

MAY-JUNE 1978 \$1.35

hi-fi stereo

BUYERS' GUIDE

SUMMER FORECAST 1978

A SNEAK PREVIEW OF ALL THE
**NEWEST AUDIO
PRODUCTS**
IN A DOUBLE-LENGTH FEATURE

PLUS
TEST REPORTS
FROM OUR OBJECTIVE
TESTING LAB

**CAR
STEREO**
MOBILE AMPLIFIERS,
EQUALIZERS, SPEAKERS AND
CASSETTE MACHINES

OUR OWN
SPEAKERS
AND
OFFER YOU

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ORDERS**
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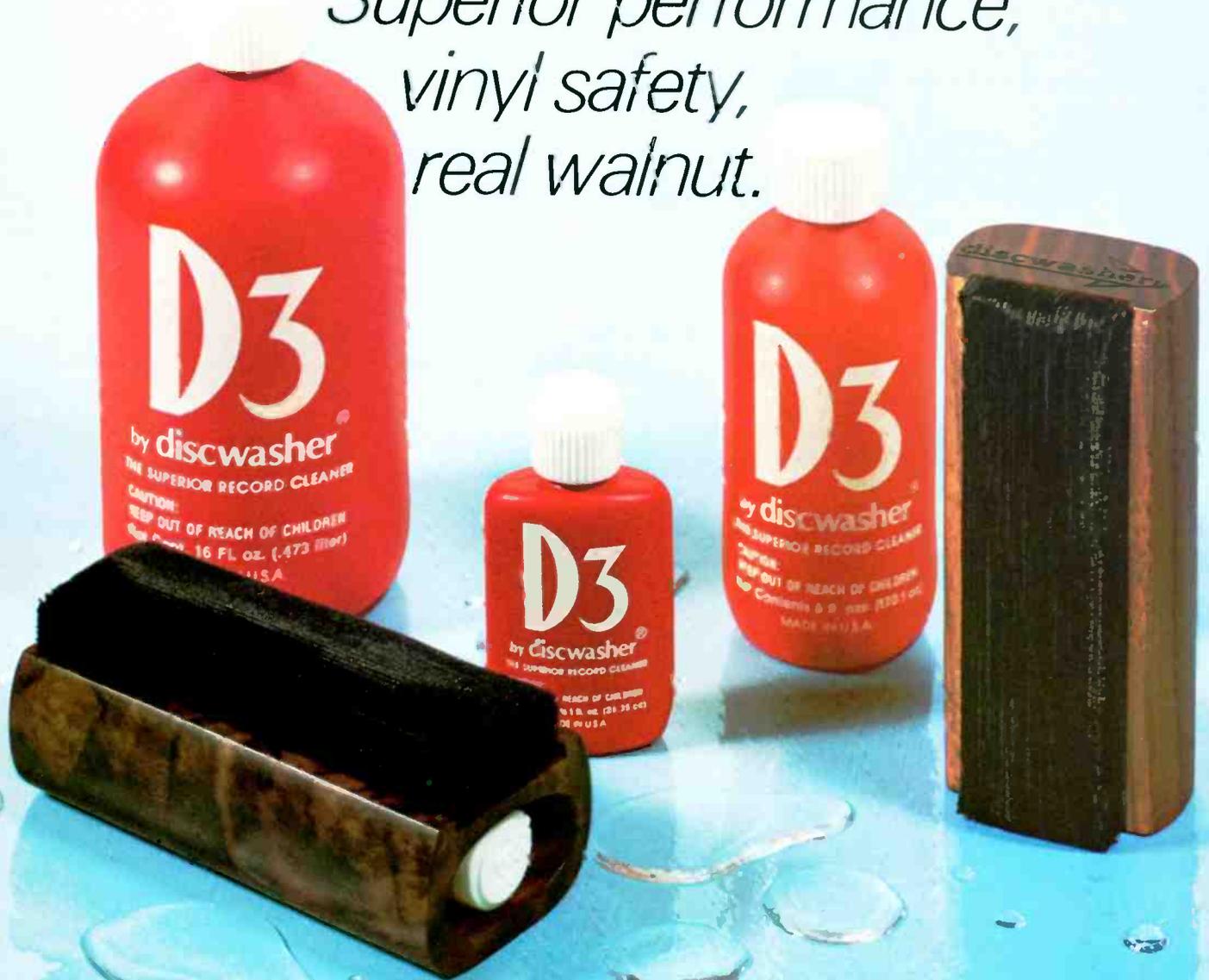
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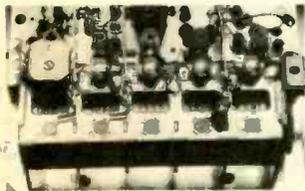


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Nikko Sounds as Professional as it Looks



5-gang capacitor

Alpha II amplifier.

One look at the front panel controls and it is obvious these units possess an unusual combination of creative features. Nikko engineers also developed the advanced technology you can't see.



Toroidal power transformer

Technology which makes these components truly professional in sound as well as appearance.

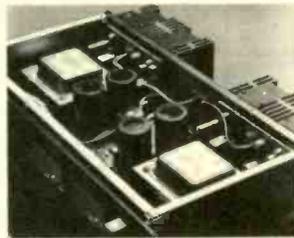
The advanced design 5-gang capacitor (highest rated capacitor available) gives the Gamma I tuner superior FM sensitivity (1.8 μ V) and selectivity (35dB wide, 85dB narrow). You get the signal you want, and only the signal you want to hear.

The thinline Beta I preamp employs high voltage FET's for exceptionally fast signal reaction and extremely high efficiency and linearity in the high frequency range. A toroidally wound power transformer reduces hum radiation while the phono overload rejection capability is one of the highest ever measured.

If you thought Nikko only makes rock-solid, quality-built receivers, we have some pleasant surprises.

For the discerning listener, we present a selection of rack-mountable stereo components from Nikko Audio's Professional Series. The Gamma I FM tuner, The Beta I preamp and the

Alpha II amplifier, totally independent, dual power supplies offer far greater dynamic range and lessened crosstalk than the usual split single power supply and significant headroom. (120 watts per channel, both channels driven into 8 ohms, from 15 Hz to 20 kHz with THD and IM distortion a phenomenally low 0.03%.)



Dual power supplies

These are but a few examples why Nikko sounds as professional as it looks. Nikko designs and builds all its stereo equipment with dedication to total reliability, highest quality and superb performance. And the price is always affordable.

Take another look at the features and controls. Then visit your Nikko dealer and experience true professional sound.

Available with black or brushed aluminum front panel

Nikko Audio

For those who take their stereo seriously

Nikko Electric Corp. of America
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hi-fi/stereo

BUYERS' GUIDE

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When it comes to speaker design, JVC goes 2969 times further.

Traditionally, speaker systems have been designed by a tedious trial and error process, by which individual combinations of speaker, crossover and enclosure combinations are analyzed—one at a time—until the desired sonic results are achieved.

JVC has put an end to these time-consuming and archaic procedures, with a revolutionary new system called Phase Moire (Mor-ay) Propagation Technology, that uses a specially-constructed device to move a test microphone in a way that creates and preserves, via computers, video and high-speed filming, a field of nearly 3000 sound testing positions.

By viewing the film, our engineers can actually see what a speaker will sound like before they get too far into the design process.

The initial result of our unique Phase Moire Technology, combined with a great deal of human engineering, is the SK-1000. This unusually-efficient, extraordinary-sounding three-way speaker system delivers

truly magnificent, rock-solid bass from its 12" free-edge woofer and heavy magnet structure. Capable of handling up to 170-watt peaks (85 watts RMS), the SK-1000 reproduces vocals and midrange with unusual smoothness, thanks to our specially-designed 5" midrange driver. Clear, crisp, brilliant highs are dispersed evenly within the listening area from a 1" soft-dome tweeter.

We also give you complete control over midrange and tweeter response with a pair of front-panel level controls.

But all the technology in the world can't fool two of the most sophisticated testing devices known: your ears. And all the words in the world can't tell you what the SK-1000 (and its two smaller companions, the SK-700 and SK-500) really sound like.

So we suggest that you hear what we've been talking about at a JVC dealer.

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JVC

We build in what the others
leave out

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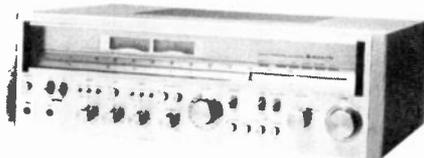
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THE LATEST HI-FI COMPONENTS IN OUR... AUDIO SHOWCASE

High Power Receiver

Sanyo Electric's model JCX2600K receiver offers a "whopping" 85 watts RMS per channel with 0.1% total harmonic distortion. Features include a 41 click stop electric detent volume control, and 11-position click stop tone controls for bass, midrange and treble. Other features: loudness, stereo/mono and FM muting controls; two phono

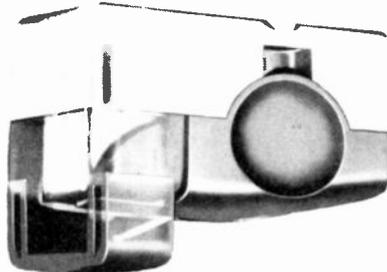


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inputs; two speaker inputs; dubbing and monitors for both channels; low and high filter controls; tone defeat; lighted indicators for AM, FM, phono and auxiliary modes; signal and center tuning meters. Specifications: 1.8 mV FM sensitivity; equalization turnover controls for bass at 100, 200 and 400 Hz; treble at 2.5, 5 and 10 Hz. Suggested list price is \$469.95.

Signet Dual Magnet Cartridges

Signet phono cartridges, products of Audio-Tecnica Corp., are bench-assembled rather than mass-produced in the usual manner. This is why, the company says, it is possible to combine the small-



est diamond stylus with the smallest cantilever of any production cartridge known. For example, the cantilever of the TK7SU is just 0.5 mm in diameter at the large end of the hollow tube, tapering to just accommodate the 0.11 mm diamond at the tip. The square-shank stylus can be precisely oriented

to be perpendicular to the groove. The makers also use a "nude" stylus which, unlike common bonded styli, eliminates the metal diamond holder that adds mass at the worst possible place in the moving system. The total effect is said to be much like using lightweight magnesium wheels on a race car. "It costs more, but for critical applications it is well worth the investment." Specifications for the TK7SU model: frequency response, 5 to 45,000 Hz; tracking force, 3/4 to 1 3/4 grams; channel balance, 0.75 dB; channel separation, 30 dB minimum at 1 kHz and 23 dB at 10 kHz; output at 5 cm/sec., 2.7 mV; vertical tracking angle, 20 degrees (the new IEC/DIN standard); recommended load impedance, 47,000 ohms (standard for stereo units); cartridge inductance, 370 mH; DC resistance, 500 ohms; cartridge weight, 6.8 grams. Price: \$175.00.

New Philips Speakers

Philips High Fidelity Laboratories offers two new model speakers. Model SJ2930 is an 8-inch, two-way system with tuned port that can handle 20 watts RMS from 48 to 17,500 Hz. The fundamental system resonance is at 48 Hz. Components consist of the 8-inch woofer plus 2 3/4-inch cone tweeter. Impedance is 8 ohms. Each speaker weighs 2 3/4 lbs. and measures 21 1/2 inches by 13



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inches by 11 3/4 inches. This model retails for \$159.90 per pair. The SJ-2931 is a 10-inch 3-way tuned port system able to handle 35 watts RMS at 8 ohms across 45 to 17,500 Hz. Other drivers consist of a 4-inch cone mid-range and a 2 3/4-inch cone tweeter. Crossover frequencies are 2500 and 8000 Hz. Each speaker weighs 39 lbs. and measures 27 by 14 1/2 by 12 1/2 inches. Price: \$199.90 per pair.

Setton Receiver

Setton International's RS-220 50-watt-per-channel receiver is the basic item in the company's line. It features 0.085% THD and IMD with both

Introducing the Koss Theory of loudspeaker design and the three new Koss CM speaker systems that prove it.



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Here for the first time is the culmination of a world-wide search for the ultimate in loudspeaker design within the limitations of today's technology and within affordable price restrictions. Indeed it represents a breakthrough in loudspeaker technology of such significance that it heralds the second major revolution in loudspeaker design.

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Now, enjoy freedom from acoustic feedback with the new AT605 Audio Insulator System from Audio-Technica.

Add the AT605 System and stop howling from feedback at high sound levels, reduce distortion or cartridge mistracking from sound energy conducted from speaker to turntable.

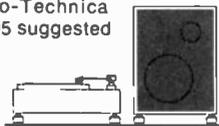
Solve problems of outside vibration like subways, heavy trucks, or jarring footsteps. Or reduce transmission of annoying sound to adjacent apartments with the AT605 System under your loudspeakers. Gain new freedom of speaker placement, and improve performance especially of high-energy, low-frequency transients.



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If feedback limits the quality of your system, or restricts your choice of equipment location, the AT605 Audio Insulator System can help. At all Audio-Technica dealers for just \$24.95 suggested retail. Win the fight against feedback today!

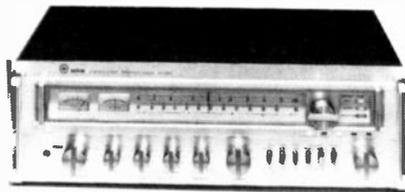


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AUDIO SHOWCASE

channels driven at 50 watts from 20 to 20,000 Hz. FM stereo distortion is said to be substantially less than 0.2% and stereo separation is typically greater than 40 dB. The tuner section features: a dual gate MOS FET front end; IF section with three 2-element ceramic filters; phase-lock loop IC; 2.0 microvolts sensitivity; 50 dB quieting sensi-



Circle No. 107 On Reader Service Card

tivity; 70 dB alternate channel selectivity; 1.25 dB capture ratio. Amplifier performance, typically: total harmonic distortion of 0.055% and 0.060% IMD, from 20 to 20,000 Hz, at 50 watts output into 8 ohm loads in both channels. There are output terminals for two sets of speakers, and separate bass, middle and treble controls. A "Security Panel" includes a protection circuit indicator that alerts the user to shorts in the speaker line and also provides for automatic shutdown of the output stage when that is required. Price of the RS-220 is \$559.95.

Top-of-the-Line Speakers from Sweden

Sonab Electronics OA-116 speakers use a blend of directional and omnidirectional sound utilizing a Carlsson patented Ortho Acoustic principle. The speaker is made available as a "properly aligned" stereo pair (OA-116R and OA-116L for the right and left channels respectively). The speaker is equipped with six matched and aligned tweeters,



Circle No. 132 On Reader Service Card

a midrange element and a new bass element which is located at the bottom of the bass-reflex enclosure and close enough to the back of the enclosure to

provide a four times reduction of radiation angle, thereby increasing the ratio of direct to reflected sound by a factor of four. The bass register is transmitted so close to the floor and wall that reflected sound is converted into direct sound, according to Sonab. Frequency response is 28 to 15,000 Hz and power handling capacity is 50 watts RMS. The cabinet, made of particle board, is stabilized by a number of cross sections made of expanded ABS plastic to prevent the cabinet from resonating. Price: \$520 each.

Improved Top-of-the-Line Receiver

Tandberg's TR-2075 Mk II receiver is an improved version of the company's TR-2075 AM/FM stereo receiver. Like its predecessor, the new model combines a sensitive tuner and preamp with a powerful amplifier. But the improved model features an exclusive toroidal transformer that is said to eliminate stray electronic fields. There's also



Circle No. 97
On Reader Service Card

electronic varactor diode tuning, an electronic diode switching system, and a true complementary power amplifier design. Specifications: THD and IM distortion are 0.05% of rated power; 75 dB FM quieting in stereo; 0.9 dB IHF capture ratio; 89 dB (ref 10 mV) phono signal-to-noise ratio. A newly designed power supply produces 75 watts RMS per channel into 8 ohms, increasing available power to 150 watts per channel for clean reproduction of high-level musical transients, according to the company. Suggested retail list price: \$1,100.

New Nikko Tuner

Nikko Audio's new NT-550 tuner "takes its place" between the company's FAM-450 AM/FM stereo tuner and the NT-850 stereo tuner. The new unit features a sensitivity of 1.9 uV, cap-



Circle No. 103 On Reader Service Card

ture ratio of 1 dB, stereo separation of 45 dB at 1000 Hz, and distortion of 0.15%. Front panel controls include a power on/off switch, hi-blend multi-

path switches, tuning knob and mode selector. There's also a tuning meter. Suggested retail price: \$179.00.

Quanta Top-of-the-Line Turntable

BSR Consumer Products Division has made this Quanta 550 turntable the top-of-the-line model in a new series of multi-play units. It features an integrated circuit chip "brain" that automatically and electronically maintains playing speed and pitch control, as indicated by the strobe light and pilot light surrounding the 550 platter. The platter itself is a computer-engineered rubber mat of high-resolution durability



Circle No. 65
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designed to give optimally firm support to records. The belt drive motor incorporates an electronic speed changing system that changes the speed of the motor automatically, and there's a rotating stub spindle to eliminate wear of the record center hole. A slide-in shell facilitates the change of cartridges in seconds. The tonearm is fully counterbalanced by a gear assembly traditionally found only on the highest priced turntables. The Quanta 550 comes with an ADC QLM-34 cartridge. Suggested retail price: \$149.95.

Fisher 90-Watt Speaker

Fisher's latest entry in the speaker sweepstakes is this ST640A three-way, 5+1 speaker system which features a 10-inch woofer, 10-inch passive bass radiator, 6½-inch dome midrange, and two 2-inch flare dome tweeters. There's also a 5-inch midrange complement in



Circle No. 69
On Reader Service Card

the rear of the walnut grain vinyl cabinet. Each speaker has a rated amplifier power of 90 watts RMS and features a circuit breaker. The cabinet measures 26½ inches by 16½ inches by 12 inches. The ST640A lists for \$249.95 each, and is also available as

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

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

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



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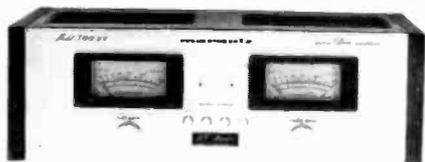
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AUDIO SHOWCASE

the ST641A with wood veneer cabinetry at \$279.95 each.

150 Watt Power Amplifier

Marantz says this low TIM power amplifier, model 300DC, produces 150 watts per channel minimum RMS into 8 ohms, from 20 to 20,000 Hz, at no more than 0.03% total harmonic distortion. The new low TIM (transient intermodulation distortion) is accompanied by an exceptionally fast slew rate, wide band width and low distor-



Circle No. 80 On Reader Service Card

tion without the excessive amounts of negative feedback commonly used in competitive power amplifier design, according to the company. The 300DC has a specially designed power transformer with dual secondaries provid-

ing two independent power supplies. This feature allows each channel to deliver its optimum performance without affecting the other channel. The unit is also equipped with meter range switching that provides more accurate indications on its VU meters when functioning at lower power levels. Price: \$649.95.

Thin-styled Sound System for Rock Music

Bertagni Electroacoustic Systems has designed this D75w unit specially for the reproduction of rock music, in particular by providing emphasis of bass



Circle No. 129 On Reader Service Card

response. Rock music utilizes large woofers and to duplicate this the company designed a uniquely shaped polymer diaphragm to create the proper frequency responses. The active surfaces of the diaphragms are about six times larger than the conventional woofer because both sides of each diaphragm radiate sound. Specifications: frequency response, 38 to 20,000 Hz; power required to produce an omnipolar total radiated sound pressure level of 96 dB is 10 watts; recommended maximum RMS amplifier/channel (controls flat without equalization), 230 watts; minimum RMS amplifier/channel (without clipping distortion), 25 watts; total harmonic distortion at 8000 Hz, 0.6%; THD at 1500 Hz, 0.7%; THD at 400 Hz, 0.8%; THD at 50 Hz, 2.0%. The D75w has crossover frequencies of 1000 and 9000 Hz. The unit has high frequency and midrange controls, and a polar dispersion of 360 degrees by 360 degrees in all horizontal and vertical planes through all frequency responses. Suggested retail price: \$449.

Integrated Amplifier

Yamaha's new high performance integrated amplifier, model CA-61011, carries a suggested retail price of \$290. The phone equalizer amplifier's signal-

(Continued on page 14)

Play it as it lays.

Only one company makes both a cutterhead to lay the music into the grooves, and a line of cartridges to play it. Ortofon.

Our patented VMS (Variable Magnetic Shunt) cartridges all feature a unique, low-mass ring magnet to create a super-sensitive flux field that responds to stylus movement with incredible accuracy. It produces a true three-dimensional sound that sets new standards in sparial realism.

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THE VMS CARTRIDGES



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The world's finest audiophile recorder has become even finer

With its large professional VU meters using LED peak overload indicators, its full electronic logic control of tape motion and its precision tape cutter and splicer, the new B77 stereocassette recorder sets new standards of convenience for the discriminating recordist.

Add to this the legendary ReVox superiority in audible sound quality and you have the finest audiophile recorder in the world at a price that will pleasantly surprise you.

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To learn more about the even finer ReVox B77, write to us for complete information and the address of your nearest demonstrating ReVox dealer.

STUDER **REVOX**

In the Black II



Performance, beauty, quality — three attributes that have always been the hallmarks of SAE products. SAE systems in the past have had them, this system's predecessor had them, and the new In The Black system has them and much more.

The 2900 Parametric Preamplifier offers our new flexible parametric tone control system, full dubbing and tape EQ. New phono and line circuitry results in unparalleled clarity and definition with distortion of less than 0.01% THD & IM.

The 2200 Stereo Power Amplifier with fully complementary circuitry delivers 100 Watts RMS per channel from 20-20K into 8 ohms; at less than 0.05% Total Harmonic Distortion, from 250mW to full rated power.

The 8000 Digital FM Tuner has linear phase filters, phase-lock multiplex, and of course, our famous digital readout tuning indicator system.

Combine these products together and you have a system that ensures superior performance in all areas, excellent control flexibility, and the sonic quality that is typically SAE.

For Complete Information Write:

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P.O. Box 60271 Terminal Annex, Los Angeles, CA 90060

Circle No. 17 On Reader Service Card
10

JAZZ



Benny Carter/by Gary Giddins

□ In an interview with Stanley Dance, Willie Cook once described the young Sonny Stitt as having "played like Johnny Hodges when he was drinking, and like Benny Carter when he wasn't"—a funny observation that suggests the state of the alto saxophone before Charlie Parker's arrival, and contrasts the heart-on-sleeve sanguinity of Hodges with Carter's genteel classicism. In fact, Hodges and Carter had established the parameters of the alto just as Coleman Hawkins and Lester Young had defined the dialectic of the tenor. Not even Parker, or Ornette Coleman for that matter, have shaken their historic positions as stylistic models for the instrument: subsequent altoists can usually be characterized as ultimately rooting in one or the other, or in an equation derived from aspects of both.

Carter is one of the most diversified and accomplished figures in American music. As altoist, arranger and bandleader, he has been genuinely innovative. But he is also a proficient trumpeter, composer, clarinetist and a competent trombonist and pianist. He has pioneered in other musical areas: in 1937, in Holland, he organized one of the first interracial big bands, and since 1943, when he went to Hollywood to work on the film "Stormy Weather," he has been a prolific film and TV scorer, knocking down

doors previously closed to black musicians. He was frequently denied both the credits and the performing rights for music he ghosted for white composers.

He looks at least a decade younger than his 70 years; as vigorous and energetic as his music. In 1976 he led a quartet at New York's Michael's Pub—his first New York club appearance since the early '40s, when musicians called him King Carter. It was a spell-binding reminder of how timeless a musician he is. Carter has named Frankie Trumbauer as his first influence on alto, as did Lester Young, but whereas Young came to prominence with a style far removed from his inspiration, Carter remained true to Trumbauer's tonal roundness and unperturbed lyricism. What he added was fire and subtle mastery of dynamics to create a style noted for its polish and clarity of melodic line. At Michael's Pub, I was enthralled by his punctilious shading of notes and the tension of his ideas. His improvisations are crafted with attention to motivic fragments, thoughtfully pursued.

(Continued on page 80)

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

AT LAST, EAST MEETS WEST.

Traditionally, the audiophile has had to choose between the East Coast Sound and the West Coast Sound, each with its own particular advantages and disadvantages:

The East Coast Sound is extremely accurate. The dispersion characteristics of East Coast speakers are, as a rule, excellent. Unfortunately, they usually need a lot of power to perform.

West Coast speakers are noted for their efficiency and volume. Unfortunately, accuracy isn't one of their strong suits.

Introducing the EPI 200.

After years of research and development, the engineers at EPI have created a speaker that combines the best qualities of East and West.

With its 12-inch passive radiator, the EPI 200 has all the efficiency of the most popular West Coast speakers.

A 30-watt receiver powers it with ease.

With that power, the EPI 200 produces the kind of sound EPI is famous for: Linear Sound. A pure, rich, accurate sound from 20,000 Hz all the way down to 34 Hz.

And dispersion? In a word, the Model 200's dispersion characteristics are *superb*. Up to 15,000 Hz, the speaker's off-axis dispersion is down an average of only 3db — a performance even other East Coast speaker makers can only dream about.

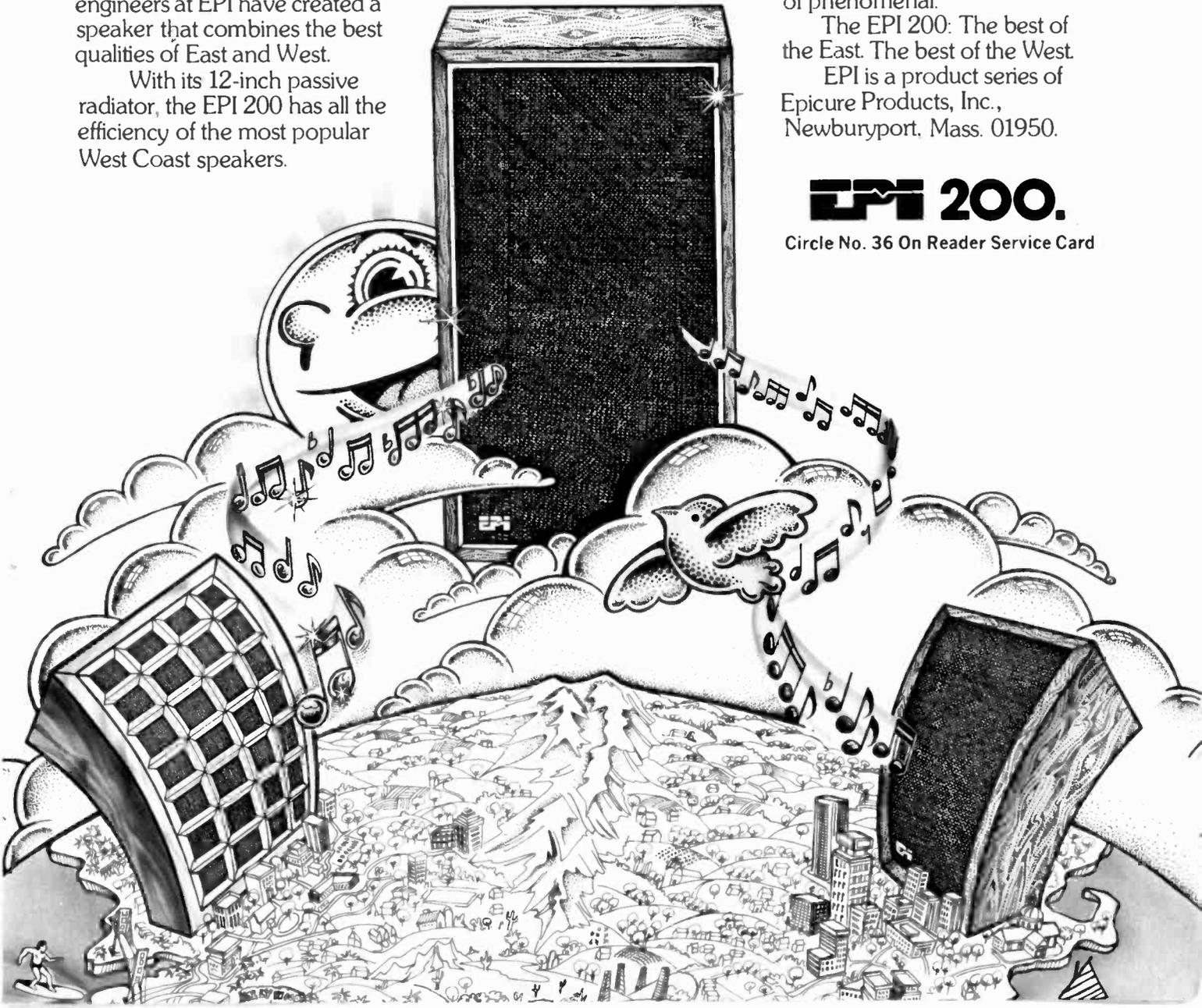
At \$400, the EPI 200 would be an exceptional value. But at under \$300, it is nothing short of phenomenal.

The EPI 200: The best of the East. The best of the West.

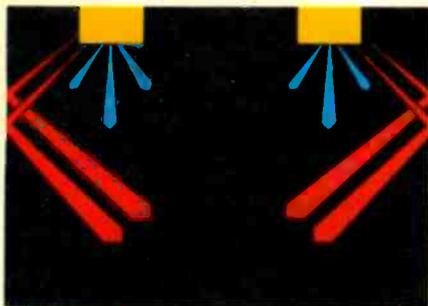
EPI is a product series of Epicure Products, Inc., Newburyport, Mass. 01950.

EPI 200.

Circle No. 36 On Reader Service Card



Like.

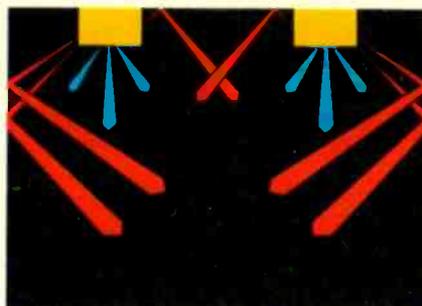


The Bose Model 301 is the least expensive Direct/Reflecting® speaker.

It is a true bookshelf speaker that can fill an entire library with music. Its size is small. Its sound is big.

Like other Bose Direct/Reflecting® speakers, the Model 301 speakers reflect off the side walls of your room for an open, spacious sound. And, you can use the Direct Energy Control to adjust the sound pattern to suit your taste and your listening room. Either way, you get a feeling of spaciousness and life-like sound you just don't expect from a speaker of its size and price.

More Like.



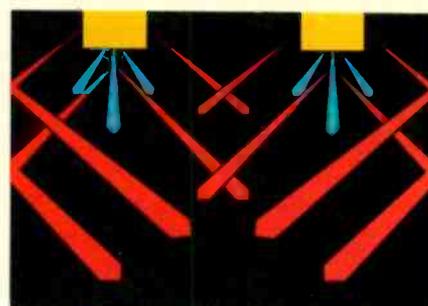
If you want sound that is even more like live, there is the new Bose Model 501.

The Model 501 is a floor-standing speaker that delivers wall-shaking bass through a 10-inch, high-performance woofer. Each speaker is "asymmetrical." One tweeter fires inward, one outward. And the left speaker works with the right to create full, rich, balanced stereo. In every corner of your room.

If your listening room isn't exactly ordinary, you can use the Direct Energy Control to adjust the high-frequency radiation of the outside tweeters. In other words, you shape the sound to fit your room.

Plus, the new Bose 501 looks as good as it sounds.

Most Like.



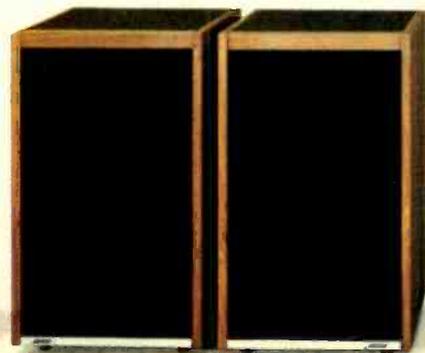
Still closer to the sound of "live" is the Bose Model 601. A high-performance speaker that behaves like one, in just about any listening environment.

Six drivers—two woofers and four tweeters—are precisely positioned so that sound comes from many directions to fill the room with sound. This configuration is essential to the exceptional spatial realism of the Model 601.

Half the drivers in the Model 601 radiate upward—above the level of sound-absorbing furniture.

In addition, there is a Symmetry Control so you can adjust the speaker's spatial characteristics to fit your living room.

The Bose Model 601 delivers life-like music better than any other speaker. Except one.



Live.



The ultimate. The Bose 901 Series III. Designed to re-create every dimension of live-performance sound for the greatest listening pleasure imaginable.

Nine matched, full-range drivers in each enclosure deliver the clearest highs, and the most powerful lows. Sound reflected in precisely determined patterns creates a feeling of spaciousness unsurpassed by any other speaker.

The patented Acoustic Matrix™ enclosure allows the Bose 901 Series III to deliver bass that cannot be duplicated in a con-

ventional wood enclosure. And a new, exclusive high-efficiency driver lets the Series III put out tremendous sound without a lot of expensive power.

Listen to the Bose 901. There are no speakers. Just music. Music as if you were hearing it for the first time. Live.

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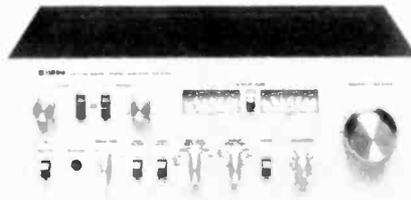
Circle No. 23 On Reader Service Card

AUDIO SHOWCASE

(Continued from page 8)

to-noise ratio is an "astonishing" 97 dB according to Yamaha. For the 20 to 20,000 Hz audio spectrum, the distortion factor is below 0.01% when the REC OUT is delivering an output of 1 volt from the phono inputs. There's a deviation of ± 0.3 dB or less from the RIAA equalization curve for a 30 to

15,000 Hz frequency range. The bass control offers a choice of 125 Hz or 500 Hz for the turnover frequency, with a control range of ± 10 dB at 20 Hz

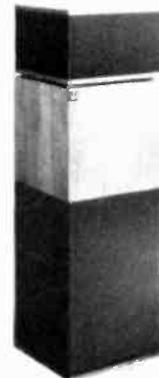


Circle No. 101 On Reader Service Card (control at 500 Hz). The treble control has a selection of 2500 or 8000 Hz for the turnover frequency, with the con-

trol range being ± 10 dB at 20,000 Hz when the control is set for 2500 Hz. Both controls have defeat positions so that the unit can be operated as a "flat" amplifier. The power amplifier delivers 45 watts per channel RMS, both channels driven into 8 ohms, over the 20 to 20,000 Hz frequency spectrum with no more than 0.05% total harmonic distortion. A unique "Main Direct" feature is for advanced audiophiles. When turned on, the output signal from the phono equalizer or the tuner input signal is directly fed to the power amplifier via the volume and balance controls.

Dual Cabinet Speaker System

Elite Systems says the separate cabinetry that characterizes this Magnum Opus speakers system permits selected placement for optimum stereo imaging. The high frequency system consists of a 60-watt midrange driver into a 30-inch heavy cast aluminum re-entrant exponential horn that is complemented by a 20-watt sonophase diffraction horn tweeter. This cabinet measures 16 $\frac{3}{4}$ inches by 16 $\frac{3}{4}$ inches by 12 inches.



Circle No. 135 On Reader Service Card

The bass system features a 50-watt, 15-inch driver that is front loaded into a 48-inch folded horn which terminates at a 6-square-foot mouth. The cabinet size is also 16 $\frac{3}{4}$ inches square but 42 inches high. The crossover network is of constant K design, three-way, with crossovers at 450 and 3500 Hz. Other specifications: frequency roll-off, 12 dB/octave; power handling capacity, maximum 130 watts and 1,140 watts for short term; minimum amplifier output, 10 watts. Price per side: \$690.

TEAC Open Reel Deck

TEAC's A-6600 open reel tape deck is a quarter-track, 2-channel, 4-head machine that features full IC logic control, automatic reverse with sensing foil and automatic repeat play. The advertised value is under \$1,300. Also featured: a two-capstan servo tension system; 20 dB mic attenuator; cue control; automatic space and individual

(Continued on page 18)

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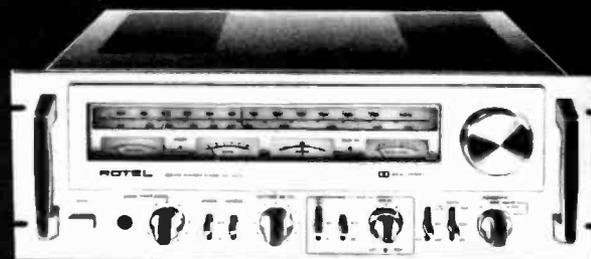


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Stereo Review, July 1977 Hirsch-Houck Laboratories Reports



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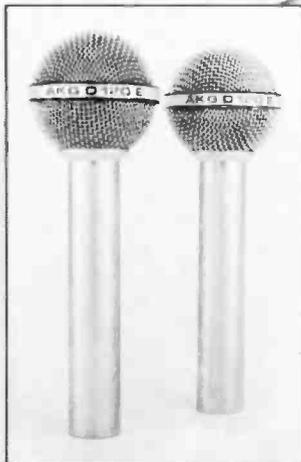


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The new amplifier. Not mere stereo, but dual monaural. We call it the DM Factor. For inter-channel separation at 20kHz at better than 80dB. For THD at lower than 0.01% at rated output. For remarkable clarity and definition. Ten violins sound like ten violins

instead of one big mushy solo.

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The turntable. Our direct drive high torque servometer eliminates gears, belts and pulleys. And with them wow, flutter and noise. Our logic control eliminates unreliable mechanisms in the nerve center. Our high resolution tone arm eliminates virtually all resonance. Everything you never wanted in a turntable.

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Because if we've got you so far, just wait till we get your ears.

 **MITSUBISHI**
AUDIO SYSTEMS



AUDIO SHOWCASE

(Continued from page 14)

mic and line controls for each channel with master control. Independent two-position bias and equalization selectors maintain a compatible adjustment between the A-6600 record electronics and the newest tape formulations. The



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large VU meters may be switched to read up to ± 6 VU in order to monitor higher levels and maintain the optimum

signal-to-noise ratio when using newer tapes. Independent input level controls provide mic/line mixing capabilities and a separate output level control is also provided. The A-6600 has two speeds ($3\frac{3}{4}$ and $7\frac{1}{2}$ ips) and four heads for erase, record, playback and reverse playback. Options include an RC-80 remote control, MM-100/ME-120 microphones, E-1 demagnetizer, and the RMK recorder maintenance kit.

New-Look Stereo Amplifier

This uniquely-packaged Powermaster 75 Stereo Amplifier is priced at \$449 by Meteor Light & Sound Company, a division of Hammond Industries. The amplifier incorporates individual channel level controls, illuminated twin output meters and LED peak indicators.

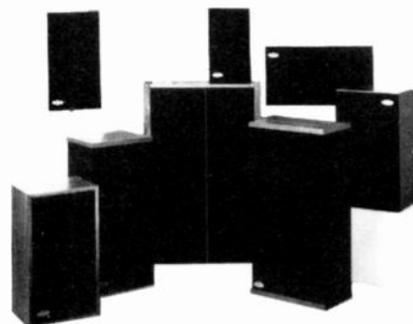


Circle No. 130 On Reader Service Card

Bass and treble tone controls may be switched completely out of the circuits when not in use. All controls are of slide fader type, and the tone controls are center-detented for convenient mid-range setting. Disc jockeys and other professional users will especially appreciate the low, 20-pound weight of the amplifier. The amplifier puts out 75 watts RMS per channel, both channels driven, from 20 to 20,000 Hz, at any power level from 250mW to 75W with distortion less than 0.1% THD. Other specifications: frequency response, 20 to 20,000 Hz ± 0.5 dB; signal-to-noise ratio, better than 85 dB; input sensitivity, 1.5V for rated output; tone control range, ± 10 dB at 100 Hz and 10 kHz.

Synergistics Speaker Series

Eight new "A" series speakers offered by Synergistics range in price from about \$100 to \$600. Three are 4-way systems. These systems, says the company, "usually require less than half of the amplifier power of directly competitive speakers . . . and they have none of the tonal coloration associated with



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high-efficiency systems." The design concept is said to be a refinement of long established acoustic suspension principles. Top-of-the-line, with a suggested retail price of \$600, is the Synergistics S72A speaker. This four-way model features two 10-inch woofers, two $4\frac{1}{2}$ -inch midranges, three $2\frac{1}{2}$ -inch tweeters and one Piezo electric super tweeter. The usable audio range is 26 to 26,000 Hz, the minimum power requirement is 6 watts RMS (maximum is 200 watts RMS), and each speaker weighs 103 pounds.

Pioneer Receiver

This SX-980 receiver, at \$550, is the lowest-priced of four new receivers from U.S. Pioneer Electronics Corp. The audio amplifier section offers 80 watts per channel at 20 to 20,000 Hz, 0.05% total harmonic distortion, and a conventional power transformer (instead of the toroidal type used in higher-

(Continued on page 75)

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Circle No. 22 On Reader Service Card

Puzzled about turntables?

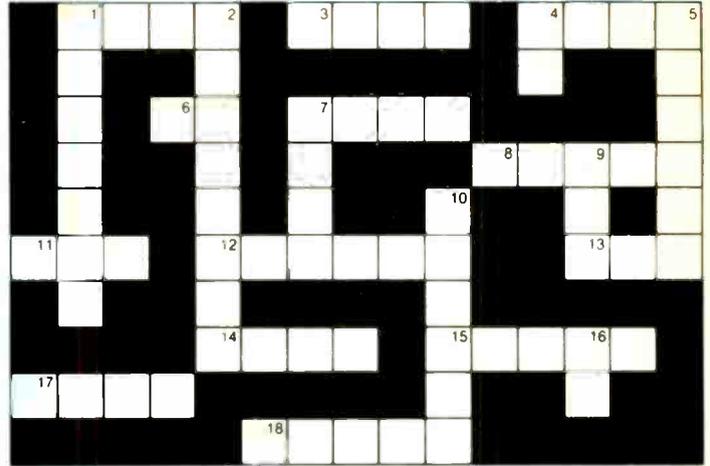
ACROSS

1. Match effective _____ of tonearm and stylus
3. Natural elasticity of _____ filters motor vibrations
4. Isotrack Series eliminated _____ shell
6. Frequency (abbrev.)
7. _____ alloy dynamically balanced platter
8. Stylus _____ adjustment
11. _____ and flutter
12. With record warp stylus may lose _____ contact
13. Ribbed _____ permits air flow
14. Lightweight anodized aluminum _____

15. Set stylus force in _____
17. _____—Skating Control
18. Plug-in-Arm connection moved closer to _____

DOWN

1. One _____ Thorens turntables produced
2. _____-line tonearm design
4. Hertz (abbrev.)
5. Not generally known, Thorens developed _____ drive turntable in 1929
7. First set counterweight for _____ balance
9. Revolutions per minute (abbrev.)
10. Tracking _____
16. Milligram (abbrev.)



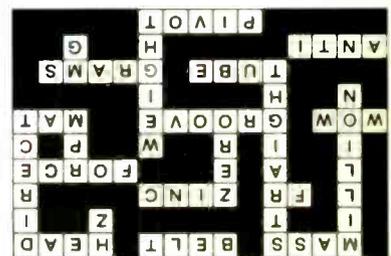
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Take the confusion out of turntable selection. For decades serious record collectors have chosen Thorens Turntables—people who insist that their turntables perform flawlessly, with minimal attention for many years. The most experienced name in home music entertainment (established 1883), Thorens has manufactured over *one-million* turntables, bringing its belt drive design to a level of technical perfection not approached by *any* other drive system known today.

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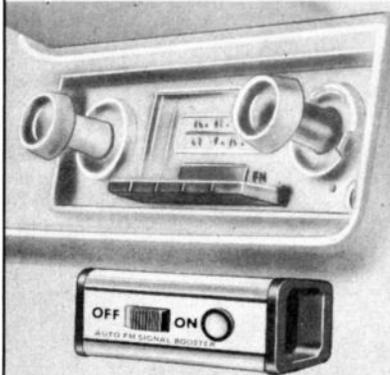
Pictured Above: Top Right—TD-126C • Lower Right—TD-145C • Lower Left—TD-166C • Top Left—TD-160C

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Circle No. 8 On Reader Service Card

A GUIDE TO RECENT STEREO RECORDINGS

by THOMAS D. KELLY

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

© **Beethoven: Nine Symphonies.** Anna Tomawa-Sintow, soprano; Agnes Baltsa, contralto; Peter Schreier, tenor; José van Dam, baritone; Wiener Singverein; Berlin Philharmonic Orch., cond. Herbert von Karajan. Deutsche Grammophon 2740 172, 8 records. © To van der Sluys, soprano; Sue Luger, contralto; Louis van Hulder, tenor; Willem Ravelli, baritone; Amsterdam Tonkunstchor; Concertgebouw Orch., cond. Willem Mengelberg, Philips 6767 003, 8 records. The Deutsche Grammophon collection is Karajan's third time around

Symphony No. 3 is an example, electrifying here in its space, exuberance and uncanny precision. Some might object to the massive treatment given to the first, second and fourth symphonies, but I enjoyed them thoroughly. The "Eroica" is one of the finest put to discs, *Symphony No. 7*, which has always been a specialty of Karajan's, here is olympian in stature, with some of the most powerful low string playing you'll ever hear. The "Choral" symphony is grand indeed, with soloists who are perhaps rather cautious, but the chorus is marvelous.

The sonic quality of the new DG album is outstanding. The strings are recorded quite close up, but they always are rich in texture and some of the double bass playing, as here recorded, is extraordinary. I don't think I've ever heard before the famous double bass passage in the third movement of *Symphony No. 5* played with such precision and virtuosity. For my taste the woodwinds and brass are a bit too far to the back in the aural perspective. They can be heard of course, but I would like for them to have been recorded with a bit more presence. By any standards this is an extraordinary album, and it will probably be as popular with collectors as Karajan's two previous sets. A handsomely illustrated booklet comes with the album, with profuse program notes, essays, and photos of Karajan and each section of the Berlin Philharmonic.

The Mengelberg set was recorded when the Dutch conductor had been associated more than with the Concertgebouw for a half-century, with the exception of the "Eroica" all taken from recordings of public concerts during 1940-1944. The "Eroica" apparently was not available from transcriptions and the Telefunken commercial recording has been used. Considering that these are actual concert performances with no opportunity for remakes, the orchestral playing is incredibly perfect. Mengelberg's willfulness is often apparent; during the finale of the *Symphony No. 7* he almost brings the proceedings to a halt but then again returns to tempo. An interesting idea actually, but it does come as a shock. Even more of a surprise is what he does with the final page of *Symphony No. 9*. He turns the final notes of the symphony into the opening of *Symphony No. 5*, and most listeners will probably be disturbed by the effect. Did he actually interpret it that way, or is there some defect in the transcription? The reproduction is dated of course, but very adequate to convey the performances. Unfortunately this album has been released at full price, which probably will limit its sales. One



Utterly magnificent

with this repertory. He recorded all nine with the Philharmonia Orchestra for EMI/Angel in the early fifties, and in 1963 repeated the cycle for Deutsche Grammophon with his Berlin Philharmonic, an album that has long been a world-wide best-seller. This new set, recorded in the Philharmonic Hall in Berlin between May 1976 and March 1977, is a glorious achievement. The orchestral playing is utterly magnificent, marked by exquisite solos and remarkable articulation. The finale of

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High Fidelity - Nov./1976

Comments about the Ohm F.

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Stereo Review/November 1973

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

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

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

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

Comments about the Ohm H.

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

*The Complete Buyer's Guide
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Comments about the Ohm D2.

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

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

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

Comments about the Ohm L.

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

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

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Comments about the Ohm E.

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

*Canadian Stereo Guide/Winter
1974*



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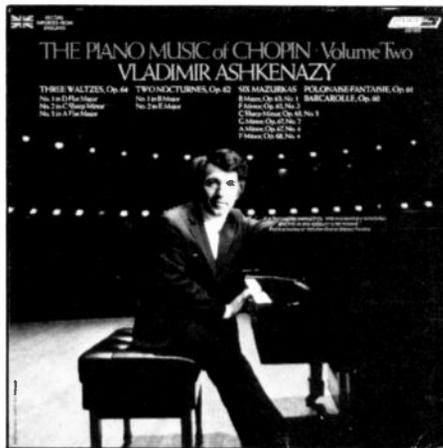
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STEREO RECORDINGS

would think that mono recordings dating back more than three decades would be issued at a budget price, but for those with the money to spend and the interest there are treasures of a very particular type to be had here.

© Brahms: *Violin Concerto in D, Op. 77*. Itzhak Perlman, violinist; Chicago Symphony Orch., cond. Carlo Maria Giulini, Angel S 31286. A meeting of giants here in this expansive account of the glorious Brahms concerto. Giulini's conception is noble, and perfectly matched by the aristocratic playing of Perlman who already is a legend among violinists. The Chicago Symphony plays the score lovingly, and my only negative comment is that the reproduction is occasionally a bit harsh. I miss the fine smooth and natural reproduction to be heard in the old RCA recording of this concerto played by Heifetz with Reiner and the Chicago Symphony back in the heyday of Chicago Symphony recordings before the rich acoustics of Orchestra Hall were destroyed by remodeling.

© Chopin: *Polonaise-Fantaisie, Op. 61* *Bacarolle, Op. 60*, Vladimir Ashkenazy, pianist, London CS 7022. Here is another outstanding disc from the famous Russian pianist, this one offering two of Chopin's major works along with a varied assortment of eleven



Masterfully played

shorter waltzes, mazurkas and nocturnes, all written during the tragic last four years of Chopin's life. Chopin's association with George Sand had deteriorated, his health was not good and a seven-month visit to London in 1848

aggravated his poor physical condition. Surprisingly little of this is reflected in the music he wrote at the time, although he destroyed many attempts at composition and during his final year only kept two mazurkas. Ashkenazy plays the music on this disc masterfully, and this must be considered one of the finest Chopin programs currently in the catalog. London has provided its usual high quality of piano reproduction.

© Delibes: *Coppélia* (complete ballet), Paris Opera Orch., cond. Jean-Baptiste Mari, Angel SB 3843, two records. *Coppélia* was premiered in Paris more than a century ago to instant praise as audiences responded warmly to this romantic story of a beautiful young peasant girl who is jealous of a mechanical doll. The plot is skimpy, but filled with am-



An excellent recording

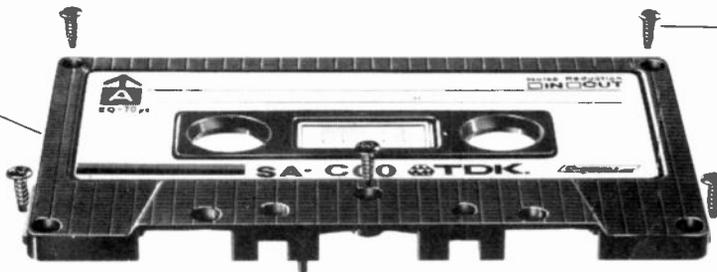
ple opportunity for various exhibitionistic dances, including the famous Mazurka and Czardas. The score is rather repetitive and I imagine that all but the most devoted balletomanes would find that the suite from the ballet provides just about all they'd care to hear of *Coppélia*. Angel's new recording is excellent, very French in character, and cavernously recorded. Ernest Ansermet's older recording with the Suisse Romande Orchestra still sounds remarkably good in spite of its age and costs half as much. For the suite alone you might try Stanley Black with the London Philharmonic or Richard Bonyngue with the Suisse Romande Orchestra, both on London and both containing a suite from the other Delibes balletic masterpiece, *Sylvia*.

© Elgar & Walton: *Marches*, London Philharmonic Orch., cond. Sir Adrian Boult, Angel S37436. There surely is no dearth of recordings of Elgar's "Pomp and Circumstance" marches; you can hear all five in versions conducted by Sir John Barbirolli, Daniel Barenboim,

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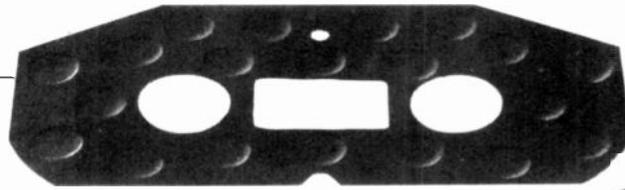
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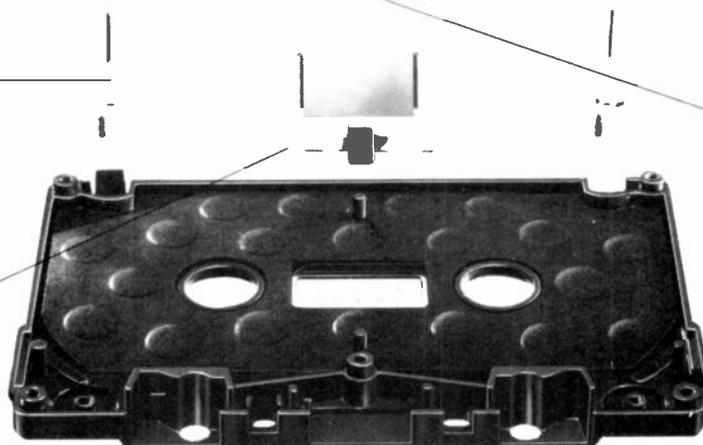


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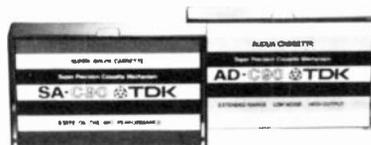


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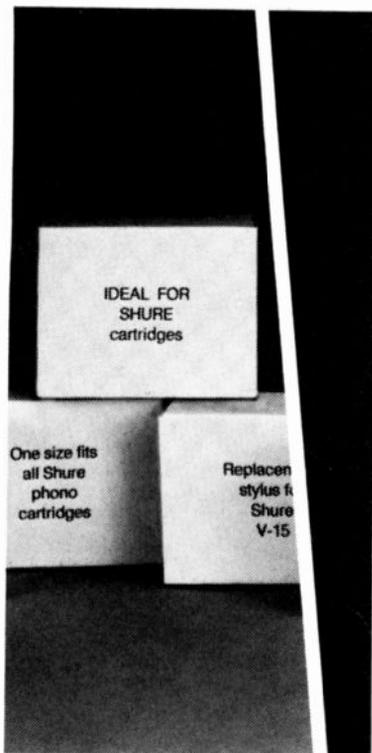
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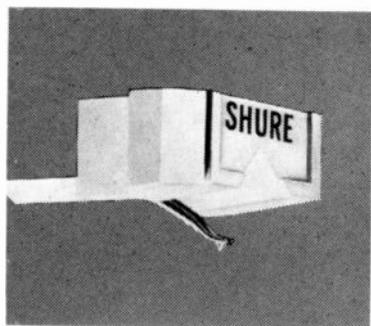
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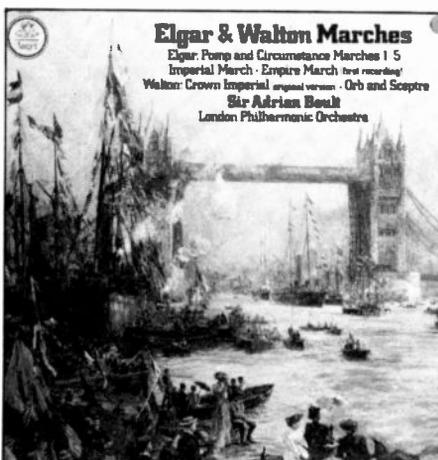


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STEREO RECORDINGS

Sir Georg Solti and Sir Arthur Bliss, with a special nod to the latter for its excellent sonics and budget price. But Boult is a natural for this music, and he leads the London Philharmonic in vivid, majestic accounts of the set, ex-



Large-scale reproduction

cellently recorded. Of even more interest is the second side which contains two Elgar rarities: "Empire March," composed for the opening of the British Empire Exhibition at Wembley in 1924, and "Imperial March," written nearly three decades earlier for Queen Victoria's Diamond Jubilee, June 22, 1897. Two of Sir William Walton's marches fill out the disc, "Crown Imperial," composed for the 1937 coronation, and "Orb and Sceptre," written for the 1953 coronation. Both of these were premiered by Boult, and it is fitting that he conduct this recording. Large-scale reproduction does justice to these colorful scores.

© Strauss: *From Italy*, Op. 16, Dresden State Orch., cond. Rudolf Kempe,



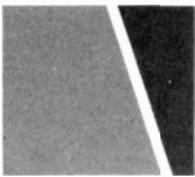
A symphonic retrospective

Angel S 60301. Strauss was 22 years old in 1886 when at the suggestion of

Brahms he visited Italy, a journey he totally enjoyed. Upon returning to Munich he composed this symphonic retrospective containing four movements: "In the Campagna," "In the Ruins of Rome," "On the Shores of Sorrento" and "Neapolitan Life," the latter based on familiar Italian folk-songs. While not as original as *Don Juan* which followed two years later, *From Italy* is a richly rewarding opus, particularly the third movement which has an exquisite serene beauty. Kempe was one of the Strauss specialists of the twentieth century, and this performance is taken from his set of the complete orchestral works of Strauss, which is slowly being issued on single discs in the States. This appearance of *From Italy* fills a glaring void in the LP catalog.

© Tchaikovsky: *Aurora's Wedding Ballet Music*, National Philharmonic Orch., cond. Leopold Stokowski, Columbia M 34560. Here is another of the last recordings by Stokowski, a score that he recorded earlier monophonically for RCA. *Aurora's Wedding* is a much-shortened version of the *Sleeping Beauty* ballet, mostly taken from the final act, a forty-minute series of brilliant dances. Stokowski's enthusiastic conducting belies his age and the National Philharmonic responds vigorously to him. The reproduction is excellent, although not quite as good as the engineering on Stokowski's recent Columbia LP of Sibelius' *Symphony No. 1* with the same orchestra.

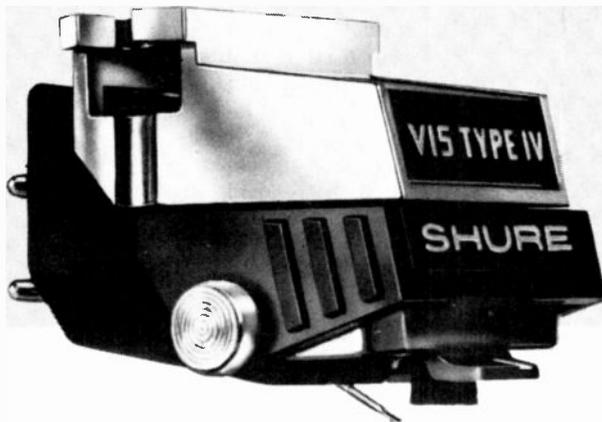
© Tchaikovsky: *Symphony No. 6 in B Minor, Op. 74 "Pathétique"*, Chicago Symphony Orch., cond. Sir Georg Solti, London CS 7034. This favorite Tchaikovsky symphony has long been associated on recordings with the Chicago Symphony. The monophonic Mercury recording with Rafael Kubelik conducting was a sensation when originally issued. The Chicago Orchestra's later stereo recording on RCA with Fritz Reiner directing only recently disappeared from the catalog. Now we have this brand-new version with the Orchestra's dynamic current music director on the podium. It is a powerhouse performance, direct and unemotional, quite unlike the recent Rostropovich-London Philharmonic interpretation on Angel in their complete set of the symphonies. Solti's performance was recorded in Chicago's Medinah Temple in May 1975 and is just about the best sound the London engineers have achieved in that locale, with warmth, clarity and a wide dynamic range. If you're in the market for a new "Pathétique" you could not go wrong with this excellent new London disc. ▲



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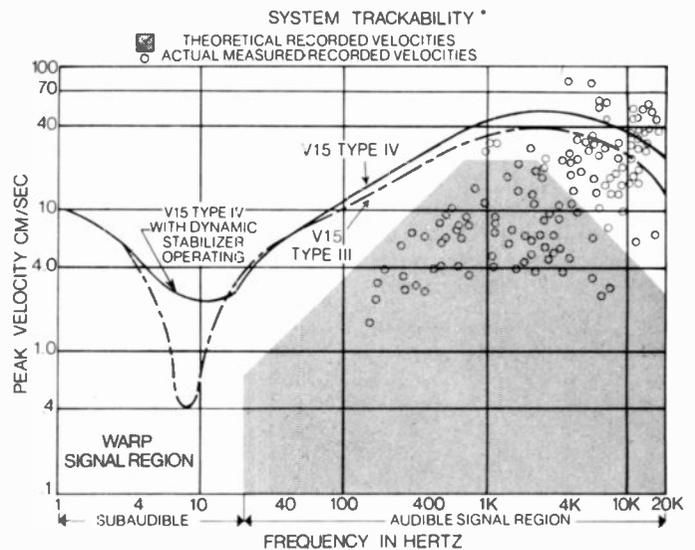


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pop discs

A review of the latest popular music releases

by KEN IRSAY

Sherbet: "Magazine." MCA-2304 \$6.98.

Sherbet, as we all know, is a light, refreshing confection that's perfect on a hot summer day. This Australian quintet is well-named. The music is heavily Beatles-influenced with tight vocal harmonies and tempo changes within each song. I found myself stopping the record often to figure out which Beatles song a particular riff was borrowed from. Harvey James plays a good lead electric guitar, occasionally letting loose a Pete Townshend super strum (catch the intro to "I Got



Love"). Lead singer Daryl Braithwaite most closely resembles David Clayton Thomas in his delivery, but he can also rise pretty close to soprano, as he does in "Love Is Fine." The 10 songs are of varied emotional subjects (love, independence, frustration, etc.) and their construction reflects more technical sophistication than your run-of-the-mill pop group. No doubt about it, Sherbet goes down smooth.

Rick Danko: "Rick Danko." Arista AB 4141 \$7.98.

When he sang lead for The Band, Rick Danko's voice was unmistakable. He strained to hold the notes and always seemed to be singing one key too high. Now that the group has "dis-Banded" and Rick is singing lead all the time instead of just a few times each album, I suppose we'll have to get used to it. At least his is a sincere and, at times, soulful delivery. This album contains a variety of uptempo and slow stuff, liberally sprinkled with big name guest musicians and appearances by the other Band members. "What A Town" opens the set with an easy, shuffling beat and some New Orleans



street band horns. "Brainwash" quickens the pace, Blondie Chaplin helping with flashy guitar riffs. A disappointment is Eric Clapton's lackluster guitar solo on "New Mexico." Garth Hudson plays a fine accordion accompaniment on the track. Others featured on the album: Doug Sahm, Ronnie Wood, Joe Lala, Jim Gordon and Jim Price.

Andy Gibb: "Flowing Rivers." RSO RS-1-3019 \$6.98.

Andy probably could have made it on his name, and if you're going to come from a pop music family, the Bee Gees are the right family. But riding coattails into musical stardom was unnecessary. In his recording debut Andy Gibb proves himself a sensitive composer of love songs; sometimes a bit mawkish but most often quite touching.



His voice is the patented Gibb airy vibrato—only a bit higher. The only one of the 10 tunes not written by the artist is "I Just Want To Be Your Everything." Big brother Barry wrote that one. He is also listed as executive producer of the package. Instrumental accompaniment, which can easily be overbearing for a soft-voiced vocalist like Gibb, is tasteful here. Gibb is always well forward in the mix, with guitars, strings and percussion providing the perfect foundation. "Come Home For The Winter" is an aside into light country music and "Starlight" is reminiscent of America's hit of a few years back, "I Need You." "Let It Be Me" is downright countrified funk. As noted, the album is mostly easy listening love songs, but the seed is planted for ventures beyond in future efforts.

Cowboy: "Cowboy." Capricorn CPN 0194. \$7.98.

Cowboy is the band they wouldn't let die. This is the third incarnation of



a group that truly deserves to live. It is one of the tightest, cleanest sounding and most skillfully produced of the Southern rock groups from the Macon hit factory called Capricorn Records. The album opens with a nice early Byrds-type guitar intro to "Takin' It All The Way." "Pat's Song" is a pretty ballad with a "Bridge Over Troubled Water" theme. It starts slow and soft, gradually building with added instrumentation. The bass and harmonica lines are particularly good. "Straight Into Love" features the laid-back rhythm and wailing guitar that is a proudly-displayed trademark of the Southern bands.

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pop discs

Leroy Gomez: "Don't Let Me Be Misunderstood." Casablanca NBLP-7080 \$7.98.
 Donna Summer: "Once Upon A Time." Casablanca NBLP-7078-2 \$11.98.

There's so much mediocre disco music being churned out that the few items that really grab on and mesmerize your nerve endings are well worth



the money. Two such winners are the latest from Donna Summer and Leroy Gomez. And believe me, they do mesmerize. Not only are they great to dance to (you would expect that of course), but they're also good listening. Example—side two, cut one of the Donna Summer double disc set: "Now I Need You" begins with what sounds like a soft but rapidly paced metronome. As it becomes louder, however, it is clearly a fast electric guitar pluck. A socking bass drum comes in the back door. A tape recorded cymbal played

backwards enters the mix, and it's all held together by the eerie drones of a Moog synthesizer. Finally the breathless voice of Donna Summer backed by an almost churchlike choir. Ah, if words could but approximate the total effect. Each time you listen you'll hear something you missed before. While Donna Summer's album is primarily synthesizer-based, Leroy Gomez produces his pure funk with good ol' instruments. Put your asbestos suit on because this set really spits fire. The entire first side is made up of a combination of the old Animals classic, "Don't Let Me Be Misunderstood," interwoven with a steamy, surging, downright passionate "Esmeralda Suite." The side features a pounding backbeat, wild flamenco acoustic guitars, bombastic brass and the most exciting electric guitar riffs since Eric Clapton's "Layla." A great version of Van Morrison's "Gloria" is a standout on side two. Repeating an important point—these albums are great for listening, as well as dancing.

Ozark Mountain Daredevils: "Don't Look Down." A&M SP-4662 \$7.98.

The group is a tight country-rock combo known for their crisp recordings. The fast tunes feature close-miked intense drumming, mixed forward along



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with the vocals. Highlights include harmonica blasts on "River To The Sun," crystal clear acoustic guitar on "Giving It All To The Wind" and the final rave-up instrumental hoedown, "Stinghead."

Alessi: "All For A Reason." A&M SP-4657 \$7.98.

This is slick, well-produced, teen-oriented pop. It features one of my favorite guitarists, Charlie Brown, who played up a storm in "Hair" on Broadway. The album includes a song called "Air Cushion," in which the Alessi brothers (they're twins) wish they were the air cushion on which a young lovely is floating in a Palm Springs hotel pool.

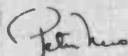
Linda Ronstadt: "Simple Dreams." Asylum 6E-104 \$7.98.

James Taylor: "JT." Columbia JC 34811 \$7.98.

These albums share three characteristics. They're both performed by re-

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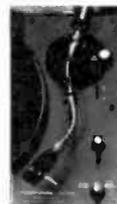
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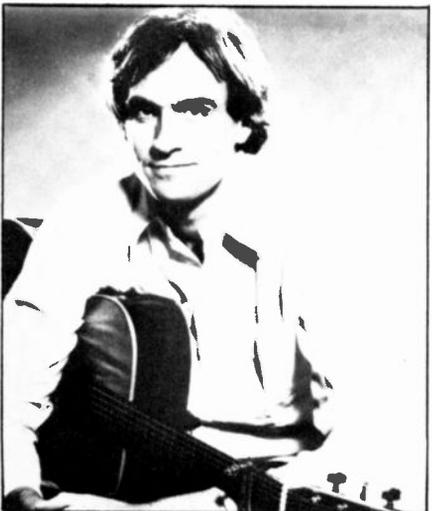
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pop discs



ording superstars of the first magnitude. Both were produced by Peter Asher. Both were mixed down using the Aphex Aural Exciter system. It's this last rather intriguing trait that should be of particular interest to hi-fi mavens because it qualitatively sets these discs apart from most of today's pop output. According to producer Asher, the Aphex is a phase randomizer. Each instrument or track is sent into the unit separately during the mixing. The circuit transforms all of the out-of-phase components into a broad phased spectrum and sends it back out. Asher points out that the system is not comparable to equalization or brightening. The result is much more obvious. No matter how sophisticated your stereo system is, these recordings will bring out the best in it. Words like crispness and presence come immedi-



ately to mind. It's as if the artists' performances were emanating from in front of your speakers rather than coming through them. You don't particularly care for Ronstadt or Taylor? No matter. If you're into dynamite sound, invest in these albums.

Franklin Micare: "Franklin Micare." Private Stock PS 7005 \$7.98.

It takes a lot of guts these days for a new artist to admit that what he sings is just pop. It seems as if everybody's musical category is at least prefixed. You know, "gutter-rock," "snowball-salsa," whatever. Franklin Micare, whose background includes singing Cole Porter tunes, says he sings pop music. But his brand of pop covers a lot of territory. Opening the album are



two good-timey movers, "Nobody" and "Delectable Love." They seem a bit crowded with horns and background singers, but the overall effect is a gang of folks celebrating life and love. At the other extreme, "Hot Jazz" is a bouncy, almost scat style vocal solo with only acoustic guitar accompaniment. Micare said he wanted to produce a "home-made rather than slick" sound on this disc, and he did so by using session musicians in different combinations to achieve spontaneity. Franklin Micare is a versatile vocalist whose recording debut should be greeted enthusiastically by all the pop people of America.

Dillard, Hartford, Dillard: "Glitter Grass . . ." Flying Fish FF 036 \$6.98.

In their 20 years of playing country licks and guesting on each other's albums, this is the first full fledged collaboration of two seminal forces in popular music, John Hartford, representing



progressive country, and The Dillards, bluegrass kings. The amalgam, as you might expect, is superb. Country rockers alternate with beautiful ballads, with a country-reggae tune for good measure. Straight bluegrass and pure rock are also represented.

Barclay James Harvest: "Gone To Earth" MCA-2302 \$6.98.

Barclay James Harvest is one of those nearly very successful British groups that seems to have been around for about umpteen years (more than 10, less than 20), releasing albums regularly but never really breaking into big time popularity. And it's a darned shame, because they're good musicians and producers. What has been holding them back, I fear, are their frequent lapses into lyrical pretense. But they more than make up for it with the music. This set is apparently a deliberate attempt to be more accessible to the majority of record buyers who haven't bought their previous albums. Catchy arrangements and rich production mark this collection. The group makes use of



all the sonic space within the stereo spectrum without overcrowding it. Even the Phil Spector-ish "wall of sound" rhythm on "Hymn" doesn't become muddy. "Love Is Like A Violin" features a chorus right out of the Moody Blues songbook. In fact, the group makes no secret of its debt to (or admiration for) the Moodies. The final cut on side one is "Poor Man's Moody Blues," which combines many of the instrumental and vocal tricks of that legendary combo. ▲

Not many tonearms can pass this simple but very revealing test.

Pivot bearing friction is one of the most important elements of tonearm design. It is the major source of resistance encountered by the stylus as it traces the record groove. And it directly affects the way your records sound and how long they last.

While most tests of tonearm performance require sophisticated laboratory equipment, a remarkably precise test of bearing friction can be made with only a $\frac{5}{8}$ " square of paper, such as the corner of a dollar bill.

That piece of paper, placed on the head of a carefully balanced free-floating tonearm, will cause the tonearm to lower—or it won't. It depends on whether the bearing friction of the tonearm pivot is significantly lower than the 25-milligram weight of the paper.

A good place to make this test is at your high fidelity dealer. You can try it on any turntable you may be considering. We believe you'll be surprised how few—even very high-priced ones—can pass this simple test.

We encourage this test with confidence, since even our lowest-priced model, the 1237, has vertical bearing friction well below the test condition.

While making this test, you might examine tonearms in other ways. For example, are they straight (good) or curved (not so good)? Curving the tonearm adds more mass and makes the arm prone to lateral imbalance.

Also, note how smoothly you can balance the arm, the sense of precision you get as you set tracking force and anti-skating and the overall sense of quality in the materials and finish.

Then you'll know why Dual wants you to know more about tonearms. And why others may not.



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Circle No. 6 On Reader Service Card



SUMMER FORECAST 1978

GET A SPECIAL SNEAK PREVIEW
OF THE DAZZLING ARRAY OF NEW HI-FI PRODUCTS
EMERGING IN AUDIO STORES NOW

Before you head to your local audio store expecting to find what you saw there last week, you ought to know that a whole new crop of audio equipment is probably being installed right now! HI-FI/STEREO BUYERS' GUIDE's editors saw most of the new introductions at the latest Consumer Electronics Show, and we've gathered the highlights of what we saw within the pages that follow.

The sheer number of new components is enough to stagger anyone's imagination, but don't be daunted by that. Prices for basic stereo components are going down for comparable levels of performance. The bigger, more complex items are naturally costing more than the less convenient, simpler products of a few years back but for the extra performance and the extra features, you're getting more than ever before. Whether you're looking for a good buy on a basic system or are seeking to upgrade to a higher performance combination, you should find plenty here to get you geared up for a visit to your local audio hunting ground for some demonstrations and critical listening of your own.

Receivers and Tuners

Billed as "the world's most powerful 50-watt receiver," the SR-804 is the newest Class G receiver from Hitachi. Complete with twin power meters and two tuning meters, it'll also deliver 100 watts on transients for \$399.95. Also from Hitachi: the FT-440B, a \$279.95 tuner that matches the new preamps and power amps in the line.

JVC is offering the new FM/AM tuners, the JT-V11 (\$149.95) and the T-3030 an FM tuner with digital frequency synthesizer (\$599.95).

Kenwood is introducing three receivers, as well as a pair of tuners. The receivers are the KR-3090 (26 watts/channel), the KR-5030 (60 watts/channel), and the KR-6030 (8 watts/channel) while the FM/AM tuners—the KT-5500 and KT-6500—offer 1.9 μ v and 1.8 μ v sensitivity (respectively) with 75 dB selectivity on the KT-6500.

Mitsubishi is expanding its line to include the DA-F20 Quartz PLL Synthesized Tuner and the DA-C20 tuner/preamp combo. The DA-F20 goes for \$380, and features switchable selectivity, record level calibration, and both rotary and five-digit frequency readout. Signal-strength and center-tuning are indicated by LEDs rather than by meters and 50 dB separation, 0.08% THD and 75 dB S/N are claimed in the stereo mode. The DA-C20 tuner/pre-amplifier docks with the Mitsubishi power amps to make up a receiver. The tuner/preamp will sell for \$490. S/N and THD are similar to that of the DA-F20. The preamp handles moving coil as well as conventional cartridges at a THD of 0.005% or less.

Nikko has a new frequency-synthesized digital tuner, the Gamma V, with six-station memory and the LED signal-strength display that seems to be the current vogue. Auto-scan and manual tuning are provided as well as selectable bandwidth and variable mute. Another new tuner, the NT-550, fills out

the line between the FAM-450 and the NT-850.

Optonica offers a new receiver in the 45-watt class (\$330 suggested retail) available in either brushed aluminum (SA-5201) or in ebony (SA-5205). Each sports a wood cabinet and the Optonica tear-drop knobs. The Phase Linear 5000-Series Two tuner has a built-in linear expander, LED multi-path indicator, PLL multiplex decoder, and variable mute. Price is about \$549.95.

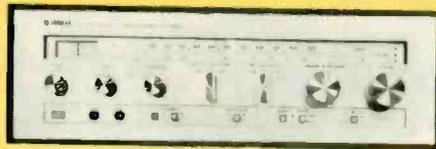
Philips has entered the receiver market with four new products, the AH784 (\$199.95) with 18 watts/channel, the AH785 (\$269.95) with 30 watts, the AH786 (under \$400) with 45 watts, and the AH787 (under \$500) with 60 watts.

Pioneer has taken over the lead in the receiver power race. Their new SX-1980 features 270 watts/channel, dual-wound toroidal power transformer, and quartz-assisted tuning (with an indicator to tell you when you're close enough to let go of the knob.) A veritable goliath, it also has peak-reading power meters, signal-strength and center-channel meters (with multi-path option), and selectable phono cartridge loads—both resistive and capacitive. Price is \$1250. At about \$900, the new SX-1280 receiver offers similar features (sans selectable phono cartridge resistive load) with 185 watts/channel. FM performance is only a smidgin less noteworthy than the deluxe SX-1980. The new SX-1080 has a fixed phono input impedance and 120 watts/channel at

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Sanyo's JCX2900K receiver has a rated output of 120 watts per channel with .08% maximum THD. Two tape inputs with dubbing included. \$570. No. 110.



Yamaha's new CR-420 receiver offers 25 wpc, with less than .05% THD at a price of \$280. Includes input and output selectors, FM tuning meter, FM mute. No. 101.



Rated at 270 watts per channel with less than .03% THD, Pioneer's new SX-1980 also offers an automatic phase control feature and phono pickup load selection. \$1250.00. Circle R. S. No. 85 for details.

about \$700, while the SX-980 (\$550) offers 80 watts/channel.

Sankyo's SRC-4040 (40 watt/channel) FM/AM receiver (at \$330) is available in black for \$10 more (SRC-4040BL) as is their 20-watt model the SRC-2020 (\$220). You guessed it; the black one is the SRC-2020BL at \$230.

Sansui has filled out the new line of receivers which features ultra-wide frequency response, DC-connected power amps and ranges from the G2000 at 16 watts/channel (\$230) to the G22000 "separable" receiver at 220 watts/channel. The latter features a 200 kHz bandwidth, with a slew rate of 150 V/ μ s and a square wave risetime of 0.7 μ s. THD is 0.009%. It goes for \$1200. In between are the G3000 (26 wpc), the G5000 (45 wpc), G6000 (65 wpc), G7000 (85 wpc), G8000 (120 wpc), and G9000 (160 wpc).

Setton offers the RCS-X-1000 Hi-Fi Control Center—a remote-control digital tuner/preamp that received the Gold Award in France. Each is hand-made, has provision for six preset FM stations, and uses LED displays for proper tuning as well as for signal strength and output-power level. The separate volume controls for each channel look and act like airplane throttles. Independent, selectable-turnover-frequency tone controls are provided, with a digital readout of the amount of boost or cut on each channel. A built-in pink-noise generator is used for testing, and a flat cable connects the control center with the remote 120 watt/channel amp. Price: \$3500.

Sherwood offers us two new top-end receivers, the S75CP and the S110CP. Each is part of the "Certified Performance" series and features a new phono preamp with a 94 dBA signal-to-noise ratio. The 70-watt S75CP goes for about \$575, and the 100-watt S110CP is approximately \$750.

Thorens has entered the receiver market with the AT-410 (\$1095) which features 50 watts per channel, five FM presets and two AM presets. The AT-410 features three loudness/presence contours and a choice of three high filters.

Toshiba has five new receivers, the SA-725, SA-735, SA-750, SA-775 and SA-7100. The top-of-the-line model, the SA-7100, offers 100 watts per channel and it sells for \$595. Also new from Toshiba is a combination package consisting of the new ST-335 Tuner, SY-335 Preamp, and SC-335 power amp (40 watts/channel). Total price for the package is \$399 with a matching rack available at extra cost.

Amps—Pre-, Power, and Integrated

From A & E Technical Research (distributed by Osawa) you'll find the DCA-120 DC stereo power amp with 60 watts/channel for \$800. The DCA-120 boasts a frequency response from DC to 500 kHz and a 20 V/ μ s slew rate. Phase accuracy is within 3° from DC to 20 kHz with a group time delay of 0.42 μ s. Accompanying it is the E-2000 Phono-Equalizer Amplifier at \$1800—a fully DC-coupled preamp that uses chopper stabilization of the phono input to surmount drift. Phase accuracy is within 1° across the audio band, and response extends from DC to 500 kHz.

BGW offers the new Model 103 Stereo System Control Center (\$449)—with a 94 dB phono signal-to-noise ratio. Another newcomer is the Model 210 Stereo Power Amp (\$599)—a less powerful (100 watt/channel) version of the 410 but with similar features.

Cerwin-Vega has formed the Metron Group of professionals that have turned out the PR-1 Preamplifier Control Center (\$500) which features low TIM and exceptional dynamic range, the M-200 Power Amplifier (\$550) which has

an output of 125 watts per channel, the A-4000 Power Amplifier (\$1200) at 350 watts per channel, and the MC-1 Moving Coil head amplifier.

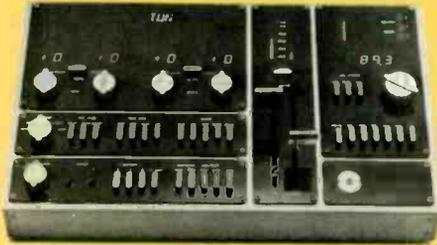
Hitachi introduced two new power amps using power MOS-FETs in the output stage. The HMA-7500 at \$500 offers 75 watts per channel operation while the HMA-9500 can deliver 100 watts per channel for \$1350. The distortion spec on the 9500 is 0.005% and it responds out to 100 kHz. There is also a new preamp with selectable cartridge loads, the HCA-7500 (\$350).

Kenwood showed the KA-3700, KA-5700 and KA-6100 integrated amps at 20, 40, and 50 watts/channel respectively, while Lux Audio offers the CX-1 direct-coupled, DC head amp (\$295), and the L-110 integrated amp—120 watts/channel for \$995. The L-110 features a direct-coupled output stage, touch mute, linear equalizer, and a choice of three turnover frequencies on the tone controls. Lux also offers a moving-coil cartridge matching transformer—the 8020—(20 or 30 dB of voltage gain) for \$195. For an extra \$30, you can buy an adaptor box—the AD-8000—that mates this transformer with any preamp.

Marantz's Model 300DC is a power amp that features low TIM at a power level of 150 watts/channel, while Mitsubishi is adding two dual-monaural, direct-coupled power amps—the DA-A15DC (150 watts/channel at \$630) and the DA-A10DC (100 watts/channel at \$430)—to its line. Either amp can be docked with either of Mitsubishi's preamps or with the new tuner/preamp. The new power amps replace the DA-A10 and DA-A15, which were not direct coupled. Also from Mitsubishi, a new preamp—the DA-P20 a

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TUNERS



Setton's RCS-X-1000 tuner/control center includes two headphone jacks driven by headphone amps. The tuning section includes a synthesizer circuit and LED tuning indicator. \$3500. R. S. No. 107.

"dual monaural" design that minimizes crosstalk (\$380).

Nikko's new Alpha III power amp features MOS-FET circuitry and delivers 80 watts/channel. Bandwidth extends to 200 kHz and THD is 0.06%. Phase Linear showed three new preamps and four new power amps. The 2000-Series Two preamp has individual tone controls for each channel with selectable turnover points (\$299.95). The 3000 Preamp/Control Center incorporates CMOS logic and relays to do the switching. Suggested price is \$499.95. The redesigned 4000 Series Two preamp incorporates Phase Linear's latest Autocorrelator and Peak Unlimiter-Downward Expander (\$649.95). The Phase 200-Series Two power amp is rated at 120 watts/channel (0.09% THD) at \$399.95, while the redesigned 400-Series Two delivers 210 watts at the same THD for \$599.95. The Dual 500 power amp is rated at 505 watts/channel at 0.09% THD (\$1349.95). Finally, an improved version of the Phase 700—the Series Two—delivers 360 watts/channel at \$879.95.

RAM Audio has a new preamp/control center, the RAM 203 at \$290, and a new power amp, the RAM 520 that replaces the 512. Power is now 200 watts/channel and price is \$1250.

SAE has three new integrated amps—two at 100 watts/channel, the other at half that power. The Model 2922 (\$850) has a parametric equalizer built in and delivers 100 watts. The Model 3022 (\$700) has the same output but uses conventional tone controls. The Model 3031 (\$550) offers 50 watts and standard controls. All three are marriages of existing power amps and preamps and are priced \$150 lower



JVC's new T-3030 FM tuner includes quartz-crystal locked PLL circuitry in its frequency synthesizing section. \$599.95. For details, circle Reader Service No. 73.

than the separate pair. All that's missing is the power displays of the separates. SAE also offers several new separates. The Model 2300 (\$700) is a new 150 watts per channel power amp that uses a toroidal power transformer and needs no forced air cooling. The Model 3100 (\$350) delivers 50 watts per channel and has a single row, bi-directional, LED power-level display with peak overload indicators. The companion preamp for the 3100 is the Model 3000, also at \$350. It has every control function of the current Model 2900 except for the parametric equalizer. The tone controls are addressable either to the line outputs or to the tape outputs (for equalization prior to recording.) All power amps use a monocoque construction for light weight and strength.

Technics has a new integrated amp, the SU-7100 at 35 watts per channel. It includes a wood case at an attractive price of \$169.95. A new Darlington power IC is used. Finally, Van Alstine has a newly designed power amp—the Model Two at \$1000.

Turntables, Tonearms, Pickups

AIWA introduced its first direct-drive, semi-automatic turntable, the AP-2200 (\$220.00), with front-lip controls and low-mass, S-type arm, while Audioncraft (distributed by Osawa) showed a new one-point support tone arm, the AC-300 MK II (\$325.00). It's available either with a straight, low-mass, fixed-head arm or with an interchangeable S-type arm that has a detachable headshell. The arm won the Japanese Grand Prix award.

From BSR comes the new Quanta line of turntables—two single-plays and two changers. The Quanta 400 is a fully automatic, single-play belt-drive unit with dust cover for \$79. The Quanta 500 (for \$20 additional) offers pitch control and a strobe. The Quanta 450 is a changer version of the 400 at \$109, while the 550 is a changer ver-



Mitsubishi has introduced the DA-F20 quartz PLL synthesizer FM tuner. At \$380, it offers a stereo S/N ratio of 75 dB and a stereo THD of .08% (wide). No. 104.

sion of the 500 (\$149).

Denon of the Discwasher Group offers the DP2500 turntable (\$525 with laser-designed arm and bearings, \$475 without), a quartz-controlled single play as well as the DP1800 (\$520) which features a natural marble base for reduced feedback. Discwasher also showed the CPY cartridge at \$500 including power supply/equalizer.

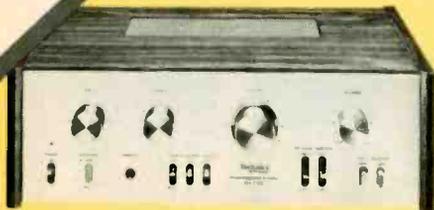
Garrard had two new single-play, semi-automatics on display, the GT-25P (\$144.95) with 4-pole, Synchro-Lab motor, and the GT-35P (\$189.95) with DC servo motor and pitch control. Both are belt drives and are single-play versions of the GT-25 and GT-35 changers. Harman/Kardon is introducing the ST-8, an updated straight-line-tracking arm system with auto lift-off and damped cueing. The turntable is driven by a Hall-effect, servo-controlled DC motor. Price is about \$499.

Hitachi added two turntables to their line. The HT 460 is a fully-automatic, direct-drive unit at \$199.95, and the HT 550 is a semi-automatic, quartz-lock, direct-drive at \$300. Both feature the Hitachi UniTorque motor, a flat, 8-pole, pancake motor with phased coils to smooth out the torque.

From Kenwood: the KD-3070, a direct-drive, semi-automatic using a 20-pole DC servo motor. Also the KD-750, a quartz-lock, PLL direct-drive platter with built-in braking. The replaceable headshell is fabricated from lightweight magnesium.

Lux Audio had three new turntables, all manuals. The PD-272 (\$320) is a direct-drive with integral Lux tonearm. The PD-444 is also a direct drive that will accommodate two tonearms, one of which may be a 16 inch-er. Price is \$795. The heavy platter is magnetically suspended to reduce the load on the

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Technics' new SU-7100 integrated amplifier offers 35 watts per channel with no more than .1% THD at a price of \$169.95. For more information circle R. S. No. 98.



Hitachi's new HCA-7500 preamplifier is priced at \$350. It offers a total harmonic distortion spec of .01% and a phono signal-to-noise ratio of 87 dB. No. 72.



Phase Linear is introducing a new power amp, the Phase 700 Series Two. At \$879.95, it is rated at 360 watts per channel, .09% THD or less. R. S. No. 105.

bearings, and a poleless motor is used. The PD-441 is exactly the same as the PD-444 except that only a single tonearm can be used (\$645).

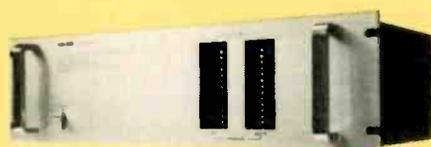
In the Marantz line, the 6110 replaces the 6100 semi-automatic. The new belt drive sells for \$139. At the top of the line, the 6350Q replaces the 6350; that's an in-production change to a quartz-lock system (\$289). The 6170 is a direct-drive, servo-controlled, semi-automatic at \$180.

Optonica introduced two new platters, one a direct drive—the RP-7505 at \$260—the other a belt drive—the RP-7205 at \$180. Both are fully automatic, have the same tonearms, and feature servo control, albeit of different types. Only the direct drive has pitch control. It also features a 20+ pound metal-filled plastic base.

Ortofon has filled out the line with a competitively priced "Variable Magnetic Shunt" cartridge, the FF-15XE. They also offer a thick-film capacitor—the CAP-210—that slips over the pins of their cartridges to increase the capacitive load when operating into low-C preamps. The removable part will be factory-mounted on the top-of-the-line Ortofon and be an optional accessory for the others.

From U.S. Pioneer, three new economical semi-automatics: the PL-514 (\$125) a belt-drive using a synchronous motor; the PL-516 (\$150), a belt-drive with frequency-generator servomotor; and the PL-518 (\$175), a direct-drive with DC servo. Each uses an aluminum die-cast arm base and precision carbon-chromium tonearm bearings.

Rotel offers the RP-6300, a direct drive with auto lead-in for about \$225. The arm is gimbal-mounted and has a removable head. Thorens widened its belt-driven line to include the TD-



Nikko's Alpha III MOS FET power amplifier delivers 80 watts per channel with .06% THD or less. Its expected price is \$499.95. Circle Reader Service No. 103.

160B Mark II, a turntable-only for which tonearm boards are available for the Stax, Grace, Infinity and SME arms. Price is \$225.

Tapes and Decks

Ampex will be offering their new Grand Master line for cassette, open-reel and 8-track—a direct descendant of the Grand Master professional tapes. The cassette version features an improved shell with better guidance.

BASF introduced their Professional I and Professional II cassettes. The former is a ferric oxide with a claim of 1½ dB more dynamic range than competitive products. The Professional II is a CrO₂ product with 2.4 dB lower noise than "chrome equivalents," ½ dB better headroom at 333 Hz, and up to 10 dB more headroom in the 11–20 kHz region. Furthermore, head wear is said to be lower than with the chrome equivalents. Meanwhile, Fuji offers their new FX-I and FX-II formulations. The FX-II uses a Berridox pigment that is compatible with chrome bias and EQ. Berridox is a cross between two iron oxides, hematite and magnetite, and the combo is said to provide better performance than competing chrome equivalents and at less cost. The FX-I is based on Fuji's own Pure Ferrix formulation and uses normal bias and EQ. Finally, you can expect to find some improvements in the Scotch Dynarange series from 3M Company.

Among the new cassette decks is the AD-6400 from AIWA. It features three-position bias and equalization switching with a continuous fine-tuning control on the bias. Response to 15 kHz on LH tape (17 kHz on chrome and FeCr) is claimed.

From Denon, two new cassette decks; the front-loading DR-350 (\$560) with front-panel bias fine adjustment and the DR-750 (\$1565). The latter features Sendust heads, mic/line mixing, wide-range meters (peak or VU), and four-position tape switching with a fine control on the bias.

Fisher has four new products in the tape line: two modestly priced front-loading cassette decks—the CD 4011 for \$129.95, and the CD 4015 (\$159.95). The two are basically the same but the CD 4015 also includes Dolby. The CR 4025 (\$249.95) features wireless remote control, while the ER 8150 will handle either cassette or 8-track for \$299.95.

Hitachi is offering three new front loaders. The D 900 is a three-head deck using Hitachi's R&P head and is priced at \$495. It features full logic controls, dual capstans, double Dolby (with calibration controls), and peak/VU meters. The D850 is also a three-head deck with power-assisted controls, FM Dolby, and peak-reading meters (\$349.95). The more modestly priced D550 (\$219.95) is a two-head deck with power-assisted controls. All three decks come equipped with a remote-control jack on the back, and a remote control attachment is slated to be available by midyear.

And from Kenwood, the KX-830 and KX-1030, each featuring a two-belt drive system and heavy flywheel. The KX-1030 is a three-head deck (all ferrite) with double Dolby. A response within 3 dB from 35 Hz to 18 kHz on

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CASSETTE DECKS



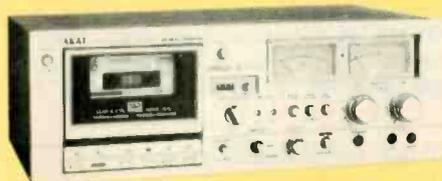
Sony's TC-K7 II two-head cassette deck with Dolby noise reduction has bias and equalization settings for standard, ferrichrome and chromium dioxide tape. \$500. For more information circle R. S. No. 93.



Panasonic's new RS-612 front-load cassette deck with Dolby noise reduction will sell for about \$160. It includes separate bias/equalization switches. R. S. No. 82.



Fisher's new CR4025 cassette deck has a price of \$249.95. Its highlight is a wireless remote control feature which may be used as an editing aid. Circle No. 69.



Akai's new GXC-750D cassette deck has a rated frequency response of 30 to 19,000 Hz, ± 3 dB, (FeCr tape) with less than 1% THD. \$695. Circle R. S. No. 62.

\$170, the STD-1870 with memory rewind, provision for three tapes, an output-level control and recording mute (\$240), and the STD-1850—essentially the same as the 1870 but without memory rewind or recording mute (\$210). The STD-1850 is also available in black (STD-1850BL) for an extra \$10. The STD-2000 is \$300 (the black STD-2000BL is \$310) and features a switchable MPX filter and separate bias and EQ switches.

TDK SA is claimed. It also features a fine bias adjustment control for each track. (See the *Spotlight* feature on the KX1030 elsewhere in this issue.)

Marantz has filled out their line with three new cassette decks. The three-head 5030B has full-process Dolby and hard permalloy heads. It also has mic/line mixing with a master fader control and a defeatable peak limiter. The 5020B is a two-head version of the 5030B, while the 5010B offers a peak limiter and bias and EQ for three types of tape. All three fit the new Marantz rack.

Optonica featured the RT-6501 microprocessor cassette deck. The RT-6501 offers a frequency-generator, servo-controlled motor and an extra kHz of high-end response. The deck is available in black or silver for \$360. The RT-6501 has five forms of memory. It can be programmed to turn on and off, to record or to play back, and will even find and play a certain segment of tape.

Panasonic introduced the RS-612US, a front-loading cassette deck with Dolby. It features a timer standby mechanism and oil-damped cassette door—all for \$160.00.

Sankyo has five new decks: the STD-1650, a front loader with Dolby for a mere \$120, the STD-1750 at

As of January 1, 1978, Sony Corporation of America will be marketing Sony's cassette and Elcaset products. Sony showed four new cassette decks. The top-of-the-line model, TC-K7II uses two motors and has a S/N of 60 dB (without Dolby) using Sony's FeCr tape. Price is \$500. The TC-K4 and the portable TC-158SD yield S/N of 50 dB at \$280 and \$380 respectively, while the TC-K3 still comes in at 58 dB and is \$220. Response extends to 16 kHz on the high-priced home decks; to 15 kHz on the TC-158SD and TC-K3. There's also a full function remote control (RM-30) for the TC-K7II.

Technics unveiled the RS-631, a front-loading, cassette deck with three peak-responding LEDs. The door is oil-damped and the cassette lifts up to meet your hand. It also features a timer switch, 3-position bias and EQ, mic/line mixing, output-level control, memory auto play, and memory auto rewind. Price is \$299.95. Also from Technics is the RS-1700US, a $\frac{1}{4}$ -track, open-reel deck with auto reverse and the capability to record and play in either direction. There is also a $\frac{1}{4}$ -track playback head in the four-head stack. Price will probably be \$1800 when it's available in August. For those who own the RS-1500US and want to switch from $\frac{1}{2}$ -track to $\frac{1}{4}$ -track recording, there



The RT-6501 microprocessor cassette deck is a newcomer to the Optonica line. It can be programmed to turn itself on and off, and has electronic memory rewind and tape counter. \$360. No. 120.

is the RP-2422 head assembly at \$249.95. That includes the price of mounting and aligning the new heads. The RS-1500US will also be available $\frac{1}{4}$ -track record/play capability (and $\frac{1}{2}$ -track play) as the RS-1506US.

Finally, Uher revealed two new cassette decks using the Star loading approach—the cassette slips sideways into a slot. The CG-332 (\$399) has a switchable MPX filter, 16 $\frac{1}{2}$ kHz response, peak indicator lights, and separate left and right record-level controls with a separate master fader. The CG-350 (\$500) is a 3-motor deck similar to the 332 but automatically switches between Ferric tapes and chrome. All functions are logic controlled and up to 9 selections can be programmed for automatic location.

Speakers

Speakers rival the rabbit for their proclivity toward reproduction. New models abound with a rapidity that defies the editors' ability to keep up. Nonetheless, and undaunted, we attempt to hop to the pace.

From AEI, the medium-priced Evolution 1, a two-way acoustic-suspension system using a 10-inch woofer and 1-inch tweeter. Crossover occurs at 1.5 kHz and a response from 35 Hz to 17 kHz is claimed under anechoic conditions. \$160 ea., walnut; \$140 ea., vinyl.

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TURNABLES ETC.



Marantz's new top-of-the-line turntable, the 6350Q, is a direct-drive unit. Its PLL servo system utilizes a quartz crystal to ensure platter speed accuracy. \$309.95. For more information circle R. S. No. 80.



BSR is introducing a new belt-drive turntable, the Quanta 400. It's an automatic single-play unit, with S-shaped tonearm and ADC QLM pickup. \$79.95. No. 65.



Kenwood's new turntable is called the KD-750. It includes quartz/PLL control feature, an all-electronic braking system, and tonearm. \$450. R. S. Number 74.

(Prices will be slightly higher on the West Coast.)

The originator of the acoustic-suspension system, AR, debuted the AR-9 (\$650), their new top-of-the-line model. It's a floor-standing tower, almost 4½ feet high and uses a pair of 12-inch woofers, an 8-inch lower midrange, 1½-inch dome upper midrange, and ¾-inch dome tweeter in a four-way configuration. Crossover frequencies occur at 200 Hz, 1200 Hz, and 7000 Hz. AR claims it to be the flattest, highest power-handling speaker they've ever produced.

Bozak reputedly has a new Listener Series. The smallest member, the LS-200, goes for \$110 and is a two-way bookshelf type with 10-inch woofer and a new "Z" tweeter. The LS-250 (\$180) is a three-way with 12-inch woofer and 4-inch midrange, while the LS-400 (\$230) is a floor-standing, three-way with a 6-inch midrange.

The new Braun L1030 (\$400) is the first studio monitor to be introduced to the US by this West German firm. It's at the top of their High Performance Series and is available in walnut or black. Their new automobile system incorporates a mounting bracket and goes for \$260 the pair. Also from Germany comes Canton's Gamma 800, a three-way system at \$500 the pair. Frequency response from 23 Hz to 30 kHz is claimed in an 11-inch square package. Also from Canton, the HC-100 slanted-front miniature system for car or home. Available in black or silver at \$180/pair.

Cerwin-Vega proclaimed their Strok-

er series of sub-woofers. They're available in either 15-inch, 18-inch or 24-inch sizes—the latter two more for disco use. The new 15-inch woofer also finds its way into the 15TR system, an update of the 15T. Stupendous sound levels can be expected from these large woofers, each of which is capable of a 2-inch cone excursion.

Another British speaker firm has landed on our shores, to wit, *Chartwell*, distributed by *Osawa*. The line includes the LS3/5A "baby monitor," the PM-100, PM-200, PM-400 and PM-450. All but the PM-400 are two-way systems with woofers ranging from 6½ inches (in the PM-100) through 8 inches (in the PM-200) to 12 inches (in the PM-450). The PM-400 uses a 12-inch woofer and 5-inch midrange as well as an Isophon tweeter. Prices range from \$350 to \$6000.

ESS has made some in-production improvements in their models. The woofer surrounds have been beefed up to smooth the bass response, and the Heil tweeter diaphragm has a slightly reduced hinge area to raise its resonant point and smooth out the treble. There's a new vinyl overlay on the Performance Series, and the 1b bookshelf now has the midrange and brilliance controls on the front panel. The production model Transars were on display, and there have been some changes. The Heil woofer is now driven from the bottom rather than from the top, and the solid drive rods are now hollowed to improve the rigidity of the assembly. The "current amplifier" has been improved and safety features have been

added to the production models. At about \$3500 the pair, you have your choice of baffle finishes (walnut, rosewood, ebony, or mirrored), woofer color (black, midnight blue, or clear), feet (aluminum, black, or walnut) as well as a choice of four grille colors. Each unit is accompanied (temporarily) by a "Certified Transar Consultant" who will set up the system in your home, and (permanently) by a personalized engraved nameplate.

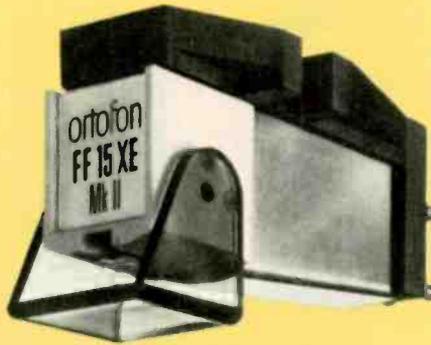
Fisher's new ST speaker line was unveiled. The ST420 is a two-way using an 8-inch woofer, 2-inch tweeter and 8-inch passive radiator (\$109.95). The ST430 (\$169.95) ups the woofer to 10 inches and adds a 3-inch midrange. Both are vinyl covered but the ST440 (and up) are available in wood veneer as well. The ST440 is a three-way (12 inch/5 inch/3 inch) ported system at \$219.95 (in vinyl) or \$239.95 in wood (ST441). The ST450 (vinyl) and ST-451 (wood) go at \$269.95 and \$289.95 and double up on the midrange drivers. The ST460 (and ST461) use a 15-inch woofer as well as a pair of 5-inch midranges and a 3-inch tweeter. Prices are \$329.95 and \$349.95. The ST640A (and ST641A) use 10-inch woofers (with 10-inch passive radiators) as well as a 6½-inch dome midrange and a pair of 2-inch dome tweeters. Also included is a 5-inch, rear-firing, midrange complement. Prices are \$249.95 and \$279.95. The ST660A (and ST-661A) are similar but with 12-inch woofer and radiator, 6½-inch rear-firing midrange, and 1-inch dome tweeters—\$299.95 and \$329.95.

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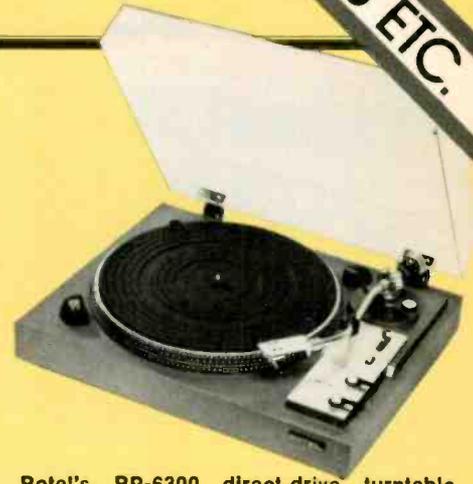
TURNTABLES ETC.



AIWA's AP-2200 turntable will sell for \$220. It's a direct-drive, semi-automatic turntable which provides synchronized record operation when used with AIWA's cassette decks. Circle R. S. Number 106.



Ortofon FF15XE Mk II magnetic phono pickup utilizes an elliptical stylus and has a recommended tracking force of 2 grams. Its recommended load capacitance is 400 pF. \$40. Circle R. S. No. 115.



Rotel's RP-6300 direct-drive turntable with automatic lead-in will sell for about \$225. Tonearm is gimbal-mounted and it has a removable headshell. Circle No. 87.

Hitachi added two new three-way systems, the top-of-the-line HS530 (\$350) and the HS330 (\$250). Each uses metal-cone drivers, the woofer having a gathered-edge surround.

Infinity's latest brainchild is the Quantum Reference Standard, a mere \$6500 the pair with electronic crossover. They stand 6½-feet high and weigh 600 pounds. Response is from 18 Hz to 32 kHz ± 2 dB. The Infinity/Watkins woofer (15 inch) is in a sealed enclosure and operates only up to 100 Hz. A line array of six EMIRM dipole-radiating midranges (similar to the EMIT tweeters) takes over to 4 kHz, where it hands the baton to a line of 13 front-firing (and 7 rear-firing) EMIT tweeters. Adjustable baffle wings aid in smoothing the response and in achieving proper stereo imagery in any listening room.

JBL debuted their lowest-priced three-way system, the L-50 (\$276). Emphasis has been placed on flat on-axis frequency response as well as flat energy response. A 10-inch woofer, 5-inch midrange and 1.4-inch tweeter are used—all of the cone variety. They are located to minimize horizontal lobing.

JVC has filled out the bottom of their line with two new bass reflexes—a two-way, the SK-500 for \$199.90 the pair and a three-way, the SK-700 at \$159.95 each. Each uses a 10-inch woofer. Kenwood added the LS-890, a three-way system with twin reflex ports. KLH showed four new systems including the Classic One, the Classic Five, and the Magnum Model CT44.

Leak is alive and well in the British Isles. Their new 3090 is proof of that. It comes in two sections; one, a transmission line for the 15-inch sandwich-cone (aluminum overlay) woofer, the other for the 7-inch lower midrange, 4-inch upper midrange, and pair of 1-inch isodynamic tweeters. Price is \$870. The lower midrange cone is also of sandwich construction while the upper midrange is Bextrene.

The Martin TL-3050 is a new 3-way transmission line system using an 8-inch woofer in a Formica-clad enclosure while Mesa added to their Bass Reciprocator line with two miniatures—the Mini-Mesa 30 (\$109 each) and the Micro-Mesa 15 (\$119.95/pair including mounting brackets). The Environ-Mesa consists of two Mini-Mesa 30's and a sub-woofer designed into a walnut coffee table. (Well, rattle my cup.) Response goes down to 28 Hz, and the price goes up to \$817 for the three-piece system. In prototype form, the Maxi-Mesa 50 is a three-way system only 9-inches high. Price is \$300.

A new company, Petroff Labs, made its debut at the CES with the PL-1 described as a Positive Bipolar speaker system. Identical front- and rear-firing sets of speakers are driven in phase in each floor-standing cabinet. Ten-inch woofers, 2-inch dome midranges, and 1-inch dome tweeters are used, with crossover frequencies set at 500 Hz and 3000 Hz. To further fill out the low end, there is a dual isolated-voice-coil woofer (12-inch) in a separate enclosure. Complete system is \$795

(\$250 for the subwoofer alone.)

Philips introduced two new speakers, the ported, two-way SJ 2930 at \$159.90 per pair, and the three-way ported SJ2931 (\$199.90 the pair). Presage debuted the Models Fifteen and Seventeen ultra-efficient, bass-reflex designs capable of operation with 10-watt amps. Price of the Seventeen is \$99.95. Meanwhile, Qysonic Research added the Micro (\$89) and Laug (\$199) to their line. The Micro uses two 3-inch low-mid drivers and a 2-inch high frequency driver in a miniature box capable of response down to 80 Hz. The Laug uses two 8-inch drivers and functions as an add-on woofer to get down to 28 Hz.

Sound Source is a new firm whose economical line is all wood-finished. The Source 1a is a two-way-plus-passive-radiator system at \$169. The Source 2a is a three-way ducted system for \$209 while the Source 3a is a three-way transmission line (\$299). At the top is the Source 4a, again a three-way transmission line using a 12-inch woofer. Price is \$389. STR showed the three-way PHD Gamma and PHD Delta systems. Prices are \$249 and \$300 respectively and each features the Metastatic Slot Tweeter.

Synergistics demonstrated a prototype of their S92 system with bipolar radiators and stereo subwoofer (12-inch drivers for each channel.) Six 4½-inch midranges and a pair of flat printed-circuit tweeters are used for each channel. Extremely high efficiency and high power-handling capability are claimed

SPEAKERS ETC.

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The Source 1a speaker includes an 8-in. woofer/midrange, a 1-in. tweeter, and a 10-in. passive radiator. It requires 5 watts minimum power and handles up to 60 watts. \$169. Circle R. S. Number 109.



Synergistics' S22A (left) and S12A are designed for use with medium-output receivers (systems under \$500.) The S12A Price: \$100. Circle R. S. Number 111.



Chartwell's newly introduced PM-100 speaker incorporates a 1.9-inch soft-dome tweeter and a 6½-in. bass/midrange driver. It handles a maximum of 40 watts per channel. \$300. R. S. No. 108.



Audio Technica's new lightweight headphone line includes the ATH-1, which weighs just 6.7 ounces. Its claimed frequency response is 30-20,000 Hz. \$29.95.

Dome Monitor—finished in walnut or oak veneer. Driver complement consists of a 12-inch woofer, 1½-inch dome midrange, 1-inch dome high frequency radiator and 1-inch dome ultra-high frequency ambience radiator.

Visonik announced a three speaker Euro line, the first of which will be the Euro 5 (\$170), a two-way system with 8-inch woofer and 1-inch dome tweeter. Cabinet is hardwood with rounded corners. Also available is the Sub-1 sub-woofer for use with the small David series. Price is \$550 in dark grey/black/silver or \$360 in walnut. *Wharfedale* is back in the states with two new models, the Teasdale (\$270) and the Dovedale (\$355). Each is a three-way, ducted-port, maximumly flat, 4th-order Butterworth system using Bextrene woofers and midranges, and isodynamic tweeters. The more expansive Dovedale doubles up on its 7-inch woofer: the Teasdale uses a single 8-inch. Walnut veneer on each.

Accessories

We saw five new graphic equalizers at the show: two from *Soundcraftsmen*—the RP2215-R and the less expensive (\$299.50) RP2201-R, as well as one from *Rotel*—the RE-900 (\$340), one from *Nikko* (the Delta I), and one from *ADC*—the Sound Shaper II. The



Acoustic Research is offering a new top-of-the-line speaker: the AR-9. It's a floor-standing tower using 2 12-in. woofers, an 8-in. lower midrange, a 1½-in. upper midrange and a ¾-in. tweeter. \$650. No. 60.

ADC entry is a 12-bander (instead of the customary 10) and has built-in level meters. Furthermore, the *ADC* SLM-1 (\$59.95) sound-level meter plugs into the Sound Shaper II and displays on the built-in meters so response can be tailored right at the equalizer without recourse to the SLM-1 readings at all. Price for the Sound Shaper II is \$249.

Three new time-delay, ambience-simulator systems: from *ADS*, the ADS-10 digital system which claims better

(Continued on page 82)

for this \$2000 system.

Tannoy introduced their prestigious (and gorgeous) Buckingham and Windsor speakers to the US market while *Technics* debuted an economical (\$149.95) Linear Phase, two-way system, the SB-4500A. The 10-inch woofer is housed in a vented cabinet and crossed over to a 2¾-inch cone tweeter at 2 kHz. *TSS* has two new sub-woofers, the T-Bass (\$328) and the RM-B (\$244).

At \$349.95, *Ultralinear* has a new four-way system—the 275 Tri/Radial

BUILDING YOUR OWN LOUDSPEAKERS

CROSSOVERS, ENCLOSURES, WOOFERS, TWEETERS AND HOW TO PUT THEM ALL TOGETHER

by William S. Gordon

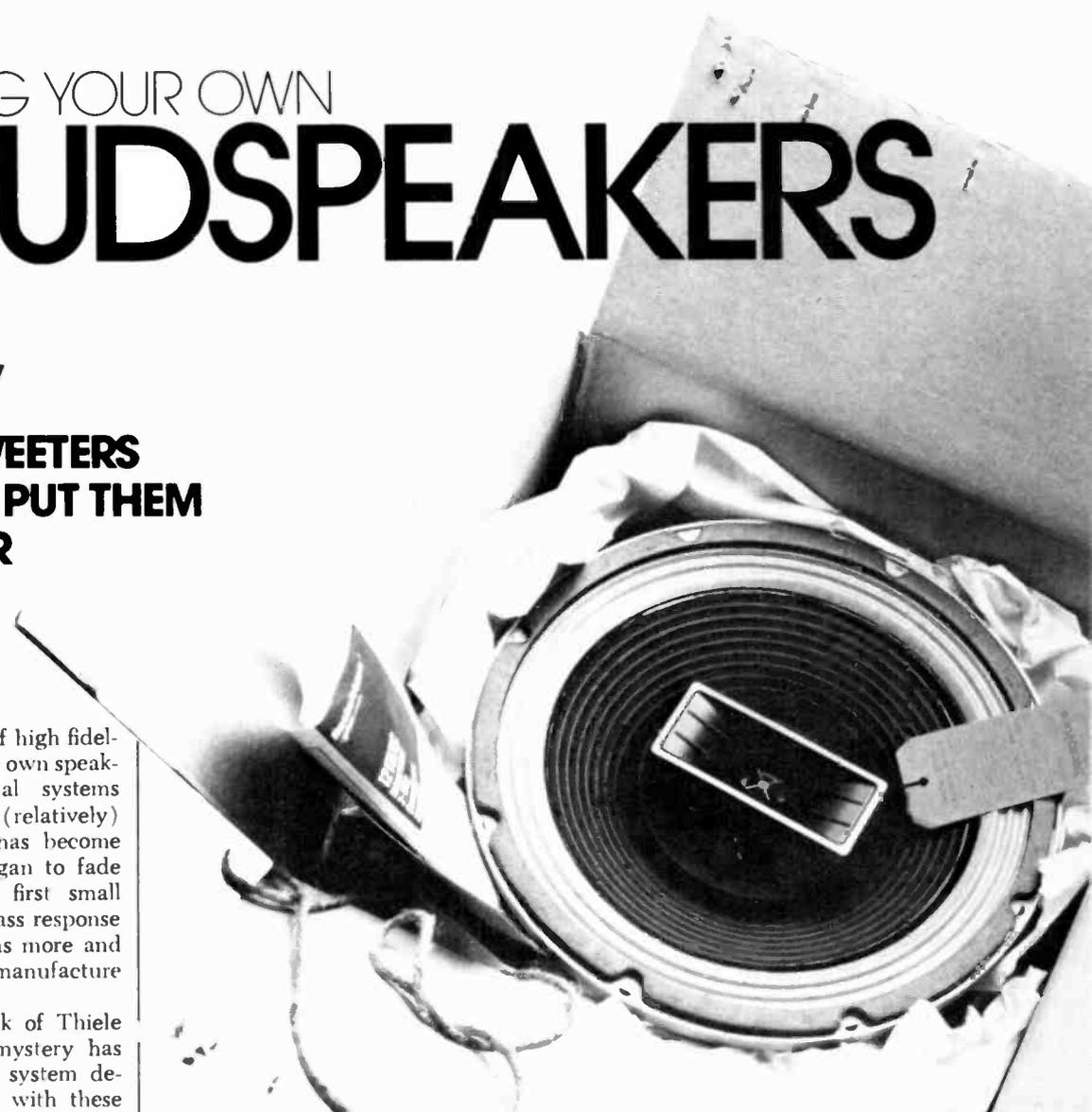
Back in the early days of high fidelity true buffs built their own speakers. Since commercial systems have become so good and (relatively) inexpensive, that pastime has become less popular. The trend began to fade when AR introduced the first small speaker system with good bass response in the fifties. It continued as more and more companies started to manufacture loudspeaker systems.

With the theoretical work of Thiele and Small, much of the mystery has been leached from speaker system design. An engineer, familiar with these design equations can predict the system response on paper—at least in the bass region. But those very same theories predict sonic disaster to the ignorant. Now that cut-and-try speaker designs are (hopefully) a thing of the past, the real question is, can you make a good loudspeaker system yourself? Shouldn't the speaker be handed over once and for all to the professional engineers rather than be the province of the audiophile tinkerer?

The answer to that question is mixed. Sure, you have to be incredibly lucky to end up with a good sounding system merely by buying a bunch of drivers and sticking them in a box. That's a step backward by a quarter of a century. And few music lovers have the engineering background to compute the Thiele alignments for themselves. So, has the loudspeaker been irrevocably and absolutely passed off to the packaged speaker manufacturers of this world?

Not at all. While grabbing up a mixed bag of drivers and your table

saw is hardly to be recommended these days, there are a number of speaker kit manufacturers to be considered, as our recent survey shows. Most offer complete kits including a matched set of drivers, crossover network and cabinetry in either ready-made, ready-to-finish, or pre-cut form. The engineering has been done for you. You supply the hands and the assembly time. Many of these do-it-yourself suppliers also will sell you just the drivers and crossover, and will either give you plans for a cabinet, or specify the proper inter-



Electro-Voice's 12TRXC 2-way speaker combines a 12-in. woofer with a horn tweeter. Electro-Voice recommends that the 12TRXC (\$126.50) be combined with the 1823M midrange (\$66) and the 8HD horn (\$22). Prices slightly higher on West Coast. Circle Reader Service #138.

nal volume and porting (if necessary) to get the rest results from those parts.

Why would you want to build a loudspeaker system anyway? For many reasons—basically the same ones that apply to any do-it-yourself project. There's the sheer fun of working with your hands. Of being able to point to a tangible object and say, I built that myself! In our society the result of so much of our labor is intangible that seeing the results of one's labor gives a lot of satisfaction.

Next reason—to save money. By put-

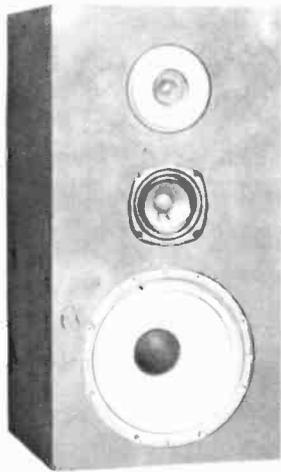
Photos on this page courtesy of Electro-Voice, Inc.

ting in the labor yourself, you should be able to get a better system for the same money or to pocket some cash on a system equivalent to a ready-made. (Although my finance professor lectured the class that one must assign the value of one's own labor to a project to come up with the "true cost," few of us bother to do so.) To boot, since most kits are sold by mail, there's no middleman getting his cut in the process.

And perhaps the most persuasive reason for building a speaker yourself is when what you want can't be found among currently-available ready-made speakers. Many of us want to build the speaker system into a cabinet, or into the wall or corner of a family room. Commercial systems just may not fit! Here's where you want to buy just the drivers and crossovers (along with, of course, the details on the proper enclosure volume and porting) and do the cabinet design and construction yourself.

Most of the kit people that supply drivers and crossovers separately will give you one universal piece of advice: a loudspeaker enclosure must be rigid and airtight. Rigid, to insure that the panels don't vibrate and thereby

LOUDSPEAKERS



Speakercraft of Oregon offers the Model 4 three-way speaker kit. The basic kit costs \$115 and includes a 10-inch woofer, a 5-inch midrange and a 2 1/4-inch tweeter. Enclosure kit; \$25. Trim kit: \$39. R.S. #142.

send forth spurious sounds, and airtight, to insure that the cabinet acts in the way that it was designed to act. All seams should be caulked with silicone-rubber adhesive or duct seal; the same holds true for mounting the drivers. No leaks! Even a ported enclosure must be sealed everywhere except at the port or vent, and those openings must be of the proper dimensions. On totally sealed (acoustic-suspension) systems, extra care must be taken since the sound pressure inside the box builds up at loud levels.

Particle board is the ideal material for the enclosure—better than plywood and cheaper as well. Particle board is dense, heavy and non-porous. It's uniform throughout and has no internal voids as does plywood. It's smooth, easy

to work with, doesn't splinter and takes veneer (real or vinyl) very well. Large spans—say over 2 or 3 feet—should be reinforced with either three- to four-inch wide strips of particle board (or plywood) glued on end, or with sections of 2-by-2 lumber. Stick with 3/4-inch particle board—nothing less—and use plenty of glue. In general, the back, one side, and either the top or bottom of the inside should be covered with several inches of Fiberglass or other acoustically absorbent material. Add more absorbent material inside if called for in the plans, but don't let it interfere with the cone motion.

Here's a compendium of what's available from some of the speaker-kit firms. Their addresses are listed at the end of the article. We'll take them in alphabetical order. Prices are for complete kits.

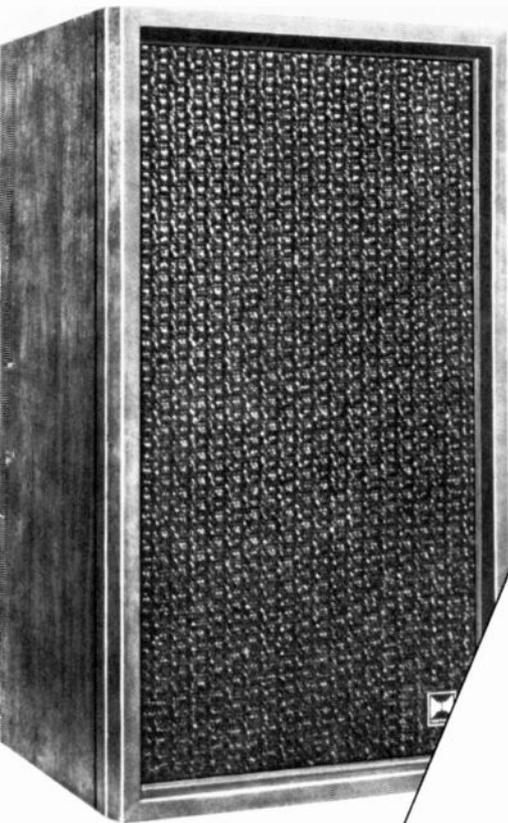
Acusta Craft sells individual drivers, crossovers, and cabinets. They also have kits that encompass all three, as well as fully assembled and finished speaker systems. For those who wish to do most of their own woodworking, there are also pre-cut baffle boards, and sundry items such as Tung Oil for the finish, walnut putty sticks (for the mistakes), glue, acoustic lining, and Velcro (for attaching the grille.)

Acusta Craft kits range from the miniature Model 6, a two-way direct-radiator in an 11 1/2-inch by 7-inch by 5 1/4-inch box (\$49), through the Model 17, a three-way ducted-port system using a 12-inch Electro-Voice woofer, and midrange and tweeter horns (\$299). You can inch your way up to the Model 17 by starting with just the woofer alone and adding the midrange and tweeter later.

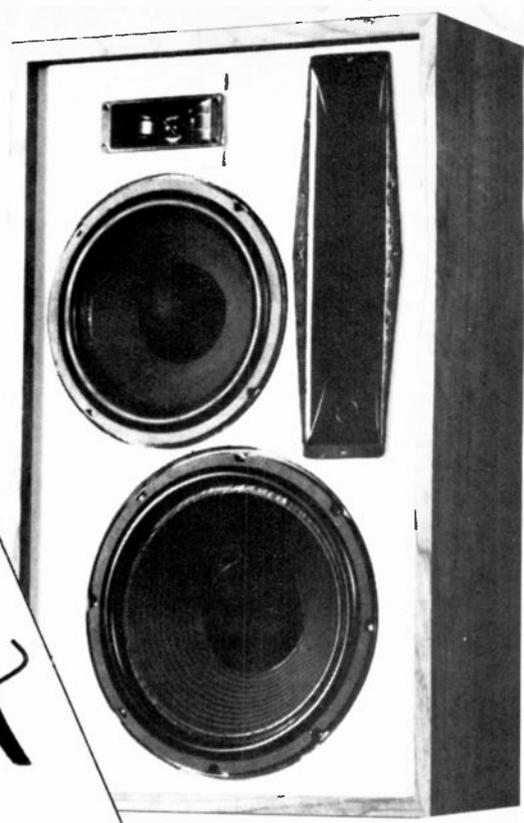
In between the 6 and the 17, is the Model 10 two-way bookshelf (\$67 in



Speakerkit's Model Six is a 4-way speaker comprised of Philips drivers, including a 15-inch woofer. Drivers and crossovers cost \$135. each. Enclosures: \$115 each. Optional marble top: \$100 pr. Circle R.S. Number 143. JBL's Enclosure Series (right) includes three enclosures which accommodate ten recommended combinations of JBL drivers. Complete kits range from \$171. to \$1152. Circle R.S. #133.



Acusta Craft's Model S-16 combines a T-1700H horn tweeter, WF-1200 12-in. woofer and M-560 cone-type midrange. Kit, with particle board enclosure, \$155 ea. With walnut veneer: \$180 ea. Circle R.S. #144.



Heath's AS-1363 speaker includes 10-inch woofer, 4 1/4-inch midrange element and a 1-inch dome tweeter. Finished product measures 24 3/4 x 14 1/4 x 11 1/2 inches. Price is \$189.95 a pair. Reader Service #31.

30-inch woofer, incidentally, will generate a 119-dB sound pressure level and has a cutoff frequency of 31 Hz in the optimum enclosure. The appropriate E-V horn midrange and tweeters are recommended.

Who hasn't heard of *Heathkit*? There are eight speaker systems in their current catalog, each of which is available only as a complete kit. They range from the add-on, 4 1/2-inch single driver system (\$26.95) to the AS-1348 three-way, six-driver, floor-standing model at \$269.95. The 1348 uses a 15-inch slot-loaded woofer, a pair of midranges, and three tweeters. There are also four two-way systems ranging in price from \$59.95 through \$129.95. The latter (AS-1344) is a tower type with two 6 1/2-inch full-range drivers and two 1-inch dome tweeters. Two additional three-ways, using 10-inch woofers, are available at \$189.95/pair (AS-1363) and at \$149.95 (AS-1373).

Isophon supplies a wide variety of drivers and crossovers, some of which are premounted on baffle boards. Their extensive catalog includes individual crossover components (chokes and capacitors) and recommends combinations of their drivers and crossover components. They also specify the cabinet volume (in liters) for each system.

Another big name in speakers is *JBL*. They too supply separate drivers and crossovers for the do-it-yourselfer. Recently they introduced three ready-built but unfinished enclosures for their drivers. The enclosures are available in 3-,

Speakerlab's Model Seven is a 4-ohm speaker; includes 12-inch woofer, 10-inch woofer, a horn midrange and horn tweeter. Complete kit with walnut enclosure: \$287; with utility enclosure: \$243. R.S. #146.

5-, and 8-cubic foot volumes and are veneered with American black walnut. Two grille styles are available—one for all-cone systems, the other for *JBL* high frequency horns that use a protruding acoustic lens.

Speaker Kit makes extensive use of Philips drivers in their Lambda series. No cabinet is available for the two-way Model Two, but the drivers and crossovers can be had for \$37 and are designed to be mounted in a sealed box of 0.88 cubic feet. The Models Three, Four and Five are three-way systems using Philips drivers exclusively. All are acoustic-suspension systems, the Model Three using a 19-inch woofer, the other two using a 12-inch driver. Prices are \$103, \$125, and \$160 respectively (in kit form). The Model Six (\$325) is a 4-way, floor-standing system using a 15-inch Philips woofer, 7-inch Philips upper woofer, 2-inch Philips midrange and 1-inch Philips tweeter. (A Model Seven, also using Philips drivers is planned for introduction this summer.) The Model Ten uses Electro-Voice drivers. It is a high-efficiency, Thiele-aligned, three-way, floor-standing system with 12-inch woofer and horn midrange and tweeter. Kit price is \$300.

Speakerlab's catalog is quite extensive. (Continued on page 78)

kit form), the Model 12 two-way, large bookshelf (\$99), and the Model 16 three-way (\$155). The Models 6 through 16 are acoustic-suspension, direct-radiator systems. The Model S16 (\$180) is similar to the 16 but uses a horn tweeter rather than a dome. Each system is available in finished form for about 20 percent extra, and the components for each are available at substantial savings.

Electro-Voice is one of the most honored names in the American loudspeaker industry. They supply drivers to many manufacturers and have their own line of audiophile and professional speaker systems. They also sell their drivers and crossovers separately and have available a booklet recommending specific combinations, and advising the proper cabinet volume and porting for each system. Besides giving you the "ideal" volume for each system, they give a range of acceptable volumes on each side of optimum, tell you how to modify the port for the cabinet volume and specify the 3-dB down point and the maximum low-frequency and mid-frequency sound pressure levels. Ideal for the built-in buff who wants to do his own cabinet design.

All the E-V systems are vented and Thiele-aligned. The woofers range from 8 inches to 30 inches in diameter. The

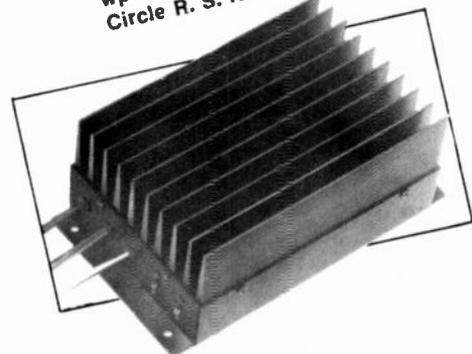
CAR STEREO 1978

by FRED PETRAS

A LOOK AT THE LATEST IN SPEAKERS, AMPLIFIERS, EQUALIZERS AND CASSETTE MACHINES



Panasonic's CJ255Z power amplifier has 4-speaker operating capability and puts out a maximum of 50 wpc but a Circle Reader Service No. 82. ADS offers its CAEG power amp for about \$100. It will deliver 25 wpc into two 4-ohm speakers. Circle R. S. Number 116.



If you've spent the past several years aching to put in your car the same big kind of high fidelity sound you've been enjoying in your living room, stop aching. It's now possible. That's the message from the car sound industry, which has moved into new technological areas and, it is predicted, will eventually be as big as the home hi-fi components industry that it is trying to emulate.

The average car stereo player or radio/player puts out from three to five watts per channel, but power outputs ranging from 15 to a claimed 175 watts per channel are now available to you. Never before has the car stereo industry been able to offer as wide a variety of choices to the music lover who wants quality sound in his car environment. There's something for every level of taste, every budget, every installation situation.

But as with many other happy situations, there are a few catches. While the car sound industry is trying to emulate the home audio component industry, and so far has done quite well, it has quite a way to go on some levels. Two cases in particular involve non-observance of any universal specification standard and confusion about what any given unit should rightfully be called (what a unit is called is not necessarily what you might expect to get).

Beware of Specification Sheets. Most audiophiles have grown accustomed to

being able to compare manufacturer's specifications, which is possible with home hi-fi components thanks to a universal standard for indicating power output capabilities, distortion figures and other performance measurements. In the car stereo field, however, no such universal reporting standard is observed. You'll see specs which indicate "Instantaneous Peak Power" capabilities, or claims that a unit will provide "60 more watts of power," or "50 watts output power," or that it will "boost audio power to 40 watts."

Note that none of the above claims indicate how many watts *per channel* are provided for how many ohms of speaker impedance, nor are watts per channel indicated on an RMS basis, nor is the total harmonic distortion level indicated.

A "90 watts RMS power booster" has its power output capability described as follows: "Power output per channel, 35 watts RMS at less than 0.9% THD, 40 watts RMS at less than 10% THD, 45 watts maximum." To most hi-fi enthusiasts this piece would more properly be called a "35-watt-per-channel power booster."

Our advice is two-fold: keep your eyes open and then keep your ears open—and be critical. Get as much information as you can in the way of product brochures and specification sheets, and study them with great care. Then, armed with a fair idea of what's happening on the spec front, go on a

Audiovox's AMP-1000 is described as an amplifier booster with graphic equalizer, capable of increasing output of your current car stereo system by 22 watts per channel RMS. Bass, midrange, treble slide-bar controls comprise the equalizer section. \$99.95. Circle Reader Service Number 112.



listening tour of your local auto sound purveyors. Listen closely and carefully for amplitude and distortion. If the sound is fuzzy, don't buy; if the sound level is less than what you want, again, don't buy.

While spec delineation and spec standards are still an unsettled matter, the fact is that mobile high fidelity (mo-fi) makers are striving to develop specs that come close to, or in some cases match, those of comparably priced home hi-fi. In most such cases, specs are spelled out meaningfully.

When Is A Booster Not A Booster? (And Other Similar Puzzles). In the area of product descriptions, you'll hear what are actually power amplifiers described as "boosters." The word booster has been generally used for the past few years to describe low-powered car amplifiers of uncertain distortion characteristics, often sold in conjunction with heavy-duty speaker drivers. While the boosters and booster/speaker combinations raise the sound levels in cars, the quality of that sound is not always of hi-fi quality. The designation, "amplifier," is being used to denote units of higher output, with better distortion specs.

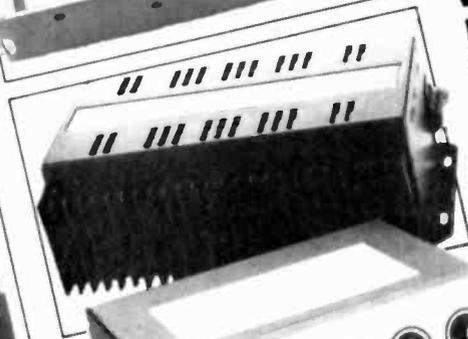
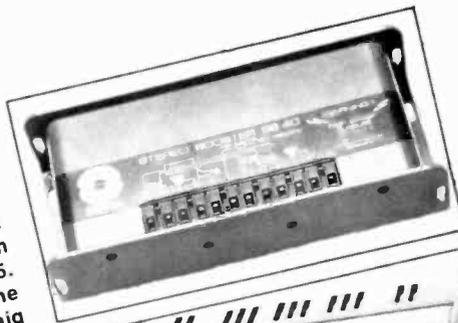
Another current area of confusion is

the equalizer or equalizer/booster (or amp) combination. Many units purporting to be equalizers are merely discrete devices with a set of rotary bass and treble tone controls, plus occasionally, a rotary midrange tone control; some are combined with booster or amplifier. (The latter are more correctly identified as integrated amplifiers.) Such units provide a limited control of sound frequency ranges and cannot honestly be called equalizers or equalizer/boosters. However, there are many *graphic equalizers* in the car sound field, offering from five to 10 frequency ranges of control, on the order of plus/minus up to 12 dB from "flat" response, for precise "tailoring" of the sound to suit your needs. These are truly equalizers in the accepted sense, and as they equate to similar units in the home hi-fi field.

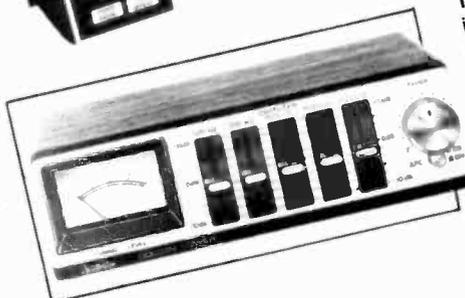
In short, listen and compare, and *don't* buy solely on the basis of what a unit is called.

A final caution: as with home audio, when you're assembling your mobile sound system, be sure you know your amplifier power needs relative to the speakers or speaker systems you intend to use. If you expect to use typical "raw" car speakers, remember that they

Setton's BS-40 (right) is a car stereo booster which puts out 15 watts per channel into 8 ohms, with less than 1% THD from 30-20,000 Hz. \$99.95. R. S. No. 107. Below the Setton unit is the Craig V503 a 72-watt booster with a 4-frequency graphic equalizer. \$159.95. No. 113.



Royal Sound's EA-400 graphic equalizer amplifier offers a five-band equalizer with vertical slide controls and 20 wpc RMS with total harmonic distortion no more than .03% from 10-40,000 Hz. \$180. For details circle R. S. No. 117.



Jandy's Car-Fi Model 300 is a power amplifier whose output spec is 20 wpc RMS, with .9% THD at 1 kHz. 5-band equalizer is built in. \$135. Circle No. 114. Boman's Audio Graphic Equalizer (at left) includes five frequency response slide controls and a front-to-rear fader control \$160. Circle Number 100.

AMPLIFIERS EQUALIZERS & BOOSTERS

CAR STEREO 1978

Sankyo's CS-333 AM/FM radio with Auto-Reverse cassette player sells for about \$160. It's an in-dash unit which includes volume, tone and balance control and a stereo indicator light. For details circle Reader Service No.77.



Uher's BR-211 bracket/preamplifier was designed to house either the CR-240 or the CR-210 cassette recorders. It may also be used with any AM/FM/MPX radio and with any outboard amplifier/speaker combination. \$220. Circle Reader Service Number 122 for details.

have limited power handling capability, and blow out easily if you drive them with excessive amounts of power: Heavy duty models will take more power, and generally, provide a better quality of sound. If you intend to use two-way or three-way enclosed mini versions of home type speaker systems, you'll need substantial amounts of drive power in that most such units are inefficient (Note: efficiency is not generally related to sound *quality*). Before you buy, determine the minimum drive power needed and the maximum power handling capability of the speakers. Make sure that the amp you buy has enough power to drive them, and, conversely, make sure it is not so powerful that it can blow the speakers in a moment of carelessness.

What's Available. In the next page or two we'll provide a rundown on what's available in car sound equipment, both from the hi-fi side as well as the regular equipment side.

The biggest influx of new auto sound products is in the area of amplifiers and equalizers. The new amplifiers include straight power amplifiers, many designated boosters, and amps combined with equalizers. The new equalizers consist of a few straight equalizers and

many equalizer units combined with amplifiers (often called "booster-equalizers").

At least 20 companies have debuted mo-fi stereo power amplifiers, ranging in output from 10 to 175 watts per channel RMS. Prices range from about \$35 to \$395 (for the 175 wpc Laser model mentioned earlier). Panasonic has come up with a \$79.95 model offering four channels of amplification, 10 watts per channel, for driving four speakers individually. Most of the power amps are of undistinguished appearance, usually small black "boxes" fitted with connectors, with the higher powered models often sporting "fins" to dissipate heat. Cosmetics are of little consequence in that the units were meant for "hideaway" installation, under the dash, on the firewall, under a seat, or perhaps in the trunk.

As noted, some amps come with built-in equalizers. But one firm, Fosgate, offers a 100 wpc model that comes with a separate three-band graphic equalizer (with six slide controls, three for each channel) plus a 12-LED peak level volume indicator and slide-type volume control.

Perhaps the most notable of the new amps with built-in equalizers is Laser

Acoustics' A-350A, a stepup of the 175 wpc A-350. It incorporates the world's first 10-band parametric equalizer for car use. It features a plus/minus half-octave variation for each position, and plus/minus 9 dB attenuation of each frequency. It also has a built-in crossover for bi-amplification and can be switched internally to provide four separate stages of amplification at 85 wpc. It sells for \$550.

In addition to Fosgate, Laser and Panasonic, the following are among companies debuting new amplifiers this summer: Automatic Radio, Bristol, Boman, Audiovox, Audiomobile, Concord, Car Tapes, Clarion, Fujitsu Ten, Jandy, Pioneer Electronics, Presage, Pyramid, Royal Sound, Soundfax, Sparkomatic, and Visonik. Several other companies also produce amps and boosters, among them Setton International, Nakamichi, Craig, Kraco, Magnadyne, Sanyo and Linear Power.

At least 15 companies are introducing equalizers or booster-equalizers this year. Their products have quite a bit of visual variety and appeal in that they are meant for "up-front" installation, most often under the dash edge. Many models are finished in black—the finish most often associated with "professional" audio equipment, and now widely used in home audio components. The booster-equalizers offer power outputs of 8 wpc to 35 wpc. Most of the units are quite compact and can easily be accommodated in virtually any car. One booster-equalizer from Pyramid, a seven-band graphic type, is described as "the world's smallest;" it

measures 1¼ by 4¾ by 6¾ inches. It puts out 22 wpc into four ohms with 0.05% THD—a true home high fidelity spec.

Another example of home hi-fi technology come to the auto is Boman's EQA-60, a 30 wpc five-band graphic type booster-equalizer finished in black and sporting an audio output meter in addition to a reverberation (echo) intensity control. It sells for \$160. Boman also has a straight five-band graphic equalizer with built-in radio tuning meter that is matched to and sold in conjunction with its "Gold Label" series of four radio/cartridge or radio/cassette players with 15 to 25 wpc outputs, two of which feature digital station, frequency and time readouts.

Another hi-fi-oriented booster-equalizer is the Tamon EB70, a five-band graphic unit with 35 wpc output, featuring two audio level meters. Its THD is 0.5 per cent.

Perhaps the most off-beat booster-equalizer is the new Model AMP-1000 from Audiovox. It is a two-piece affair, consisting of 22 wpc amp and a hand-held remote control that contains three slide-type bass, midrange and treble tone controls, volume control and push-type on/off switch. The amp mounts out of sight, the remote control mounts to the dash and is instantly removable to discourage theft. Price: \$99.95.

In addition to the above, you'll find new booster-equalizers or straight equalizers in the following lines: Audiovox, Automatic Radio, Craig, IDI, Jandy, Motorola, Kraco, Linear Power, Metro Sound, Mitsubishi, Muntz, and Royal Sound. Among other companies making such units are: Audiomobile and Clarion.

Four companies are on the mo-fi scene with preamplifiers, to use in conjunction with their amplifiers. Ranging in price from \$50 to \$125, they feature bass and treble controls (sometimes also a midrange control), source selector, and volume control. The companies are Automatic Radio, Fujitsu Ten, Laser, and Linear Power.

It seems that only two companies—Mitsubishi and Fujitsu Ten, are planning to debut tuners this year. Both firms' units are finished in black and look like mini versions of home component tuners. The Mitsubishi set has a tuning meter; the Fujitsu, priced at \$160, features a motor-driven automatic search system.

A few companies have come up with modularized combinations in order to offer high power but compact, in-dash mounting capability (the amps are mounted out of sight). Pioneer Electronics, for one, has debuted two such models under the "Supersystems" designation. KPH-838 is a straight cas-

sette player with separate amp, KPH-9000 is an AM/FM stereo radio/cassette player with separate amp. Pioneer's rating of the amps is "Maximum RMS output power 20 watts per channel; 10 watts per channel (both channels driven) 60 to 20,000 Hz into 4 ohms with no more than 0.8 per cent THD."

Another such combo is the Muntz Model 171, an AM/FM stereo radio/cassette player with separate 15 wpc amplifier at \$280.

When you go shopping for car sound equipment you'll find a batch of new radio/players or straight tape players in the medium power range. Notable are three new models from Panasonic with 12 wpc outputs, and two 14 wpc models from Sanyo (feeding 12 watts to woofer, two watts to tweeter speakers).

When shopping, you will also notice in the cassette bailiwick many models with automatic reversing capability. Some of the radio/tape combos with auto-reverse also sported automatic scanning. Hi-Fi/STEREO BUYERS' GUIDE counts 21 new auto-reverse cassette deck introductions under the Audiovox, Bristol, Clarion, J.I.L., Mitsubishi, Motorola, Muntz, Royal Sound and Soundfax brand names. And a few other companies offer such models . . . namely Automatic Radio Car Tapes, IDI, Medallion, Metro Sound, Panasonic, Sankyo, and Superscope.

If you're the type who just can't stop "rolling your own" tapes, cheer

Craig's Model T606 (1) in-dash stereo-matrix cassette tape player includes an AM/FM/MPX radio and digital clock. Price: \$200. Circle No. 113. Sanyo's FT-1490A (2) is an AM/FM/cassette unit which delivers up to 12 wpc RMS, with Dolby on both the FM and cassette modes. \$180. Reader Service No. 110.

Bristol KD-3534 (3) cassette unit includes an AM/FM player with digital station display and digital clock. \$220. Use R. S. No. 119. Pioneer's KPH-838 under-dash cassette player includes Dolby noise reduction and a separate 20 wpc power amp. \$190. Circle No. 118.

Sharp Electronics' Automatic Program Search System is incorporated in the RG-5252 cassette deck. \$169.95. Circle Reader Service No. 90. Muntz combines a power amp (Model 77) with an automatic reverse cassette deck/AM/FM player (Model 171). The combo: \$280. Circle No. 121.

CASSETTES



CAR STEREO 1978



Acoustic Fiber Sound has introduced its Classic Domaxial 6x9-inch speaker. Its pole-mount soft-dome tweeter is placed over the bass element. \$110 a pair. R. S. No. 123.

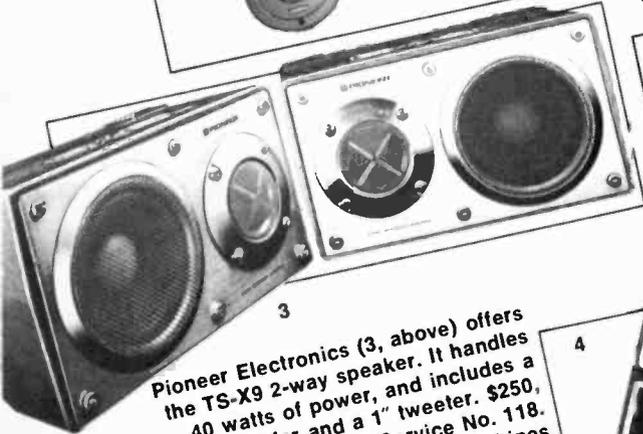
SPEAKERS



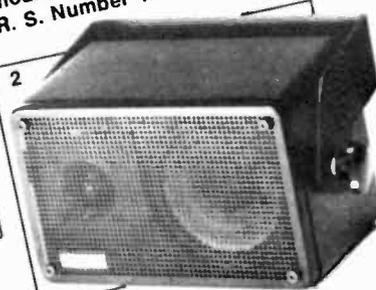
Sparkomatic's SK-700V speakers were designed for use in recreational vehicles. Comprised of 6" woofers and 2 1/4" tweeters, they sell for \$79.95 per pair. Circle Reader Service Number 127 to get further details.



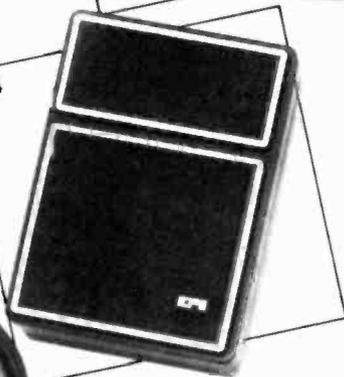
Jensen offers two 6x9" woofers, two 3 1/2" midranges, and two 2" tweeters with individual mid- and high-frequency controls in its Separates speaker system. \$160. Use R. S. No. 125. Tamon (2, below) offers the LB-1030, a two-way compact speaker with mounting bracket. \$189 a pair. R. S. Number 128.



Pioneer Electronics (3, above) offers the TS-X9 2-way speaker. It handles 40 watts of power, and includes a 3 3/8" woofer and a 1" tweeter. \$250, pair. Reader Service No. 118. Epicure's LS70 speaker (4) combines a 1" air-spring tweeter with a 6" woofer. 75 each. R. S. No. 124.



Another thrust of some radio/player firms is the use of electronic tuning for consecutive scanning pause, station search, station lock-in. This feature appears in sets from J.I.L., Muntz, Pioneer, and Royal Sound. By the time this is in print there may well be more such models.



KLI's 693DMSC is a 6x9-inch 3-way speaker which employs a dome midrange element and a samarium cobalt tweeter. \$215 per pair. Circle No. 126.

Two summers ago the car player industry was in the throes of "melding" with the CB radio industry. At least two dozen companies had combo 23-channel CB/AM/FM stereo radio/tape player combinations. A look at such offerings recently showed them to be somewhat back from their previous up-front position, but still very much in evidence, mostly in the 40-channel format. Most of the combinations were priced around \$300. Among companies producing such products—both new upcoming models and current models, are Clarion, Cobra, Craig, Kraco, Midland, Motorola Roberts, and Sankyo. You may also find models in other brands at your local stores but be careful. Some may be from companies now out

(Continued on page 82)

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Opera

For Today

Luciano Pavarotti

by Spelght Jenkins

□ All sizes and shapes of tenors with every conceivable kind of voice have made the big time throughout the almost 400 years of opera, but certainly in this century Luciano Pavarotti is the first to be almost universally regarded as a lovable teddy bear. The Italian tenor has that rarest and most valuable of traits: he makes an audience love him personally.

Though he is presently hard at work losing weight, Pavarotti is an enormous man. Over 6 feet in height, he at one time was substantially over 300. At the time of this writing he has lost over 90 pounds, and though more shapely is still large. Yet he has never seemed fat or ponderous. The tenor does not move heavily onstage or react to his sopranos as though he is a fat man.

By his seeming refusal to acknowledge his own large size, Pavarotti can convincingly play the part of the lover. His Rodolfo, seen last spring on American television coast-to-coast, was one of the more successful portrayals, unequalled in TV opera. And this by a man who could be the prototype of the comic opera singer.

Part of it is charm, part of it, as always, is knowing how to satisfy an audience when you accept their applause (onstage and before the curtain), part of it is acting with the voice and a lot of it comes from the thrilling reaction to a brilliant, well-used instrument. Pavarotti has one special



This photo gives a glimpse of Pavarotti as Nemorino in Met's production of Donizetti's "L'Elisir d'Amore."

quality that has always meant audience favor: he has an easy, brilliant and effective high C.

Essays could be written about that note. Why is the C, only a half-step above the B-natural, so important? No one knows, except that through the years, singers, male or female, who really have had a strong high C possess a great asset. Even so, the world is full of famous tenors who lack the note. Caruso did not have one, nor does Plácido Domingo nor José Carreras nor Jon Vickers and all three are vastly popular tenors. Yet when one has all the at-

tractiveness of Pavarotti and adds to it a strong high C, the world is literally one's oyster.

From almost his first appearance on records, Pavarotti manifested a brilliant high register. The first complete opera, recently reissued, came from Angel Records, a rare opera by Mascagni, *L'Amico Fritz* (S-3737). This work has a wonderful role for a lyric tenor, and on the recording Pavarotti's voice is light and fresh, with the high notes firmly connected to the rest of the voice. This is important in tenors; only the very greatest can move their voice through the passageway," the area in which the reliance on total chest register is mixed with more and more head register, keeping the same color of sound. If the "passageway" notes are clear and the color remains constant, chances are that the high notes will remain in place and will come out easily.

In Pavarotti's case al-



Pavarotti's new release is of Donizetti's "La Favorita" (London 13113), the opera which he will also be singing this year at the Met.



Luciano Pavarotti has an easy, brilliant high C—a special quality that has always made him a favorite.

though there is, of course, greater brilliance in the B's and high C's, the voice remains the same color of silver. After this first *L'Amico Fritz*, the Italian tenor recorded the small tenor lead in the Joan Sutherland recording of Bellini's *Beatrice di Tenda*, (London 1384) and began his association with London Records. Then came his first solo tenor recording containing a lot of Donizetti, among others "Spirto gentil" with its high C, and arias by Bellini and Rossini. Though the recording was excellent and is still in print, the career of the tenor really took off with the issuance of *La Fille du Régiment* (London 1273), allegedly starring Joan Sutherland. The great Australian soprano had her share of glory, but it was the tenor aria, "Pour mon ame" with its nine high C's that put the album and Pavarotti on the map.

Since then debuts with every major opera company in the world following.
(Continued on page 80)

Her eyes are green, her hair is black, her dress is bright yellow, and when she is stabbed by Pagliacci her blood will be red. Yes, all the colors will be in high fidelity from a home video tape recorder, but will her screams be true to life?

For many stereophiles the home video tape recorder offers the potential of a whole new adventure in viewing. For example, the PBS stations have presented some outstanding operas this year, often scheduled successfully against heavy network fare to prove that the PBS stations can meet the nets head on. The only problem with competitive scheduling is that the viewer/stereophile could be the loser, having to choose between an excellent opera or one of the rare outstanding network spectacles. The stereophile with a home video recorder on the other hand could easily watch one while recording

the other for delayed viewing.

Many network stations run some outstanding contemporary music programs, but most often they are scheduled in the wee hours of the morning when it takes two toothpicks to keep each eyelid propped open for viewing. With a home video cassette recorder (VCR) you can set the timer, trundle off to bed, and like magic, the next morning you've got a video tape of the wee-hour festivities.

In the interest of exploring the potentials of video cassette recorders from the point of view of the audiophile, *HI-FI/STEREO BUYERS' GUIDE* obtained samples of different video cassette systems and gave them a month's tryout under actual living and listening conditions. Perhaps by fate, the first recorder arrived the night our local PBS station broadcast Pagliacci with hi-fi simultaneous sound through a local FM station.

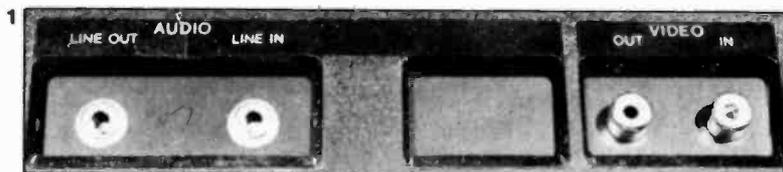
But before we get into how our recordings turned out, some background and history on the development of home TV recording.

Many people see the home video tape recorder as the next best-seller in consumer electronics. Maybe not quite as big as CB radio was, but definitely in that league. The potential market is so great there are presently four different systems in the marketplace.

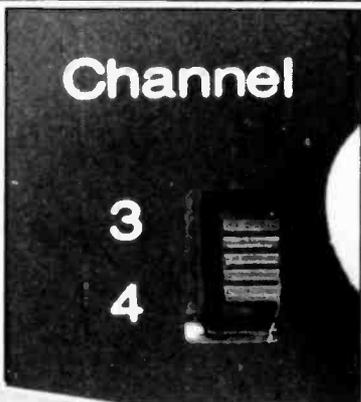
Each system is incompatible with the others; you cannot interchange recordings for playback between the various systems. The only point of similarity is that all home video systems are complete recording systems with integral VHF and UHF tuners, requiring only a connection to the TV signal recording, and a connection to the TV receiver's antenna terminals for playback. All systems have a built-in *splitter* for VHF reception so the user's antenna feeds both the recorder and TV set simultaneously, permitting simultaneous viewing and recording of one channel, or the taping and viewing of different channels. The same is true of UHF reception except on the Sony Betamax, which requires an external UHF splitter. (Why the splitter wasn't built into the recorder is one of those questions that will never be answered to anyone's satisfaction.)

With some minor variations, the video cassette recorders use piano key controls such as those found on standard audio cassette recorders. In fact, operation of a TV recorder is easier because there are no level adjustments; both the sound and picture levels are adjusted automatically. The user simply presses one or two keys to record, and one key to play. The output of the TV recorder is RF, generally at the channel 3 or 4 frequency. The user selects the unused channel in his or her local area (one is always unused), and the TV recorder plays through the unused channel. No modifications of any kind to the TV set are necessary—the recorded signal is received just as if it were being broadcast.

In addition to the record and play controls, the usual rewind, fast forward, stop, pause, and eject controls are also



(1) On the Sony machine, the audio and video connections are automatically switched over only when the appropriate patch cords are plugged in. The idea is fail-safe and a delight to use. (2) RCA's VHS machine has the modulator completely built in and the user selects either channel 3 or 4 for operation. No viewing area has stations assigned to both stations. Always check with your dealer to make sure that the machine you buy will work in your home.



JVC's Vidstar VHS videocassette recorder offers two-hour playing time, an optional built-in clock which indicates time on a 24-hour basis. Its price: \$1050. Circle R. S. No. 148 to obtain further details.

VIDEO CASSETTE

included. One system, the VHS under the RCA label, also includes an *Audio Dub* control that turns on only the audio record so the user can add a sound track to go with any picture at a later time—the original sound track is, of course, wiped clean.*

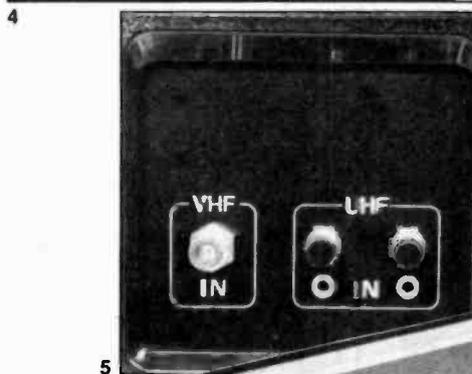
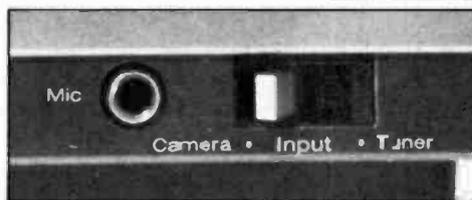
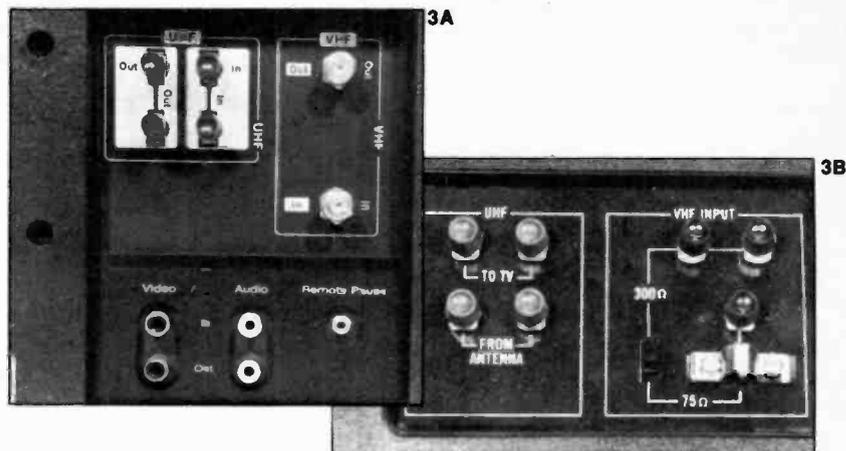
Most VTRs make provision for a camera and microphone input. (Camera & microphone are often offered as accessories for use with the video cassette recorder, an aspect of the VCR which we will leave to the photography buffs to discover.) There are also line level audio inputs and outputs, and the line output can conceivably be fed to a high fidelity system for considerably better sound quality than is generally, available from the miniscule speakers built into most television sets.

The two leading systems for video cassette recording are Sony's *Beta*, and JVC's *VHS*. The Beta system is presently available in Sony and Zenith recorders (almost identical machines), while the VHS system is available from JVC, RCA, and Panasonic.

Almost unbelievably, both systems include their own particular constraints, and both are still trying to discover new ways to circumvent their inherent limitations.

The Beta system was designed to provide one hour of recording time, using 1/2-inch tape at a lateral tape speed of 4 cm/sec (1.57 inches per second), a speed which is obviously adequate for sound recording. The Beta video cassette, was made physically only large enough to hold one hour's worth of tape. Unfortunately, few "serious" programs in the U.S. run only one hour, so Sony increased recording time to two hours by cutting the tape speed in half to 2 cm/sec. (0.78 ips), a new low in tape speed if one expects to obtain an audio recording with any degree of fidelity.

JVC, learning from Sony's blunder, designed a two-hour cassette which is physically somewhat larger than Sony's. Even so, often a "serious" musical show, movie, or spectacular runs more than two hours; so again we had a video recording system that could not record all shows full length on one tape. While



(3) In the VHS (A) and Quasar (B) VCR systems, both the VHF and UHF antenna connections have built-in splitters; thus the TV antenna can feed the video cassette recorder and the TV set simultaneously. The UHF input is 300 ohms, the VHF input is 75 ohms, and the user may select the desired input either by the flick of a switch, or by using a matching transformer supplied with the video cassette recording system. (4) RCA's VCR machine includes a front panel switch which controls the camera/ audio and TV input (5) Sony's VCR lacks a built-in UHF splitter.



Quasar's VH5000 video cassette recorder offers four-hour playing time, and an optional timer clock which is able to shut off power to the recorder at any pre-set time you want. \$995. For more information circle Reader Service No. 150.

THE PICTURE IS GREAT, BUT HOW DO THEY SOUND? RECORDERS



Sony's SL-8200 Beta-format VCR system offers two hours of recording time, and also has an add-on clock option. From the standpoint of operating ease, this unit is outstanding. All features seem to have been designed with ease and convenience in mind. It sells for \$1095. For detailed information on this unit, circle Reader Service Card Number 147.

VIDEO CASSETTE

JVC introduced their two-hour machine in the U.S., the RCA version of the same machine has a switch to change the tape speed from 3.34 cm/sec for two hours, to 1.67 cm/sec (0.65 ips) for four hours maximum recording on a single cassette. This established another low for sound recording tape speed. (It is reported the Panasonic version of the VHS system—which is rumored to be the same machine used by RCA—will have a 2/4-hour selector switch. We haven't yet seen the machine, nor an announced JVC 2/4 model.

There, in short, are the problems:

you have a choice of short recording time or unusually slow tape speed for audio recording.

We had a chance to try four available machines just before Christmas 1977. They were the Quasar, JVC VHS, RCA VHS, and Sony Betamax (2-hour version).

Contrary to talk of poor picture quality, they were great. Sure there is some loss of detail, but the softness is comparable to the color sets of about four or five years back. Even on a large 25-inch set the picture looked good. Colors were right on the mark, and

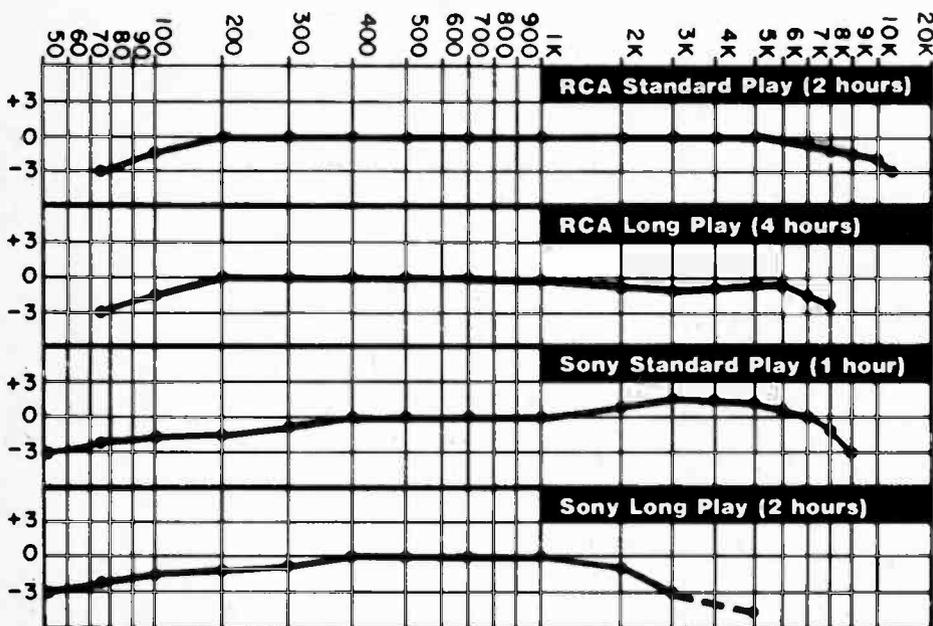
titling could be read easily.

In terms of human interactive engineering, some designers should be sent back to school. Quasar's optional time clock—which is the best of the bunch because it will completely shut down the power to the recorder—needs Munchkin-sized fingers to insert the detents in the clock mechanism. RCA's built-in digital clock, and JVC's optional built-in clock, require 24-hour recycling if you pass the desired starting time for automatic recording. Also, the JVC clock indicates time on a 24-hour basis. RCA uses AM/PM indicators but the clock is so bright that it is beamed at the ceiling and cannot be seen from the viewing location. Sony's optional clock, which can be secured to the recorder, has the best timer control mechanism in terms of ease of operation, but it is calibrated in 20 minute segments—there is no calibration at the quarter and half-hour detent—the user must approximate the most important time mark next to the hour itself.

As for the operating controls, Sony is far and away ahead of the others in operating ease. The others are almost as easy but the controls aren't in as logical an arrangement. For example, though the color *red* is almost universal for a record interlock, RCA uses *green*, and *red* for *stop* (Got any idea how many times we preset the RCA to the stop mode instead of record?)

As for the sound, sorry to say it's generally not in the same class with the pictures. The Quasar had an obvious loss of the deep and middle bass; there was simply no need to measure any further. The sound is adequate for reproduction through a small TV speaker. It is best described as good table radio quality. But since the Quasar is priced considerably below the other systems, the reduced bass response is not a flaw in design, but rather, it's a compromise with price.

The Sony has a compressor that appears to work over most of the high level input signal range, making fre-



The RCA machine's frequency response at the 2-hour-tape speed was +0/-3 dB from 75 to 10,500 Hz. The 4-hour-tape speed yielded a response of +0/-3 dB from 80 to 8000 Hz. The frequency response of the Sony VCR at the tape speed used to make 1-hour tapes (4 cm/sec.) was 75 to 9000 Hz +1/-3 dB, down 5 dB at 50 and 1000 Hz. At the 2-hour tape speed, the response was down 3 dB at 4000 Hz.

RCA's Selectavision video cassette recorder offers four-hour recording capability, a remote pause control, a tape counter with memory, and an audio dub feature. Its built-in digital clock includes AM/PM indicators. This unit uses VHS-type recording tape and sells for \$1000. Details on this VCR unit are available from RCA, just circle Reader Service Number 145 on the R. S. Card.



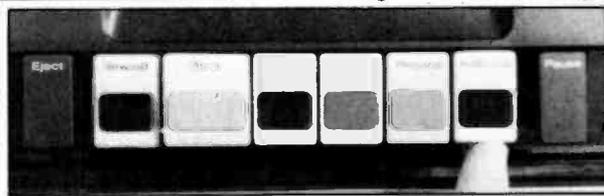
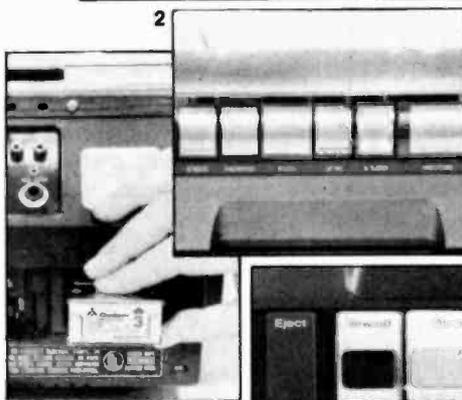
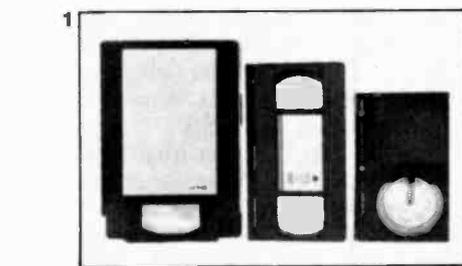
frequency response and distortion measurements somewhat difficult. It also appeared to have some form of audio mute that suppresses the output when the input audio level falls below a threshold. However, if the system is "keyed" by a program peak, it is operative for many subsequent seconds to handle unusually low signal levels.

An input level of one volt appeared to be the control point for the compressor so we used it as the reference level for the sound tests. At the higher tape speed (the one hour rate): with a 1 volt input, distortion measured 1.6% THD with a signal-to-noise ratio of 52 dB wideband, 53.5 narrowband. The frequency response measured $+1/-3$ dB from 75 to 9000 Hz; down 5 dB at 50 and 10,000 Hz. Wow and flutter measured 0.1%. Overall, not the broad response we're used to from modern hi-fi equipment but certainly adequate for reasonably good fidelity from TV broadcasts.

At the LP (long play) tape speed the Sony had a distortion of 3% THD with a signal-to-noise ratio of 48 dB wideband, 49 dB narrowband. The frequency response fell off rapidly on the high end: it was down 3 dB at 4000 Hz, 6 dB at 5000 Hz, and 12 dB at 6000 Hz. The wow and flutter measured 0.2%. The Sony's nominal output level was 800 mV.

The RCA VHS recorder has a record level limiter that cuts in at 0.1 volt. Below 0.1 volt input, the amplitude response was linear. At the higher tape speed (the two-hour rate): with a 0.1 volt input distortion measured 2.2% THD. The signal-to-noise ratio measured 42 dB wideband, 46 dB narrowband. The frequency response measured $+0/-3$ dB from 75 to 10,500 Hz. Again, an acceptable frequency response for TV sound. Wow and flutter measured 0.15%.

At the LP tape speed, the distortion and signal-to-noise ratio were exactly the same as at the higher speed. The frequency response measured $+0/-3$



(1) 1/2-inch VCR tape is totally enclosed when not in the machine. Each cassette has a window and its own calibration system so that the user can tell at a glance how much recording time remains. (2) In the Quasar and Sony machines the output channel to the TV set is determined by a plug-in modulator supplied with the machine. (3) Sony's tape control keyboard is superb. The play control automatically switches the recorder's output to the TV set. Also the motor power shuts off when the tape control is pressed off, a useful feature not available on all VCR's. (4) RCA's control keyboard includes an audio dub feature which erases the audio track and allows the user to record a new sound track while retaining the video recording.

dB from 80 to 8000 Hz; not the greatest response in the world but a value we accepted a few years back from "hi-fi cassette equipment." Wow and flutter measured 0.25% with peaks to 0.35%.

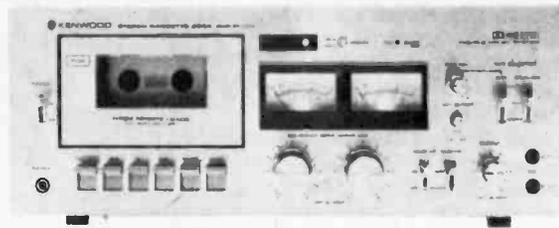
Obviously, the VHS system tried hard to deliver reasonably acceptable sound quality even in the extended play mode, and as with the original cassette system, if there is sufficient demand some improvements could be made to upgrade the sound quality further. The Beta system appears to have been intended for optimum reproduction through the associated TV receiver. Its sound system can stand considerable redesign for the stereophile, particularly in the LP mode. It is rumored that Sony will offer a three-hour cassette in early '78; perhaps they will upgrade the LP sound at the same time.

Summing Up. As far as an entertainment value is concerned any of the home video tape recorders will enhance your appreciation of television, for even a Pagliacci or Madama Butterfly short on bass is better than nothing if one must be out of the house when the opera is broadcast. And we have viewed with joy, some of the very best rock concerts originally broadcast at inhuman early-morning hours.

Given the ability to personally rearrange the program schedule of network and PBS stations, we as viewers and stereophiles will only benefit through use of home video cassette recorders. Allow a few years for audio development, as we did for the Philips audio cassette system, and we'll be capable of recording TV musical shows in full audio fidelity. ▲

SPOTLIGHT ON...

KENWOOD KX-1030 STEREO CASSETTE DECK



AN OUTSTANDING BUY WHICH INCLUDES A THREE-HEAD SYSTEM AND USER-ADJUSTABLE BIAS

□ Kenwood's KX-1030 cassette deck includes *both* a three-head system (with simultaneous record/play) and a user-adjustable bias for both left and right channel (which may be used effectively with all kinds of tape), *as well as* a virtually automatic bias calibration testing system. At \$400, it's quite an outstanding buy.

Basically, the Kenwood looks the same as many other moderately-priced front-loading cassette decks; even the same as many other Kenwood decks. The tape is loaded, of course, from the front. There is the usual assortment of piano key tape mechanism controls, concentric-clutched left and right record level control for microphones and line (yes, they can be mixed), ganged left/right output level control, calibrated VU meters, a memory reset counter, and a Dolby noise reduction system.

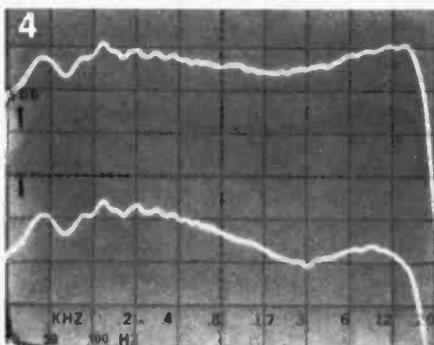
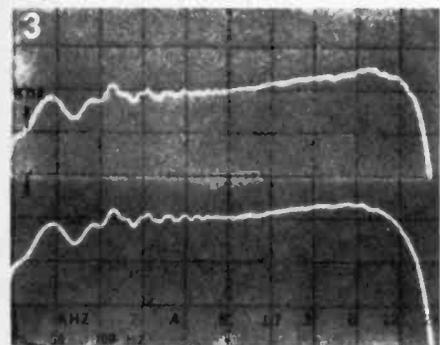
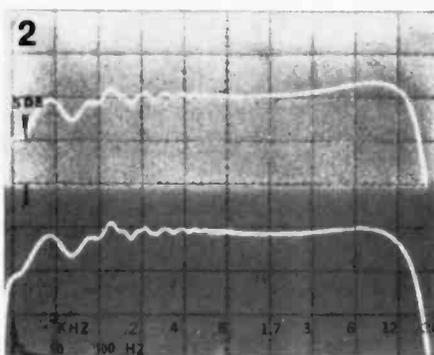
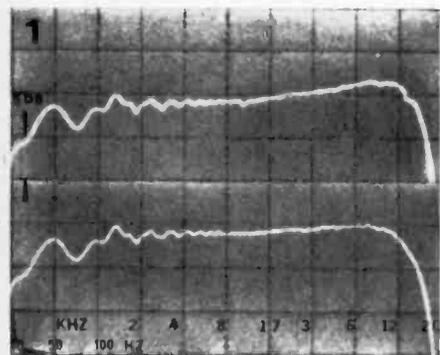
Take a closer look, and you'll notice the "extras": a tape/source monitor for the three-head system, a set of concentric controls labeled BIAS ADJ (bias adjustment), and a push switch labeled simply OSC, (oscillator). It is the combination of these three items that gives the Kenwood KX-1030 a level of performance you'd expect from tape decks priced twice, or three times as much.

Let's start with a look at the three-head system. Because the playback head is combined in the same shell as the record head, the KX-1030 appears at first glance to be a standard two-head cassette deck. Don't be misled. The KX-1030 does not include a playback head that serves only as a monitor, with actual playback done through a combination record/play head, nor does the playback head serve only for the bias calibration system. In the Kenwood KX-1030 the simultaneous play-

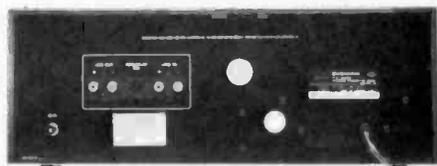
back head is a true high fidelity head complete with its own Dolby decoder. It gives the user a true, "flat," high fidelity playback.

The user-adjustable bias and its calibration system are designed for use with all three types of tape; it isn't limited to one particular type. When the OSC button is pressed in, the input signal(s) is disconnected and an alternating signal of 400 Hz and 10,000 Hz is recorded on the tape at the proper recording level. The playback of the 400/10,000 Hz signal is indicated on both the left and right VU meters. The REC (record) lamp on the front panel, which is generally lit when the system is set for recording, now goes on only when the 10,000 Hz signal is fed, allowing the user to know which frequency is being indicated on the VU meter. The user notes the VU meter

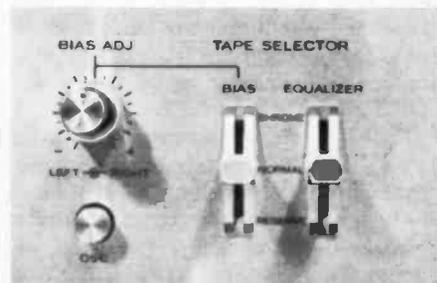
(Continued on page 77)



The variable bias feature is extremely effective. The top trace shows the response with bias set at "normal"; below, after bias has been optimized via the calibration system.



The rear apron consists of a set of line level inputs and outputs. There is no need for Dolby calibration. Dolby is preset for flat response gained via bias adjustment.



Pressing the OSC button automatically disconnects the input signal and applies the bias test tones alternately to the tape. Left and right bias level are individually adjusted through concentric controls.

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Heathkit AR-1429—\$319.95
Circle No. 31 On Reader Service Card

RECEIVERS

HEATHKIT AR-1429 AM/FM STEREO RECEIVER

Features unusually high FM stereo sensitivity and add-on capability for an FM Dolby decoder. \$319.95 in kit form; metal cabinet with wood trim.

Description; An AM/FM stereo receiver FTC-rated at 35 watts RMS per channel into 8 ohms from 20 to 20,000 Hz at a distortion no higher than 0.1% THD. Features includes a stereo beacon, FM center channel and AM/FM signal strength tuning meters, pre-wired space and front panel switching for an optional FM Dolby decoder, one of two tape inputs through the input selector switch, and an amplifier output hold-off that prevents power supply turn-on transients from being fed to the speakers.

There are stereo inputs for magnetic phono, aux, and two tape. Outputs for two speaker systems, tape, and phones. A set of connections are provided for an oscilloscope multipath indicator. The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for tuning, volume, balance, ganged bass, ganged treble, and input selection. There are switches for speaker system A, speaker system B, FM Dolby (when so equipped, also provides 25 uSec FM de-emphasis), squelch, blend (MPX filter), stereo/mono, loudness compensation, tone control defeat, and tape monitor.

The FM antenna input is 75/300 ohms. The AM antenna is a plug-in flexible loop 6 feet in diameter with a 4-foot connecting cable. Switched and unswitched AC outlets are provided.

Overall dimensions are 20 in. wide x 4¾ in. high x 13½ in. deep. Weight is 25 lbs.

Note: The kit was assembled by a hobbyist and was aligned according to the assembly manual. Performance was not optimized through an instrument alignment.

Performance—FM Tuner: Full limiting was attained with 3.5 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 3.6 uV. The stereo high fidelity sensitivity (55 dB quieting) was 40 uV. The squelch is not an interstation mute. It is user-adjusted during alignment to prevent reception of signal levels judged by the user to be too noisy for good reception.

The non-Dolby frequency response (with uSec de-emphasis) measured +0/−0.6 dB from 20 to 15,000 Hz. Monophonic distortion was 0.26% THD. Stereo distortion was 0.18% THD. The signal-to-noise ratio measured 72 dB. Stereo separation was 40+ dB. Selectivity was very good.

With the Dolby adaptor installed (25 uSec de-emphasis) the frequency response measured +0/−1.8 dB from 20 to 15,000 Hz (down 1.8 dB at 15,000 Hz). Distortion and signal-to-noise ratio remained essentially the same. The Dolby appeared to be adjusted

by the builder for a slightly lower reference level than 50% modulation, which resulted in the best FM Dolby we have heard in terms of noise reduction.

Performance—AM Tuner: Average at best, but extremely sensitive to the position and orientation of the loop, which is difficult to fold into a cabinet, conceal behind a wall or cabinet, or position for best 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 36.9 watts RMS. The frequency response at 36.9 watts RMS/8 ohms measured $\pm 0/-0.4$ dB from 20 to 20,000 Hz at a distortion no higher than 0.12% THD at any frequency. (Distortion was no higher than 0.09% THD at 35 watts.)

The tone control range measured ± 11 dB at 50 Hz; $+10/-6$ dB at 10,000 Hz.

The magnetic input hum and noise measured -68 dB; stereo separation was 59 dB. ▲

NIKKO NR-1415 AM/FM STEREO RECEIVER

High FM stereo sensitivity and a great deal of output power at notably low distortion. \$850.00 in wood cabinet.

Description: An AM/FM stereo receiver FTC-rated at 175 watts RMS per channel into 8 ohms at a distortion no higher than 0.045% THD from 15 to 20,000 Hz. Features include a stereo beacon, FM center channel and AM/FM signal strength tuning meters, normal (wide) and narrow FM IF selectivity, Dolby adaptor connections switched from front panel for tape recorder (flat) or with compensation for 25 uSec FM Dolby broadcasts, a midband tone control, a front panel mono microphone input that can be blended (mixed) with other signal sources, automatic dubbing to/from either of two recorders, and an output hold-off that prevents power supply turn-on transients from being fed to the speakers.

In addition to connections for the monophonic microphone and noise reduction adaptor there are stereo inputs for two magnetic phono, aux, tuner, and two tape. Outputs for three speaker systems, two tape, phones, and the FM detector. The preamplifier outputs and main amplifier inputs are available on the rear apron.

Controls are provided for tuning, volume, balance, ganged bass, ganged midband, ganged treble, microphone level, input selection, and speaker selection. There are switches for power, tone control defeat, mono/stereo, loudness compensation, audio mute, low filter, high filter, FM mute, wide/narrow FM IF selectivity, noise reduction adaptor/NR with 25 uSec compensation, tape monitor selection, and tape dub selection.

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

Overall dimensions are 22-3/32 in. wide x 7-11/16 in. high x 20 in. deep. Weight is 57.9 lbs.

Performance—FM Tuner: Full limiting was attained with 2.8 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 7.5 uV. The stereo high fidelity sensitivity (55 dB quieting) measured 52 uV. Full mute release was attained with 1.8 uV.

At standard test level the stereo frequency response measured $+1/-1.8$ dB from 50 to 15,000 Hz; down 2.2 dB at 40 Hz. In the



Nikko NR-1415—\$850.00
Circle No. 103 On Reader Service Card

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

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

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

normal (wide) selectivity mode monophonic distortion was 0.11% THD; stereo distortion was 0.2% THD. In the narrow selectivity mode mono distortion measured 0.17% THD; stereo distortion was 0.14% THD (lower figure is correct). The signal-to-noise ratio measured 72 dB. Stereo separation was 40+ dB.

In the normal IF mode selectivity was very good; in the narrow mode it was excellent.

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 186 watts RMS. The frequency response at 186 watts/8 ohms measured $+0/-0.8$ dB from 20 to 20,000 Hz at a distortion no higher than 0.032% THD at any frequency.

The tone control range measured ± 12.5 dB at 50 Hz; ± 7.5 dB at 1000 Hz; ± 10 dB at 10,000 Hz.

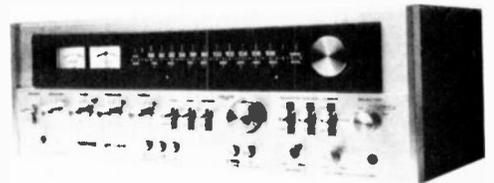
The magnetic input hum and noise measured 55 dB; stereo separation was into the noise level.

Note: When the noise reduction switch is set to 25 uSec, the signal fed to the associated Dolby adaptor is compensated for 25 uSec FM de-emphasis. When the NR switch is set for tape, the signal fed to the Dolby adaptor is flat. ▲

REALISTIC STA-78 AM/FM STEREO RECEIVER

Features an excellent AM tuner. \$269.95 in wood cabinet.

Description: An AM/FM stereo receiver FTC-rated at 22 watts RMS per channel into 8 ohms at no more than 0.5% THD from 20

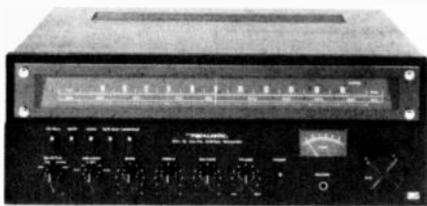


Nikko NR-1415—\$850.00
Circle No. 103 On Reader Service Card



Realistic STA-78—\$269.95
Circle No. 32 On Reader Service Card

TEST REPORTS RECEIVERS



Realistic STA-78—\$269.95
Circle No. 32 On Reader Service Card

to 20,000 Hz. Features include a stereo beacon, combination AM/FM signal strength tuning meter, 75 and 25 uSec FM de-emphasis, a tape dubbing output (second tape output, from receiver signal, permits tape to tape dub), screw terminal and phono jack speaker connections, and a linecord FM antenna.

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

Controls are provided for tuning, volume, balance, ganged bass, ganged treble, speaker selection, and input selection. Switches for power, 75/25 uSec de-emphasis, FM mute, mono/stereo, tape monitor, and loudness compensation.

The FM antenna input is 75/300 ohms or a linecord antenna. A rod antenna and external connection are provided for AM. One unswitched AC outlet is provided.

Overall dimensions are 17-7/16 in. wide x 6 3/4 in. high x 13 1/2 in. deep.

Performance—FM Tuner: Full limiting was attained with 2.8 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 6.5 uV. The stereo high fidelity sensitivity (55 dB quieting) measured 60 uV. At standard test level the stereo frequency response with 75 uSec de-emphasis measured +0.3/–2.4 dB from 20 to 13,000 Hz, down 4.2 dB at 14,000 Hz. With 25 uSec de-emphasis the stereo frequency response measured +0.3/–1.8 dB from 20 to 14,000 Hz.

Monophonic distortion measured 0.24% THD. Stereo distortion was 0.48% THD. The signal-to-noise ratio was 72 dB. Stereo separation was 38 dB. Selectivity was good.

Performance—AM Tuner: Excellent. Unusually quiet. Digs out high-end stations generally covered by noise.

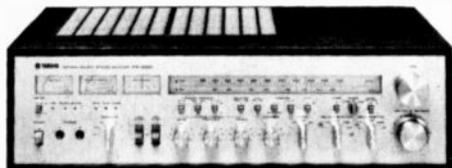
Performance—Amplifier: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 22.1 watts RMS. The frequency response at 22.1 watts/8 ohms measured +0/–0.8 dB from 20 to 20,000 Hz at a distortion no higher than 0.07% THD at any frequency.

The tone control range measured ± 13 dB at 50 Hz; +9/–10 dB at 10,000 Hz.

The magnetic input hum and noise measured –58 dB; stereo separation was into the noise level. ▲

YAMAHA CR2020 AM/FM STEREO RECEIVER

Jam-packed with performance and features, must be seen and used to be fully appreciated. \$750.00 in wood cabinet.



Yamaha CR2020—\$750.00
Circle No. 101 On Reader Service Card

Description: An AM/FM stereo receiver FTC-rated at 100 watts per channel into 8 ohms with no more than 0.05% THD from 20 to 20,000 Hz. Features include a stereo beacon; FM center channel tuning meter; automatic FM fine tuning which is applied when the hand is removed from the tuning knob (called OTS for "optimum tuning system"); left and right power output meters calibrated from 0.1 to 200 watts into 8 ohms, with the right meter also serving as an AM/FM signal strength/tuning meter (automatically switched to signal strength when the hand is on the tuning knob); a head amplifier for a moving coil (MC) pickup; dual range FM mute (3 and 30 uV); dual range bass (125, 500 Hz) and treble (2,500, 8,000 Hz) tone control turnover frequencies; a presence (midband) tone control; dual range low (70, 15 Hz) and high (8,000,

12,000 Hz) filters; FM Dolby adaptor connections switched from the front panel; automatic dub to and from either of two recorders; separate input/tape monitor and recorder input selectors (allowing taping of one source while listening to another); continuously variable loudness compensation, an output hold-off that prevents power supply turn-on transients from being fed to the speakers; and an output cut-off that temporarily disables the amplifier if an attempt is made to drive the output into overload.

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

Controls are provided for tuning (also serves as a touch-switch for the FM fine tuning and power/signal strength meter), concentric volume/balance, ganged bass, ganged treble, ganged presence (midband), input selection/tape monitor, tape input selector/tape copy, speaker selection, and MC/MM phono selection for the #1 phono input. There are switches for power, right meter power/signal strength function, low filter selector, high filter selector, bass turnover frequency, treble turnover frequency, tone control defeat, FM Dolby adaptor on-off, FM blend (MPX noise filter), FM mute on-off (automatic mono when mute is off), FM mute level, OTS (FM fine tuning) on-off, AM/FM tuner selector, and 20 dB audio mute. The preamplifier/main amplifier separation switch is on the rear.

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

Overall dimensions are 21¼ in. wide x 6-9/16 in. high x 16-15/16 in. deep. Weight is 42 lbs. 7 oz.

Performance—FM Tuner: Full limiting was attained with 3.5 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 8.5 uV. The stereo high fidelity sensitivity (55 dB quieting) was 65 uV. Full mute release was attained at 4 or 30 uV depending on the setting of the mute range switch.

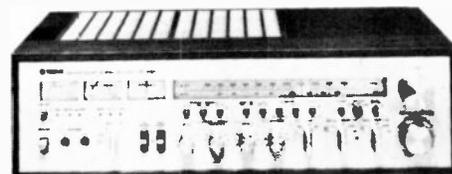
At standard test level the stereo frequency response measured +0/-0.5 dB from 20 to 15,000 Hz. (The FM Dolby selector appears to have "standard" 75 uSec de-emphasis.) Monophonic distortion was 0.06% THD. Stereo distortion was 0.1% THD. The signal-to-noise ratio measured 76 dB. Stereo separation was 40+ dB. Selectivity was very good.

The FM fine tuning is magnificent, providing a precise lock-up at minimum distortion. One of the best fine tuning systems we have tested to date. Has none of the fine tuning problems presently common to PLL.

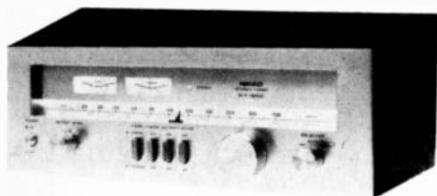
Performance—AM Tuner: Very good. Sensitivity and reduced background noise considerably better than average. The automatic power/signal strength meter serves as the AM tuning indicator.

Performance—Amplifier: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 121 watts RMS. The frequency response at 121 watts/8 ohms measured +0/-0.3 dB from 20 to 20,000 Hz at a distortion no higher than .028% THD at any frequency. With the 15 Hz subsonic filter switched in, the frequency response is down only 1 dB at 20 Hz.

The tone control range depends on the setting of the turnover switches. At 50 Hz: with a 500 Hz turnover the range was ± 15



Yamaha CR2020—\$750.00
Circle No. 101 On Reader Service Card



Nikko NT-850 — \$230.00
 Circle No. 103 On Reader Service Card

dB; with a 125 Hz turnover the range was ± 8 dB. At 10,000 Hz: with a 2,500 Hz turnover the range was ± 10 dB; with an 8,000 Hz turnover the range was ± 4 dB. The presence control has a center frequency of 3000 Hz with a range of ± 6 dB.

The magnetic input hum and noise measured -70 dB; stereo separation was into the noise.

The moving coil phono input selector switches in a head amplifier having 5 dB gain into the #1 phono input channel. When the head amplifier is switched out, the #1 input serves as a standard magnetic phono (MM) input.

The power output meters have a nominal accuracy of 10% across the entire scale from 100 to 20,000 Hz. At 20 Hz the meter readings are 50% of the actual power output (3 dB down). ▲

TUNERS

NIKKO NT-850 AM/FM STEREO TUNER

An outstanding value for budget priced systems. Nice performance even for moderately priced installations. \$230.00 in metal cabinet.

Description: An AM/FM stereo tuner featuring a stereo beacon, FM center channel and AM/FM signal strength tuning meters, an aural multipath indicator (adjust antenna for minimal noise in speaker), 75 and 25 uSec FM de-emphasis, an FM mute, and normal (wide) or narrow FM IF selectivity.

There is a continuously variable line level output, and an output for an oscilloscope multipath indicator.

Controls are provided for tuning, output level, and AM/FM modes. Switches for power, normal/narrow IF selectivity, MPX filter, multipath test, and FM mute. The 75/25 uSec de-emphasis selector is on the rear apron.

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

Overall dimensions are 15¼ in. wide x 5¼ in. high x 13½ in. deep. Weight is 13.2 lbs.

Performance—FM Tuner: Full limiting was attained with 3.4 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 8.5 uV. The stereo high fidelity sensitivity (55 dB quieting) was 50 uV. At standard test level the stereo frequency response with 75 uSec de-emphasis measured ± 0.5 dB from 20 to 15,000 Hz.

With 25 uSec de-emphasis the stereo frequency response was $\pm 0.5/-1$ dB from 20 to 15,000 Hz.

With normal IF bandwidth the monophonic distortion measured 0.08% THD; the stereo distortion was 0.17% THD. With narrow IF bandwidth (greater alternate channel rejection) the mono distortion measured 0.3% THD; stereo distortion was 0.17% THD. The signal-to-noise ratio measured 68 dB. Stereo separation was 40+ dB. With normal IF bandwidth the selectivity was good. With narrow IF bandwidth it was very good.

The maximum output level corresponding to 100% modulation of the FM transmitter measured 800 mV.

Note: Center channel tuning is critical for minimum distortion. Distortion values are somewhat higher—though still good—at other than at the precise meter-indicated center of channel scale cali-

bration.)

Performance—AM Tuner: Sensitivity is slightly below average. Reception, however, is unusually quiet, with notably low background noise level. ▲

SETTON TUS 600 AM/FM STEREO TUNER

FM distortion is considerably less than the already low claim of the manufacturer. One of the lowest FM distortion figures we have measured. \$379.95 in metal cabinet.

Description: An AM/FM stereo tuner featuring a stereo beacon, FM center channel and AM/FM signal strength tuning meters, front panel switched output for an FM Dolby adaptor with automatic de-emphasis correction to 25 uSec, and a user-set variable FM mute.

There are outputs for fixed and variable line level, and the Dolby adaptor. The variable line output is turned off when the Dolby connection is selected. The Dolby output de-emphasis is always 25 uSec while the variable line output is always 75 uSec.

Controls are provided for tuning, output level, FM mute level, and AM/FM/FM MPX filter. There are switches for power, Dolby in/out, and stereo/mono.

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

Overall dimensions are 20 in. wide x 6-15/32 in. high x 11 1/4 in. deep. Weight is 18.7 lbs.

Performance—FM Tuner: Full limiting was attained with 2.8 uV. The monophonic high fidelity sensitivity (60 dB quieting) measured 7.5 uV. The stereo high fidelity sensitivity (55 dB quieting) was 70 uV. The FM mute could be set for full release within the range of 3 to 30 uV, or full off.

At standard test level the frequency response using 75 uSec de-emphasis measured +0.2/-2 dB from 30 to 15,000 Hz. With 25 uSec de-emphasis, the frequency response measured +0.2/-1.0 dB from 40 to 15,000 Hz, down 2.6 dB at 30 Hz. Monophonic distortion measured 0.17% THD; stereo distortion measured 0.08% THD (yes, the stereo distortion was less than the mono THD). The signal-to-noise ratio measured 67 dB. Stereo separation was 40+ dB. Selectivity was very good. Note: Overall, the tuner appeared to be in precise electrical alignment, particularly the tuning meter.

Performance—AM Tuner: Sensitivity and signal-to-noise ratio were slightly better than average. ▲

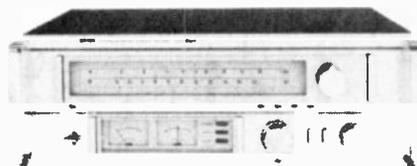
SONY ST-2950SD AM/FM DOLBY TUNER

FM Dolby at moderate cost. \$300.00 in metal cabinet with wood trim.

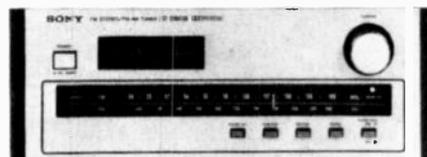
Description: An AM/FM stereo tuner with an integral FM Dolby decoder. The FM de-emphasis is automatically switched from 75 uSec to 25 uSec when the Dolby is switched in. Other features include a stereo beacon, FM center-channel tuning meter, and an AM/FM signal strength tuning meter.

There are outputs for line level and the FM detector.

A control is provided for tuning. Switches for power, FM Dolby,

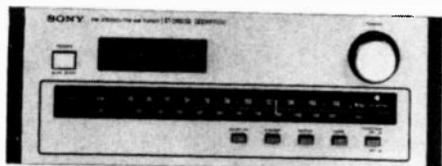


Setton TUS 600 — \$379.95
Circle No. 107 On Reader Service Card



Sony ST-2950SD—\$300.00
Circle No. 93 On Reader Service Card

TEST REPORTS INTEGRATED AMPLIFIERS



Sony ST-2950SD—\$300.00
Circle No. 93 On Reader Service Card



Nikko NA-850 — \$270.00
Circle No. 103 On Reader Service Card

high blend (mpx filter), FM mute, mono/stereo, and AM/FM selection.

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

Overall dimensions are 15 $\frac{3}{4}$ in. wide x 5 $\frac{3}{4}$ in. high x 12 $\frac{1}{4}$ in. deep. Weight is 13.1 lbs.

Performance—FM Tuner: Full limiting was attained with 4.5 μ V. The monophonic high fidelity sensitivity (60 dB quieting) measured 6 μ V. The stereo high fidelity sensitivity (55 dB quieting) was 70 μ V. Full mute release was attained with 2.4 μ V.

At standard test level the stereo frequency response with 75 μ Sec de-emphasis measured +0/0.8 dB from 30 to 15,000 Hz; down 1.6 dB at 20 Hz. With the Dolby switched in and 25 μ Sec de-emphasis the frequency response measured +0/−1.6 dB from 20 to 15,000 Hz.

Monophonic distortion measured 0.12% THD. Stereo distortion measured 1.4% THD. The signal-to-noise ratio measured 64 dB. Stereo separation was 40 dB. Selectivity was good. The output level corresponding to 100% modulation of the transmitter is 700 mV.

Performance—AM Tuner: Background is considerably lower than average. ▲

INTEGRATED AMPLIFIERS

NIKKO NA-850 INTEGRATED STEREO AMPLIFIER

Features an unusually flat output meter calibration. \$270.00 in metal cabinet.

Description: An integrated stereo amplifier FTC-rated at 60 watts RMS per channel into 8 ohms at a distortion no higher than 0.08% THD from 20 to 20,000 Hz. Features include a subsonic filter (−3 dB at 15 Hz), tone control defeat, automatic tape dubbing to/from either of two recorders, and left and right output power meters with dB and power/8 ohm calibrations. A continuously variable meter level calibration control is calibrated so 0 dB equals 60, 50, 40, 30, 15, 5, and 1.5 watts. An output hold-off prevents power supply turn-on transients from being fed to the speakers.

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

Controls are provided for volume, balance, ganged bass, ganged treble, meter level, input selection, and tape monitor/dub selection. There are switches for power, tone control defeat, subsonic filter, high filter, loudness compensation, speaker system A, and speaker system B.

Switched and unswitched AC outlets are provided.

Overall dimensions are 15 $\frac{3}{4}$ in. wide x 5 $\frac{3}{4}$ in. high x 12 $\frac{1}{4}$ in. deep. Weight is 19.8 lbs.

Performance: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 62.7 watts RMS. The frequency response at 62.7 watts/8 ohms measured +0/−0.3 dB from 20 to 20,000 Hz at a distortion no higher than 0.045% THD at any frequency.

The tone control range measured $+13.5/-12$ dB at 50 Hz; ± 10 dB at 10,000 Hz.

The magnetic input hum and noise was -60 dB; stereo separation was into the noise level.

The subsonic filter produces 2.5 dB attenuation at 20 Hz, and is 3.5 dB down at 15 Hz.

The power output meter(s) frequency response is essentially "ruler flat" (better than ± 0.5 dB) from 20 to 20,000 Hz. The meter level control calibrations are unusually accurate for a continuously variable adjustment, and power output indications are within 1% (worst-case) of true value. Because the meter can be adjusted to indicate "full scale" and very low power outputs and because of its unusually flat response, it can also be used for frequency response tests on associated equipment, such as recorders. ▲

SONY TA-2650 INTEGRATED STEREO AMPLIFIER

Very nice package for a moderate price. Sound quality is that of higher priced amplifiers. \$220.00 in metal cabinet with wood trim.

Description: An integrated stereo amplifier FTC-rated at 45 watts RMS per channel into 8 ohms 20 to 20,000 Hz at a distortion no higher than 0.2% THD at any frequency. Features include "acoustic compensation," a broad upper-low to midband boost at lower volume levels (actually could be termed "presence equalization"). Other features are front and rear connections for the #2 recorder, with the rear connections automatically disconnected when plugs are inserted into the front panel jacks; a 20 dB audio mute; automatic dub from and to either of two recorders, and an amplifier hold-off that prevents power supply turn-on transients from being fed to the speakers.

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

Controls are provided for volume, balance, ganged bass, ganged treble, input selection, and speaker selection. There are switches for power loudness/acoustic compensation, tape dub selector, tape monitor selector, and 20 dB audio mute.

One switched and two unswitched AC outlets are provided.

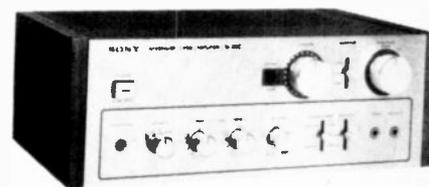
Overall dimensions are 15½ in. wide x 5¼ in. high x 11¼ in. deep. Weight is 19.1 lbs.

Performance: The power output per channel at the clipping level with both channels driven 20 to 20,000 Hz into 8 ohms measured 48.5 watts RMS. The frequency response at 48.5 watts/8 ohms was $+0/-0.2$ dB from 20 to 20,000 Hz at a distortion no higher than 0.07% THD at any frequency.

With the acoustic compensation switched in and the volume control ¼-open there was a very broad moderate boost starting at about 100 Hz and rising to $+2.6$ dB from 1000-2000 Hz, decreasing to $+0.5$ dB at 10,000 Hz. It serves primarily as a presence equalizer when the volume control is open up to 50% of total range.

The tone control range measured ± 12 dB at 50 Hz; ± 6 dB at 10,000 Hz.

The magnetic input hum and noise measured -66 dB; separation was 52 dB. ▲



Sony TA-2650—\$220.00
Circle No. 93 On Reader Service Card

CASSETTE DECKS

KENWOOD KX-1030 DOLBY CASSETTE DECK

Magnificent. Run to your local dealer with an assortment of tapes and try one out to see what real hi-fi from cassettes is all about. \$400.00 in metal cabinet.



Kenwood KX-1030—\$400.00
Circle No. 74 On Reader Service Card

Description: A front-loading 3-head system (simultaneous record/play) Dolby cassette deck featuring individual equalization and bias selectors, and individual left and right user bias level controls for normal, chrome, and reserve (Ferrichrome) tapes, with a built-in two tone (400, 10,000 Hz) oscillator-test system for bias adjustment.

The test system records both tones in recycling sequence, and optimum bias adjustment for a particular brand or type of tape is attained when the bias is adjusted for identical output level from both tones.

Other features include microphone/line mixing, left and right calibrated VU meters, a peak record indicator lamp, automatic end of tape stop/disengage, and a memory reset counter.

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

Controls are provided for concentric-clutched left and right microphone, concentric-clutched left and right line level, ganged output level, and concentric left and right bias level (functions for all three tape types). There are switches for power, bias, equalization, Dolby, tape/source monitor, bias test oscillator, and counter memory on-off.

The tape mechanism has piano keys for the record interlock, REW, forward, FF, pause, and stop. The tape is ejected when the door is given a light push.

Overall dimensions are 16-15/16 in. wide x 6-9/16 in. high x 12-13/16 in. deep. Weight is 16.5 lbs.

Performance; The playback frequency response from a standard test tape with a 50 to 10,000 Hz range measured +3/-1.2 dB.

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

Using BASF Professional Type I tape: without Dolby, the record/play frequency response measured +1/-1.4 dB from 40 to 15,000 Hz, down 3 dB at 30 Hz. (Essentially ruler flat from a shade higher than 40 Hz to 14,000 Hz.) Distortion at the meter-indicated 0-VU record level was 0.22% THD with 13 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 47 dB. With the Dolby active, the response was similar but down 3 dB at 13,000 Hz. Distortion and headroom remained the same. The signal-to-noise ratio measured 50 dB wideband; 58 dB narrowband.

Using Sony Ferrichrome tape: with Dolby, the record/play frequency response measured +0.5/-2 dB from 40 to 15,000 Hz. Distortion at the meter-indicated 0-VU record level was 0.55% THD with 8 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 50 dB wideband; 58 dB narrowband.

Using BASF Professional Type II tape (for chrome); with Dolby, the record/play frequency response measured +0.5/-0.2 dB from 40 to 15,000 Hz. Distortion at the meter-indicated 0-VU

record level was 0.22% THD with 9 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 51 dB wideband; 59 dB narrowband.

The maximum output level corresponding to a 0-VU record level was nominally 600 mV.

Wow and flutter measured 0.11% steady.

The peak record level indicator lamp cut in 6 dB above 0-VU, well below the headroom for the tapes used, allowing the record level to be pushed against the pin for even higher signal-to-noise ratios.

The test oscillator system works extremely well. It records a short length of 400 Hz followed by 10,000 Hz, repeating the cycle. The user observes the simultaneous playback on the VU meters and adjusts the bias level controls so the output from both tones are equal. If you are not monitoring the test signal a panel lamp indicates when the 10,000 Hz signal is on. ▲

REEL-TO-REEL

REVOX B77 REEL-TO-REEL TAPE DECK

Words simply cannot describe the clean, apparently noiseless and uncolored recordings of the B77. \$995.00.

Description: A two-speed (7.5, 3.75 ips) three-head system (simultaneous record/play), three-motor, four-track stereo recorder accommodating reel sizes to 10½ inches. Features include two calibrated VU meters, two headphone outputs (for phones rated 200 ohms or higher) with a headphone level control, a headphone monitor function selector (stereo, stereo reverse, left, right, mono), an edit selector that moves the tape against the play head (no capstan or reel motors) for hand feeding, a built-in splicing block with guillotine-like cutter, prewired sockets for optional slide synchronizer, capstan speed controller, and full remote control switcher, a reset counter, optical end of tape stop/disengage, individual left and right record selectors, and S.O.S. (sound on sound), echo, and overdub effects.

There are inputs for low and high output microphones, aux, and radio (through DIN connector). There are outputs for line and two phones.

Controls are provided for left record level, right record level, left input selection, right input selection, headphone monitor level, and headphone function selector. Left and right "screwdriver adjust" output controls are located on the rear. There are switches for power, tape speed, reel size (7-, 10-inch), tape/source monitor, left record selector, and right record selector.

The tape mechanism has push-tabs for the record interlock, play, stop, REW, FF, and pause.

Overall dimensions are 17.8 in. wide x 16.3 in. high x 8.14 in. deep.

Performance: At 7.5 ips, the playback from a standard test tape with a 50 to 15,000 Hz range measured +2.2/-0 dB. At 3.75 ips, the playback from a standard test tape with a 50 to 7500 Hz range measured +2.2 dB from 75 to 7500 Hz, rising to +4 dB at 50 Hz.



Revox B77 — \$995.00
Circle No. 86 On Reader Service Card

TEST REPORTS RECORD PLAYERS



Revox B77 — \$995.00

Circle No. 86 On Reader Service Card

Note: The machine was supplied factory adjusted for Scotch type 207 tape and all tests were performed with this tape.

At 7.5 ips, the record/play frequency response measured +0.5/−0.7 dB from 30 to 20,000 Hz, down 1.8 dB at 20 Hz. Distortion at the meter-indicated 0-VU record level was 0.6% THD with 7 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level measured 53 dB wideband.

At 3.75 ips, the record/play frequency response measured ± 1 dB from 30 to 18,000 Hz, down 3 dB at 20 Hz. Distortion at the meter-indicated 0-VU record level was 0.95% THD with 5.5 dB headroom to 3% THD. The signal-to-noise ratio referenced to 0-VU record level was 51 dB.

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

Wow and flutter measured 0.04% steady at 7.5 ips; 0.08% steady at 3.75 ips.

Note: The frequency distribution of the background noise does not peak in the ear's most sensitive range and recordings actually sound almost noiseless. Also, the sound is extremely clean, the equal of many fine studio recorders. Neither the "quiet" background or unusually clean sound can be illustrated by measurements; you must hear them for yourself. Mechanically, and in terms of operating ease, the machine is among the very finest, if not in fact worthy of being used as the standard of reference. ▲

RECORD PLAYERS

GARRARD GT-25 MULTI-RECORD PLAYER

It's a little more sensitive than usual to external shock and vibration, but as a package it is attractively priced for lower-moderate cost systems. \$159.95 includes integral base, dust cover, and Shure M91ED pickup.



Garrard GT-25 — \$159.95

Circle No. 70 On Reader Service Card

Description: A two-speed (33, 45 rpm) manual, automatic, or multi-record player depending on which of two supplied spindles is used. The multi-record mode is only for 12-inch records. An optional 7-inch large-hole 45 rpm multi-record spindle is available. In all modes the tonearm cycles to the rest and the motor is turned off after a record, or the last record in a stack is played. The mechanism can be set for repeat play of one record or the last record in a stack.

There are controls for speed select, tonearm indexing (7 or 12 inches, a 10-inch record must be manually indexed), off/manual/auto/repeat modes, auto start/reject, and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as a 0 to 3 gram VTF adjustment calibrated in 0.25 gram increments. There is a calibrated anti-skate, and a locking tonearm rest. The pickup mounts in a plug-in universal carrier for which a stylus overhang gauge is provided (though the supplied pickup is factory installed and adjusted). The output cable capacity is nominally 130 pF.

Performance—Record Player: Speeds remained constant over an applied test range of 90 to 140 volts with total immunity to transient line voltage variations. Both speeds were precisely "on

the mark." Wow and flutter measured 0.06% with peaks to 0.22%.

The stylus force adjustment was accurate within $\frac{1}{8}$ -gram.

The record changer was jamproof even when used with records having enlarged spindle holes.

Performance—Pickup: The pickup is rated for a VTF of 0.75 to 1.5 grams. The record player requires a minimum VTF of 0.75 grams. We attained best results with 1.5 grams. The frequency response measured ± 1.5 dB from 20 to 14,000 Hz, rising to +6 dB at 20,000 Hz. The rise is due primarily to the low capacity cables provided and can be somewhat "tamed" by connecting a shielded patch cord to the output cables (the more capacity in the cable the better). Worst-case stereo separation was 21 dB at 1000 Hz; 17 dB at 15,000 Hz. Overall sound quality of the M91ED in the Garrard GT-25 was typical of its performance in other record players. ▲

JVC QL-8 RECORD PLAYER

This is what high fidelity is all about. A record player for the purist, but priced to match. You can literally fine-tune the tonearm to get even better sound than you'd expect from any pickup. \$799.95 includes integral base and dust cover.

Description: A two-speed (33, 45 rpm) electronically regulated manual record player made from individual components (motor, tonearm, base/dustcover) which are factory-assembled into a complete player featuring full-time illuminated 33 and 45 strobes and a twelve-step pitch control directly calibrated ± 6 Hz in 1 Hz increments either side of 440 Hz "A."

Pushbutton controls are provided for main power, start/stop, 33 speed, and 45 speed. The tonearm lift is part of the tonearm assembly.

The tonearm has a combination sliding and microadjust counterweight that also serves as a 0 to 3 gram VTF calibrated in 0.1 gram increments. The calibrated anti-skate is detented throughout its range. The tonearm assembly mounts in an elevator assembly with coarse and fine adjustments so the entire tonearm assembly height can be optimized for any pickup. In addition, angular rotation adjustment is provided for the universal plug-in pickup carrier. A stylus overhang gauge is provided. The tonearm rest has both a positive lock and a user-set "permanent" lock (which prevents any accidental or deliberate movement of the tonearm). The output cable capacity was nominally 60 pF.

Performance: Both speeds held exact with total immunity to transient line voltage variations over an applied test range of 90 to 140 volts.

The pitch control was calibrated at both speeds in 1 Hz increments, give or take the accuracy of the frequency measurement system (it's exact for all intents and purposes). Our listening panel was able to preset the turntable to proper pitch for recordings where there was knowledge of the "non standard" pitch. The concert pitch range of this turntable is 434 to 446 Hz centered on an international "A" of 440 Hz.

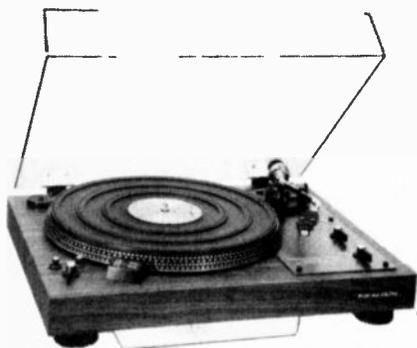
The tonearm's VTF calibrations were "on the mark." Resistance to external shock and vibration was unusually high. The stylus overhang gauge arrangement is poor and extra care must be taken



JVC QL-8—\$799.95

Circle No. 73 On Reader Service Card

TEST REPORTS RECORD PLAYERS



Realistic Lab-400—\$199.95
Circle No. 32 On Reader Service Card

to avoid damage to the stylus. The tonearm, however, can be literally fine-tuned to the pickup and our listening panel reported it was possible to tune for even better sound than usually attained from the best of the high performance pickups.

The panel rates this as one of the best record players they have ever used. ▲

REALISTIC LAB-400 AUTOMATIC TURNTABLE

This complete record playing system delivered typical performance for its price range, plus above average resistance to external shock and vibration. \$199.95 includes integral base, dust cover, and Realistic/Shure 1000E pickup.

Description: A two-speed (33, 45 rpm) electronically controlled fully automatic record player for single records (no multi-record play). Unit recycles and turns off after play, or the record can be endlessly repeated. Features include full-time illuminated 33 and 45 strobes and pitch controls, and tonearm indexing for 7-, 10-, and 12-inch records.

Controls are provided for speed selection, 33 pitch, 45 pitch, start/reject-off-start/repeat, record size (tonearm indexing), and tonearm lift.

The tonearm has a micro-adjust counterweight that also serves as a 0 to 4 gram VTF calibrated in 0.5 gram increments. There is a calibrated anti-skate and a locking tonearm rest. The pickup is factory-installed and adjusted in a plug-in universal carrier for which a stylus overhang gauge is provided (though the supplied pickup is supplied factory adjusted). The output cable capacity is nominally 210 pF.

Performance—Turntable: Speeds remained constant with total immunity to transient line voltage variations over an applied test range of 90 to 140 volts. The 33 pitch control range measured +4.8/−5.2%; the 45 pitch control range was +5.5/−8.2%.

Wow and flutter measured 0.07% with peaks to 0.15%.

The stylus force calibrations were accurate within 1/8-gram.

Performance—Pickup: The pickup is rated for a VTF of 0.75 to 1.25 grams. Above average high frequency sound quality was attained with 0.75 grams but 1.25 grams was required for optimum bass; we recommend 1.25 grams, which provides best overall performance.

At 1.25 grams VTF, the frequency response measured within ±2 dB from 20 to 14,000 Hz, rising to +9 dB at 20,000 Hz. The rise can be somewhat "tamed" by connecting a shielded patch cord to the output cables. Worst-case stereo separation measured 26 dB at 1000 Hz; 20 dB at 15,000 Hz.

Note: In the event the stylus overhang gauge must be used, use extra care to handle the operation gently to ensure that the stylus will not be damaged in the process.

Overall, the player has above average resistance to external shock and vibration and is recommended where it will be roughly handled, or where the floor is somewhat shaky. ▲

VISONIK BD-5200 TURNTABLE

Performance was essentially typical for its price range. \$188.00.

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

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

The tonearm has a micro-adjust counterweight that also serves as an 0-2.5 gram stylus force adjustment calibrated in 0.5 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal carrier for which a stylus overhang gauge is provided. The tonearm rest has a locking device. Medium capacity output cables are provided.

Performance: All speeds held constant over an applied test range of 90 to 140 volts, with complete immunity to transient line voltage variations. The pitch control range measured +4.5/-3.7% at 33 rpm; +5.8/-5.2% at 45 rpm. Wow and flutter measured 0.07% with peaks to 0.13%.

The tonearm's stylus force calibrations were exact. VTF (vertical tracking force) could be estimated within ¼ gram accuracy. ▲



Visonik BD-5200 — \$188.00
Circle No. 91 On Reader Service Card

VISONIK DD-8200 TURNTABLE

All function controls are on the front panel including the tonearm lift. The dust cover can remain closed during all operations. \$249.00 includes intergal base and dust cover.

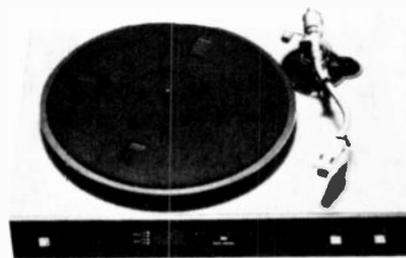
Description: A two-speed (33, 45 rpm) electronically controlled record player with integral base and dust cover. Features include full-time illuminated 33 and 45 strobes and semi-automatic operation. The motor starts when the tonearm is lifted off its rest. At the end of play the tonearm lifts and recycles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

There are pushbuttons for speed select. Lever controls for tonearm lift and reject (with recycle to off).

The tonearm has a micro-adjust counterweight that also serves as an 0 to 2.5 gram stylus force adjustment calibrated in 0.5 gram increments. There is a calibrated anti-skate. The pickup mounts in a universal carrier for which a stylus overhang gauge is provided. The tonearm rest has a locking device. Low capacity cables are provided for stereo/CD-4 pickups.

Performance: All speeds held constant over an applied test range of 100 to 140 volts, with total immunity to transient line variations. The pitch control range measured +4.8/-2% at 33 rpm; +3.4/-4% at 45 rpm. Wow and flutter measured 0.07% with peaks to 0.2%.

The tonearm's stylus force adjustment was "on the mark," and

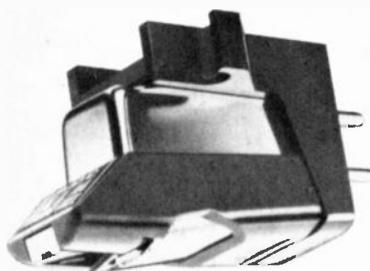


Visonik DD-8200 — \$249.00
Circle No. 91 On Reader Service Card

TEST REPORTS HEADPHONES

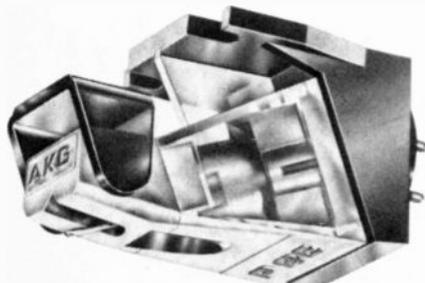


Koss PRO/4 AAA – \$70.00
Circle No. 76 On Reader Service Card



ADC QLM36 Mk III – \$79.95
Circle No. 66 On Reader Service Card

Editor's Note: We reviewed ADC's XLM cartridge in the March/April '78 issue, however the price listed in the caption was incorrect. The price of the ADC XLM Mk III is \$110. My apologies.



AKG P8ES – \$135.00
Circle No. 79 On Reader Service Card

VTF (vertical stylus force) could be estimated within ¼-gram accuracy.

Where overhead space is a problem the fact that all the operating controls are on the front panel can be a decided asset. ▲

HEADPHONES

KOSS PRO/4 AAA STEREO HEADPHONES

A very efficient set of headphones. \$70.00.

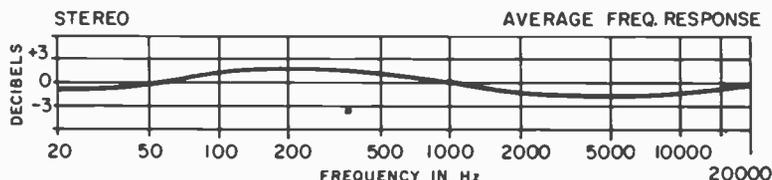
Weight: 18 oz. Cord: 6 feet long, coil type. The Pro/4 AAA's have a cushioned headband and circumaural phone cushions. Pressure on the ears and overall sense of weight is moderate. Sound quality includes deep bass and somewhat "hot" highs. Average definition. These headphones are very efficient and can create extremely high sound levels, using low-power amplifiers. ▲

PHONO PICKUPS

ADC QLM36 MK-III STEREO PHONO PICKUP

Though lower in cost the overall sound was that of the model XLM, with an even "fuller" deep bass. \$79.95.

Description: A magnetic pickup with a 0.3 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.5 grams. Best results were attained at 1.5 grams.

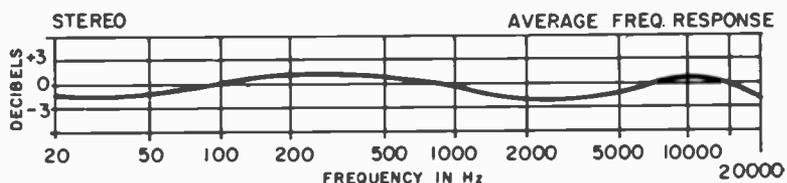


Performance: The frequency response measured within ± 2 dB with an unusually flat upper high end. Channel balance was within 0.25 dB to 18,000 Hz, rising to 1.5 dB at 20,000 Hz. The worst-case stereo separation was 26 dB at 1000 Hz; 23 dB at 15,000 Hz. ▲

AKG P8ES STEREO PHONO PICKUP

Features an unusually "sweet" sound. Overall sound quality far outclasses its measurements. The listening panel could sense no difference between the P8ES and the slightly less expensive P8E. \$135.00.

Description: A magnetic stereo pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.25 grams. Best results were attained using a typical high performance record player in the 1 to 1.5 gram range. No difference in sound quality within this range.



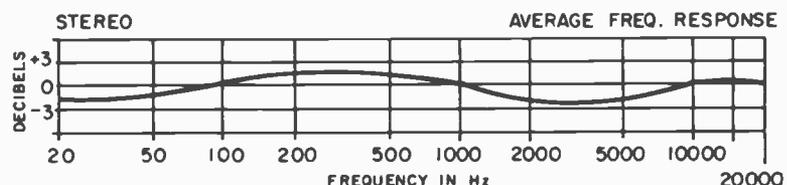
Performance: The frequency response measured within ± 2 dB from 20 to 20,000 Hz. Channel balance was better than 1 dB. The worst-case stereo separation measured 26 dB at 1000 Hz; 21 dB at 15,000 Hz.

The listening panel reported that this is an exceptionally "sweet" sound which might prove unsuitable for the distortions of acid and punk rock; but they give it highest ratings in all areas of performance. ▲

AUDIO TECHNICA AT12XE STEREO PHONO PICKUP

Overall performance is typical of its price range. \$60.00.

Description: A magnetic pickup with a 0.3 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 1 to 1.75 grams. Best results were attained at 1.75 grams.

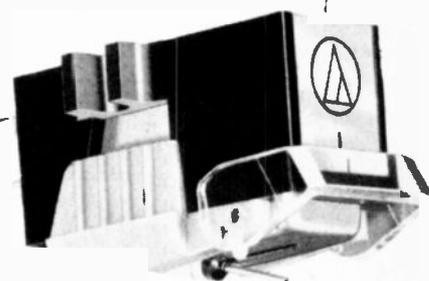
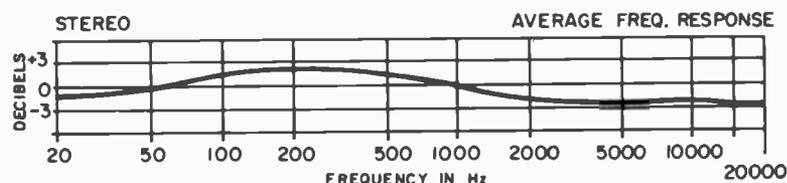


Performance: The frequency response measured $+2/-3$ dB from 20 to 16,000 Hz, with one channel having a steady rise from the midband to 20,000 Hz. Channel balance was within 2 dB from 20 to 10,000 Hz; increasing to 5 dB at 20,000 Hz. The worst-case stereo separation measured 17 dB at 1000 Hz; 10 dB at 15,000 Hz. ▲

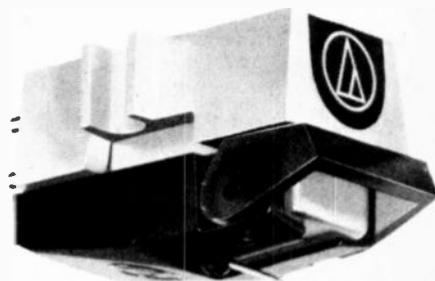
AUDIO-TECHNICA AT-15XE STEREO PHONO PICKUP

A very good sound quality but at least one notch below the sound common today from high performance models. Deep bass is a little richer than usual, but definition is slightly less than the AT-15Sa. \$100.00.

Description: A magnetic pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.75 grams. Best results were attained in the 1 to 1.5 gram range with high performance players, in the 1.5 to 1.75 gram range with lesser quality players. (Pickup is a good choice for just below top-of-the-line record players.)

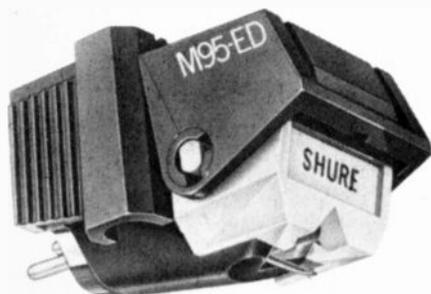


Audio Technica AT12XE - \$60.00



Audio Technica AT-15XE - \$100.00

TEST REPORTS PHONO PICKUPS



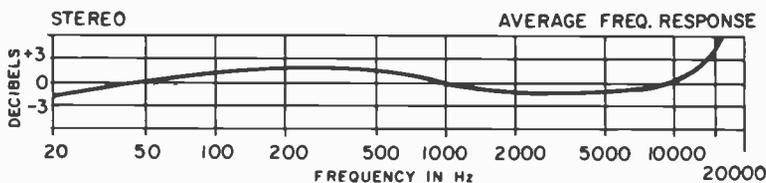
Shure M95ED — \$74.95
Circle No. 94 On Reader Service Card

Performance: The frequency response measured within ± 2 dB from 20 to 15,000 Hz, down 3 dB at 20,000 Hz. Channel balance was essentially exact from 20 to 17,000 Hz, increasing to 1.5 dB at 20,000 Hz. The worst-case stereo separation measured 24 dB at 1000 Hz; 16 dB at 15,000 Hz. ▲

SHURE M95ED STEREO PICKUP

Very good sound quality but somewhat below that attained from highest performance pickups. \$74.95.

Description: A magnetic stereo pickup with a 0.2 x 0.7 elliptical stylus. The manufacturer's recommended VTF is 0.75 to 1.5 grams and good results were attained throughout the range. Pickup is a good choice for just below top-of-the-line record players.



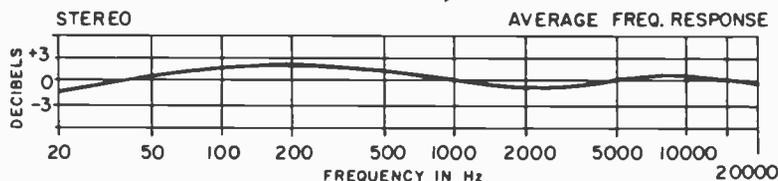
Performance: The frequency response measured within ± 2 dB from 20 to 14,000 Hz, rising to +6–7 dB at 20,000 Hz. Channel balance was within 1 dB. The worst-case stereo separation measured better than 30 dB at 1000 Hz, 18 dB at 15,000 Hz. The overall sound quality is slightly edgy in the upper highs because of the rising response. The rise can be reduced by adding capacity through shielded patch cord extensions. ▲

SHURE V15 TYPE IV STEREO PICKUP

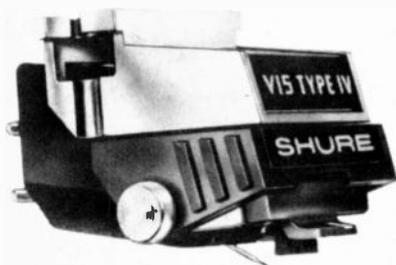
Magnificent sound. Creates a "live" sound quality from recordings that is impossible to measure or pin down with words. Truly spectacular definition. \$150.00.

Description: A magnetic phono pickup with a "hyperelliptical" stylus. The manufacturer's rated VTF is 0.75 to 1.25 grams and excellent results were attained anywhere within this range. The stylus guard assembly has a built-in dustbrush that tracks ahead of the stylus. The brush, which is made of conductive fibers, also serves to "ground" the record and "drain" static charges.

The dust brush provides a negative tracking force of 0.5 gram, so the set VTF should be 0.5 grams higher than desired: for example, set the VTF to 1.75 grams for an actual 1.25 gram VTF.



Performance: The frequency response measured within +1.5/-1 dB from 20 to 20,000 Hz. Channel balance was within 1 dB from 20 to 20,000 Hz. The worst-case stereo separation measured 23 dB at 1000 Hz; 20 dB at 15,000 Hz. ▲



Shure V15 IV—\$150.00
Circle No. 94 On Reader Service Card

AUDIO SHOWCASE

(Continued from page 18)



Circle No. 85 On Reader Service Card

priced models). Specs for the tuner section: FM sensitivity, 9.8 dBf; selectivity, 80 dB; capture ratio, 1.0 dB; distortion, 0.1% S/N, 80 dB (mono) and 0.15% S/N, 74 dB (stereo). Features include: twin power meters; variable tuning capacitor design; automatic pilot cancellor that eliminates the 19 kHz signal in the circuit electronically without affecting the tuner's response; tape duplication feature that permits duplication from tape deck No. 1 to tape deck No. 2 while listening to AM, FM or any other input source.

Beveridge Control Module

If your preamp doesn't provide tonal compensation features, this Beveridge CM-1 Control Module will do the job, according to the manufacturer. You'll achieve concise control over program material without sacrificing the transparency and definition that probably led to the purchase of your "straight through" preamp. A reverse switch flops right and left channels for checking channel balance and for troubleshooting. A bypass moves the signal directly from the preamp into the poweramp,



Circle No. 131 On Reader Service Card

bypassing the CM-1. A tape switch allows insertion of the BCM into a tape-monitor, without losing the monitor feature for a tape deck or other out-board device. There's a stereo spread switch system that permits tailoring the stereo image from 'stereo (normal) to mono, with two in-between settings. On recordings with too much discrete right and left channel information, settings -1, or -2 would lead to more natural imaging. A spectrum control has gain that pivots around a 1 kHz point when set at "soft" or "bright." And finally, a bass environment control permits the gain of 40 Hz to be increased or decreased by 4 dB. Specifications: total harmonic distortion, 0.002%; intermodulation distortion, 0.002%; input

impedance, 240K; frequency response, 10 to 30,000 Hz \pm .25 dB. Price: \$300.00.

Inexpensive Sub-Woofer

An inexpensive new sub-woofer, called the Goliath 11, is available from Miller & Kreisel Sound Corp. When this sub-woofer is combined with the small "super speakers" made by many other well-known companies, the result is a "big stage, big system sound that is totally unexpected and previously ob-

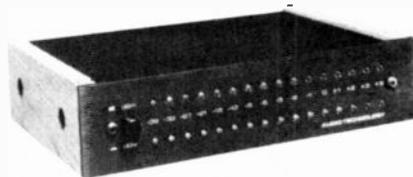


Circle No. 140 On Reader Service Card

tained only with very large and expensive speaker systems of the audiophile class." The Goliath 11 is complete with built-in bass matrixing network, and selectable crossover frequencies of 50, 75, 100, 125, or 150 Hz. Power requirement is 35 watts per channel or more. The company says the suggested retail price of \$175 is far lower than the \$315 to \$600 formerly charged for sub-woofers.

Peak Reading LED Display

Audio Technology's Model 510 two-channel, peak reading LED display has a 45 dB dynamic range with 1 dB resolution about the 0 dB point and a display rise time of 50 μ s. There are 16 LEDs per channel, calibrated from -39 dB to +6 dB. These are used to display the peak value of complex audio waveforms to an accuracy of \pm 0.25 dB. In the power mode, the unit will accurately measure peak power amplifier output from 0.00085 watts to 1600 watts, depending on the amplifier load impedance and selector switch posi-



Circle No. 139 On Reader Service Card

tions. Rear panel switches are provided for setting the 0 dB reference to 25, 50 or 100 watts and to select the speaker impedances of 4, 8 or 16 ohms.

Audio enthusiasts as well as engineers will find the 510 invaluable for recording purposes when compared to present day VU meters because the LED display can track complex signals more accurately and over a greater dynamic range. Each line level input is independently and continuously variable over a range of 50 mV to 5 V for a 0 dB indication. A calibration feature is included to balance channels and return the instrument to a 0 dB reference. List price: \$119.95.

Ebony Receiver

Optonica High Fidelity Products says this ebony-finish SA-5205 receiver offers 45 watts per channel output, minimum RMS at 8 ohms, from 20 to 20,000 kHz with no more than 0.19% total harmonic distortion. Other specifications: 10.8 dBf (1.9 μ V) nominal FM sensi-



Circle No. 120 On Reader Service Card

tivity; 1.2 dB capture ratio; 40 dB (1 kHz) stereo separation. Features include: direct coupled OCL circuitry, phase-locked loop circuitry, two-color LED protection circuit, 41-position detent volume control, FM air check. The receiver is also available in brushed aluminum if the ebony doesn't turn you on. Suggested retail price is \$330.

Super-Woofer Speaker System

The new Sansui SP-X9000 speaker system is "built on the rock-solid bass foundation of a 16-inch woofer," according to the company. The massive woofer features a powerful, large-diameter ferrite magnet and high-temperature heat-dissipating voice coil structure. An 8-inch midrange driver has an aluminum film-coated center cap



Circle No. 89 On Reader Service Card

for crisp response. Dual 6-by-2-inch horn tweeters and dual 1 $\frac{3}{4}$ -inch horn super-tweeters with super-thin mylar

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ALL ABOUT SPEAKERS

- What Specs Can and Can't Tell You About Speakers
- How To Listen Critically
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WHO NEEDS SEPARATES?

- A look at today's super receivers

hi-fi/stereo
BUYERS' GUIDE
JULY/AUGUST 1978

ON YOUR NEWSSTAND:
June 29, 1978

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(Continued from page 75)

film diaphragms provide an extended and clear high end that is well above the range of audibility. The multiple drivers in this four-way system push response to beyond 23,000 Hz. Crossover frequencies are 1,000 Hz, 6,000 Hz, and 10,000 Hz. A three-step level control balances the output to match different room acoustics. An extremely high sensitivity of 100 dB/W/m is combined with a 220-watt maximum input power handling capacity at 8 ohms. Thus the speaker can be used with large or small amplifiers. Approximate advertised value is \$350.

"Economy" Video Cassette System

For potential video cassette users who have "overriding budget considerations," Akai offers an "Economy" system which includes an optical viewfinder that clips onto the system's black-and-white camera and a 16m C-mount lens. The Economy system, like three higher-priced systems, utilizes Akai's VT-300 video cassette which includes



Circle No. 62 On Reader Service Card

such features as pause, audio dubbing, and optional still frame. The VT-300 is a 14.5 lb. unit that records for 30 minutes on 1/2-inch tape cassettes. The suggested retail value of the complete Economy record and playback system is \$1595. Prices of other systems range up to \$1995.

AR9 4-Way Speaker System

Teledyne Acoustic Research claims to have achieved important speaker design refinements with this AR9, four-way, floor-standing system. The unit features two 12-inch acoustic suspension woofers, one 8-inch acoustic suspension low midrange driver; one 1 1/2-inch dome upper midrange driver, and one 3/4-inch dome tweeter. Crossover frequencies are 200, 1200 and 7000 Hz. There are three 3-position switches for lower midrange, upper midrange and high range level control. The speakers may be used with amplifiers capable of delivering up to 400 watts continuous power per channel that are being driven to clipping 10% of the time on normal music source material. The crossover networks are said to be the most expensive and sophisticated ever used in



Circle No. 60 On Reader Service Card

an AR speaker system. Two design features that help preserve stereo imagery: acoustic blankets surrounding the tweeter and the high and low midrange drivers; vertical arrangement of the three high-range drivers. The power-handling capacity of the 'upper-midrange driver (1200 to 7000 Hz) has been improved through use of a special formula high temperature magnetic fluid that acts as a heat transfer agent. Each unit is just under 53 inches high. Price: \$650 each.

Kenwood KX-830 Cassette Deck

Outstanding features of this KX-830 front-loading cassette tape deck, says Kenwood, include a highly stable tape transport system, exceptional frequency response, and an impressive signal-to-noise ratio. A massive 150-gram flywheel driven by a high-power, high-torque, electronically-controlled DC motor with a rotational torque of 100 gram-centimeters handles sudden load increases sometimes caused by tape cassette housings. Wow and flutter of the drive mechanism is put at a "mere" 0.06% WRMS. The capstan, which is machined to a roundness tolerance of 0.01%, is reinforced by a triangular capstan assembly that maintains sta-



Circle No. 74 On Reader Service Card

bility and provides additional protection from shocks or bumps. Signal-to-noise ratio is 64 dB (chrome tape with Dolby on), and frequency response is 25 to 15,000 Hz, or up to 17,000 Hz with chrome tape. An ultra-hard Permalloy record/playback head minimizes high frequency drop-out. Controls include: a three-position equalization switch; three-position bias switch; LED peak indicator; expanded scale

VU meters; memory rewind; line-input and microphone/DIN input selector positions; front-loading feature. Nationally advertised value: \$300.

Popular-Priced 2-Way Speaker System

Technics model SB-4500 linear-phase, 2-way speaker system features a 10-inch woofer and 2 $\frac{3}{8}$ -inch cone tweeter, and a crossover network that is claimed to be so smooth that the speaker sounds more like a single wide-range driver than a two-driver unit. The woofer has a corrugated cone made from pulp that combines lightness with strength. Woofer response is said to extend from deep bass up to 4 kHz. The wide-range cone tweeter is made of a synthetic resin that prevents air leakage around the

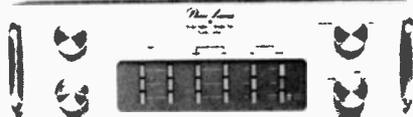


Circle No. 98 On Reader Service Card

tweeter and supports it with high compliance. The compliant material provides acoustic isolation from the cabinet to reduce distortion. The voice coil is of copper-clad aluminum wire for exceptional conductivity, and heat dispersion. Tweeter response extends up to 28 kHz, with resonant frequency at a low 350 Hz. The acoustical centers of the speaker units are precisely aligned, but kept acoustically isolated. The SB-4500 handles peak power up to 75 watts, yet the 92.5 db/W/m efficiency assures ample volume even with low power input. Solid bass is achieved by means of a vented cabinet. Price: \$149.95.

Phase Linear Delay System

A new 60C0 Analogue Delay System that "recreates the sonic and spatial characteristics of various listening environments" is offered by Phase Linear. The system is said to restore the "acoustical signatures" of room size and space that are lost in the recording process and "opens up a world of depth and

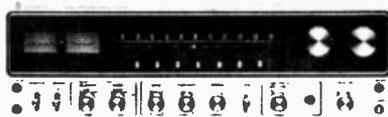


Circle No. 105 On Reader Service Card

spaciousness that was once unique to a live performance." Delay specifications include initial delays of 15 ms and 60 ms, adjustable by lock control to 20 ms and 90 ms. Five discrete delay paths are available. Reverberation delay time is adjustable from 200 ms to 4 seconds. Suggested retail price: \$599.95.

Sherwood "Notarized" Receiver

Sherwood's new S-110CP receiver delivers 100 watts per channel RMS, and distortion is less than 0.08% at rated output. You can believe these specs, says Sherwood, because the receiver is part of the firm's CP (Certified Performance) line and therefore is lab-tested to ensure that performance matches or exceeds advertised specifications. You get a notarized document stating that the tests have been made, and performance is up to par. A "revolutionary" Digital Detector is said to provide superior linearity and low distortion while eliminating the need for coils and tuned circuits that would require periodic adjustment. Other features include: two-way tape dubbing; signal-strength and center-channel tun-

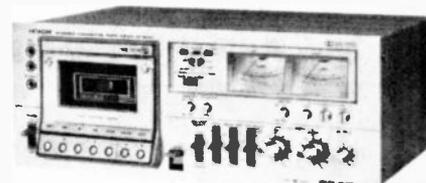


Circle No. 92 On Reader Service Card

ing meters; two phone inputs; five-position mode selector switch; main-in pre-out jacks. Notable specs include: IHF FM sensitivity, 9.84 dBf (1.7 uV); 1.0 dB capture ratio; 80 dB alternate channel selectivity; 95 dB FM image rejection; 100 dB IF rejection; 65 dB AM rejection; stereo separation of FM better than 45 dB at 1,000 Hz; FM tuner stereo sensitivity of 33.2 dB (25 uV) for 50 dB S/N; 94 dB (IHF "A" weighted) phono signal-to-noise ratio for the preamp. Price: \$750.00.

3-Head, Front-Loading Cassette Deck

Hitachi's model D-900, three-head front-loading cassette deck with Dolby incorporates the company's R&P three-head system which puts separate record and playback heads into a single housing to eliminate azimuth and adjustment problems. The D-900 features full logic controls, dual capstan, double Dolby circuit for record and playback,



Circle No. 72 On Reader Service Card

Dolby calibration control, and separate bias and equalization switches. Wow and flutter is said to be only 0.05% with frequency response for chrome tape from 30 to 18,000 kHz \pm 3 dB. The signal-to-noise ratio is 63 dB with Dolby on and 55 dB with Dolby off. Distortion is less than 2% (1 kHz, 0 dB), and cross talk between channels is 35 dB and between tracks 60 dB. The unit is powered by a DC servo motor. Price: \$495.



SPOTLIGHT ON: KENWOOD

reading with the REC indicator off, and then adjusts the bias control(s) for the same meter reading when the REC lamp is on; the bias is now calibrated to the tape in such a manner that the 400 Hz output level is the same as for 10,000 Hz. This whole procedure takes less than five seconds per track, a total of less than ten seconds to individually calibrate the left and right channels for any brand or type of tape.

The adjustment range of the bias controls is rather large and accommo-

dates every tape in our test selection, right down to the three-for-a-dollar cassettes we purchased several years ago. Almost every type and brand of what we consider "high fidelity" tape could be adjusted for an almost perfect response from 40 to 10,000 Hz, with the response above 10,000 Hz being determined by age, brand, and type of tape. A response to 14,000 or 15,000 Hz with modern, currently available tape is typical.

The bias adjust controls are detented

at a compromise "universal" bias level for the newest types of ferric, ferrichrome, and chrome tapes. But since it takes less time to individually calibrate the bias than to think about it, there's really no reason to use the detent bias value unless it happens to exactly match the brand or type of tape you generally use. If you always use the same type of tape you need calibrate only once

Figures #1 through #3 illustrate how the variable bias can be used to

(Continued from page 56)

fine-tune the frequency response of several representative high-fidelity tapes. In each photograph, taken off a spectrum analyzer oscilloscope, the horizontal sweep is 20 to 20,000 Hz. Each major vertical division represents 5 dB; each minor vertical division is 1 dB. The upper trace is the frequency response at -20 dB record level with the bias control(s) in the *detent* or "normal" position. The bottom trace is the response when the bias has been optimized using Kenwood's bias calibration system. Note that in all three examples the top trace—representing "normal"—has the rising high frequency response normally associated with high energy tapes on high performance machines. In the bottom traces the high end rise is "tamed" because we have now adjusted for equal output at 400 and 10,000 Hz, producing a substantially flatter response in the upper midrange, a frequency band to which the ear is particularly sensitive. While this re-

sults in the frequencies between about 12,000 to 15,000 Hz being attenuated within 3 dB of midband reference, the smoother upper midband is far more important than the slightly attenuated upper highs. (Much of what the average tape fan records on cassette has little information above 10,000 to 12,000 Hz anyway.)

Figure #4 illustrates the effect of variable bias on an older chromium dioxide tape formulation, which by current standards cannot be called high performance quality. The Kenwood KX-1030 does an admirable salvage job. The bottom trace is the frequency response using "normal" (detent) chrome bias; the sound quality can be charitably described as *muddy*. The top trace is the frequency response with the bias having been user-adjusted through the Kenwood's calibration system. Look carefully, and don't be confused by the swayback appearance of the response. The response is actually within

±2.5 dB limits from about 40 to 15,000 Hz. It will sound somewhat "hissy" because of the upper midband/low high end rise, but it will be comparable to the sound attained from many hi-fi cassette recorders. (With some experimental juggling of the bias, like setting the 10,000 Hz output 1.5 to 2 dB down we could get an even smoother overall sound, but that's a bonus over and above the outstanding results you can attain calibrating bias level in the usual manner.)

Summing Up. The Kenwood KX-1030 Stereo Cassette Deck is a magnificent performer. While you can get additional details from the test report elsewhere in this issue, we have conclusively illustrated that it is possible to obtain the best in high performance adjustments and convenience at a relatively moderate cost.

For additional information on the Kenwood KX-1030 circle No. 74 on the Reader Service Card. ▲

BUILDING YOUR OWN SPEAKERS

(Continued from page 43)

sive. Complete kits are available in either walnut or "utility" (vinyl-clad) finish and are also to be had, fully assembled, in walnut enclosures. Drivers, crossovers and many accessories are available separately, and, if you desire, you can buy just the baffle board. Their two smallest models, the S.1 and S1 are available in either 4- or 8-ohm versions. The former was designed for auto use. Each is a small, two-way, acoustic-suspension system at about the same price—\$69 for the walnut kit, \$54 for the utility finish. The Speakerlab 2 is a 4-ohm, sealed, 2-way with mylar dome tweeter (\$98 in walnut, \$84 in vinyl). The Speakerlab 2.5 and 3 are three-way sealed systems, the main difference being in the woofer. The 2.5 (\$129/\$109) uses a 10-inch woofer and has a 4-ohm impedance; the 3 (\$165/\$145) uses a 12-inch woofer and has an 8-ohm impedance.

All of the above use direct-radiating drivers, i.e. cone or dome types. The Speakerlab 4 (\$195/\$165) uses a horn tweeter and cone midrange and woofer, while the 6 (\$221/\$191) uses horns for both the midrange and tweeter. The Speakerlab 7 (\$287/\$243) uses 2 woofers, a 10-inch and a 12-inch, that, combined, have the radiating area of a 16-inch. Horn midrange and tweeter complete this 4-driver, 3-way system. The Super 7 (\$351/\$307) is similar to the 7 but with better horns. Finally, there is the Speakerlab K (\$407), a fully horn-loaded 3-way system designed for corner placement.

How many times have you read that should listen to a speaker before

you buy? If that's true, should you buy by mail? Will you get a pig-in-the-poke? Well, we haven't heard all these speakers so we can't be sure. But consider the following.

There are a number of *Heath* factory stores around the country. You can audition *Heathkits* there. With the driver manufacturers, you have to rely upon the reputation of the company. *E-V* and *JBL* certainly have enviable ones in this country, and you may very well find that they themselves make assembled speaker systems that use the same driver array and cabinet volume as the one you're considering. So you may be able to audition the "final" product before you start

Acusta Craft offers a limited 5-year warranty on all their components and a kit assembly and satisfaction guarantee. If you try to assemble the kit and you can't, they will complete it for you without charge. You must pay the shipping costs however, have followed the instructions, and at least have oiled the cabinet. And if you're not satisfied with the sound within 30 days, they'll refund your money—assuming the kit's been assembled properly, is undamaged, and is shipped back to them prepaid.

SpeakerKit also has a limited 5-year warranty on their components and will give you a refund if you don't like the sound. Their conditions are similar to *Acusta Crafts*. You must have correctly assembled the speaker, using their enclosure, and return it, undamaged, within 30 days. *Speakerlab* also works on the "satisfaction guaranteed or your

money back" basis. They give you 60 days to decide. Again a limited 5-year warranty is given on components for home use.

So, in the main, your risk is limited to shipping costs and elbow grease. And, you have a chance to listen to the speaker in your home—a much better idea than store auditioning. ▲

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Heath Company
Benton Harbor, Michigan 49022

Isophon
Walter Odemer Co., Inc.
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Burbank, California 91506

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Speaker Craft of Oregon
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SpeakerKit
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Speakerlab
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Seattle, Washington 98105

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201. There are over 400 kits described in the new *Heathkit* catalog for virtually every do-it-yourself interest—amateur radio, hi-fi components, color TV, test instruments, digital clocks and weather instruments, radio control equipment, marine, aircraft and auto accessories, and many more.

202. *Electro-Voice* will send complete information on Thiele-Small parameter speakers and systems which combine flat, wide response, high efficiency, and small size (to half size of sealed systems) including Interface and Sentry systems. There's also information on new separate component speakers.

203. *Crown* offers a new four-color brochure illustrating and describing the company's complete line of hi-fi amplifiers, preamplifiers, speaker systems, control centers and tape recorders.

204. *Sony's* "High Fidelity Components" has a glossary defining major specification, control and convenience feature terminology, which complements the reference chart of specifications for components.

205. The new 20-page, full-color stereo-phone catalog from *Koss* features lively photography and art to show 15 of the company's dynamic and electrostatic stereophones and listening accessories. There is a specification comparison chart and prices.

206. *Kenwood's* wide range of receivers, amplifiers, tuners, tape decks, stereo compacts, and speakers is described in a new brochure.

207. The full range of *Magnavox* audio products from the tuner/amplifiers to combination stereo FM/AM radio phonographs and 8-track tape player/recorders are featured in this new 60-page four-color audio catalog.

209. *JBL's* brochure describes the Decade "family" of loudspeakers: the L26, the L16 and the L36. Each system features styling, hand-craftsmanship, and sound quality, yet is priced for the budget-minded. Their enclosures are finished in natural oak.

210. *Klipsch* loudspeaker systems are attractively presented, including explanation of the Klipschorn corner horn and corner mirror effect. Available for a few dollars are reprints covering design, stereo re-creation, etc.

211. "Hearing Is Believing," a booklet from *ESS, Inc.*, has a serious theme and a constructive purpose. Fundamentals of loud-speaking technology are examined. How to develop a superior loudspeaker is spelled out.

213. *Pickering* has attractive specification sheets on stereo headphones. Also offered is a colorful brochure on cartridges in the UV-15, XV-15 series, as well as the V-15 Micro IV series.

216. For tips from leading sound engineers, send for "The Music-Maker's Manual of Microphone Mastery" from *Shure*. It describes how to match voices and instruments.

220. This full-color booklet by *Dynaco* is subtitled "High Fidelity Components for the Audio Perfectionist." There are two intro-

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

221. A new series of product literature is now available from *Jensen Sound Laboratories*. The new catalogs feature four-color photographs and graphic illustrations of the high fidelity line.

222. *TDK* has a new booklet, "SA... a new state of the cassette art," in which they claim great things: much lower noise levels, greatest dynamic range, unexcelled frequency response, high precision, among others. So send for the booklet to see if you agree.

223. *Technics-Panasonic* has a complete condensed catalog of its line of stereo and 4-channel receivers, separate amplifiers, turntables, tape decks, speakers, separate tuners, microphones, headphones, integrated amplifiers, and CD-4 4-channel demodulators.

224. Before you purchase your hi-fi equipment, read "The *Garrard* Guide," what every hi-fi shopper should know about *Garrard* automatic turntables. There are 11 pages of information and pictures.

225. As part of a broad educational campaign, *Sansui* is making available a booklet, "A Non-Technical Guide to QS 4-Channel Sound," for the consumer. It describes the various forms of 4-channel, their advantages, disadvantages and availability of material.

227. *Tandberg* has an attractive color booklet displaying its tape decks, cassette deck, receivers, speakers and accessories.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

248. *NCI Premium Distributors* has a completely illustrated 165-page wholesale price catalog for \$4. Send for information on how to get this display of all major brand radios, televisions, stereos and appliances.

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lowered, usually as Rodolfo in "La Boheme"—which he considers his good luck role—and he suddenly became one of the few artists in the classical world whose every record is a best seller. He has the public to such a degree that even less than good recordings can not only rise to the top of the charts but can stay there for a long time.

Everything since that first *L'Amico Fritz* has been for London; like Miss Sutherland, he is an exclusive artist for London, and they make sure that he stays that way. In the repertory for lyric tenor his many recordings are supreme. It is hard to find a better Edgardo in *Lucia di Lammermoor* (London 13103); he has the brilliance for the denunciation in Act II and the melting legato and cantilena for the tomb scene. In the bel canto repertory, however, his best recording is of Bellini's *I Puritani*. (London 13111).

Recorded in the period of his greatest overweight, the album should show some of the tightness on top that could be felt in the theater in that time. It does not. In this, his high D's are spectacular and he even makes the high F totally in the head in the manner of Rubini. It is not just the high notes ever with Pavarotti, however. He sings fluidly and easily, caressing the words and phrasing with some genius. Bellini demands that a singer have line, line and more line, and Pavarotti has it.

Two other roles for him that suit his repertory perfectly have never been among his favorites; the tenor solo in the Verdi Requiem and the Duke in *Rigoletto*. The former is well caught on disc (London 1275) with his voice

easy and the top notes flowing. On the recording, too, the "Hostias" has just the right degree of lightness and poetry. The Duke in "Rigoletto" has seldom been performed by him, and on records (London 13105) he is less than convincing. Perhaps his voice is too soft-grained for the Duke. It cut sufficiently, but it is not the sharp edged, bright performance that one would expect.

About two years ago Pavarotti made the decision to move away from the lighter bel canto area and into the heavier parts. The step was widely decried as being the beginning of the end of his voice. Such as not proved the case, though, he has sung Calaf in *Turandot*, Manrico in *Il Trovatore* and Cavaradossi in *Tosca*. Pavarotti has proved in his manner of singing particularly in the first two, that the focus of the voice is the important criterion. Though he may not have the traditionally heroic instrument for those roles, he projects his voice easily and no orchestra can hide it. Without forcing, he can clearly be heard, and his voice is more than brilliant enough to handle any challenge perfectly. The best recording of the heavier parts is *Turandot* (London 13108), which boasts Miss Sutherland's Princess and the Liu of Montserrat Caballe. His voice rings out in the riddles, with the two high C's in the act particularly notable. Best by far is his rendition of the third act aria, "Nessun dorma," a classic case of bel canto singing in Puccini. His Manrico is also excellent, but the *Trovatore* recording (London 13124) leaves a lot to be desired. Bonyne conducts this

one very heavily; Miss Sutherland sounds uninvolved, and it is left to Pavarotti and Marilyn Horne (Azucena) to carry the day. This they do but it is not enough for a whole *Trovatore*.

Other Verdi operas, such as *Luisa Miller* (London 13114) and *Un Ballo in Maschera* (London 1308), have him in superb form, but his favorite role Rodolfo is not too happily caught on records. He sings it marvelously—the line, the approach, the treatment of the words is wonderful—but the recording (London 1299) is fatally handicapped by Herbert von Karajan's molasses-slow tempos. It may be very beautiful but it has nothing to do with the passion, youth and excitement of Puccini's Bohemians. The great pity of the recording is how well it is sold; to many it incorrectly symbolizes the sound of *La Boheme*. In the case of Pavarotti and the Mimi, Mirella Freni, the thought is accurate, but the music is produced in such a symphonic fashion with so many elongated ritards and general slowness that it distorts the opera ridiculously.

Pavarotti's latest release, appearing too late to be reviewed here, is of Donizetti's *La Favorita* (London 13113), the opera which he sings this year at the Met. No doubt whatever else, his two arias, "Una virgine" and "Spirto gentil," will stand out.

The tenor has had enormous success with aria recital discs: one of Donizetti arias, another called "King of the High C's" have all sold well. Last year a Christmas record called "O Holy Night" was another huge success. ▲

JAZZ: BENNY CARTER

(Continued from page 10)

Cannonball Adderley, a Parker disciple on fast tempos, chose Carter as a model on ballads, preferring his pear notes and his clipped, dispassionate configurations, spilling from the upper register down to the bottom, sometimes with an abrupt angularity. Like his most formidable colleagues in the '30s, Carter's style has always seemed modern. This is no less evident in the standards, blues and swing numbers he plays today than in his "Funky Blues" solo, on a record with Hodges and Parker in 1952. Nor has he been unwilling to listen hard to younger players. Parker was ridiculed in his youth for not sounding like Carter, but as early as the mid-'40s Carter's own playing began to reflect Parker's innovations

ous. The time he manifests on alto is quite different from that typical of his arranging. When he writes for an ensemble, especially a reed section (his lithe, jaunty saxophone passages are among the most robust pleasures in composed jazz), he swings with a straightforward bravura. The reeds sway with an irresistible punch on pieces like "Sleep," "Honeysuckle Rose," and "Swingin' at Maida Vale." His alto improvisations, on the other hand, have a playful, sometimes recon-dite rhythmic quality. He will enjoy the rhythm with fluid on-the-beat-phrases, and then dispel it, allowing his melodies to hover beyond its pull, catching up at his own wiley discretion. On trumpet, he has yet a third rhythm—an easygoing, accessible can-

ter. On some tunes, he switches between alto and trumpet, offering notably different distillations of the tune.

Carter's return to full activity has been sponsored by Norman Granz's Pablo label. He is reportedly working on two orchestra recordings, one for his own ensemble and one for Count Basie's band; there have already been three albums focusing on his improvisational talents. *The King* is especially valuable as a compendium of eight Carter originals, well played by a carefully chosen sextet, including Milt Jackson and Tommy Flanagan. But Carter's playing is tenuous. He is more intriguing as a soloist on *Carter, Gillespie, Inc.*, which wags a historical tale. Carter was internationally acclaimed when he first encountered a green, Roy Eldridge-influ-

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enced Gillespie at a 1939 Lionel Hampton session. Gillespie was assigned the first chorus on "Hot Mallets," except for the bridge, which was played by Carter. The trumpeter was fiery and a bit frantic, though articulate; while Carter's eight bars were so perfectly shaped, poised, and played that they seemed less a release than the very point of the chorus. On their fine 1976 reunion, Gillespie's light shines brightest, while Carter's considerable inventions are somewhat deferential.

Carter's full recovery of former glories is finally evident in two albums recorded at the 1977 Montreux Jazz Festival, his own *Benny Carter 4*, and *Count Basie Jam*, where he is heard in a lovely rendition of "These Foolish Things." On his extraordinary quartet album, Carter proves he is back with a vengeance, demonstrating equal imagination and equanimity in up tempo versions of "Three Little Words" and "Undecided," and ballads like "Body and Soul" and "Here's That Rainy Day." Throughout there is a sense of unflappable relaxation and mastery, of

rectitude at the center of swing. It is one of the most stimulating saxophone recitals in years, and not to be missed.

Carter's earlier work as saxophonist and arranger can be heard on 1933 and *Swing, 1964* (both on Prestige). The big band he put together in London in 1936 can be heard on *The Early Benny Carter* (Everest), while his famous American orchestra of a decade later is given half of *Big Band Bounce* (Capitol). The "Funky Blues" session was reissued as *Norman Granz Jam Session* (Verve). In the early '60s, Carter organized two all-star ensembles to rerecord some of his classic arrangements, like "Honeysuckle Rose," as well as new material; the albums, *Further Definitions* and *Additions to Further Definitions* (both on Impulse), are stunning successes. Sadly, the classic big band sessions for Columbia in the '30s are out of print, and the sessions for Contemporary in the '50s are difficult to find. But such is the consistency of Benny Carter that just about any album boasting his music is worth hearing. ▲

SUMMER FORECAST 1978

(Continued from page 40)

response, and better dynamic range than other digital systems. Price is less than \$1000 including rear-channel speakers and a built-in 100 watt/channel amp to drive them.

Phase Linear has a \$599.95 "bucket-brigade" type of simulator with three selectable primary delays, three selectable secondary delays and selectable recirculation and reverb time. It's called the Model 6000. SAE's Model 4100 is also a bucket-brigade type with built-in comparadors, an 80 dB S/N, and three simultaneous delays. Price is \$500.

SAE also has a new headphone—the Model 7000 (\$50)—a semi-open-air isolation type with high-velocity, mylar-film dome driver. It's high sensitivity and relatively high impedance (200

ohms) makes it compatible with many preamps.

Audio-Technica has five new headsets—two electrets and three dynamics. The ATH-6 and ATH-7 electrets go for \$99.95 and \$149.95 respectively, while the ATH-1, ATH-3, and ATH-5 dynamics range from \$29.95 to \$79.95. *Audio-Technica* also introduced two new miniature electret microphones, the AT803S (\$80) and the AT805S (\$50).

Wrapping It All Up. Our pencil is down to the nub. Suffice it to say, you'll also be seeing new home video equipment, lots of new racks, and auto speakers and amplifiers galore, not to mention gizmos to clean records, tape recorders and the like.

Happy hunting! ▲

CAR STEREO 1978

(Continued from page 48)

of business because of a "shakeout" in the CB industry. Buying such units poses the question, who will provide service if they break down?

A detailed discussion of speakers for car sound is beyond the scope of this article. Suffice it to say that this summer will bring many new speakers, as well as the return of many models which were previously available. Notable are the two-way types patterned after home speaker systems from ADS, Jandy, Mesa, Mitsubishi, Pioneer Electronics, Royal Sound, Tamon, Ultra-

linear, and Visonik plus three-way types from Fujitsu, Jandy, Metro Sound, and Setton.

Also notable are five custom rear deck speaker mounting enclosures from Clarion. Four are meant to accommodate seven popular foreign car models in the BMW, Datsun and Porsche lines. One is a universal type that fits most sports or compact cars. The enclosures range from \$170 to \$270 and hold as many as six speaker drivers—to accommodate virtually any mo-fi installation. ▲

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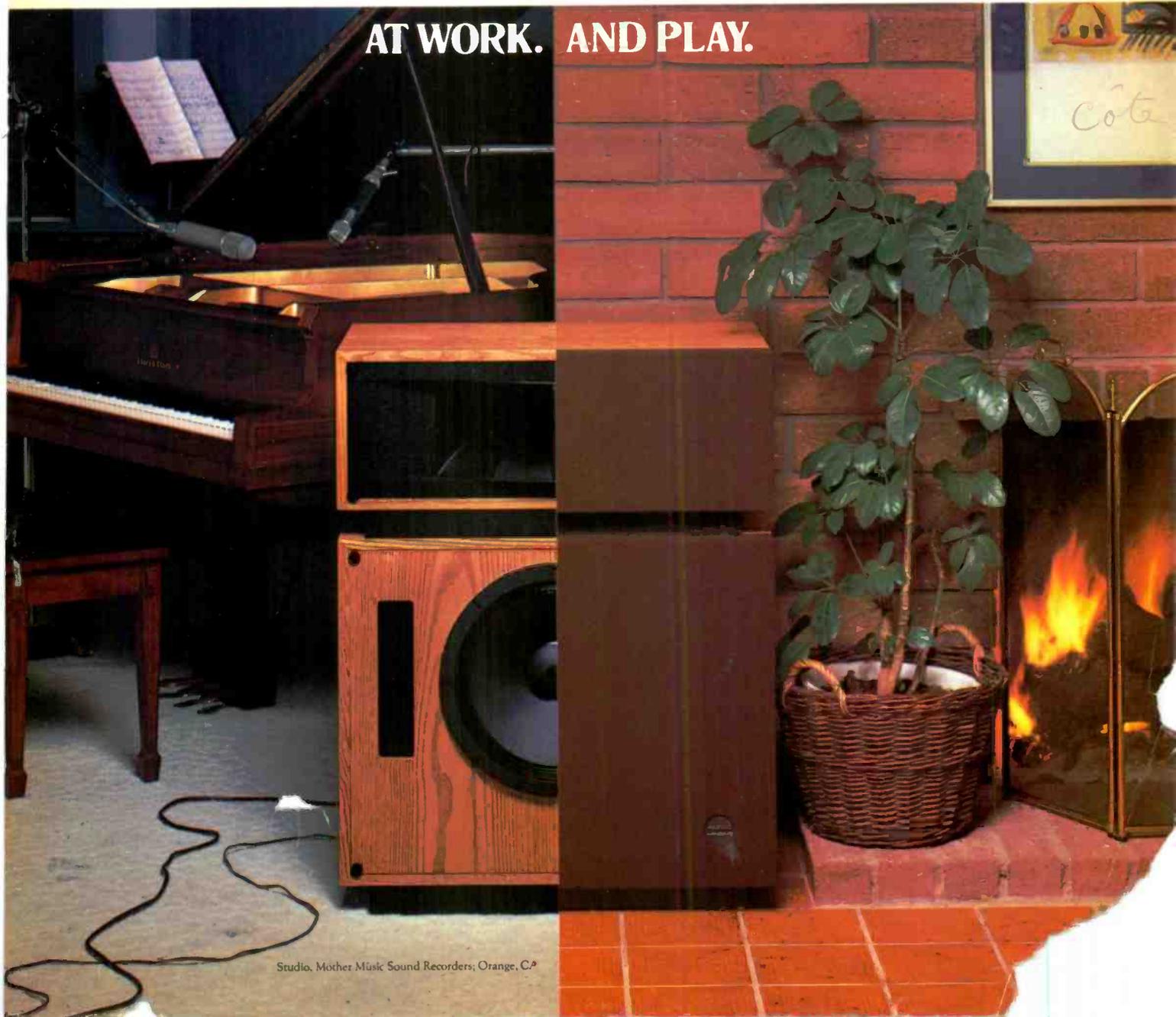
So listen to our speakers and hear how our work for professionals comes into play. For the name of your local dealer and a full line catalog, just write us: Altec Lansing of Canada, Ltd., 151 Carlingview Dr., No. 5, Rexdale, Ont. M9W5E7.



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