1.2% THD with 5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 46 dB.

With the Dolby active, the record/play frequency response measured +1.8/-2 dB from 75 to 15,000 Hz, down 3 dB at 40 Hz. Distortion and headroom remained the same. The signal-to-noise ratio referenced to 0-VU record level measured 52 dB wideband, 55 dB narrowband. Note: The Dolby tracking is quite good for a machine of this price.

Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured +0/-2.1 dB from 40 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 1.5% THD with 5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 54 dB wideband, 60 dB narrowband.

Using TDK-SA tape (chrome bias): with Dolby, the record/play frequency response measured +0/-3 dB from 100 to 14,500 Hz. Distortion at the meter-indicated 0-VU record level was 1% THD with 4 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 56 dB wideband, 60 dB narrowband.

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

Wow and flutter measured 0.08% with peaks to 0.1%.

The peak record level indicator is a green/red LED. Normally the LED glows green to indicate that the machine is in the record mode. Its color changes to red at precisely 3 dB above the meter-indicated 0-VU record level. A clever attention-getting peak level indicator, in our opinion.

Note: The mpx filter caused a higher than average attenuation of 4 dB at 15,000 Hz, and we suggest that the Dolby noise reduction system be used without the mpx filter when possible. Fact is, very few modern FM tuners require use of the mpx filter. Use the filter only if your tuner has excess pilot leakage, as indicated by improper Dolby performance. ▲



Circle No. 131 On Reader Service Card

**DESCRIPTION:** A front-loading, dual capstan, three-head system (simultaneous record/play) Dolby stereo cassette deck featuring left and right calibrated peak-reading record level meters, bias and equalization selectors for Normal, Ferrichrome, and chrome type (high bias) tapes, a user-adjustable bias level control

### REALISTIC SCT-30 CASSETTE DECK

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

(uses interstation noise from an FM tuner as the reference tones), front panel left and right Dolby calibration adjustments, rear apron left and right FM Dolby calibration adjustments, a test oscillator system for the Dolby, friction-held position markers concentric with the record and output level controls, automatic end of tape stop/disengage, and a reset counter.

There are inputs for microphones and line. Outputs

for line and phones.

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

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

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

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

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

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

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

Using TDK-SA tape (high bias): with Dolby, the record/play frequency response measured  $+2/-1.5$  dB from 30 to 15,000 Hz, down 2.5 dB at 20 Hz. Distortion

at the meter-indicated 0-dB record level was 1.0% THD with 9.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 47 dB wideband, 62 dB narrowband.

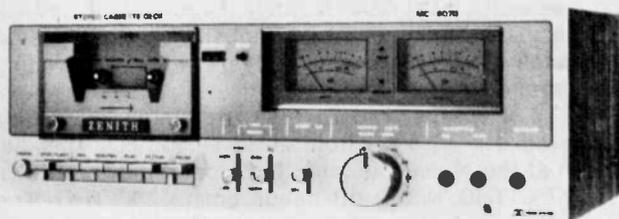
Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured  $\pm 2$  dB from 20 to 15,000 Hz. Distortion at the meter-indicated 0-dB record level was 1.1% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 42 dB wideband, 58 dB narrowband.

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

Wow and flutter was a notably stable: 0.08%.

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

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



Circle No. 133 On Reader Service Card

## ZENITH MC-9070 CASSETTE DECK

If care is taken when setting the recording level, excellent recordings can be attained using budget-priced tapes. \$250, in wooden cabinet.

**DESCRIPTION:** A front-loading Dolby cassette deck featuring selectors for low/mid/high bias and normal/ferrichrome/chromium dioxide tapes, calibrated left and right record level VU meters, a peak record level indicator, and reset counter.

Inputs are provided for microphones and line. Outputs for line and phones.

There are concentric-clutched left and right record

level controls. Switches for power, equalization, bias, and Dolby on-off.

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

Overall dimensions are 16 $\frac{1}{4}$ -in. wide x 6-in. high x 10 $\frac{3}{4}$ -in. deep.

**PERFORMANCE:** The playback frequency response from a standard test tape with a 40 to 12,000 Hz frequency range measured  $+0.1/-1$  dB.

Using TDK D tape: without Dolby, the record/play frequency response measured  $+2/-3$  dB from 30 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.2% THD with 3 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 47 dB.

With the Dolby active, the record/play frequency response measured  $\pm 3$  dB from 30 to 15,000 Hz, with a 4 dB rise from 13,000 to 14,000 Hz. (With another less expensive tape, the high end frequency response with Dolby has less of a high frequency rise. The machine handles most brand-name budget tapes very well.) Distortion and headroom remained the same. The signal-to-noise ratio referenced to 0-VU record level was 51 dB wideband, 60 dB narrowband.

Using TDK-SA tape (high bias): with Dolby, the

## TEST REPORTS / REEL-TO-REEL

record/play frequency response measured  $\pm 2$  dB from 30 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 1.5 dB with 3 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 52 dB wideband, 63 dB narrowband.

Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured  $+3/-2$  dB from 30 to 15,000 Hz with a 4.5 dB rise from 10,000 to 13,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.2% THD with 2.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU

record level was 50 dB wideband, 60 dB narrowband.

The peak record indicator lamp began to fade in at 2 dB above 0-VU record level; it was at full brightness when it reached 3 dB above 0-VU.

Wow and flutter measured 0.08% with peaks to 0.12%.

Note: If the peak record level is maintained no higher than  $-4$  dB—to provide greater headroom—notably excellent recordings can be made using budget-priced tapes. Even better performance at  $-4$  dB is attained from the TDK-SA tape. ▲

## REEL-TO-REEL



Circle No. 128 On Reader Service Card

### TANDBERG TD-20A REEL-TO-REEL TAPE DECK

A two-speed, four-motor, four-track, three-head reel-to-reel tape deck which accommodates reel sizes up to  $10\frac{1}{2}$  inches in diameter. Features abound on this machine and include multi-track and sound-on-sound recording capability. The sound quality is dead quiet and magnificent. Simply reaffirms that *Tandberg* continues to be synonymous with *high fidelity*. \$1300.

**DESCRIPTION:** A two speed (7.5, 3.75 ips), 4-motor (one is for the pinch roller), 4-track stereo, three-head system (simultaneous record/playback) reel-to-reel tape deck accommodating reel sizes to  $10\frac{1}{2}$ -in. There are built-in reel locks for NARTB (small size) reels, and locking adaptors are supplied for NAB (large hub) reels. Features include: left and right calibrated peak indicating meters; microphone/line or line/line input mixing; a master gain control with a detented "marker"; a freewheeling mode for hand feeding tape when editing; Sel Sync for in-line multi-track recording by using a record head for a playback monitor; individual left and right record selectors (which permit sound on sound (S.O.S.) recordings); a front-panel socket for an optional wireless remote control; an infra-red optical end of tape stop; a 25 dB microphone input attenuator; Edit/Cue (monitoring during fast wind); and a reset counter.

There are inputs for left and right microphones or

radio (DIN), or line #2; and left and right line #1. Outputs for line and phones.

Controls are provided for left #1 record level, right #1 record level, left micro/line #2 record level, right micro/line #2 record level, master level, left output level, and right output level. There are switches for power, speed select, reel size (tape tension), tape/source monitor, playback mode (left, stereo, right), Sel Sync on-off, left record select, right record select, and 25 dB microphone input attenuation. Recessed screwdriver-adjustable bias level controls are provided on the front panel.

The tape mechanism has touch-pad switches for the record interlock, REW, stop, FF, and play. Freewheel is attained when the stop and FF switches are depressed.

Overall dimensions are 17.1 in. wide x 17.7 in. high x 7.7 in. deep. Weight is 37.5 lbs.

**PERFORMANCE:** At 7.5 ips, the playback from a standard test tape with a 50 to 15,000 Hz range measured  $+2/-0$  dB. At 3.75 ips, the playback from a standard test tape with a 50 to 7500 Hz range measured  $+2/-0$  dB.

Note: The machine was supplied factory-adjusted for Maxell UD/XL tape and all tests were made using this tape.

At 7.5 ips: the record/play frequency response measured  $+1/-1.5$  dB from 20 to 20,000 Hz. The distortion at the meter-indicated 0-dB peak program level was 1.7% THD with 2 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 60.5 dB.

At 3.75 ips: the record/play frequency response measured  $+0/-1.5$  dB from 20 to 15,000 Hz, down 3 dB at 18,000 Hz. Distortion at the meter indicated 0-dB peak program level was 1.5% THD with 2.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-dB record level was 59 dB.

Note: Noise measurements are wideband, and do not change with weighting filters, indicating outstanding power supply filtering more or less typical of the overall quality of this machine.

The maximum output level corresponding to a 0-dB record level was nominally 1.5 volts.

Wow and flutter measured notably low; 0.05% with peaks to 0.07% at both speeds.

The optical infra-red end of tape sensors will stop a tape on a transparent or translucent leader, elimi-

## TEST REPORTS / INTEGRATED AMPLIFIERS

nating the annoyance of tape run-off. To load, the play (or wind) button must be held down until the leader is beyond the optical sensor.

The peak meters are fast rise, very slow decay, almost a semi-hold. They indicate the absolute program peak record level and the background noise is essentially dead quiet if the recording level is pushed up

against 0-dB. Distortion is minimal if the signal is not permitted to rise beyond the 0-dB calibration.

The listening panel reported an outstanding sound quality and essentially dead quiet background, equal to or surpassing that of many professional studio recorders. ▲

## INTEGRATED AMPLIFIERS



Circle No. 142 On Reader Service Card

### KENWOOD KA-801 INTEGRATED AMPLIFIER

The KA-801 is the middle-of-the-line unit in a new series of amplifiers which incorporate high-speed transistors and circuitry and which were designed to radically improve clarity in the mid-range and high frequencies. Our tests and our listening panel agree: The amplifier produces an exceptionally clean sound with awesome deep bass. You won't find unnecessary frills, but you will find extraordinary sound quality. \$600, in metal enclosure.

**DESCRIPTION:** An integrated stereo amplifier FTC-rated at 110 watts RMS per channel into 8 ohms, 20 to 20,000 Hz, at a distortion no higher than 0.015% THD.

Features include DC coupling for all inputs except phono, or AC coupling (DC blocking) which provides some attenuation below 20 Hz when needed for turntable rumble reduction or DC isolation, left and right output power meters with a logarithmic calibration from 1-mW to 200-watts into 8 ohms, automatic dubbing from one recorder to another, and an output hold-off that prevents power supply turn-on transients from

being fed to the speakers.

Inputs are provided for two magnetic phono, tuner, aux, and two tape. Outputs for two speaker systems, two tape machines, and headphones.

There are controls for volume, balance, ganged bass, ganged treble, input selection, tape monitor/dubbing selector, output selection, and mono/stereo modes. Switches for power, tone control defeat, loudness compensation, DC/AC coupling, and 20 dB attenuator.

Two switched and an unswitched AC outlet(s) are provided.

Overall dimensions are 17-5/16 in. wide x 5-3/16 in. high x 16-3/16 in. deep. Weight is 38.6 lbs.

**PERFORMANCE:** The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 111 watts RMS. The frequency response at 111 watts/8 ohms was +0.4/-0 dB from 20 to 20,000 Hz at a distortion no higher than 0.01% THD at any frequency.

With the AC coupling switched in, the 20 Hz attenuation from the high level inputs was 0.5 dB (essentially negligible). Through the phono input, the 20 Hz attenuation was 1.5 dB (also negligible).

The tone control range measured  $\pm 9$  dB at 50 Hz;  $\pm 7.5$  dB at 10,000 Hz. The magnetic input hum and noise measured -67 dB, with stereo separation well into the noise level.

The output power meter calibrations range from "on the mark" at 100 watts to 20% low at 1 watt. Their frequency response measured ruler flat from 50 to 20,000 Hz, down about 2 dB at 20 Hz.

The listening panel reported an exceptionally clean sound with: "awesome deep bass." Basically, the amplifier is short on *gingerbread icing* and generally unneeded frills, but very long on sound quality. ▲

## POWER AMPLIFIERS



Circle No. 130 On Reader Service Card

**DESCRIPTION:** A stereo power amplifier FTC-rated at 50 watts RMS per channel into 8 ohms, 20 to 20,000

Hz, at a distortion no higher than 0.05% THD. A monophonic "bridge" connection, whereby the speaker is connected to each channel's "hot" output, provides an FTC rating of 160 watts RMS into an 8-ohm load, 20 to 20,000 Hz, at a distortion no higher than 0.1% THD.

Features include left and right 12-step LED output power indicators with green/yellow (safe) calibration. An internal protection circuit (termed "IOC") uses a

## TEST REPORTS/PREAMPLIFIERS

### CROWN PL-1 POWER AMPLIFIER

A power amplifier rated at 50 watts per channel into an 8-ohm load, with .05% THD or less. It meets these criteria admirably, and also offers a rear-panel option of a monophonic bridge connection which provides a mono output of 160 watts into an 8-ohm load, at a distortion no higher than 0.12% THD (as measured in our lab). Its price is about \$479.

red LED to indicate when the amplifier has been driven into output clipping, or there is some other form of overload or unsafe condition. A speaker output is provided ahead of the normal speaker outputs which follow a hold-off to prevent power supply turn-on transients from being fed to the speakers.

There is one set of line level inputs (the left channel is used for mono). There are outputs for two speaker systems after the output hold-off, one speaker system in front of the hold-off (instantaneous on), and phones.

Controls are provided for left and right volume. Switches for power, speaker system 1, and speaker system 2. A switch on the rear apron selects stereo or

"bridge" mono operation.

Overall dimensions are 19 in. wide x 3½ in. high x 12¼ in. deep. Weight is 18 lbs.

**PERFORMANCE:** The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 53 watts RMS. The frequency response at 53 watts/8 ohms measured +0/-0.1 dB from 20 to 20,000 Hz at a distortion no higher than 0.08% THD at any frequency.

In the monophonic "bridge" mode, the power output at the clipping level was 160 watts RMS into 8 ohms. The frequency response at 160 watts/8 ohms measured +0/-0.1 dB from 20 to 20,000 Hz at a distortion no higher than 0.12% THD at any frequency.

A 1 volt input produced 53 watts/8 ohms output per channel in the stereo mode; 171 watts/8 ohms in the mono mode.

When the green LED output power indicators are all lit, the output power per channel is 10 watts/8 ohms. When all green and yellow LEDs are lit, the output is 50 watts/8 ohms. The red IOC overload indicators illuminate at 64 watts/8 ohms per channel in the stereo mode; 160 watts/8 ohms in the mono mode.

The signal-to-noise ratio referenced to a 1 volt input and 10 watt output measured 98 dB. ▲

## PREAMPLIFIERS



Circle No. 130 On Reader Service Card

### CROWN SL-1 PREAMPLIFIER

A preamplifier without tone controls which features a remote phono preamplifier module designed to keep connections between turntable and preamp as short as possible. Frequency response measured ruler flat throughout the audible frequency range with no more than .005% distortion—a figure so low that it is indistinguishable from the residual noise level of our test equipment. Designed for use in a standard 19-inch rack panel mounting. \$549.

**DESCRIPTION:** A stereo preamplifier without tone controls which features left and right LED overload (output clipping) indicators, a 7-second output hold-off when power is first turned on, a subsonic (low) filter, and a remote magnetic phono preamplifier module with a high level output that is connected to the preamp through a 5-foot power/signal "umbilical" cord. The preamplifier has switch-selected input impedance of 47K or 100K ohms, and individual left and

right screwdriver-adjustable gain controls. The phono inputs on the preamplifier itself are intended only for connection to the module; they are not standard equalized high-gain inputs.

The preamplifier has inputs for the phono module, tuner, two aux, and two tape. Outputs for two line level (parallel connections), and two tape.

Controls are provided for volume and balance. There are switches for power, input selection, tape monitor 1, tape monitor 2, and low filter. The phono input impedance selector switch and left and right phono gain controls are on the module. The power/signal cable from the module plugs into matching jacks on the rear apron.

One unswitched and four switched AC outlets are provided.

Overall dimensions are 19 in. wide x 3½ in. high x 7¾ in. deep. Weight is 10 lbs.

**PERFORMANCE:** Note: Though the preamplifier is rated for 2.5 volts output, tests were conducted at the common high fidelity equipment test level of 1 volt. Rated overload is 10 volts.

At 1-volt output, the frequency response was ruler flat from 20 to 20,000 Hz at a distortion no higher than 0.005% THD (including noise) at any frequency. (Actual value might be considerably lower because 0.005% THD gets into residual and radiation noise levels of the equipment used for testing.)

The output clipping level measured 11 volts, and the LED overload indicators turned on precisely at 11 volts.

The subsonic low filter was down 3 dB at 33 Hz (its

rated performance), and down 13 dB at 20 Hz.

With a 3 mV input and a 1 volt output, the magnetic input hum and noise with maximum module gain measured -65 dB, with no trace of crosstalk from the opposite channel.

The purpose of having a remote phono preamplifier is to permit the shortest possible connections between the pickup and the first amplifier stage, thereby eliminating the possibility of hum pickup and

high frequency losses in the turntable cables. We found no differences when using standard 1-meter turntable cables. Perhaps long extensions added to the usual turntable cables might result in hum pickup and high frequency losses, but that's an individual problem we have not yet run across. Except for one particular turntable supplied with unusually short cables, we have always been able to reach the preamplifier with the supplied turntable cables. ▲

**HEADPHONES**



Circle No. 126  
On Reader Service Card

**AKG K141/4  
HEADPHONES**

A very light pair of headphones whose performance overall is commendable. \$64.

**DESCRIPTION:** 8-ounce stereo headphones with sling headband and pressure ear cushions. A 9-foot cord is also provided.

**PERFORMANCE:** A comfortable pair of headphones which feels very light, both on the head and on the ears. Sound quality lacks deep bass, but overall sound is pleasant. Efficiency is somewhat higher than average.



Circle No. 127 On Reader Service Card

**KOSS K/6A  
HEADPHONES**

The efficiency of these headphones is well above average. They are able to deliver lots of volume—and need very little power to do so. \$25.

**DESCRIPTION:** 16-ounce stereo headphones with cushioned headband and circumaural ear cushions. An 8-foot coil cord is also provided.

**PERFORMANCE:** A generally comfortable pair of headphones, with moderate weight on head and moderate pressure on ears. Sound quality lacks ultra-deep bass, but has a rich, pleasant sound overall. Efficiency is well above average. They do not require much power to attain high volume levels.

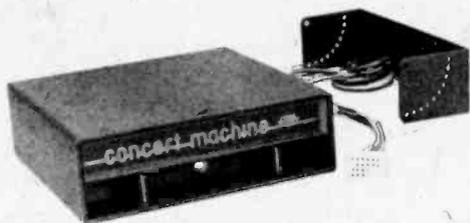
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The American Heart Association 

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## EQUALIZERS & OTHER SEPARATES



Sound Concepts' 1060 Concert Machine Ambience Restoration System offers a time delay selection range of 5 to 70 mSec. \$300. Circle Reader Service Number 138.



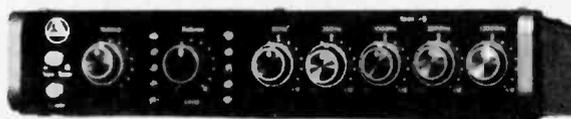
Clarion's PLE-029 rack houses the GT-501E tuner (\$250) and the GE-501E equalizer (\$55) and may be stacked to house cassette deck and amp, too. Circle 136.



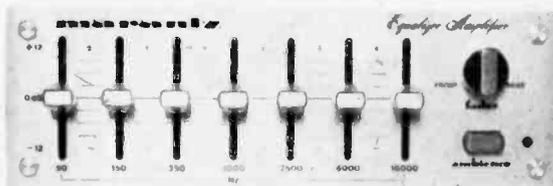
Fujitsu Ten's Model RV-130EX-1 is a combination pre-amplifier/graphic time delay unit that includes echo control and front/rear fader. \$180. Circle No. 135.



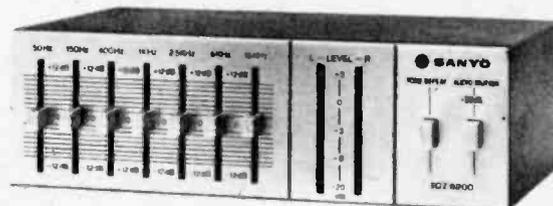
Mitsubishi's CV-23 equalizer/booster is a 6-position unit including volume/front-rear fader knob and left/right balance slide control. \$180. Circle No. 140.



Pyramid Industries offers the Model X-Spec 5, a five band concentric preamplifier/equalizer which may be bi-amped or used in stereo. \$230. Circle No. 141.



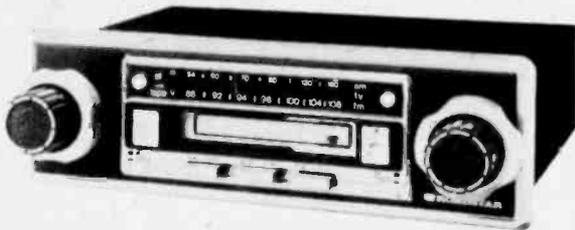
Marantz's Model SA-247 equalizer/amplifier offers seven equalizer controls, an ambience control, and 15 watts per channel into 4 ohms. Circle No. 77.



Sanyo's EQZ6200 is a preamplifier/7-band graphic equalizer combination includes 20 dB muting switch and LED level indicators. \$70. Circle No. 106.

# CAR STEREO SHOWCASE

## **IN-DASH UNITS**



*Roadstar's 2141 in-dash cassette/AM/FM combination also includes a TV audio reception feature and a local/DX sensitivity switch. \$270. Circle No. 148.*



*Jensen's R410 cassette/AM/FM receiver includes Dolby noise reduction circuitry and a local/distant selection switch. \$340. Circle Reader Service No. 105.*



*Sparkomatic's SR-3400 cassette player with AM/FM radio includes digital station read-out and digital clock. \$300. For details, circle Reader Service No. 149.*



*Sharp's RG-3550 is an in-dash FM/AM/FM stereo radio with cassette player that includes the automatic program search system. \$220. Circle Number 145.*

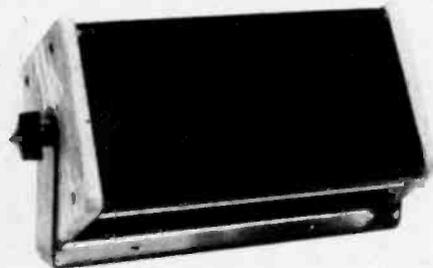


*Metrosound's MS-8580 in-dash cassette tape player with AM/FM radio includes an automatic reverse feature. \$240. For details, circle Reader Service No. 146.*

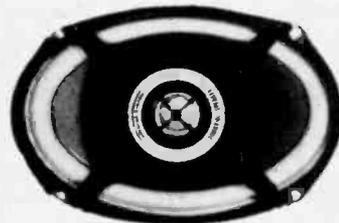
## **SPEAKERS**



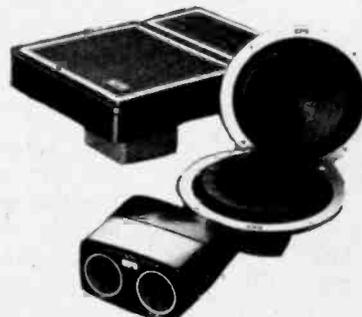
*Jensen's Triax II 6x9-inch biamplifiable speakers can handle up to 100 watts RMS and sell for about \$140 each. Get details by circling Reader Service No. 105.*



*Infinity's new Infinitesimal speaker includes a 5-in. woofer and an EMIT™ tweeter. \$175 each, including mounting bracket. Circle Reader Service Number 139.*



*Royal Sound's RS-600 6x9-inch 2-way speaker handles up to 38 watts and sells for about \$125 per pair. For details, circle Reader Service Number 137.*



*Epicure's LS-70 speakers (\$75 each) may now be coupled with the LS-35 companion speaker systems (\$75 per pair), with level control system included. Number 68.*

# AUDIO SHOWCASE

(Continued from page 24)

less than 0.05%, 20 to 20,000 Hz, rated output; IMD, less than 0.00095% at rated output; NTIM distortion, 0.0035% at 50 watt peak equivalent level. The all-new Straight Line One audio preamplifier is priced at \$549 and offers the following specs: frequency response,  $\pm 0.1$  dB, 10 to 20,000 Hz; signal-to-noise ratio, 101 dB below rated output, A weighted; THD, less than 0.0009%, 10 to 20,000 Hz at rated output; IMD less than 0.00055% of rated output; NTIM distortion, less than .0035% of 2.5V peak equivalent output.

## Mini-Subwoofer System

Until now, state-of-the-art three-piece mini-subwoofer systems have been regarded as "esoteric" systems with equally esoteric prices in the \$600 to \$800 range. More in keeping with the average hi-fi buyer's budget is the \$279.95 price tag on this Ultralinear TriModal TM-116 system which includes Ultralinear's (Sub-One) bass module having a 10-inch dual voice coil low frequency driver and matching 10-inch passive radiator. Outputs from the bass module lead to two TMS-16 mini-satellite units which individually feature a 4½-inch air suspension midrange/bass driver and a 1-inch soft-dome high frequency radiator. The TriModal three-piece system provides room-filling sound without having to place two large speakers directly in front of listeners. The bass module can be anywhere in the room. Both the bass module and the satellite units are individually circuit breaker protected.



Circle No. 118 On Reader Service Card

## Automatic Turntable

Sony's new PS-X70 Automatic Turntable features a tonearm that has its own servomotor system so that you won't have to "wince" because of the speed reduction that can otherwise occur as a single motor attempts to spin the platter and also lift the tonearm from the record. The "pop" that may occur when a stylus touches down or lifts up is also muted by means of an automatic circuit which also prevents speaker-destroying hum and buzz that can occur should you remove the headshell while the amplifier is turned on. Other features of the arm include a



Circle No. 94 On Reader Service Card

lightweight carbon-fiber shaft-core for arm rigidity and exceptionally low resonance. A second servomotor drives the extra-heavy platter while a quartz-crystal-phase-locked version of Sony's Magnedisc speed control system monitors the turning speed at the outer rim of the platter for greatest precision. The direct-drive brushless-slotless motor is claimed to eliminate speed irregularities due to "cogging." Other features: feather-touch controls; auto-start; cueing; 33/45 speed change; repeat; pitch control. Specs: rumble, -75 dB (DIN B); wow and flutter, 0.025% WRMS; speed variable, 10% on demand, otherwise fixed within 0.002%. Price: \$500.

## Two-Motor Cassette Deck

This Luxman K-12 two-motor stereo cassette deck is usable with the new metal-particle tapes, and a "major feature" is said to consist of the use of direct-coupled DC amplifiers in both recording and playback modes. Other features include: plasma bar-graph record-level indicator with peak-hold display; frequency-generated servo motor for capstan; coreless motor for reels; Sendust record/playback head; IC logic operating controls; provision for use with remote control and external timer; Dolby. Specifications: frequency response, 30 to 16,000 Hz  $\pm 3$  dB with

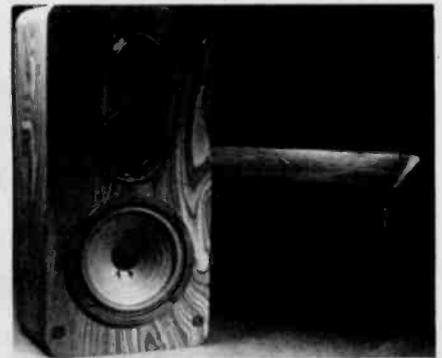


Circle No. 119 On Reader Service Card

LH tape, 30 to 18,000 Hz with chrome tape, and 30 to 20,000 Hz with metal tape; wow and flutter, .04% WRMS; S/N ratio, 69 dB with Dolby on and using metal tape; overall distortion, 1.2%. Suggested list price: \$995.

## Rounded Corner Speakers

Acutex's rounded corner speaker system, Model 3.1, features an "innovative" 8-inch Perfect Piston™ woofer for low frequencies, a 4.5-inch Passive Reflexer™, and a 3-inch Acutex cone dome tweeter for high frequencies. Frequency response is said to be 35 to 20,000 Hz and efficiency is put at 99



Circle No. 121 On Reader Service Card

dB/1 watt/1 meter. Nominal impedance is 8 ohms, and cabinet dimensions are 21 inches high by 11 inches wide by 9 inches deep. As for those rounded corners, Acutex says: they are "sure to enhance any decor." Suggested retail price per speaker: \$149.

## Liquid-Filled Tracking Arm

Renaclean, Germany's largest selling line of audio maintenance products, is being made available to U.S. consumers. One of the more innovative items



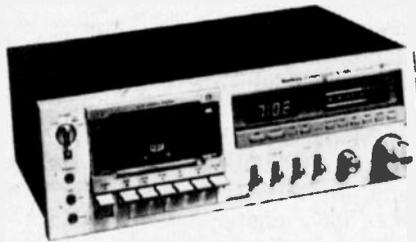
Circle No. 120 On Reader Service Card

is a liquid-filled tracking arm (top left corner of record player). Anti-static fluid within the tracking arm is fed to a special fiber cleansing pad and applied to the record automatically as it is being played. According to Renaclean, the result is better audio fidelity and longer wear because records stay cleaner. The reservoir in the arm refills easily and holds a three-month supply of the anti-static material. Suggested retail price: \$30.00.

#### Clock/Timer Cassette Deck

Sanyo's Model STD-2500 Dolby stereo cassette tape deck, priced at \$450, is equipped with such "state-of-the-art" refinements as a built-in digital

clock/timer display with a real-time tape counter, fluorescent bar-graph peak level indicator, an exclusive Sanyo dymalloy head, a servo-motor with built-in rotation control for low wow and flutter, fully auto-loading tape system, memory stop, and Dolby noise reduction system. Even rack handles



Circle No. 123 On Reader Service Card

are available. Specifications for this 4-track, 2-channel unit: power consumption, 20 watts; recording system, AC bias; erasing system, AC erase; motor, FC servomotor; wow and flutter, less than 0.065% WRMS; frequency response, 30 to 15,000 Hz with LH tape and 30 to 17,000-Hz with chrome tape; signal-to-noise ratio, more than 65 dB (chrome tape, with filter, Dolby off) and 5 dB better at 4 kHz and 10 dB better at 5-kHz or higher using Dolby; distortion, less than 1.5%; fast-winding time, about 80 seconds for C-60 tape; line input, 50 MV, 50k ohms; microphone input, 0.5 MV (6.8k ohms); line output, 580 MV (Dolby level); headphones output, 2 MV (80 HMS, Dolby level output control at max.).

## SUMMER FORECAST 1979

(Continued from page 48)

CS-732D, both featuring "Quick Reverse" that utilizes a photo sensor for virtually instantaneous reversing in both record and playback modes; Hitachi with its Model D-777; and Sony, with its TC-K96R that features a detachable front control panel for remote operation.

What appears to be a new low price for a major-brand Dolby cassette deck has been set by Sanyo. Its Model RD5008 is priced at \$129.95. It also features five-point LED level indicators for each channel.

Another new low price may have been established by Sharp Electronics. Its new RT-2551 cassette deck featuring a "soft-touch" solenoid transport controls is priced at \$339.95, to our knowledge the lowest price for such technology to date. It also features Sharp's exclusive APSS—automatic program each system.

The open reel tape equipment category also has some new offerings. Four companies have added new reel units. Akai's new GX-635D at \$995 features: a new head cover that simplifies threading and also permits easier access to heads for cleaning and demagnetizing; 10½-inch reel capacity; full-logic solenoid controls; and automatic reverse in both record and play modes. A Dolbyized version is also available, priced at \$1,095. TEAC has added the Model 35-2 for about \$1,900. It features full-logic operation, front bias and equalization controls, and a 10½-inch reel capacity. Philips Model N4520 at about \$1,400, marks the firm's entry into the "professional" equipment ranks in this country. It features totally adjustable biasing and 10½-inch reel capacity. Marantz offers quartz-locked drive and electronic digital counter in its new Model 7700-2, priced at \$2,500.

Turntables. Trends in turntables center around front controls, anti-resonant

bases and quartz speed control. Among models featuring all of the above are Mitsubishi's Model DP-EC20 at \$520, AIWA's Model AP-2600U, priced at \$400, and Technics' Models SL-5300 and SL-5600 at \$290 and \$240 respectively. The AIWA unit additionally features a digital display of operating speeds. Among new models featuring front controls are Mitsubishi's DP-EC20 and DP-EC10, Hitachi's HT-463, HT-660, and Technics' SL-5200 and SL-5350, the latter a record changer. Among new models with anti-resonant bases are Kenwood's KG-650 and KD-600, and Sony's PS-X30, PS-X40, PS-X50, PS-X60 and PS-X70. Among new units with quartz-controlled speeds are: Technics SL-5200 and SL-5350 (record changer); Kenwood KD-650 and KD-600; Sony PS-X70 and PS-X30; and Hitachi HT-463 and HT-660.

Amplifiers. The big news in ampli-

fiers and amplifier sections of stereo receivers is increased focus on the DC concept of amplification with its potential for ultra-wide frequency range, better transient response, and lower transient intermodulation distortion (TIM). Based on the solid consumer acceptance achieved by a few companies, many others are offering DC technology. Among them are: AIWA with its integrated Model AA-8700U with 75 watts per channel output at \$550; Pioneer with its integrated SA-9800 at \$750; Rotel with its integrated Models RA-2040 (120 wpc) at \$880, RA-2030 (80 wpc) at \$680, and Model RB-2000 power amp (120 wpc) at \$610, and a matching DC preamp at \$530; Technics with four integrated models ranging from 47 wpc at \$300 to a 115 wpc unit at \$1,000; and Sansui with three integrated amps ranging from \$350 to \$1,450, the latter, the

### ON OUR COVER

Featured on our cover this issue is a collection of new products which are expected to be in your local hi-fi dealer's store just about now. At far left is Ohm's new "I" ("eye," not "one") speaker. It's a ported system, using a 12-inch woofer and a 1-inch tweeter on the front panel and an 8-inch woofer and a 1½-inch tweeter, both firing upward, on the top panel (not visible in this photo). Its price: \$600 each. Circle Reader Service No. 134. At right on top are three microcomponents from Technics. The top unit is the SE-CO1, a 35-watt-per channel power amplifier which sells for about \$360. The middle unit is the ST-CO1 tuner which sells for about \$260. The other unit is the SU-CO1, a preamplifier selling for about \$260. Reader Service Card Number 98 will bring

you details. Below the microcomponents you will find the TEAC Model 124 Syncaset, a new cassette deck capable of multi-track recording, at a price of \$449. Circle Number 10. Next in our stack is the JVC KD-A8 cassette deck which features automatic biasing and is capable of handling the new metal tapes. Circle Number 74 for details on this \$750 machine. Below it is U.S. Pioneer's new SA-8800 high-speed amplifier which sells for about \$550. Reader Service No. 85 will bring you additional information. And holding up the entire stack are two Kenwood units, the KT-917 pulse detector tuner (\$1000) and the KA-907 integrated amplifier (\$1000). Circle Reader Service Number 75, and Kenwood will provide details.

AU-X1 with the highest slew rate we've encountered so far, 260 V/microsecond. Sansui also offers a DC preamp at \$495, and a 110 wpc basic DC amp at \$665; and Sony has debuted the TA-E88B DC preamp that consists of two independent preamps mounted on a single chassis with independent power supplies.

An unusual pair of units by Mitsubishi has also been introduced. It consists of the DA-A7DC, a 75 wpc DC power amplifier tentatively priced at \$330, plus Model DA-C7, a matching tuner/preamplifier combination tentatively priced at about \$360. The amp and preamp combo were designed for "docking" with each other for space-saving reasons.

Among new receivers with DC preamps are Nikko Models NR-1219 and NR-1019 (no price information); Rotel Models RX-2002 (\$800) and RX-2001 (\$720); and Sansui Models TA500 (50 wpc) at \$465, G7500 (90 ) at \$620, and G5500 (60 wpc) at \$465.

Another significant development on the amplifier front is the introduction by Kenwood of a pair of high-speed single-channel amplifiers, featuring exceptionally fast rise times and slow rate, that are said to "virtually eliminate intermodulation distortion." The units, part of the firm's "Audio Purist Group," achieve this high performance through the use of a new high-speed output transistor—actually the equivalent of 300 individual transistors, each with its own built-in emitter resistance, on a single silicon substratum Model L-07MII, 150 watts, sells for \$600. Model L-05M, 100 watts, sells for \$415. Model L-07II, is a high-speed preamp for use with the above amps, list priced at \$900.

This same high-speed technology is used by Kenwood in a series of three integrated stereo amps, priced from \$450 for an 80 wpc unit, on up to \$1,000 for a 150 wpc model. The latter features a rise time of 0.8 microsecond, and a slew rate of  $\pm 230$  V/microsecond—four to ten times better than comparable amplifiers using conventional bi-polar transistors, according to Kenwood.

Hitachi, has introduced its first integrated amplifiers which use MOS FET technology. The HA-7700, priced at \$600 has 65 watts per channel output. Model HMS-6500, a new MOS FET power amplifier priced at \$350 has a 50 watts per channel output.

**Tuners.** Some new tuner technology has emerged from Kenwood. Four new tuners have been introduced which utilize new digital circuitry dubbed "Pulse Counter Detector." The prices of these units range from \$270 to about \$1000. (See the 8 *New Innovative Products*

feature elsewhere in this issue for details on this new concept.)

Other news in tuners is the widening use of quartz lock/control for optimum tuning accuracy. This, according to several observers at the 'Show, is a new stamp of merit that is being sought by consumers becoming ever more sophisticated—and demanding. Among companies offering QL tuners were Marantz with its ST-7 at \$835; Pioneer with its Model TX9800 at \$450; Rotel with its Model RT-2000 at \$460 and its Model RT-2100 at \$640; AIWA with its AT9700U at \$520; and Sansui with its TU-919 at \$585. The latter three have digital station readouts.

**Readout Systems.** New systems of recording level, power output, and tape usage indication are also going to be quite evident to you. For example, fluorescent level readouts appear in Eumig's Model FL-1000 at about \$1500; Hitachi's New D-560 cassette deck at \$300; in Pioneer's CT-F800 at \$450; and Technics' Models RS-M22, RS-M33, RS-M44, and RS-M95, priced from \$300 to \$1,300.

Sony has added, the TC-K60 at \$550 to its cassette models with liquid crystal readouts.

Plasma bar-graph recording level readouts showed up in Lux Models K-12 at \$995, and in the super deluxe 5K50 at \$1,995, the former with metal tape recording capability, the latter convertible to that medium.

LED bar graph readouts were featured by TEAC in its Model A-510 cassette deck at \$499 and in the bargain-priced Sanyo RD5008 at \$129.95.

Another new feature, digital tape counters, appears in Sanyo's New RD-5372 cassette deck at \$500 and in Technics' M-95 at \$1,300.

Technics utilizes fluorescent power indicators instead of traditional meters in five new amplifiers priced from \$260 to \$1,000, and three non-switching integrated amplifiers from U.S. Pioneer ranging from \$450 to \$750 also feature fluorescent power indicators.

And Yamaha is substituting LEDs for power meters in a new basic DC amp, the 120 wpc Model M-4, priced at \$450. Additionally, Rotel offers two receivers priced at \$720 and \$800 utilizing LEDs, for power readouts, and Hitachi has such a model at \$380.

As for digital readouts of station frequencies, they are also included on two receivers from Rotel, Models RX-2002 and RX 2001, plus the Model RT-2100 tuner. The units are priced at \$800, \$720 and \$640, respectively.

**Speakers.** The new offerings in the speakers area by and large represent refinements and incremental advances in current technology.

An example is the addition by Technics of two more systems to its Linear

Phase group of phase-coherent speakers. Model SB-6060 is a three-way unit that employs a 12-inch woofer, 4-inch cone midrange, and dome tweeter, with each speaker mounted individually and separately from the others. Price, \$350 each. The Model SB-7070 is Technics' first four-way Linear Phase model. It uses a 13 $\frac{1}{2}$ -inch woofer, 6 $\frac{1}{2}$ -inch midrange, 4-inch cone upper midrange, and a soft-dome tweeter, all individually mounted. Price, \$450. Both use ports for the woofer section.

Altec has added to its existing high-end consumer line a professionally oriented model at a lower price. The Model 14, said to be a smaller, more affordable version of its Model 19 Studio Monitor, was designed for home use. It features a 12-inch bass driver and the firm's proprietary "Mantaray" constant directivity horn with wide dispersion characteristics for greater latitude in seating position while listening. It has a dual band equalizer for separate adjustment of mid and high frequencies. The price, \$495.

Jensen, long known for its low and middle priced speaker systems, has entered the high end arena with its intriguing System B, priced at \$590. The system is actually in two parts—the speaker enclosure itself, plus a "U"-shaped wood framework that attaches to the sides of the enclosure in a choice of two positions. In one position the system is perpendicular. In the other its face is tilted upward at a slight angle. This choice of positioning enables better coupling of the system to room acoustics for better sound. It uses five drivers in a four-way configuration. A one-inch front firing dome tweeter is used with a two-inch rear-firing tweeter for the highs; a 1 $\frac{1}{2}$ -inch soft-dome is used for the upper midrange; a six-inch cone driver is used for the lower midrange; and a 12-inch driver is used for bass.

ESS, known for the unique Heil air motion transformer (amt) midrange/tweeter has come up with a new version of it for use in systems at a lower price under the "Eclipse" brand designation. Model B102 at \$249 and B122 at \$329 are bookshelf models that use the new amt driver plus a 10-inch and 12-inch woofer, respectively, and also have passive radiators, plus brilliance controls. The M102 at \$429 and M122 at \$595 are floor models finished in walnut. The M102, using 10-inch woofer, stands 40 inches tall. The M122, using 12-inch woofer, is 44 inches high. Both occupy slightly more than a square foot of floor space. Both feature brilliance (treble) and presence (midrange) controls.

"A new technology which exemplifies the state of the art in loudspeakers today" is Martin Speaker Division's

claim for the high quality sound of its new "Transflex" series of slim vertical speaker systems. Using a proprietary form of transmission line loading, the systems are notable for their excellent bass response (verified at the Show). The Transflex Model TL1650, priced at \$250, uses a 6½-inch woofer and one-inch dome tweeter in a housing that measures 25½ by 8 by 11¼ inches and can be mounted on optional chrome metal tripod base. The TL2050, somewhat larger and also pedestal-mountable, uses 8-inch woofer and one-inch dome tweeter. It sells for \$350. Model TL3050, standing 48½ inches high and using optional low wooden base, employs a 10-inch woofer, two-inch dome midrange, and one-inch dome tweeter. It sells for \$550. The Delta 4050, standing 52½ inches high, and priced at \$650, uses two 11-inch woofers, five-inch midrange, and one-inch dome tweeter. An optional wood base is available for the 4050. All models are finished in teak.

Ohm Acoustics has taken a new design direction with its Ohm I, priced at \$600. Employing a vertical, slightly tapering housing, it uses a 12-inch "subwoofer," and one-inch tweeter mounted on the front panel, and another one-inch tweeter plus eight-inch woofer and 1½-inch tweeter in the top panel, firing upward. The front panel also has two ports. The system's 24-element crossover contains four controls to match the unit to the listening room and insure flexible placement.

RTR has a new offering which can best be called a large wedge-shaped system, the Model 800D, priced at \$600 each. Located near the base of the sloping front panel is a 10-inch woofer; above it an 8-inch upper bass/lower midrange driver; plus 1½-inch midrange and one-inch tweeters higher up on the panel. The driver positioning

is phase coherent. The driver cutouts are contoured to lessen diffraction distortion.

BTM Manufacturing, a two-year old speaker company has made available four wedge-shaped units whose upper sections each contain two electrostatic elements featuring a new design approach to electrostatic technology. The electrostatic elements inside the patented "Translator" design are made up of two plastic membranes surrounding one fixed plate, instead of the other way around as in traditional electrostatic technology. No external power supply is needed. The models are the 290 with eight-inch woofer at \$139; 300 with 10-inch woofer at \$199; 310 with 12-inch woofer at \$349; and 320 with two 10-inch woofers at \$499. The enclosures are of solid woods and trim.

Infinity has added two speakers to its line, one at each end of the price spectrum. At one end, it offers a new colossal-size speaker system and at the other, it has introduced an "InfiniTesimal" speaker system. Manifesting the former is the Reference Standard 4.5, priced at \$3,000 the pair complete with equalizer/contour control in separate enclosure. Each system uses two Infinity-Watkins 12-inch dual-drive woofers, four Electromagnetic Induction Midrange (ENIM) drivers in a dipole configuration, and four Electromagnetic Induction Tweeters (EMIT), one of them facing rearward. The units stand 64½ inches high and are 26½ inches wide and 14½ inches deep. The woofers use polypropylene cones for superior bass and midrange response.

Polypropylene is also used in the five-inch dual voice coil woofer of the InfiniTesimal, Infinity's entrant into the mini-speaker field. Priced at \$175 each, the system also employs an EMIT tweeter. The system can be driven with as little as 10 watts of power and

can handle 65 watts. It measures 11 by 6½ by 5½ inches, and comes in oak housing with black anodized aluminum and perforated metal grille.

Also entering the mini-speaker field is Sansui with a three-way model in black polished aluminum housing priced at \$145 each. Called the J-11, it is believed to be the first mini model employing a passive radiator (four-inch). The woofer is four-inch; the tweeter a one-inch soft dome. Size: 4½ by 11½ by 5½ inches.

Entering the compact speaker system field is H. H. Scott, with a two-way model with 6½-inch woofer and one-inch tweeter in a cabinet measuring 13 by 7½ by 6½ inches. It features "Controlled Impedance," a principle of proper speaker/amplifier interface under which the unit, Model 166, rated at 8 ohms, never drops below an impedance of 7 ohms at any frequency. Thus a pair may safely be used as satellite speakers in parallel with main speaker loads in hi-fi systems without amplifier power loss or stability, says the company.

Acoustic Research, a strong believer in a "family" of sound for its line, has borrowed from the technology of its trend-setting Model AR9 in its new AR90, priced at \$550 each. Looking like a smaller version of the AR9, the AR90 uses two 10-inch side-firing woofers, positioned near the base, one eight-inch lower midrange, one 1½-inch upper midrange, and a ¾-inch tweeter, the latter three firing from the front panel. It has three controls—for lower midrange, upper midrange, and high-range level. It measures about 43 inches high by 14½ by 15 inches and comes with a full five-year performance warranty. It can handle up to 300 watts continuous power per channel. Driving power needed is 50 watts per channel. ▲

## IN-DASH OR SEPARATES?

(Continued from page 51)

most in-dash and separate mo-fi equipment. The reason is that mo-fi speakers simply cannot reproduce the deep bass (they are too small), and there's no good reason to worry about extreme upper highs that will be completely masked by road noise at all times. By simply reducing the bandwidth to what can actually be of use, the overall cost to the consumer is reduced. The response at full power from this separate amplifier is ±2 dB from 50 to 13,000 Hz, which is very good for mo-fi.

But note the effect of the tone controls in Fig. 1. Maximum bass boost is in the range of 100 to 50 Hz, rolling off rapidly below 50 Hz. This can provide a full or heavy bass while reducing the possibility of speaker overload at the deep bass frequencies (which can't be

heard anyway, although overload distortion *would* be heard). Similarly, the treble boost is already substantially in at 3,000 Hz, rising rapidly to 10,000 Hz—a required response when you need boosted highs to insure that they'll be heard over the ambient road noises.

Whether you will ever have need for bass and treble attenuation in a mo-fi is debatable unless you have to "clean up" a muddy AM signal. As shown in Fig. 1, a separate amplifier can provide wide range bass and treble attenuation.

Another advantage of mo-fi separates is that the amplifier will usually have loudness compensation, and in-dash might or might not have it automatically applied by the volume control. Figure 2 shows the tremendous loud-

ness compensation that's possible in a mo-fi separate. The lower trace is the flat response. The "wave," with its bass and treble boost was attained at a mid setting of the volume control, a reasonably loud volume, but one which was needed to get over the noise level. The top trace, the bass "hump," is full bass boost on top of the loudness compensation. It represents a 22 dB boost at 100 Hz. Whether you will ever need that much bass boost in a vehicle is debatable.

Since the frequency response of the FM tuner and any associated tape player is determined by the amplifier, the overall FM or tape performance can be no better than that of the amplifier. If there are deficiencies in the FM tuner and tape player, they are added

to that of the amplifier. For example, while the frequency response of the amplifier in Figs. 1 and 2 is down 2 dB at 50 Hz, the response through the FM tuner is down 5 dB at 50 Hz. And while the amplifier is down 1 dB at 10,000 Hz, and down 2 dB at 13,000 Hz, the response through the FM tuner is down 2 dB at 10,000 Hz, down 8 dB at 13,000 Hz. While this might not be impressive in your home, it's quite good for mo-fi. Similarly, the midband amplifier distortion at maximum output was 0.2% THD. Through the FM tuner it was 0.3% THD mono, 0.7% to 1% THD for stereo (depending on the accuracy of the tuning).

**Tape Players.** As far as tape mechanisms and players are concerned, it's "six of one, half a dozen of the other." Both the in-dash and separates generally use the same type of mechanism and the overall response is determined more by the associated amplifier than anything else. Wow and flutter usually fall in the range of about 0.12% to 0.17%. The differences between various tape machines are to be found in the area of convenience features. Total cost of the unit, naturally, goes up as the number of features increases. Features might include a fast forward in addition to a fast rewind, and perhaps automatic reverse (the tape reverses direction each time it reaches the end of the track, giving you continuous play). These are available in both in-dash and separate unit categories.

**Extras.** So far we've touched on the features and performance of the more typical, moderately priced equipment. There are, of course, "gold-plated" models in both in-dash units and separates. Some expensive in-dash models also feature an FM Dolby decoder, as well as a cassette Dolby decoder (same circuit doing double-duty). However, be advised that everything labeled *Noise Reduction* doesn't necessarily mean Dolby noise reduction. We have run across ordinary high cut filters in mo-fi units whose corner frequency and slope is so shrewdly conceived that on listening it might sound like poorly tracked Dolby. It is nonetheless just a

high filter, which, though it attenuates some high frequency noise, is not the equal of a Dolby noise reduction system. (While the terms *noise reduction* and *high filter* are theoretically perfectly interchangeable these terms can cause confusion because we have simply come to accept that "Noise Reduction" means some form of active system such as Dolby, dbx, or ANRS.)

Higher priced units also give you a lot of *clean* output power—on the order of 20 watts (RMS) per channel or more. This is easily accomplished in separates where the amplifier is simply made larger. For high priced in-dash units with more power, the amplifier is removed from the in-dash chassis and placed under the seat, on the firewall, or in the trunk. To all concerned it appears that the in-dash is a single unit; actually, a control and signal cable runs in the vehicle's regular front-rear wiring channel from the in-dash "head" to the remote amplifier.

Going the separates route permits adding accessories such as those you might use in the home. Currently available mo-fi add-ons include: graphic equalizers (five or six center frequencies), reverb (time delay) systems, and even four-channel synthesizers. And by the time you read this article there is certain to be at least one in-dash model featuring graphic equalization, time delay, or both. (Some in-dash units already feature 4-channel synthesizers.)

**Installation.** As a general rule of thumb, anything other than a straight in-dash equipment exchange is best left to the professional installers and shops. There are many reasons for this, the chief one being that unless you have the special disassembly instructions for your vehicle's dashboard (recently made cars particularly) you will probably cause more damage just to the trim than a pro installation would cost. Secondly, even if you know how to get the dash panel off you will probably find you need a special adaptor plate (unless you can use the one from the vehicle's present radio) which you can't purchase; the knobs might require special extender covers, and your dash

might require specially sized speakers: the whole world does not believe in 6 x 9 or 3 x 10 speakers. If you want door-mounted speakers, door steel requires a special cutting tool and you must know how to re-weatherproof the door.

**Theft and Insurance.** As for immunity to theft, just make certain you have good insurance and that the equipment is firmly secured to the vehicle. (Insurance, when applicable, is only good if the equipment is a *permanent part of the vehicle*.) This means that if someone attempts to steal the stuff, the thief will also cause extensive damage to the car. So be prepared for extensive damage if you live in a metropolitan area. The rip-and-run artists had a field day with CB; mo-fi is even more valuable, and sticks out like a neon sign saying "take me" to anyone peeking through a window.

Even in-dash equipment is vulnerable to theft, particularly in late model autos. For ease of factory assembly, in-dash hardware now goes in through the front of the dash. Generally, a plastic dash trim protects the equipment which is secured by a couple of screws in a plastic honeycomb. One flip of a crowbar, a snip of the wires, and the equipment is out in seconds, leaving behind some fifty to one hundred dollars worth of damaged dashboard.

If the dash gear in your vehicle goes in from behind the dash it's probably safe, because it can take upwards of an hour to remove or install behind-the-dash equipment. It's easier for a thief to look for a front-mounted installation.

It's not that we're being excessively pessimistic. The fact is that millions of dollars worth of CB equipment was ripped off, and for thieves, mo-fi is simply a replacement for CB. It's just as easy to sell, and there's presently a large demand for no-questions-asked mo-fi equipment. The best advice is to have a *permanent* professional installation, possibly connected to an alarm. If you make the theft of your property look difficult, the thief will move on to the next car. If it's worth the time and money to install mo-fi, it's worth the effort to protect it. ▲

## OPERA: JAMES LEVINE

(Continued from page 56)

ideally. He conducted both the operas mentioned above this season, and in the several performances of each that I attended no one was ever covered except when the composer deliberately chose to do so. The pieces were never too nervous nor rushed.

Levine's interests as a music director include an equal fascination for German opera. He started off with a *Wozzeck* a few years ago in which he brought out the Mahlerian side of the composer's work more than any other

reading I can remember. A subsequent *Rosenkavalier* had marvelous Viennese feeling, and he launched his Wagner with a poetic yet vigorous *Lohengrin*. Last season came an acclaimed Paris version of *Tannhäuser*, which managed to hold the sprawling opera together, and this season will find him steering the Dutchman's ship into port.

Not every one of the twenty-eight operas has, of course, been equal, but along the way he has showed feeling for many styles including the Russian

of *Eugene Onegin* and the Czech of *The Bartered Bride*. Puccini has not been slighted nor has Richard Strauss, and it all adds up to the most amazing record in American opera perhaps since Toscanini.

It is good that the recording picture steadily seems to be improving, with the best albums having appeared within the last twelve months. I think the improvement has not only come from his assembling the three-member team mentioned above but also because,

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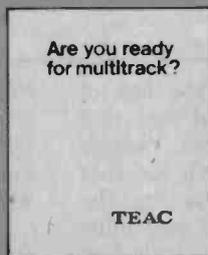
**303.** Crown will send you a four-color brochure which illustrates and describes the company's complete line of amplifiers, preamplifiers, tape recorders, equalizers.

**304.** From Sony Corporation you can obtain a brochure called *High Fidelity Components*. It includes a glossary which gives definitions of all major specifications jargon and convenience feature terminology.

**305.** Koss will provide you with a copy of its 20-page headphone catalogue which includes full-color photos and specification and price information on fifteen different dynamic and electrostatic stereophones.

**311.** *Hearing is Believing* is the title of a booklet on loudspeaker technology offered by ESS, Inc. In it, the principles of loudspeaker technology are examined and ESS's answers to the question of how to develop a superior speaker system are discussed at length.

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



**316.** For tips from leading sound engineers, send for "The Music-Maker's Manual of Microphone Mastery" from Shure. It describes how to match voices and instruments with the right type of microphone, and also how to best solve the recording problems you're likely to encounter with each type of instrument.

**323.** A free consumer guide to car audio is now available from Panasonic's Auto Products Division. Included in this 123-page paperback are tips on how to go about selecting the equipment you'll be happy with, what you need to know about specifications and features, how much power do you need, a directory of what equipment is offered by Panasonic, instructions on how to do your own installation, and a complete listing of Panasonic service centers nationwide.



**324.** *The Garrard Guide* is designed to provide you with all the information you need on buying an automatic turntable. The brochure consists of eleven pages of information and illustrations.

**337.** Pioneer Electronics of America will send you a 32-page booklet entitled, *How I Install Car Stereo*. It was written by a 26-year-old expert who has installed nearly 5000 car stereo systems. He shows in detail how to mount, wire, troubleshoot, and maintain a hi-fi sound system in your auto.

**338.** Fuji has made available a booklet on tape which is called *Cassette Tape and How to Make It Work For You*. It is written on a non-technical level and contains practical information on the selection and use of the cassette tape medium.

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he has figured out how to get the engineers to catch a truly live sound.

Also helpful is his tight control over casting. It was not always thus. His first recording for RCA, Verdi's *I Vespri Siciliani* (ARL 4-0370) shows Levine's mastery of Verdi and gave more than a hint of the opera's later success when he led its new production in New York. But the cast afforded some problems. It was originally designed as the forthcoming Metropolitan cast, and indeed the final form had fine performances from Plácido Domingo and Sherrill Milnes. But the soprano was not as planned. Montserrat Caballe, scheduled for the recording and for the premiere in New York, became ill and cancelled her recording sessions. Martina Arroyo, in England where the sessions were taking place, was available and substituted. Miss Arroyo was not suited for the role, and she took away from the success of what might have been an outstanding achievement. Given the expense of recording a complete opera and assembling a cast of stars, it could happen again, but with Levine's increased experience and clout, it is doubtful if he would agree to using someone, even a star, who is not appropriate for the role.

At almost the same time an even worse problem occurred: casting problems and illness surrounding a *Norma* for ABC. Now deleted from the catalogue, the recording had an inadequate tenor (who was accepted at the last minute), an Adalgisa who had a severe cold and Beverly Sills in a role not too congenial for her weight of voice. Two recordings for Angel, Verdi's *Giovanna d'Arco* (S-3791) and Rossini's *Barber*

*of Seville* (SX-3761), started the decided upward path. The first, a rare opera which was ideal for Levine's energy and unbounding enthusiasm, had Miss Caballe in excellent voice, again with Domingo and Milnes in principal roles. The *Barber* had verve and sparkle even if the flaws in Miss Sills' voice were beginning to show, and Nicolai Gedda sounded more strained as Almaviva than he has on many occasions since. In this recording there was one member of the future Levine "team" present: Milnes as a fine, robust Figaro.

Two years ago Levine's stirring reading of *La Forza del Destino* (RCA ARL 4-1864) was issued just at the time he conducted the opera in New York. The cast was the same on stage as on disc, with Leontyne Price in what I consider her greatest role, giving an even more thrilling reading than she had in an earlier recording also for RCA with Thomas Schippers. Levine tied together the many strands that make *Forza* the most diffuse of Verdi's operas and gave it a taut rhythmic sense along with his remarkable feel for Verdi's style. Domingo and Milnes, plus Bonaldo Giaiotti, made the male contingent of the recording staggeringly strong.

Levine's first work in recorded verismo, Giordano's *Andrea Chenier* (RCA ARL 3-2046) which appeared later that spring, had brilliant conducting. Giordano's rich orchestral palette was treated to a subtle and highly colored exposure, with the only reservations coming in the casting. This was the first assembling under Levine of Renata Scotto with Domingo and Milnes, but to me both tenor and soprano were

slightly pushed by their roles' weight.

The three, plus Levine, came together next for a verismo opera that could scarcely be better performed. Many may carp at Cilea's *Adriana Lecouvreur* but given the right principal and conductor, it is wonderfully theatrical, and in this recording (Columbia M3-34588) Levine took another step in giving his recordings the sense and feel of stage life. Miss Scotto's performance has every nuance in the role, with Domingo and Milnes offering brilliant vocalism. But it is Levine's sensitive phrasing and musical command of the style that makes the recording a treasure.

Which brings us to *Otello* (RCA-CRL-3-2951). By everybody's standard a masterpiece, *Otello* was conducted by Levine at the Metropolitan as early as December 1972. It is the only opera he has conducted in every revival, and he has increasingly grown in his interpretation. The big dramatic passages and the sweet, lyrical ones have always received a fine sensitivity from him as maestro; what has increased is his capacity for the grand line, subtle variations in tempo, ever increasing finesse with phrasing and knowledge of what the singers can do. The success of the recording, of course, is enhanced by the triumph on this disc of both Domingo in the title role and Miss Scotto as Desdemona. If Milnes does not quite measure up because he only sings a fine Iago without the degree of interpretation of the others, his contribution is still major. This, the most recent opera recording of Levine, is clearly the best, and the future can only look bright. ▲

## JAZZ

(Continued from page 26)

economy and assymetry of phrase—all of them unusual in their time, and all of them widely copied ever since.

We might call Lester Young the most original soloist to emerge between Louis Armstrong and Charlie Parker, and if not for the very different achievements of pianist Art Tatum, we would have to call him that. His works with Basie, with Holiday, and with some of his own groups in the 1940s served to instruct and inspire thousands of musicians who came after—Parker himself not least among them. The great Lester Young solos—their peculiar mixture of rigorous internal logic and ecstatic transfixion by their own beauty—run a bit beyond and contrary to rational explanation. For many confirmed jazz listeners, they distill all that is best in music itself.

Young's first recordings (including *Lady Be Good* and *Shoe Shine Boy*) with a small group from the Basie band, are on *The Lester Young Story*,

*Volume One* (Columbia), the first of a series of CBS two-record sets that will eventually collect all of Young's work (with alternate takes) for that company. This first set also has the earliest Young collaborations with Billie Holiday and Teddy Wilson, including "Me, Myself and I," "Sailboat in the Moonlight" and "I Must Have That Man." *A Musical Romance: The Lester Young Story, Volume Two* (Columbia) continues the Young-Holiday series, with the assistance of Wilson and many of the Basie sidemen. "When You're Smiling" and "He's Funny That Way" are featured here. *Enter the Count: The Lester Young Story, Volume Three* (Columbia) concentrates on the full Basie band of 1939, and includes "Taxi War-Dance." (All of these sets, incidentally, overlap the Billie Holiday series of re-issues on Columbia—*The Billie Holiday Story Volume One* and *Volume Two*, and *Lady Day*—which in turn overlap later repackagings such as

*Billie Holiday's Greatest Hits*, *God Bless The Child* and *Billie Holiday: The Original Recordings*.) The sets under Young's name have many recordings without Holiday, and vice versa.

After many years, *The Best of Count Basie* (MCA) remains perhaps the best introduction to Young. It has an embarrassment of riches from 1937-1939 including "Doggin' Around," "Every Tub," "Jive at Five," "Jumpin' at the Woodside," "One O'Clock Jump," "Shorty George," "Blues in the Dark," "Time Out" and "You Can Depend on Me."

The greatest gap in the current Young discography is the 1938 Kansas City Six session recorded for Commodore, but three contemporary selections by a similar group (including the guitarist Charlie Christian) are on *Spirituals to Swing* (Vanguard).

Young's middle period (roughly from the mid-1940s into the early 1950s) is often unjustly downgraded by those

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unfamiliar with this phase of his music. Yet in these years, his work was consistently inspired if rarely essential. *Classic Tenors* (Flying Dutchman) has an enthusiastic 1943 session with Basie regulars, coupled with even better work by Coleman Hawkins; some selections by each man are duplicated on the recently out-of-print *The Big Three* (Flying Dutchman), which also includes Ben Webster tracks from the same period. Another session from 1944 with Basie sidemen is paired with a classic Young quartet date (including "Sometimes I'm Happy") on *Pres at His Very Best* (Trip); *Pres Leaps Again* (Soul Parade) duplicates this disc. Young's first encounters with the bop generation are found on *The Aladdin Sessions* (Blue Note). This includes "D. B. Blues" and his best version of "These Foolish Things." The best of Young's "modern" groups is on *The Complete Savoy Sessions* (Savoy), performing "Blues 'n' Bells" and "Ding Dong." An earlier session with most of the Basie band is also here, along with a small band led by pianist Johnny Guarnieri. *Lester Swings* (Verve) combines a 1945 trio date featuring Nat Cole on piano, with 1950-1951 quartet sessions that preserved Young's last consistent

run of work; "Count Every Star" is particularly good among these.

Most of Young's "live" work is from the middle period. *Bird and Pres at JATP* (Verve) finds Young all but overshadowing Charlie Parker at several Norman Granz concerts. Part of this material is also on *Early Modern* (Milestone), but all issues of this material are severely wowed. *Pres* (Archive of Folk and Jazz) has representative work by Young's 1948-1949 bands. *Pres Lives* (Savoy) is less satisfying; Young plays well, but is accompanied by a mediocre rhythm section which is also badly recorded.

Little from Young's late career is now in print. *Pres and Teddy and Oscar* (Verve) has a 1956 reunion with Teddy Wilson, combined with a less interesting 1952 session with Oscar Peterson. *The Jazz Giants '56* (Verve) was recorded at the same time as the Wilson session, and features him along with trumpeter Roy Eldridge and trombonist Vic Dickenson. The Wilson-Young records present the saxophonist at his late best, far above the level of the slightly later *Pres in Europe* (Onyx) and a number of out-of-print studio sessions which added nothing to the reputation of a great musician. ▲

**SOUND PROBE: NEW ADVENT**

(Continued from page 40)

crease position. Measurements are 26 inches high, 14 inches wide, and 11½ inches deep. If you put it on a shelf, remember it weighs 47 lbs, but it looks good on the floor, too. Price: \$164 each. Performance

In all kinds of music—vocal, orchestral, chamber, and jazz—that new tweeter did itself proud, spreading exemplary highs throughout the room. Human voices, in particular, had an open, natural quality, and the crisp transients did wonders for piano and percussion. Fiddles and other strings came across with a very engaging natural quality that let you forget all about the speakers and concentrate on the music. Providing, that is, that the record is good. For those exceptional tweeters unmercifully reveal any roughness or other flaws in imperfect recordings. So, on some disks, it seemed

kinder to turn down the treble control on the amplifier to the 10 o'clock position.

The owner's manual for the Advent suggests playing the London recording (CS-6609) of Richard Strauss' *Also sprach Zarathustra* to show off its way with bottom notes. That disk contains one of the few genuine 32-Hz notes to find its way on records. The Advent surmounted that hurdle without apparent strain and without apparent frequency doubling. It is the very cleanliness of the bass that might make it seem a bit pale and pristine to listeners who like the bottom beefed up with some resonance. A little bass boost from the amplifier will give them what they want.

In all, the New Advent Loudspeaker is a worthy successor to the old one. There is no better recommendation. ▲

**SOUND PROBE: JVC SK-1000**

(Continued from page 40)

The variable midrange, by the way, proved very useful in improving the sound of badly miked disks. Many recent records—in a misguided effort toward ultra-realism—are too closely miked. They give you the impression of the players crowding in on you. We don't really want to get all that chummy and prefer listening to music from a normal distance. That's where the mid-

range control comes in. Turn it down a bit and the musicians seem to be backing off where they belong.

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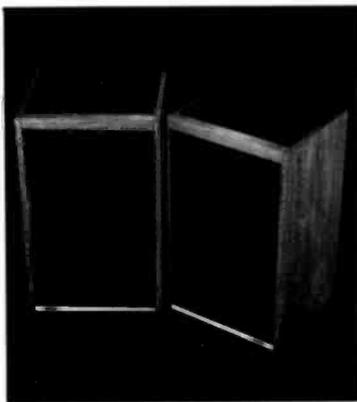
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