Stereo Review.

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SPECIAL AMPLIFIER ISSUE

HOW MUCH POWER

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AMPLIFIER SPECIALS

POWER—HOW MUCH DO YOU NEED? 42 The answer depends on your taste in music and how loud you play it, your listening room, and your speakers / by E. Brad Meyer

THE MARK LEVINSON ML-3

Julian Hirsch discovers "gold-plated" sound in a special lab test on a high-end power amplifier



POWER AMPLIFIERS FROM A TO AB All you need to know about amplifiers low distortion, Class A, Class AB, feedforward, feedback, and more / by Ralph Hodges

THE EQUIPMENT

CAR STEREO The first road test of AM stereo: Chris Greenleaf puts the Sansui CX-990 through

EQUIPMENT TEST REPORTS Hirsch-Houck Labs test the Dual CS 515

turntable, the Pioneer CT-A9 cassette deck, the Ohm Walsh 4 speaker system, and the Yamaha CD-X1 Compact Disc player

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MAKING CONNECTIONS Proper hook-up is vital to getting the best from your system / by Dawn Gordon

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How much power can your speakers handle? Can they stand up to the peaks put out by Compact Discs? / by Julian Hirsch

SYSTEMS

Audio and video merge in a producer's dining room / by Gordon Sell

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BEST RECORDINGS OF THE MONTH This Is Spinal Tap, Laurie Anderson, Handel's Concerti Grossi, and Romantic violin concertos

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Stereo Review

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BULLETIN

by Christie Barter and Gordon Sell

FCC OKAYS STEREO TV

The FCC has authorized broadcasting of multichannel (stereo plus mono bilingual) television signals. While the decision is a freemarket one in that it doesn't specify one system, the technical parameters are so tightly specified as to preclude all but the Zenith/dbx system that was chosen by broadcasters and electronics manufacturers. Stereo/bilingual broadcasting is expected to begin by summer, and some stereo TV's and sound tuners are expected on the market soon after. ... Sony has announced June availability of a stereo TV decoder to plug into its stereo-ready TV's, which have been on the market for four years. Price: \$200.

PRICE CUTS

The Moss Music Group has dropped the price on all of its MMG and Vox Cum Laude albums, both digital and analog, LP and tape, to \$7.98... And Telarc has cut the price of its LP's to \$12.98. In the past Telarc's "high tech" digital recordings have sold for a suggested list price of \$17.98, mainly through audio outlets. The new price drop is a move on the company's part to increase their availability in record stores.

TECH NOTES

Threshold has reached an agreement with Nakamichi to design a series of Nakamichi power amplifiers using Threshold's ''Stasis'' technology.... Universal Studios and Walt Disney recently petitioned the Supreme Court for another hearing on the Betamax case. The Court said no.... Harman Kardon is giving away up to twelve Maxell metal cassettes to buyers of new HK decks.... Audio-Technica is now marketing its turntable isolators as devices to prevent CD player mistracking..... JVC will sponsor the Newport Jazz Festival to be held in Newport, R.I., this August. The company will also sponsor jazz festivals in France, England, and West Germany..... Sparkomatic is sponsoring a 100-city tour of the U.S., Canada, and Europe by the rock group Yes.... The West German government has approved a merger of Grundig with N.V. Philips of The Netherlands.

GOLD AND PLATINUM AWARDS

A computer at the office of the Recording Industry Association of America has been working overtime to compile a list of the best-selling records that received Gold or Platinum awards from the RIAA from 1958 through 1983. The peak year, according to the 271-page printout, was 1978, when 193 albums were certified Gold and 102



Platinum. With 49 awards, Elvis Presley remains the male vocalist with most certifications, and Barbra Streisand leads the females with 36. The top groups are the Beatles (46), the Rolling Stones (36), and the Bee Gees (27). Copies of the clipbound, paperback report are available for \$5 for postage and handling from Jennifer West, Gold and Platinum Awards, RIAA, 888 Seventh Avenue, New York, N.Y. 10106.

RCA DROPS VIDEODISC

RCA has decided to stop manufacturing and marketing its CED videodisc player. Sales never met the company's expectations, and RCA lost an estimated \$575 million on the product. The company said, however, that it will continue to supply parts and service on the players and will make discs for them for at least three more years.

The New York Times

ARTS AND LEISURE Sunday, March 18, 1984

SOUND

An Enduring Speaker Idea Takes a Cue From Concerts to get proper response by stretching the capabilities of the speaker materials. We think it's easier to compensate

n an industry which lives by compulsive innovation, something merely new is hardly news. What is more

remarkable in the fast-changing field of audio is the and over again. That's what makes a classic. Such classics, as noted in a recent column on the

Acoustic Research AR turntable and the Ohm/Walsh loudspeakers, have a way of popping up in updated ver-sions, adapted to changing technologies but basically true to their former and familiar selves. One old acquaintance to their former and familiar selves. One old acquaintance now reappearing in modernized guise is the Bose 901 loudspeaker, whose basic design dates back to 1568 and owes its remarkable lifespan to the seminal ideas of Dr. Amar Bose, a professor at the Massachusetts Institute of Tech-

nology. The kind of imagination basic to creative achieve-

ments-whether they be works of art or feats of engineering-usually requires a springboard-a distinctive point of departure. Dr. Bose began by throwing away most established notions about loudspeakers. Recognizing the fact that most of the sound heard at a live performand the fact that most of the sound near a a five performa-ance reaches the listener not directly from the sound source—the musicians' instruments—but by way of reflections from the walls and ceiling, Dr. Bose fashioned a loudspeaker to disperse the sound in a similar way. In consequence, the Bose 901 radiates most of its sound not toward the listener but toward the wall in back of the speaker and toward the sides of the room. Where the rearward and sideways sound hits the walls, it reflects as from a mirror. Surprisingly, this changes the apparent

This curious effect is more easily understood by analsize of the listening room.

ogy to light reflections. Suppose you look at yourself in a mirror from a distance of five feet. Your reflection then appears not in the plane of the mirror itself; rather, your image seems to be standing five feet behind the mirror. Likewise, the sound reflections produced by the Bose 901 seem to be coming not from the wall but from behind the wall. This gives rise to the impression of sitting in a larger space than the actual dimensions of the listening room. Such spatial enlargement contributes to the illusion of hearing music in the kind of acoustic ambiance for which most music was intended. To some degree, this is true of all multidirectional loudspeakers, but the Bose seems particularly effective in its ability to suggest an enlarged

The speaker is unusual in other ways. There are no environment. woofers and tweeters. The sound is generated by nine wonces and tweeters. The sound is generated by inte-identical four-inch speakers, each separately chambered within the overall enclosure. To produce full-range sound from this array, a special equalizer is connected to the amplifier as an external device, modifying the amplifier's output to tailor it to the requirements of the speaker. As a Bose engineer explains, "Most speaker designers try

electronically for the mechanical properties of the speak-

er's structural elements.'

The nine separate speakers in the single box are so ar-ranged that a group of four radiates sound rearward to one side, another group of four radiates rearward to the other side, and a single speaker faces forward. According to Dr. Bose, this configuration results in a sound field similar to that experienced at a live performance. While the reflected rearward sound creates the feeling of a generous sonic ambiance, the forward-facing speaker pinpoints the locations of the musicians on the imaginary stereo stage, thus contributing to what is called "stereo imaging." To be effective in this manner, the speakers must be positioned at least one foot distant from the unit must be positioned at least one foot distant from the wall at their rear. Attractive pedestals are available for this purpose, or the speakers may be hung from the ceiling, taking up no floorspace at all and being visually unobtrusive thanks to the uncommon compactness (21 x 12 x 13

The new version of the Bose 901—called the Series V sells for \$1,400 per pair and differs from its precursors inches).

by alterations intended to fortify the speaker against the rigors of digital challenges. The dynamic range has been extended to a staggering 106 decibels-more than enough to brave sonic onslaughts from laserdisks. Despite their masterly way with laserized fortissimi, these speakers nonetheless treat the subtler aspects of music with equal aplomb and do not lose their characteristic fullness and spaciousness of sound at moderate or low volume levels. And since the sound is broadly scattered, one may approach these speakers quite closely without ever feeling

sonically blasted.

Their high efficiency allows these speakers to produce room-filling volume levels from relatively mod-est amplifier wattage. This is also significant for the digital present and future, for it allows the amplifier or receiver to stay within its rated power capacity and avoid overload distortion even at the spectacular sonic peaks typical of many digital recordings. Yet the speakers themselves remain unfazed by even the most powerful signals and can handle as much as 1,000 watts of power-

In terms of musical veracity, the Bose 901 ranks with and that third zero is no misprint! the finest and is convincing with any type of music. From

solo piano to massive symphonic scores, everything a pleasing aura of roundedness. Part of this stems from the sound dispersion achieved by this unique design, which goes a long way toward the accomplishing the ulti-mately impossible task of making an orchestra believable

in the living room.

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With hi-fi manufacturer John Koss at Koss Corp. headquarters in Milwaukee

STYLE

H^{1-FI} pioneer Paul Klipsch is put-ting together a collection of historic sound-reproducing equipment to display in a museum that will be an adjunct to the Klipsch speaker plant in Hope, Arkansas. I've just donated my first cassette deck to the museum.

A Teac Model A-24, the deck is a sturdy little unit, and it's still in working order. I've had it so long I thought it must date back to the mid-Sixties, but the earliest mention of it I can find is in an ad in our December 1970 issue.

That ad boasts of an "outstanding" frequency response of 40 to 12,000 Hz. But you wouldn't have to check the unit's specs or performance to know that it is old-fashioned. Its appearance alone makes clear that in only fourteen years this deck has become an antique.

I've thought a good bit about changing fashions in audio equipment and how style affects sales. Without reaching any conclusions, I've wondered how much our opinion of a unit's performance is affected by its visual appearance.

There have been studies about the way a man's choice of a car reveals his image of himself. What do you reveal about yourself if you respond to the industrial design of some units from VSP or Carver? Or to the Scandinavian styling of the Bang and Olufsen line? Or to the Darth Vader black equipment from, say, Yamaha or Nakamichi?

I don't know, but when I recently hooked up a little B&W LM | loudspeaker, I realized that besides reacting favorably to its sound, I responded aesthetically to its contemporary high-tech look. It fits perfectly with my new plan to turn my apartment into a cross between a SoHo art gallery and the trendy Minneapolis offices of the Canton speaker company, where all the furniture is white and everything else is black or gray except the plants.

This struck me as an original plan until I learned that half my friends are trying to make their homes look

THE AD BOASTS OF AN ''OUTSTANDING'' FREQUENCY RESPONSE OF 40 TO 12,000 HZ.

like offices or factories with minimalist high-tech decor. We are, it seems, influenced by Young Urban Professionals. In "Music for Yuppies" on page 54 I've written about some aspects of the life-style of these powerful trendsetters.

In a new column, "The High End," on page 106, Ralph Hodges writes about people in the audio world who resist mainstream trends and pursue their own goals. Style of a different sort is probably important at the High End, and I hope Hodges will address that topic.

Fourteen years from now the B&W LM 1 may look quaint in a glass case in a museum. For the present, though, I am enjoying it for its style as well as its substance.

Stereo Review

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NEW PRODUCTS

THREE-HEAD TEAC CASSETTE DECKS

The V-900X (shown) is the top of Teac's new line of three-head cassette decks. Its two-motor transport has a direct-drive capstan and microprocessor control for smooth tape handling. Dolby B, Dolby C, and dbx noise reduction are included, and the deck has a decoder for playback of dbx-processed records. An Auto Calibration feature optimizes bias and equalization automatically for the particular tape in the deck, and the same settings can be stored for later use. Standard factory settings for each tape type can



also be selected. Convenience features include music search, memory play/repeat, auto fade, and facilities for remote control or timer activation.

Wow-and-flutter is rated at 0.028 per cent, frequency response as 30 to 21,000 Hz, and signal-to-noise ratio as 92 dB with dbx. Price: \$725.

The V-800X deck has many of the same features, including all three noisereduction systems, but lacks Auto Calibration. Price: \$599. The V-700, for \$475, does not include the dbx system. Teac, Dept. SR, 7733 Telegraph Road, Montebello, Calif. 90640.

Circle 120 on reader service card



TWO-WAY AR CAR SPEAKER

An infinite-baffle two-way car speaker, the AR2CS from Acoustic Research has a 4-inch woofer and a 34-inch liquidcooled dome tweeter. Frequency response is given as 65 to 32,000 Hz and nominal impedance as 4 ohms. The power requirements range from a minimum of 5 watts to a maximum of 100 watts on program peaks.

The rectangular frame of the AR2CS is made of black plastic with a black steel grille. It projects 1¹/₈ inch above the mounting surface and fits into a 4-inchdiameter hole. External width is 51⁵/₁₆ inches, length 8³/₁₆ inches. Weight is 3¹/₃ pounds. Price: \$199.98 per pair. Teledyne Acoustic Research, Dept. SR, 10 American Drive, Norwood, Mass. 02062. *Circle 121 on reader service card*



HARMÁN KARDON T-SERIES TURNTABLES

The three belt-drive, semi-automatic turntables in Harman Kardon's new T series have heavy particle-board bases to reduce vibration. Spring-isolated, foamdamped feet contribute to a fundamental suspension resonance as low as 4.5 Hz. All three models have low-mass straight tone arms with carbon-fiber headshells. Recommended tracking force is 0 to 3 grams. The nominal $33^{1/3-}$ and 45-rpm speeds can be adjusted up to ± 3 per cent for pitch correction.

An auto-lift feature on the two top models, the T-35 and T-45 (shown), optically senses the position of the tone arm at the end of play and raises it from the record. It must then be returned manually to its rest. The tone arm and headshell used on the T-35 and T-45 have a combined mass of 8 grams. Rated wow-andflutter for both models is 0.04 percent, rumble (D1N B-weighted) 68 dB. The T-45 has gold-tipped phono cables, a disc stabilizer, and a trim control to match the impedance of the cartridge to the system's electronics. Prices: T-35, \$235; T-45, \$295.

Wow-and-flutter for the T-25 is given as 0.05 per cent, rumble as 65 dB. Price: \$185. Harman Kardon, Inc., Dept. SR, 240 Crossways Drive West, Woodbury, N.Y. 11797.

Circle 122 on reader service card

SPEAKER OPTIONS IN BOSE CAR SYSTEM

The Bose 1201 Mobile Music System combines the Bose 1201 power amplifier with either a pair of $4\frac{1}{2}$ -inch doormounting speakers or two 6 x 9-inch reardeck speakers, which can be played at higher volume levels. A switch on the amplifier tailors the frequency response of the signal to complement either pair of speakers. The amplifier is rated at 25



watts per channel into 0.45 ohms from 40 to 17,000 Hz with less than 0.2 per cent total harmonic distortion. The input level is adjustable. A circuit in the feedback loop of the amplifier compresses the signal when the amp is overloaded. Without overloading there is no compression of the signal.

The 4¹/₂-inch speakers require 1³/₄ inches of mounting depth. The amplifier is 8¹/₈ inches wide, 1³/₄ inches high, and 5⁹/₁₆ inches deep. Prices: with 4¹/₂-inch speakers, \$299; with 6 x 9 speakers, \$349. Bose Corporation, Dept. SR, 100 The Mountain Road, Framingham, Mass. 01701.

Circle 123 on reader service card

VHS HI-FI SOUND IN JVC VIDEO DECK

The new HR-D725U video-cassette recorder from JVC records and plays VHS Hi-Fi audio as well as standard VHS soundtracks. The VHS Hi-Fi tracks are recorded and played back by special audio heads on the same rotating drum as the video heads. Interference between the video and audio signals is avoided by recording them at different levels on the tape ("depth multiplexing") and by the



different azimuth angles of the audio and video heads. The deck is compatible with all prerecorded VHS cassettes, including standard VHS stereo and Dolby B-encoded tapes. Both microphone and headphone jacks are provided.

Specifications include a signal-to-noise ratio of 46 dB with Dolby B and a frequency response of 70 to 10,000 Hz for the standard audio tracks. The VHS Hi-Fi tracks have a frequency response of 20 to 20,000 Hz and a dynamic range of 80 dB. Wow-and-flutter is 0.005 per cent. Recording time with a T-160 cassette is 8 hours in EP mode and 2 hours, 40 minutes in SP even with hi-fi sound. Video features include a fourteen-day/eightevent timer, a 'full-function remote control, and variable-speed playback from one fortieth to seven times normal speed.

The HR-D725U measures $17\frac{1}{6}$ inches wide, $4\frac{3}{16}$ inches high, and $14\frac{1}{516}$ inches deep. It weighs about 20³4 pounds. Price: \$1,400. JVC of America, Dept. SR, 41 Slater Drive, Elmwood Park, N.J. 07407. *Circle 124 on reader service card*

NEW PRODUCTS

LINEAR-TRACKING ADC TURNTABLE

At a budget price of \$99.95, including an ADC cartridge, the LT-32 linear-tracking turntable from ADC offers fully automatic, single-play operation for both 7inch 45-rpm and 12-inch 33^{1/3}-rpm records. All controls can be operated with the dust cover closed. The unit's platter and tone arm are belt driven by separate electronically governed d.c. motors.



Tone-arm position is electro-optically controlled to within 0.5 degree. Audio Dynamics Corp., Dept. SR, Route 303, Blauvelt, N.Y. 10913.

Circle 125 on reader service card

STORAGE BOX HOLDS TEN COMPACT DISCS

The Discbox is a black plastic cube that holds ten Compact Discs in their cases. Boxes can be stacked vertically or horizontally with the CD cases' spines showing for quick identification. The back of each box has holes for wall mounting, and the boxes interlock on all sides so that the storage system can expand as a CD collection grows. Price: \$6.98. International Book & Record Distributors, Dept. SR, 40-11 24th Street, Long Island City, N.Y. 11101. Circle 126 on reader service card





GRAPHITE FRAMES IN JBL CAR SPEAKERS

JBL's new ER/G car speakers are claimed to be the first to have graphite frames, said to increase strength and rust resistance. Moreover, graphite won't short out if touched by a bare wire and won't interfere with the speaker's magnetic field. The speakers' low-frequency drivers use flat-wire voice coils and symmetrical-field magnetic structures to reduce distortion. Three of the four models feature what JBL calls a Co-Motional configuration, with the crystal-wafer tweeter attached to the woofer cone. The fourth, the Model 4.5, is a dual-cone system. All driver cones are silicone impregnated. The slim-line units have removable grilles for mounting from below or behind the mounting surface, and all are rated for an impedance of 4 ohms.

The top-of-the-line Model 690 fits the standard 6 x 9-inch mounting hole. Its frequency response is given as 55 to 22,000 Hz and its power-handling capability as 80 watts. Price: \$160 per pair. The narrower Model 410 measures 4 x 10 inches and costs \$140 per pair. The Model 6.5 is round, $6\frac{1}{2}$ inches in diameter. Price: \$100 per pair. The round dual-cone Model 4.5 is $4\frac{1}{2}$ inches in diameter and costs \$70 per pair. JBL, Dept. SR, 8500 Balboa Boulevard, Northridge, Calif. 91329.

Circle 127 on reader service card

WALL-MOUNTING PIONEER SPEAKERS

Pioneer's Decor S-4PG (shown) and S-5PC speaker systems are thin enough— 2% inches deep—to hang on the wall like a picture. Each 18^{1/2}-inch-long and 12^{3/4}inch-long panel contains a 5^{1/2}-inch cone woofer and a 2^{1/2}-inch cone tweeter. Frequency response is given as 50 to 20,000 Hz and impedance as 6.3 ohms. Rated sensitivity is 90 dB sound-pressure level (SPL) with a 1-watt input measured at 1 meter. Power range is 20 to 60 watts. No crossover frequency is specified. The S-5PG (weight 9 pounds, 11 ounces) has a removable glass panel for mounting an LP jacket, photo, painting, or anything else flat. The side panel of the S-5PC (weight 7 pounds, 10 ounces) is made of cork so that it can be used as a bulletin board. Hanging straps with hooks are provided as well as stands for shelf or table placement. Price: \$180 per pair in either model. Pioneer Electronics, Dept. SR, 5000 Airport Plaza Drive, Long Beach, Calif. 90815. *Circle 128 on reader service card*

TRUNK-MOUNTED CAR SUBWOOFER

Speakerlab's "Bass Hose" Ducted Sub-Woofer (DSW) consists of a trunkmounted 10-inch polypropylene driver whose sound is channeled to a 3^{1/2}-inch opening in the car's rear deck through a flexible steel-reinforced 51/2-inch duct. The driver's dual voice coils sum both channels below 180 Hz. A single DSW unit is said to be sufficient for a car stereo system since very low bass is nondirectional. A power source delivering from 25 to 75 watts is recommended. The entire DSW assembly weighs 13 pounds. Crossovers, hardware, grilles, and installation instructions are included. Price: \$189. Speakerlab, Inc., Dept. SR, 735 North Northlake Way, Seattle, Wash, 98103. Circle 129 on reader service card

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Peter Aczel The Audio Critic Winter 1982-83

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BY CRAIG STARK

FQ AND NR

In columns where you've discussed Dolby noise reduction and tapedeck equalization you've mentioned that both involve boosting the high frequencies before the tape is recorded. But the first is supposed to reduce noise and the second is supposed to improve frequency response. Does wider frequency response mean less noise, or what?

ROGER PEMBROKE Los Angeles, Calif.

Actually, the wider the frequency response of a system, the more noise it includes, so your confusion is understandable. While both noise reduction and recording equalization use treble boost, they do so in different ways that are related to their different objectives.

In a noise-reduction system such as Dolby, treble boost during recording is matched by a complementary treble cut during playback. Further, the boost or cut is applied only to very low-level ("soft") signals. In contrast, the recording-equalization circuitry in a tape deck applies a treble boost to all the signals that pass through it regardless of their level. And the complementary playback cut is produced by losses incurred in the record/ playback process itself. These losses do indeed reduce noise, but they also reduce the musically important frequencies.

Looked at from another angle, once the record/playback response of the tape system is flattened out using recording equalization, a Dolby-encoded tape is sonically over-bright (has too much treble) for very low-level signal components. We can therefore afford to reduce noise

16 STEREO REVIEW JUNE 1984 by cutting the tape's low-level treble response back to normal, which is what Dolby decoding does during playback. If we didn't use sufficient record equalization, the tape would sound better without Dolby decoding.

DOLBY DUBBING

I am thoroughly confused by conflicting advice from hi-fi salesmen on the subject of dubbing tapes with Dolby encoding. I use two cassette decks (both have Dolby B) to make copies from LP's, FM broadcasts, other Dolby-encoded cassettes, and non-Dolby-encoded cassettes. When should I use the Dolby system on my copying deck if I am dubbing from these various sources?

> JOE GOTTESMAN Beverly Hills, Calif.

If you want your tape copies to be A Dolby B-encoded, always turn on the Dolby system of the copying (recording) deck. The tape copies will then require playback with Dolby-B decoding for correct tonal balance. That rule is enough for dubbing from discs or FM since only one deck is involved. When you are dubbing a Dolby-encoded cassette, turn the Dolby system on in both decks. This will result in decoding the playback signal and re-encoding it on the copying deck, which is the procedure recommended by Dolby Labs. For nonencoded cassettes, turn the Dolby system, if any, off in the playback deck and on in the copying (recording) deck.

If you want copies that are not Dolbyized-for instance, to play on a car system or personal portable that lacks Dolby circuits-you should follow the same formulas as above, except that this time leave the Dolby system in the copying deck off.

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BY CHRISTOPHER GREENLEAF

THE FIRST AM STEREO ROAD TEST

F OR years I've been hearing about and writing about the promise and problems of AM stereo broadcasting, so you can imagine how excited I was when Sansui offered me the chance to be the first audio journalist to test drive a car equipped with its AM stereo receiver. In spite of my excitement, I was not overly optimistic. I suspected that AM stereo would have typical 3-kHzbandwidth AM sound but with two channels—stereo, but hardly high fidelity. Was I wrong!

WHY AM STEREO?

AM stereo was born of the needs of the AM broadcast stations, which have been losing listeners to FM because music sounds a lot better on equipment and higher-quality receivers.

But AM stereo has not gotten off to a very good start. It was first proposed in the middle Seventies, and various manufacturers developed different schemes for transmitting it. At one point the FCC chose a system developed by Magnavox but later revoked the decision. In March 1982, the FCC announced a "free market" decision, which allows broadcasters to use any type of AM stereo system as long as it is compatible with and does not interfere with the standard mono AM signal. As a result, we now have four different systems-from Motorola, Magnavox, Harris, and Kahn-competing for dominance in the transmitting-equipment market. There are hundreds of radio stations all over the country using one or another of these systems, but very few radios are capable of receiving AM stereo.

Sansui's CX-990 (\$519) can decode all four types of AM stereo broadcasts automatically, so the user doesn't have to be concerned with which system is being used.



FM than on AM. If AM stations could get those music listeners back, they could earn more from advertising, and AM's greater range (typically 150 miles instead of 30 to 50 miles for FM) would mean even bigger markets. And AM doesn't suffer from multipath interference, at least during the daytime, which is a big plus for mobile listening. On the negative side, AM has a narrower bandwidth and more noise. Proponents of AM stereo say these problems can be largely overcome with the use of better broadcasting

And in addition to receiving AM in stereo or mono, the CX-990 has an FM stereo tuner and an autoreverse cassette player.

THE ROAD TEST

Our normal car stereo test route is geared for evaluation of FM and tape-player performance, so we went further to test AM stereo. The route extended from nearby Brooklyn to the hills and hollows of the Berkshire County townships in western Massachusetts. Our main test station was New York City's WNBC, broadcasting from a tall mast on City Island in the Bronx, right on Long Island Sound in a relatively clear area. At our greatest distance we were 125 miles from the transmitter. The route also included areas within a hundred yards of the transmitter, streets with line-ofsight reception, and urban locations completely cluttered with structural steel or reflective surfaces.

The Sansui CX-990 has just about the nicest AM section I've heard.

AM STEREO IS RECEIVABLE AT GREAT DISTANCES, AND THE SIGNAL HAS NONE OF THE RECEPTION QUIRKS OF FM BROADCASTS.

Most AM car radios (or the AM portions of tuner/tape players) have such a constricted tonal character that it is virtually impossible to hear any differences between individual broadcasters. The Sansui, in contrast, sounded open and spacious, showing that AM's limitations are not necessarily as great as we've been told. The inevitable prejudices that long-time FM aficionados bring to AM listening may be partly based on fact, but the qualitative gap separating a good AM broadcaster from a lousy one is surprisingly wide. This tuner made that gap audible. WNBC was easily among the best two or three stations on the AM dial, and it sounded substantially better than a large percentage of the FM stations I tried.

Since WNBC broadcasts in AM only, the only available choice for an A/B comparison of AM and FM stereo was classical station WQXR, which simulcasts from the Empire State Building. Both WNBC and WQXR-AM use the Kahn system of AM stereo encoding—at the time of our test no broadcasters in the New York area were using the Harris,

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Maxell introduces the new XL-S audio cassettes; a series of ferric oxide tapes which deliver a level of performance that can capture the sound nuances found on Compact Discs more faithfully than other ferric oxide cassettes on the market. There are a number of areas where this achieve-

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For technical specifications on the XL-S series, write to: Audiophile File, Maxell Corp. of America, 60 Oxford Drive, Moonachie, New Jersey 07074.

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For Dealer Nearest You Call TOLL-FREE 800-633-2252 Ext. 874 CIRCLE NO. 2 ON READER SERVICE CARD Motorola, or Magnavox systems. Unfortunately, WQXR's AM signal was so noisy and constricted in frequency range that comparisons with the FM broadcasts were virtually meaningless.

At least as broadcast using the Kahn system, AM stereo is receivable at great distances. Unlike FM stereo, an AM stereo signal can be decoded for stereo listening wherever the signal can be received at all. There is little difference in noise level between mono and stereo, and the signal has none of the reception quirks of FM broadcasts. The familiar narrow frequency response and higher overall noise level of AM are still evident, but a quality-conscious broadcaster can make them much less inhibiting for listening to music than you might expect. WNBC's

SANSUI'S CX-990 HAS ABOUT THE NICEST AM SECTION I'VE HEARD. UNLIKE MOST CAR AM RADIOS, IT SOUNDS OPEN AND SPACIOUS.

broadcasts had satisfying amounts of bass and treble, and the stereo imaging was rock solid.

Local and short-distance listening was invariably clean and unencumbered by interference except in tunnels or near sources of unshielded electrical discharges (such as welding crews doing road work). Distant and very distant listening was clear about 90 per cent of the time, and the slightly impaired remaining 10 per cent was still listenable. To appreciate this, remember that the typical maximum distance for clear reception of FM in mono is about 60 miles, compared with 125 miles or more for AM stereo. For listenable FM stereo, 20 to 30 miles is usually about the limit in a car.

Overall, the performance of the Sansui CX-990 with AM, FM, and tapes was smooth and always musical. We expect that its AM stereo decoder will work as well with any of the other formats as it did with the Kahn-system broadcasts we were able to audition. We look forward to repeating our road test of AM stereo when there are more broadcast sources to try out. \Box

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DUAL CS 515 TURNTABLE

HIRSCH-HOUCK LABORATORIES

A LTHOUGH it is the lowest-priced model in Dual's new turntable line, the semi-automatic CS 515 offers several of the same features as higher-priced units, and its performance meets true high-fidelity standards. The two-speed, beltdrive turntable has a new isolating suspension system together with the pioneering and much-imitated Dual/Ortofon Ultra Low Mass (ULM) tone-arm/cartridge system, which is said to enable the combined mass of the tone arm and cartridge to be less than half that of conventional designs.

The suspension system uses four independent shock absorbers to isolate the tone arm, platter, and drive system from the turntable's base. According to Dual, the damping factors of the shock absorbers were selected with the help of a computer in order to optimize protection under all the operating conditions likely to be encountered in home use. The arm and platter are mounted as a unit on a separate plate that is elastically isolated from the silvergray, molded-plastic base on which the motor is mounted.

While the entire record player is not decoupled from the supporting surface, the CS 515's floating arm/ platter system provides some isolation from acoustic feedback and base-conducted vibration. When extraneous vibrations do reach the tone arm, especially from warped records, the ULM system enables

0.33 degree

grams

Effective mass of tone arm with Ortofon ULM65 cartridge: 11

the stylus to react faster and thus avoid mistracking or skipping.

The Dual CS 515 is available either with or without the Ortofon ULM65 cartridge, a lightweight (2.5-gram), elliptical-stylus model that tracks at 1.5 grams. The tone arm's



removable headshell can accept any cartridge with standard ^{1/2}-inch mounting centers. The turntable measures 17^{1/2} inches wide, 4^{1/2} inches high, and 14^{1/2} inches deep with the dust cover down. It weighs 10 pounds. Price: \$194.95 with cartridge, \$139.95 without. Dual turntables are distributed in the U.S. by Adcom, Dept. SR, 11 Elkins Road, East Brunswick, N.J. 08816.

MEASUREMENTS

Our test sample of the Dual CS 515 was furnished with an Ortofon

ULM65 phono cartridge, which we used for our tests. Although the cartridge's performance was not fully evaluated for this report, we made enough measurements to establish that it was firstrate. It was able to track all our high-level

HIRSCH-HOUCK LAB MEASUREMENTS Flutter: 0.08 per cent JIS-weighted rms; ±0.1 per cent DIN peak Rumble: -36 dB unweighted, -58 dB ARLL-weighted Tracking-angle error (for radii between 2 and 6 inches): less than HIRSCH-HOUCK LAB MEASUREMENTS Resonant frequency of tone arm with ULM65 cartridge: 11 Hz Frequency response of ULM65 cartridge: 40 to 20,000 Hz + 3.5; -1.5 dB Channel separation of ULM65 car-

Channel separation of ULM65 cartridge: better than 20 dB up to approximately 17,000 Hz Output of ULM65 cartridge: about 4.3 millivolts

nign-level

TEST REPORTS

test records at its rated 1.5 grams, including the 90-micrometer level of the German HiFi #2 record (in which respect it surpassed most higher-priced cartridges we have tested). Its tracking distortion, measured with the Shure TTR-102 and TTR-103 test records, was slightly higher than that of several other recently tested cartridges but still quite acceptable. It tracked all of the Shure ERA IV record except Level 4 of the flute section, and with the ERA V it mistracked only on the maximum level (Level 6).

After the tone arm of the CS 515 had been balanced, the trackingforce dial calibrations were almost exactly correct. The antiskating compensation was optimum when its dial was set about 1 gram higher than the tracking force. The arm lift and descent worked smoothly, although the arm drifted outward slightly during its descent, repeating about 2 to 3 seconds of the record each time it was lowered.

The turntable speed could be varied about ± 10 per cent from its nominal 33^{1/3}-rpm speed. When that speed was set exactly, the 45-rpm operating speed was 0.3 per cent slow, but it could be varied in a range from +8 to -7 per cent relative to the correct speed. Flutter components fell mostly below 5 Hz, though there was a discrete component at about 10 Hz. Rumble energy was principally concentrated between 5 and 15 Hz.

The base isolation of the Dual CS 515 was fair, but it did not quite match that of many direct-drive turntables, to say nothing of beltdriven turntables having more compliant suspensions. Its principal transmission range was from 18 to 28 Hz, with other responses at 45 and 110 Hz as well as between 4 and 10 Hz. There were also several prominent transmission modes in the range of several hundred hertz, which appeared to be resonances in the dust cover or the hollow plastic base. They resulted in little electrical output from the cartridge, however.

COMMENTS

Considering the low price of the Dual CS 515, it is a remarkably good turntable, and in view of the excellent performance of the Ortofon ULM65 cartridge, the combination surely ranks as one of today's best record-player values. It is so light that it may seem like a feather-



"... Oh, no, sir—the sound from this speaker here, the Extel Mk 8, is salubrious, exquisite, stunning, glorious, and dazzling. The sound from that speaker there, the Airex 3, is superlative, smashing, magnificent, superb, and impeccable."

weight compared with some other turntables, but its essential performance has not been sacrificed in the weight-reduction process.

Although the platter and arm of the CS 515 are suspended as a unit from the base, the mountings are

THE CS 515 IS ABSOLUTELY OUTSTANDING AT PLAYING WARPED RECORDS. IN MOST CASES THERE WAS NOT EVEN AN AUDIBLE HINT OF A WARP.

rather stiff and afford little isolation at subaudible frequencies. On the other hand, because the entire base rests quite solidly on the supporting surface, the front-panel controls are easy to operate without jarring the pickup.

We would have liked to see a front-panel reject or off button, since the only way to terminate playing before the record is finished is to lift up the tone arm and move it to its rest by hand. On the plus side, the CS 515 (like the other Dual ULM models) is absolutely outstanding at playing warped records. Our entire collection of "unplayably warped" discs was not only tracked by the Dual arm, but in most cases there was not even an audible hint of a warp. Perhaps you are fortunate enough not to have any warped discs in your collection. If so, congratulations! But the other 99 per cent or so of the record-playing public may be glad to learn that a record player as inexpensive as this one will not only play warped records as though they were perfectly flat but, in doing so, will also deliver the sound quality typical of a far costlier turntable. Julian Hirsch Circle 140 on reader service card

A to B in 0.2 secs!

one. It not only changes tape sides, it does something even more miraculous. It eliminates interruption between idea. Quick-Reverse is a better Auto-reverse was a great

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Quick-Reverse: Alwa's latest innovation in digital-ready cassette decks.

TEST REPORTS

PIONEER CT-A9 CASSETTE DECK HIRSCH-HOUCK LABORATORIES

HREE heads, dual capstans, sophisticated microprocessor-controlled tape optimization, and a high performance level characterize Pioneer's new top-of-the-line CT-A9 cassette deck. The CT-A9 has Dolby B and Dolby C noise-reduction systems, an unusually informative recording-level display, a realtime-indicating counter, and automatic tape loading.

The deck uses a dual-capstan drive to minimize wow and flutter. The main capstan is direct-driven by a d.c. servomotor that is in a phase-locked loop (PLL) with a stable, quartz-crystal oscillator. The two capstans are textured to provide a better grip on the tape. They have slightly different diameters to ensure proper tape tension across the heads and to avoid a common rotational frequency, which might actually increase rather than lower tape flutter. Light-touch pushbuttons, logic-controlled to prevent tape tangles, switch between transport modes.

When a cassette, tape openings

Fas

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downward, is dropped into the slides on the rear of the transparent cassette-well door, a sensor detects its presence. The door then closes automatically, seating the cassette, and any tape slack is taken up. The label is completely visible, and rear illumination helps the user see how much tape remains on each spool.

To optimize performance with a given tape type, the user presses one of three pushbuttons (with illuminators): UNDER BIAS, PEAK BIAS, OF OVER BIAS.



Automatic switching (with manual override) between source and tope monitoring

The four-bit microprocessor inside

the CT-A9 adjusts the bias, tape-

sensitivity level, and recording

equalization for the tape. These set-

tings are stored in the deck's memo-

ry and remain in effect until the

power is turned off, the program is

reinitiated, or the BLE CLEAR button

is pressed. The program takes only a

little over 10 seconds, and at its end the tape is rewound to the point where it began, so the test signals are automatically erased when recording begins. For most music, the PEAK BIAS setting is recommended. In the OVER BIAS mode some very high treble response is sacrificed to prevent distortion of very loud tran-

External timer-activated record or

playback operation

HIRSCH-HOUCK LAB MEASUREMENTS

t-forw	ard time	(C-60): 7	78	Tape Use chrome	d: TDK : -equivale	
vind ti	ime (C-60): 76 sec	onds	IEC 0-dB	distortio	n:
	or: +0.1 cking err			Meter ine THD:		t 3
	-flutter: (0.024 per			Signal-to-	noise rat	ios
eak-w	eighted				Unwtd.	A
	t for indi	cated 0 c	IB: 0.96	NR off Dolby B	53.2 56.8	
olt				Dolby C		
B : +4	lication a dB	t IEC-st	andard O	Doiby C	58.0	
erric)	d: Maxe			Tape used metal)	I: TDK N	1A
	distortio			IEC 0-dB	distortio	n:
HD: ·	tication a +8.8 dB			Meter ind THD: -	lication a +8.6 dB	t 3
nal-to-	noise rat	ios (in d	ccibels):	Signal-to-	noise rat	ios
	Unwid.	A-wid.	ARM		Unwid.	A
off	55.5	60.6	57.8	NR off	56.0	1
by B	60.8	69.4	68.0	Dolby B	60.0	
by C	62.8	75.2	76.5	Dolby C	61.8	

-X (Type II, 2.4 per cent B per cent (in decibels): CCIŔ, ARM I-wid. 58.9 56.0 66.8 73.1 66.1

(Type IV,

0.98 per cent per cent

Signal-to-	noise rat	ios (in de	ecibels):
			CCIR/
	Unwid.	A-wid.	ARM
NR off	56.0	61.2	58.3
Dolby B	60.0	69.6	68.3
Dolby C	61.8	76.0	77.0

sients, and in the UN-DER BIAS mode treble sensitivity is increased at the expense of somewhat increased distortion

The greatest problem with the peakreading fluorescent or LED record-level displays used on most cassette decks today is poor resolution. The CT-A9's displays have no fewer than thirtyfive illuminated elements per channel, covering the range from -40 to +14 dB overall, with 1-dB increments for all levels above -20 dB. This

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TEST REPORTS

provides a degree of resolution comparable to that of an analog meter. In addition, a series of orange dots—beginning at +5 dB for ferric and chrome-type tapes and at +7dB for metal—shows the level above which excessive distortion is likely to be encountered. The 0-dB point on the scale corresponds to the 160-nanoWeber/meter reference still used by most Japanese manufacturers. The Dolby reference level is marked at +3 dB.

The CT-A9 measures 16% inches wide, 5 inches high, and 14 inches deep. It weighs 22 pounds. Price: \$800. Pioneer Electronics (USA) Inc., Dept. SR, P.O. Box 1720, Long Beach, Calif. 90801.

MEASUREMENTS

The playback frequency response of the Pioneer CT-A9 was extremely smooth and flat. Using either our $CrO_2/metal$ (70-microsecond) or ferric (120-microsecond) IEC-standard BASF test tapes, the variation was less than +2, -1 dB throughout the entire 31.5-Hz to 18-kHz measurement range.

Overall record-playback frequency response was equally impressive. Pioneer suggested using either Maxell or TDK blank tapes, and we obtained our best results with Maxell XLI-S (ferric), TDK SA-X (chromeequivalent), and TDK MA (metal), though we obtained essentially similar graphs with several of today's premium formulations. Especially noteworthy is what happened when we recorded at the IEC 0-dB level and used Dolby C, which reduces pre-emphasis somewhat at the very highest frequencies: the response with TDK MA was down only 0.5 dB at 20 kHz!

The CT-A9's A-weighted signalto-noise ratios were excellent. The level meters' orange warning lights were usefully placed, as shown by the meter indications when 3 per cent distortion was reached with each type. The wow/flutter measurements for the CT-A9 were the best we have yet made with our usual Teac MTT-111 test tape. The figures were so low that we cross checked them with a special Nakamichi wow/flutter measurement tape, but the results were even lower: 0.013 per cent wrms and 0.02 per cent DIN weighted. This is simply superb performance.

COMMENTS

In terms of its sonic performance, we found the Pioneer CT-A9 as capable as any cassette deck we have tested. If there was an audible difference between its playback or recordplayback performance and that of our reference deck, we certainly could not readily detect it. There was none of the grainy quality on pimit the user to program a large number of selections to be played, we have always found these more complicated to use than they are worth. The CT-A9's approach was refreshingly straightforward. One button rewinds you to 0000, wherever you choose to set that. Another pair of buttons ad vances the tape to the next music selection or replays the present one from its start. All transport buttons worked positively and quietly.

In only one respect could we fault the design of the CT-A9, and that was its microprocessor-controlled tape-optimization program. We



The upper curves indicate overall record-playback response at the manufacturer's indicated 0-dB recording level using the tapes designated on the graph. In the center are the same measurements recorded at -20 dB relative to the upper curves, a level used for frequency-response measurements. Bottom curves show playback response with calibrated test tapes and indicate performance with prerecorded tapes.

ano tones that wow-and-flutter often contributes to cassette sound.

Of course, when recording and playing back a pure sine wave, we could clearly hear the modulation noise behind the signal, but this is a test no analog recorder (including open-reel mastering decks) can pass. Both Dolby B and Dolby C reduced noise without introducing either frequency-response or level changes. Dolby C eliminated any audible tape hiss from all but specially selected passages of very wide dynamic range on Compact Discs played at very high volume levels.

We also give the CT-A9 high marks for its human engineering. While many high-end machines provide memory options that perfound that the standard settings for the different tape types gave extremely flat response to 20 kHz, but when the AUTO BLE feature was used in any of its three modes (OVER, UN-DER, or PEAK BIAS), the high-end response suffered slightly in range above 15 kHz. We would naturally expect this with OVER BIAS but not with the other two. While it is highly doubtful that the rolloff would be audible, the standard settings are superior in addition to being easier to use.

This minor feature aside, however, the Pioneer CT-A9 checked out as a superlative unit that we can recommend in the highest terms.

Craig Stark Circle 141 on reader service card



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TEST REPORTS

OHM WALSH 4 SPEAKER SYSTEM

HIRSCH-HOUCK LABORATORIES

THE Ohm Walsh 4 is based on an unusual speaker designed by the late Lincoln Walsh. Unlike most hifi speakers, the Walsh speaker is essentially a "one-way" system. It has a single full-range conical driver facing down into a large enclosure. The voice coil is at the top (small end) of the cone, and the sound propagates down the outside surface of the cone. The driver consequently produces a phase-coherent, cylindrical wave front.

In its purest form, the Walsh speaker (as used in the Ohm F, for example), is omnidirectional in the horizontal plane and quite dependent on placement for best results. It is also a low-sensitivity speaker.

For the Ohm Walsh 4, which has a recommended amplifier power range of 50 to 500 watts, the Ohm engineers modified the Walsh design by placing a sound-absorbing material called Tufflex around the top rear of the main cone.

This serves to attenuate the middleand high-frequency rear-wall reflections, which improves imaging and allows for less

critical placement. In addition, the highest frequencies are augmented by the direct radiation of a small auxiliary supertweeter above the main cone, which is aimed 45 degrees inward from the system's front axis in order to provide the desired room coverage. The lowest

bass frequencies radiate from the port in the bottom of the enclosure and through the slot between the speaker, which is raised on casters, and the floor.

The Ohm Walsh 4 is 40 inches tall, 12^{1/2} inches square at the



top, and 15^{1/2} inches square at the bottom. It weighs 63 pounds. Price: \$1,895 per pair. Ohm Acoustics Corp., Dept. SR, 241 Taafe Place, Brooklyn, N.Y. 11205.

MEASUREMENTS

The unusual design of the Ohm Walsh 4 presented some problems in measuring its acoustic performance. For example, the response on the forward axis of the system was appreciably different from that measured at 45 degrees off-axis, in line with the supertweeter. The overall response in the room was a composite of the speaker's output in all directions, making it difficult to characterize it by an FFT measurement on any one axis. While this is true of any speaker, a further complication in this case was that the measured response, even with close

HIRSCH-HOUCK LAB MEASUREMENTS

Composite frequency response: 40 to 20,000 Hz ±4 dB Sensitivity: 83 dB SPL at 1 meter with 2.83 volts (1 watt) input Impedance range: 6.5 to 16 ohms Phase coherence: group-delay variation from 500 to 20,000 Hz

less than ± 0.2 millisecond Bass distortion (measured at input level needed for 90-dB SPL output at 1,000 Hz): 1 per cent from 100 to 70 Hz; 3.7 per cent at 50 Hz; 5.25 per cent at 40 Hz; 9.5 per cent at 35 Hz depended on whether the microphone was near the bottom, middle, or top of the main cone radiator. In addition, the output measured at the port (under the cabinet) was not the same as that

WHYPUTTWO FILTERS INTO ONE GREAT COMPACT DISC PLAYER?



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The DA-01 is easier to use than a modern cassette deck—slide the compact disc into the disc compartment, shut the door and hit the play button. With the DA-01's feather-touch controls, you can play the whole thing (60 minutes a side)...repeat a track...scan... and program up to 24 different segments with an electronic memory. A functional LED digital panel tells you program running time and just where the optical scanner is on the disc.

Call (201) 560-0060 for the name of the nearest dealer. Kyocera International, Inc., 7 Powder Horn Drive, Warren, NJ 07060.

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CIRCLE NO. 8 ON READER SERVICE CARD measured in the narrow slot between the cabinet edges and the floor.

With all the frequency-balance switches at their center settings, the averaged room response was smooth and flat, within $\pm 4 \, dB$ from 500 to 20,000 Hz. The bass response, measured as close to the bottom of the speaker cone as the protective cage allowed us to get. was flat within ± 2 dB from 60 to 500 Hz, and it could be spliced unambiguously to the room curve. The port output was at its maximum at 30 Hz and was within ± 2 dB from below 20 to about 60 Hz. We could not establish the proper relative contributions of the cone and port in the lowest range, but the composite response of better than ± 4 dB from under 40 up to 20,000



Hz was consistent both with what we heard and with Ohm's rating of 32 to 17,000 Hz ± 4 dB.

Our lab measurements showed an omnidirectional response below 1,000 Hz, with the rear radiation being suppressed by 20 dB or more above 2,000 Hz. With the two speakers placed a couple of feet from rear or side walls, the imaging was ex-

ceptionally good and almost independent of the listening position. Like the original Ohm F, the Walsh 4 had excellent phase coherence, with a group-delay variation that certainly seems to confirm Ohm's claims for the Walsh driver.

The frequency-balance adjustments produced definite, but not excessive, changes in the speaker's sound quality. We found the center settings to be perfectly satisfactory in our room, but that is a matter of individual taste. The low-frequency switch changes the output by about ± 5 to 7 dB between approximately 60 and 300 Hz. The high-frequency switch range is ± 5 dB from about 2,000 to 13,000 Hz. The PERSPEC- TIVE control's range is also about ± 5 or 6 dB from 250 to 1,300 Hz, and it can impart either a "forward" or "distant" quality to the sound of the speakers.

THE OHM WALSH 4 IS AS SMOOTH AND NATURAL SOUNDING AS ITS EXCELLENT FREQUENCY-RESPONSE MEASUREMENT SUGGESTS. IT PROVIDES A FULL STEREO STAGE OF SOUND AT ALMOST ANY POSITION.

Ohm rates the Walsh 4's system sensitivity as an 87-dB sound-pressure level (SPL) at 1 meter with 2.83 volts input and all controls at maximum. In our case, with the controls centered (thereby reducing the sensitivity), we measured an 83-dB SPL under those conditions. The sensitivity of the Walsh 4 is slightly lower than average for a speaker of its size, but it should present no problems when used with amplifiers in the recommended output range of 50 to 500 watts per channel. Although Ohm rates the Walsh 4 as a 4-ohm speaker, the lowest impedance value we measured was 6.5 ohms. By traditional criteria, this should be considered a 7-ohm speaker, and it can be expected. therefore, to present an easy load to any amplifier.

We measured the bass distortion at the bottom of the cone with the same close microphone placement we had used for the low-frequency response measurement. The results were excellent and fully consistent with what we heard. The relative contribution of the port output, which is probably effective in the lowest part of the bass range, could not be assessed.

COMMENTS

The Ohm Walsh 4 is as smooth and natural sounding as its excellent frequency-response measurement suggests. It provides a full stereo stage of sound at almost any position in the room, including a distinct quality of depth resulting (presumably) from sound reflections off the rear and side walls.

Ohm claims that the Walsh driver does not operate as a piston-the usual design goal for a conventional speaker-but rather as a transmission line that progressively delays the propagation of different frequencies so that a coherent cylindrical sound field is radiated. Some years ago, when we tested the original Ohm F speakers, we were able to verify that claim to our satisfaction. Although the Walsh 4 is a modified form of that system, it retains many of its qualities, with the added advantages of a reasonably high sensitivity, noncritical room placement, and a much lower price.

The heavy-duty, high-temperature voice coil of the Walsh driver makes it virtually impossible to overdrive the Ohm Walsh 4 with any home amplifier. We were able to drive a 200-watt-per-channel amplifier to its clipping point with Compact Disc program sources without straining the speakers, which sounded fine at that level.

Ohm makes much of the imaging qualities of this speaker, and it certainly lives up to those claims. A demo record produced by Ohm provides convincing evidence that the Walsh 4, playing a variety of commercial music recordings, is capable of generating distinct spatial images that are apparent from almost any position in the room. For example, Leroy Anderson's musical typewriter moves with impressive smoothness between the speakers, with not a trace of the vague, uncertain, or erratic position shifts that we observed with some other speakers.

In case I have not made the point sufficiently clear, this is a superbsounding speaker—not inexpensive by any means, but worth every cent of its price. Julian Hirsch Circle 142 on reader service card
READ THIS AD AND YOU'LL BUY A HARMAN KARDON CASSETTE DECK



That's a bold statement, but Harman Kardon has been making bold audio statements for over thirty years, introducing the world's first high fidelity receiver, the first stereo receiver and ultrawideband frequency response. Harman Kardon was also the first company to use Dolby' in a cassette deck.

Today, Harman Kardon products continue to be so technologically advanced that "state-of-the-art" falls short of describing them. They have become "stateof-the-mind," the highest level at which the mind can create.

The CD491 is Harman Kardon's most sochisticated state-of-the-mind cassette deck and one of the few in the world that can equal the full range of human hearing. The CD491 has a remarkable 20Hz to 24kHz frequency response using any tape formulation, not just expensive metal tape. An audiophile would settle for norhing less. Even more remarkable is that in a national challenge, Harman Kardon measured frequency response and beat 98% of the competition, including units costing twice as much.

The CD491 incorporates a dual capstan transport with twin flywheels to insure perfect movement cf the tape across its 3 high performance heads. The dual capstan serves to isolate the tape from the cassette shell while the dynamically balanced flywheels help generate a consistently accurate tape speed. Together they enable the CD491 to reduce wow-and-flutter to an inaudicle .025%. The only "wow" you'll ever hear is the reaction of people listening to your Harman Kardon cassette deck.

The CD491 incorporates Dolby HX Pro' for extended frequency response, plus Dolby B and C' for max mum noise reduction. Three precision heads offer improved performance and the convenience of monitoring while recording. Included is a Sendust head to withstand h gh record levels without overload and a ferrite playback head for extended high frequency response.

The combined benefits of the CD491's performance features allow for the accurate recording of more dynamic audio signals than previously possible. In fact, the large signal response (frequency response at 0Vu) of the CC491 is a virtually unrivaled 20Hz-20kHz ±3dB. This is espec ally significant as more demanding forms of software, such as digital audio, become availab e.

So, while other manufacturers continue to pie on unnecessary features and gimmicks, Harman Kardon continues to develop only fundamentally advanced audio equipment.

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TEST REPORTS

YAMAHA CD-XI CD PLAYER

HIRSCH-HOUCK **IABORATORIES**

AMAHA'S new "second-genera-Y tion" Compact Disc player, the CD-X1, is less than half the price, less than a third the weight, and about half the size of its first-generation predecessor, the CD-1. It is, in fact, one of the most compact and least expensive CD players we have seen. The styling is very clean and simple, the controls easy to use.

A major contributor to the CD-X1's size and price "shrinkage" is the use of two high-density largescale integrated circuits (LSI's) designed by Yamaha specifically for this application. Together they replace many of the IC chips and other discrete components used in the CD-1, and they perform many of the most complex functions involved in playing digital discs-including control of disc speed, laser focus, and tracking servos as well as demodulation and error correction of the digital audio data stream. One of the chips also includes a digital filter stage operating at twice the standard sampling frequency, 88.2 kHz instead of 44.1 kHz, which makes it possible to use simpler analog-output low-pass filters to minimize noise, distortion, and high-frequency phase shift.

Besides the new LSI's, the CD-X1 has a compact new three-beam laser pickup, and molded plastic parts

have replaced many of the heavy, more expensive metal castings or stampings of the firstgeneration CD players. The unit's outside dimensions are 13³/₈ x 113/8 x 35/8 inches, and its weight is just under 8 pounds. Price: \$599. Yamaha Electronics Corp., USA, Dept. SR, 6660 Orangethorpe Avenue, Buena Park, Calif. 90620.



- When disc is loaded, display shows number of tracks and total playing time
- Pius button (+) skips laser forward to start of next track.
- □ MINUS button (-) skips laser back to start of current or previous track.
- In fast forward and reverse, program is audible at accelerated speed with correct pitch but lower volume. Scanning speed is moderate for first

MEASUREMENTS

The CD-X1 reproduced a 1,000-Hz square wave with a few cycles of low-level 20,000-Hz ringing on its leading edge and a much smalleramplitude ringing on its trailing edge. This result is characteristic of CD players that use digital filters for at least part of the required low-pass filtering of their outputs.

The phase shift between the channels, essentially zero at lower fre-

- remaining in the program.
- PLAY MODE switch selects automatic pause after each track, automatic play after disc loading, or normal operation.
- Individual tracks as well as whole discs may be repeated. A phraserepeat feature (A-B on the front panel) permits repeat playback of any designated part of a disc.
- Cueing is by track number only.

quencies, reached 5 degrees at 2,500 Hz, 18 degrees at 10,000 Hz, and 32 degrees at 20,000 Hz. This is somewhat less interchannel phase shift than we have measured from other CD players, the reason being that the unit's single digital-to-analog converter is multiplexed between the left and right channels twice as often as usual since the sampling rate has been doubled. The effect is totally inaudible.

One of the most striking areas of

improvement in CD players since they were first introduced last year has been in their error-correction and tracking-servo circuits, which are crucial determinants of a machine's ability to play defective or damaged discs. The Yamaha CD-X1 was able to play all of the Philips TS4A error-correc tion/tracking test disc.

HIRSCH-HOUCK LAB MEASUREMENTS Maximum output level: 2 volts Total harmonic distortion at 1,000

Hz: 0.0037 per cent referred to 0 dB; 0.0014 per cent referred to -6 dB; 0.0034 per cent referred to -10 dB; 0.0034 per cent referred to -10 dB; 0.0045 per cent referred to -20 dB Intermodulation distortion: 0.009 per cent referred to 0 dB; 0.009 per cent referred to -20 dB

Signal-to-noise ratio: 95 dB unweighted; 100 dB A-weighted Channel separation: 95 dB at 1,000 Hz: 70 dB at 20.000 Hz Frequency response: +0, -0.15 dB from 20 to 19,000 Hz (levels of the two channels were about I dB apart) Cueing time: 4.5 seconds

Impact resistance: top, A; side, A Cueing accuracy: B Defect tracking (figures are size of the largest defect successfully tracked): signal-surface damage, 900 micrometers; painted dots.

800 micrometers; simulated fingerprint, pass



HOLOGRAPHIC INTERFEROMETRY DEMONSTRATION SHOWING DISTORTION IN A CONVENTIONAL SPEAKER AT 265 Hz HOLOGRAPHIC INTERFEROMETRY DEMONSTRATION SHOWING NO DISTORTION IN A SCNY APM SPEAKEE AT 265 Hz.

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As truly remarkable as the digital compact disc is, it has one equally remarkable side effect. Namely, along with taking the mask off sound, it also unmasks the flaws in your loudspeakers.

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fore barly audible, are now discernible when listening to music.

To eliminate the flaws inherent in every conventional driver, Sony has radically redesigned the speaker from the bottom of the woofer to the top of the tweeter.

The buckling, flimsy paper cones have been replaced by a rigid, aluminum honeycomb construction. Because it's flat, it eliminates cavity effect. Because it's aluminum, it resists bending—a major cause of distortion in paper drivers. Yet it's light in weight for truly excellent transient response.

But Sony goes further. APM drivers are square to dramatically reduce split vibration.

For a most convincing demonstration call 1-800-222-SONY for the name of your nearest APM dealer, and audition the first speakers of the digital age from the people who were present at its creation.

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TEST REPORTS

NEW ON CD Recent releases of previously recommended recordings

POPULAR

Chick Corea: Again and Again. ELEKTRA/MUSICIAN 60176-2. "Simply outstanding." (August 1983)

□ Dire Straits: Communiqué. WARNER BROS. 3330-2. "Magical logic, a really major band." (August 1979)

□ Merle Haggard and Willie Nelson: Poncho & Lefty. CBS EK 37958. "Seductive, moving." (May 1983)

□ Herbie Hancock: Future Shock. CBS CK 38814. "Sophisticated synthesized funk." (December 1983)

□ Jennifer Holiday: Feel My Soul. GEFFEN 4014-2. "Admirable authority... triggers an inner shout." (February 1984)

□ Harry Nilsson: Nilsson Schmilsson. RCA PCD1-4515. "Funny, sad, nostalgic, provocative, wonderfully eccentric." (March 1972)

□ Rick Springfield: Working Class Dog. RCA PCD1-3697. "A pop performer of substance." (June 1981)

CLASSICAL

Glass: The Photographer. CBS MK 37849. "Mysterious and thrilling." (July 1983)

□ Mahler: Symphony No. 2, in C Minor ("Resurrection"). Solti. LONDON 410 202-2. "Intensely dramatic performance, impressive sound." (October 1981)

□ Moore's Irish Melodies. NONESUCH 79059-2. "... an out-and-out gem." (May 1984)

□ Mozart: The Magic Flute. Karajan. DEUTSCHE GRAMMOPHON 410 967-2. "Played for all it's worth ... stunningly effective." (November 1980)

Duccini: La Rondine. Maazel. CBS MK 37852. "... ravishing sound [and] youthful ardor." (May 1984)

Rachmaninoff: Piano Concerto No. 3, in D Minor, Op. 30. Horowitz. RCA RCD1-2633. ... consistently dazzling... a great pianistic document." (May 1978)

□ Verdi: Nabucco. Sinopoli. DEUTSCHE GRAMMOPHON 410 515-2. "... the most satisfying recording of any Verdi opera in a good long time." (September 1983)



Related to the ability to play defective or damaged discs is a machine's ability to withstand physical impact without "detracking" (the CD equivalent of a skipped groove). *Every* CD player will skip a portion of the disc it is playing (or even stop entirely) if it is jarred or struck hard enough, but many units are especially sensitive to such ill treatment. In this respect the CD-X1 proved to be one of the best we have tested. Even moderately hard raps on the top or side of the cabinet failed to cause detracking.

We assessed the player's cueing accuracy by noting the precision with which it could cue to a specific track on the test disc that has virtually no separation between it and the preceding track. Most players we have used will clip at least a part of the first note or syllable of the second track in this test, and we found the CD-X1 to be somewhat better than average (if not quite perfect) in this respect.

COMMENTS

Each CD player has its individual operating characteristics, generally related to the amount of programming flexibility it offers. Although the CD-X1 cannot be programmed according to either time or recorded index locations within tracks, unless you need these particular capabilities it is more than flexible enough to satisfy any reasonable user. We found it a very easy, logical machine to operate as well as amazingly light and compact-it could hardly be any smaller without undesirable crowding of the operating controls and indicators.

With a much more affordable price than the first-generation CD players and a listening quality essentially equivalent to that of any other we have tested, it's clear that Yamaha's CD-X1 is a very attractive new entry into the market.

Julian Hirsch Circle 143 on reader service card



"... Not at all, Emil, I agree with you. If you like the musicians and singers to sound as if they're in the bottom of a barrel, that's how you should have it."



WHO WOULD HAVE THOUGHT IT COULD TRIGGER A REVOLUTION IN SOUND.

Remember when laser technology was the stuff that made for good science fiction? Well, it isn't fiction anymore.

Because Pioneer has harnessed the same laser that used to blow space creatures away, to blow you away.

With the P-D70. A compact disc player that

reproduces music so realistically you'll think you were at the original recording session.

Since a sophisticated optical laser never makes contact with the disc, all surface noise from dust and scratches is eliminated.

And because the music is processed digitally, distortion is essentially nonexistent, resulting in the drama of a live performance.

In addition, the P-D70 contains all the ultra-convenience features of a player so sophisticated and futuristic

But of course, it's what you should expect from a compact laser disc player from Pioneer.

After all, we developed laser optics and digital electronic technology for our revolutionary LaserDisc[™] video systems.

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HOW MUCH POVER DOYOU NEED?

THE KIND OF SPEAKERS YOU HAVE, THE SIZE OF YOUR LISTENING ROOM, YOUR TASTE IN MUSIC, AND HOW LOUD YOU PLAY IT ALL INFLUENCE YOUR POWER REQUIREMENTS.

BY E. BRAD MEYER.

I-FI experts, like psychiatrists, have the annoying habit of answering questions with other questions. Take, for example, the query, "How much power do I need?" When the psychiatrist hears this, he responds by saying something like, "How much power do you want?" The audio expert is worse. He replies with a whole series of questions: What kind of music do you listen to? How loud do you like to play it? What kind of speakers do you have? How big is your listening room? How is it furnished and decorated?

The hi-fi expert needs all this information not just to fine-tune his reply but to give any sort of meaningful answer at all. Variations in the desired loudness level, in the choice of speakers, or in the nature of the room and its furnishings can change the system's power requirements to a vast degree.

An audiophile of my acquaintance—who is also, coincidentally, a psychiatrist—reports that someone once said to him, "What do I need a bigger amplifier for? Mine already plays loud enough to hurt my ears!" His reply, of course, was that a powerful enough amplifier will play loudly *without* hurting your ears. But how do you find out how much power is enough?

The accompanying table will give you an idea of the nature of the problem. It shows the amplifier power required to achieve a playback sound-pressure level (SPL) equivalent to various kinds of live music. The conversions from electrical to acoustic energy were made with the aid of formulas and tables from Chapter 10 of Leo Beranek's classic book Acoustics; the sound levels come from my own live-music measurements. The power figures, expressed in watts per channel, are based on the assumption that there are two channels playing.

THE MUSIC

The most important characteristic shown by the table is the rapidity with which the power requirements increase as the sound-pressure level rises. (The three curves overlaid on



HE LARGER THE ROOM, THE MORE POWER IT TAKES TO FILL IT WITH SOUND, AND THE FURNISHINGS COUNT TOO.

POWER REQUIREMENTS FOR THE

the table at right give some idea of the rapidity of that increase.) This reflects the logarithmic nature of human hearing, the principal reason that the question of power requirements is so tricky. An increase in sound level of 10 dB, which most listeners would rate subjectively as "twice as loud," requires a tenfold increase in amplifier power. Conversely, if you are willing to play music at a level that is subjectively only half of what you would encounter in a concert hall (which still sounds loud to many people), your power requirements decrease by a factor of ten.

What does this mean when you're choosing an amplifier? First of all, amplifiers differ less than you might think. Going from a 50-watt-perchannel (W/ch) amp to a 100-W/ch one will increase the maximum available output by only 3 dB, which is noticeable, but just barely. Second, for someone who never listens above moderate levels, 20 watts per channel is enough for any speakers, even those with the lowest sensitivity. ("Efficiency" is often used, incorrectly, as a synonym for speaker sensitivity. The familiar "xdB SPL at 1 meter with a 1-watt input" is a sensitivity specification.)

Third, the average power required by most speaker systems, even playing loud classical music at concerthall levels, is very low. It is reproducing the momentary peaks that requires a powerful amplifier. The difference between average and peak levels on classical program material ranges from 8 to 12 dB. Although a well-designed amplifier can occasionally "clip" a peak with only a mild effect on the sound quality, one with generous "headroom"-the ability to put out more than its rated power for short periods-has a real advantage over another one with the same continuous power but less headroom.

Rock music presents a somewhat different case: The 116-dB SPL given in the table as the maximum peak level represents what you'll encounter at an actual concert. But in most rock music the peak and average levels are very close, so the cor-



* sound-pressure level measured at 1 meter with 1-watt input

responding average level would be around 110 dB. Most people can't play their systems at these levels because neither their neighbors nor their loudspeakers can stand it for very long. If you must have such levels despite the inevitable hearing damage they will cause, you can achieve them with special speakers instead of a bigger amplifier.

THE SPEAKERS

The differences between the three right-hand columns in the table show that your choice of loudspeaker can change your power requirements by a factor of at least twenty: a speaker that puts out 94 dB at 1 meter with 1 watt of input will play as loud with a 10-watt amplifier as VERAGE POWER REQUIRED BY MOST SPEAKER SYSTEMS IS VERY LOW. IT IS REPRODUCING PEAKS THAT REQUIRES POWER.

POWER IN WATTS PER CHANNEL (BOTH CHANNELS DRIVEN)

High-sensitivity speakers (94 dB*)	Medium-sensitivity speakers (87 dB*)	Low-sensitivity speakers (81 dB*)
2,512	12,600	
126	631	2,512
40	200	795
	20	
0.6	3.2	12.6
0.08	0.4	1.6
0.006	0.03	0.12
0.0016 (1.6 mW)	0.008 (8 mW)	0.03 (30 mW)

an 81-dB/W/m speaker with a 200watt amp. If you must hear music at live levels, it's pretty obvious that, depending on the amplifier power available, speaker sensitivity can spell the difference between success and failure. Particularly demanding of power are the new small, fullrange speakers, many of which have relatively low sensitivity. Although our examples were chosen to cover the range of sensitivities of commonly available loudspeakers, there are exceptions. Some large horn-loaded speaker systems are almost 10 dB more sensitive than the "high-sensitivity" figure in the table. Since this represents an easing of the power requirements by nearly a factor of ten, such speakers can produce extremely high sound levels with a modest amplifier.

THE ROOM

While the table shows the effects of two of the three principal factors in determining power requirementsspeaker sensitivity and desired sound level-it makes no mention of the listening room. The larger the room, the more power it takes to fill it with sound, and the furnishings can make even more difference than the size. The calculations in the table are based on a room with a volume of just over 3,600 cubic feet (17 feet wide, 25 feet long, and 81/2 feet high) that is fairly "dead" acoustically, containing an area rug, heavy curtains, and several pieces of heavy upholstered furniture. This is somewhat larger than an average listening room. If yours is only half the volume, your power requirements will be less by about one third.

Increasing or decreasing the amount and type of furnishings will have a stronger effect, changing the power requirements over a range of about three to one. Our assumed listening room is fairly absorptive, which means that reflected sound is soaked up before it has a chance to contribute to the overall acoustic energy. A more "live" room—one with more reflective surfaces and less padded furniture—makes the amplifier's job easier.

THE DIGITAL FACTOR

It is often said that digital Compact Discs demand more of our amplifiers than analog LP's ever did. This is true, but it does not affect your use of the figures in the table. Since the table gives the actual soundpressure levels of acoustic events, an uncompressed CD that was digitally recorded with a minimal microphone setup will behave according to the numbers you see here. Analog tapes, discs, and FM broadcasts-and, for that matter, CD recordings on which accent mikes or compressors have been used-will (Continued on page 101)

(Commueu on page 101)

The MARK LEVINSON ML-3POWER AMPLIFIER

o-compromise design and construction plus "gold-plated" sound may lure you into the world of audio's high end/by Julian Hirsch

I've tested quite a few power amplifiers in my day, but never anything quite like the Mark Levinson ML-3. Priced at \$5,400 and recommended for use with special cables that run several hundred dollars more, the ML-3 is definitely a product from audio's "high end," a region where cost-no-object design and construction are the rule.

Now, in the past I have made no bones about my contempt for the poorly considered, pseudo-scientific claims of some fanatical proponents of expensive, exotic equipment, and about many of these claims I haven't changed my mind. But the measured *and* audible performance of the ML-3 amplifier has almost made me a convert to the high end!

The Mark Levinson name has long been associated with the highest standards of performance and construction quality. The company's no-compromise preamplifiers, power amplifiers, and tape recorders naturally command very high



prices, but thousands of dedicated audiophiles have obviously decided that they represent good values. Testing and living with the ML-3 for an all-too-brief period has enabled me to appreciate the unique appeal such a product has to a serious listener.

The ML-3 is a huge, heavy amplifier that is completely finished in flat black. The front panel—a 10% x 19-inch slab of %-inch-thick anodized aluminum fitted with heavy machined handles—contains only a single recessed rocker-type power switch, which has a small red LED in it to show that the amplifier is on. A discreet company logo and the product model number are the only other visible features of the panel. Even the sizable front dimensions of the

ML-3 are dwarfed, however, by its 24¹/₂inch depth! Both sides are completely covered by the heat sinks for the forty (!) highpower output transistors. On the rear of the amplifier are the spe-



cial Levinson input and output connectors, a pair of 15-ampere "Slo-Blo" power-line fuses, and two small three-position toggle switches that adjust the damping factor (separately for each channel) for high, normal, or low values. A second pair of handles is provided on the rear of the ML-3. Their importance becomes obvious when you try to lift or move the 120-pound unit definitely *not* a job for one person!

The specifications of the Mark Levinson ML-3 include a rated output of 200 watts per channel from 20 to 20,000 Hz into 8-ohm loads with no more than 0.2 per cent total harmonic distortion or 400 watts into 4 ohms with no more than 0.4 per cent distortion. The amplifier's input impedance is 20,000 ohms, which, though relatively low, can be driven easily by any good-quality current-model preamplifier.

The ML-3 is thoroughly protected against improper operation or excessive output-current demands by a combination of temperature sensors, fast-acting relays, internal d.c. fuses, the a.c. line fuses, and a magnetic circuit breaker that is an integral part of the on-off switch. The output stages themselves can deliver enormous currents to any conceivable speaker load without distortion or damage to the amplifier, but the protection system normally allows these currents (corresponding, for example, to a steady-state output of almost 900 watts into a 2ohm load) to flow only for the relatively brief duration of a typical musical transient.

UNIQUE CONNECTORS

The input and output connectors of the ML-3 are as unusual as the overall amplifier design. They are Swissmade precision devices with goldplated contact surfaces and Teflon internal insulation. The speaker connectors can carry 50 amperes continuously (80-ampere peaks), and when used with the recommended Levinson HF 10 C cable (also made in Switzerland), they enable the amplifier to deliver its huge peak currents to the speakers with a minimum of loss in the intervening wiring.

The input connectors are similar in concept, though much smaller. They are designed to make the ground connection before the signal connection when they are inserted and to break the signal connection



The quality of workmanship that goes into building a Mark Levinson ML-3 was apparent the moment we took the covers off. The two large black toriodal transformers and four $36,000-\mu F$ capacitors dominate the interior. The bottom photo shows a close-up of the outpult-amplifier circuit board.

before the ground on removal. Such an arrangement makes it impossible to produce a speaker-killing blast of 60-Hz hum by carelessly or accidentally inserting or removing a connector with the system operating. This safety feature is augmented by an expanding internal contact that permits removal of a plug only by grasping and pulling its body. Pulling on the input cable merely tightens the grip of the connecting socket on the plug.

The internal construction of the Mark Levinson ML-3 will gladden the heart of anyone who appreciates fine workmanship. Engineers will be especially impressed by the highquality components and assembly techniques used throughout. There are no signs of compromise in any aspect of this amplifier's design or construction. Indeed, its internal appearance is so striking that the company makes the unit available with a clear Lexan top plate (\$97.50) for those who want to show off its construction.

''BULLETPROOF'' DESIGN

Testing the ML-3 was a fascinating experience. It is one of the very few high-power amplifiers we have seen that appears to be totally immune to damage in any sort of home service. After we came to accept this, we felt no compunction about driving it to clipping-or beyond-under any load conditions. When the load current was excessive the amplifier shut off with a soft click, and when the signal level was reduced it returned to operation in an equally discreet manner. This happened without any extraneous noise from the amplifier. We heard no acoustic (mechanical) hum in its vicinity (the two huge 1.2-kilowatt toroidal power transformers see to that) and, of course, no fan noise. The ML-3 was evidently designed to perform in an ideal manner for an indefinitely long period, and we have no doubt that it will do just that.

We put the novel input connectors to the test of inserting and removing them with the system operating. There was not a trace of noise from this action, which would be almost sure to cause speaker damage if conventional connectors were used with an amplifier of this power rating.

The test amplifier was furnished to us with a pair of 30-foot Mark Levinson HF 10 C speaker cables (\$367). Their free ends were fitted with heavy-duty lugs that would have made them suitable for use in an automobile's starter-motor circuit. These made it impossible to route the amplifier-to-speaker wiring through our switching comparator, so we connected the ML-3 directly to our reference speakers and proceeded to listen, using records, FM radio, and Compact Discs as program sources.

AN AUDIBLE DIFFERENCE?

I have often said that I have yet to hear a difference in sound between power amplifiers whose measured (Continued on page 102)





HAT would the perfect power amplifier be like? It would take the input signal from a preamplifier and increase its amplitude to drive the speakers—without changing the signal in any other way. It would eliminate distortion either by perfect correction or by the use of a flawless circuit. The perfect amp would be powerful enough to blow out windows, but it would still be small, light, dependable, and cool in operation. And it would have a suggested retail price of less than \$200.

The perfect power amp does not exist. Some power amplifiers do excel in various areas, and some even combine two virtues, such as low distortion and low cost (probably at the sacrifice of high power), but there isn't one that has all the virtues. Different designers and manufacturers concentrate on different areas of excellence and work to achieve different goals, which is why you'll find so many models of amplifiers to choose from when you go shopping.

More than ten years ago in these pages, Julian Hirsch said, "We wonder if 700 watts is enough," and the super-power amplifier market began to percolate. After all, it stood to reason that an amplifier that (almost) never ran out of power would be superior. But some listeners just didn't care for the sound of these muscular novelties. Many of the complaints



The D-70, a stereo 65-watt (into 16 ohms) vacuum-tube power amplifier, operates with Class AB biasing. Price: \$1.995.

were attributable to overprotective protective circuitry and other design flaws, but exceptionally high power acquired a bad name among some audiophiles.

Nevertheless, my files show close to forty currently available power amplifiers rated at 250 watts or more per channel and ranging in price from \$5,000, for the Audio Research D-250 (a vacuum-tube design), to \$750 (\$600 in kit form) for the Hafler DH-500A. The brands include both the relatively familiar, such as Marantz, McIntosh, SAE, Soundcraftsmen, and Technics, and the less familiar, such as AB Systems, Biamp Systems, FM Acoustics, and Strelioff.

Price does not necessarily follow power in these rarefied strata. It's more likely to follow weight. For example, the Harman Kardon Citation XX (\$7,500—sorry, I lied about the top price point; I didn't want to scare you off too soon) is rated at 250 watts per channel (continuous average output into 8 ohms) and weighs 93 pounds. The Carver M-1.5+ (\$799) is rated at 350 watts per channel (continuous average into 8 ohms for significant periods) and weighs a mere 16 pounds.

Now, why should one amplifier offer significantly more power at about a tenth the price and a fifth the weight? It seems to make no sense. Well, of course it doesn't unless you have some historical background for understanding power-amplifier design. Matti Otala, who designed the Citation XX, began by asking himself, "How do I build an amplifier so nearly perfect that it is unlikely ever to be faulted?" But Bob Carver asked himself a different question, "How do I build an amplifier that does what experience has shown me needs to be done yet costs next to nothing?"

Otala's thinking resulted in a device so rugged and conservatively rated that it is deemed able to pass 200 amperes of current (which would melt most people's house wiring and loudspeakers) on a short-term basis. Carver's amplifier is not really rated for excessive current capability, but I think if you tried to pass 200 amperes through it-or any other consumer amplifier I know of-you'd melt it down, except that its protective circuits would shut it off first. It should be clearly understood, however, that neither designer really expected a preposterous figure such as 200 amperes to be used for home sound reproduction. The point is merely that the Otala design goes so far

ECHNICS

The SE-A5MK2 amplifier, rated at 150 watts per channel, is designed for low-impedance loads. Price: \$800.

ARVER

The M-1.5 T delivers 350 watts per channel into 8 ohms yet weighs only 16 pounds. Price: \$799.

beyond the requirements of its intended application that nothing could conceivably perturb it, while a knowing tester with malice aforethought could probably figure out ways to make the Carver amp stumble now and again. But at normal volume levels (which could be *extremely* loud with products of this caliber), few experienced reviewers would hear any differences between these amps even if they wanted to.

"Digital ready" is a popular phrase in amplifier circles these days. Instead of emphasizing continuous average power, the "digitalready" designs maximize dynamic headroom, the ability of an amplifier to put out brief bursts of high power to handle short-term musical peaks. Since music is neither continuous nor constant in level, two amplifiers with identical power ratings will perform differently if their dynamic headrooms are different. The one with more dynamic headroom will handle power-demanding passages with more aplomb and less clipping of high-level signals.

This was demonstrated by Phase Linear at the Las Vegas Consumer Electronics Show last January. With inputs from the Phase Linear Compact Disc player, the outputs of Phase's DRS 900 power amplifier and Threshold's S/300, both rated at 150 watts per channel continuous average power, were displayed on an oscilloscpe. As might be expected, transients demanding very high momentary power caused visible—but not necessarily audible clipping by the Threshold amp.

Amplifier power has two components, output voltage and output current. Increasing either will raise the output power. With a nominal rating of only 100 watts per channel, Harman Kardon's hk870 power amplifier has an unusually high instantaneous output-current rating of 60 amperes. The manufacturer says that the amplifier's transient output power nearly doubles into 4-ohm loads and almost quadruples into 2 ohms. Soundcraftsmen's 1200 Digital/Dynamic Reserve power amp, designed for the highcurrent needs of digital material, is rated at 250 watts per channel but has a momentary reserve power of 600 watts. It uses a dual signaltracking power supply.

LOW DISTORTION

While one group of designers sought more power, others were taking the complaints of discontented listeners to heart. These designers reasoned that distortion was responsible for objectionable sound. Now, even a

HRESHOLD

The S/500 Series II is rated at 250 watts per channel. It can deliver a peak current of 35 amperes. Price: \$2,970.

ENWOOD

The Basic M-2 is a 220-watt-per-channel amplifier that includes the speaker cables in its feedback loop. Price: \$600.

decade ago it was hard to find a power amplifier with more than 0.2 per cent of the conventionally measured harmonic and intermodulation distortions at rated output, and all experiments I'm aware of have found that 0.2 per cent distortion is entirely inaudible in complex music. But if people were upset, something had to be done. First, additional types of distortion that were not being successfully eliminated had to be identified. Second, the traditional types had to be reduced to the vanishing point just in case.

The first objective entailed intensive original research, which is still going on, although less avidly than before because many types of distortion have been discovered and cured or else pronounced inconsequential. The second objective was definitely easier to achieve, but the means used, *negative feedback*, caused the amplifiers to generate new types of distortion.

Feedback, which made ultra-lowdistortion amplifiers possible, involves returning a portion of the signal at the output of the amplifier to the input, where it is combined with the input signal to compensate for the mistakes (distortion) that the amplifier is going to make in processing the input. It's a sophisticated idea, and many popular amplifiers have used feedback in various ways. But the investigations of novel types of distortion have pointed a finger at excess feedback as a possible source of unwholesome sound.

During the design stage of Sony's Esprit TA-N900, for instance, it was reported that the amplifier sounded better and more natural if no negative feedback was applied in the output stage, so that was eliminated—even though negative feedback would have improved the spec for total harmonic distortion

(THD). Still, the TA-N900, priced at \$1,750, produces 200 watts per channel with a THD of 0.05 per cent. Mission Electronics' d.c.-coupled Model 777 power amplifier relatively uses a low 14 dB of feedback for both the signal and d.c. bias. Local very high-feedback loops are used to achieve stability of the d.c. bias. The Model 777 has a THD of less than 0.02 per cent (0 to 40,000 Hz) and a price of \$1,400.

An alternative to feedback is feedforward, in which the signal path from input to output is actually two paths, one the workhorse circuit that actually does the job of driving the loudspeaker, the other a lightduty conduit that can be made to behave precisely (well, almost) as the designer wishes. When the two paths converge, the workhorse signal is made to conform to the dictates of the light-duty signal, and distortion goes away. The technique can be implemented in several fashions, and when appropriately elaborated can actually impose additional stability and regularized operating conditions on an amplifier.

Variations on this technique are Super-Feedforward by Sansui, Stasis by Threshold, and Current-Dumping by Quad. Yamaha's Zero Distortion Rule feeds the input signal forward, compares it with the actual output signal, and then feeds the difference signal (representing distortion) back to the input to apply correction. Hence the Yamaha amps could be described as both feedforward and feedback devices.

The negative-feedback loop in Kenwood's Basic M2 power amp is extended to the speaker's input terminal to compensate for losses or

UTTERMAN

The OTL-1 is rated at 150 watts per channel into 16 ohms (65 watts into 8 ohms). A vacuum-tube amplifier, it stands nearly 4 feet tall and has a 5-kilowatt regulated power supply. Price: \$9,000, other undesirable effects of speaker cable. The Power Linear Circuit in the Technics SE-A5MK2 (150 watts per channel, \$800) is designed to compensate for low-impedance conditions said to occur during amplification of music signals. This is a development of the linear feedback circuit with emphasis on drive linearity of the output stage. All these products deserve commendation for ingenuity, but be aware that advertising agencies have occasionally gotten a bit out of hand. Claims have appeared that certain amps not only have no distortion, but less than no distortion, which is both scientifically and philosophically unacceptable.

HIGH CLASS

Most amplifier output stages operate in what is known as Class AB, loosely defined as a condition in which only about half of the output stage is functioning at any given moment. The other half is mostly resting for the brief instant its contribution to the signal waveform is not required. Afterward it must be suddenly roused to take over its share of the work, and the split second of grogginess (nonlinearity) that results is known as crossover distortion, which is measurable and, like any other form of distortion, undesirable. How disagreeable or audible it is in competent Class AB designs

HILE

one group of designers sought more power, others reasoned that distortion was responsible for the objectionable sound.

is disputed, but it can be essentially eliminated with Class A operation, in which both halves of the output stage are kept "awake" constantly, through the application of what could be called electronic "tension" (d.c. bias is the technical term), even though both halves of the output stage are not constantly driving the loudspeaker(s).

My files show only two lines of amplifiers operating in pure Class A, one being the Mark Levinson ML-2 (\$3,245, 65 pounds, and a mere 25 watts of mono power), and the other the Krell products, comparably priced and comparably heavy but offering a lot more power (100 watts plus) in stereo as well as mono configurations. The reason for the substantial weight (and size) is the need to throw off the large amounts of heat generated by Class A biasing. Massive chunks of chassis will drain this heat away from devices rather semiconductor quickly, thereby stabilizing thermal conditions, which must be controlled for proper circuit operation.

Alternatives to pure Class A are offered in at least a dozen amplifier models, most of them from Japan and all of them sliding or switching from Class A to Class AB biasing conditions depending on the dictates of the audio signal. Logically, crossover distortion will be a much higher percentage of total ouput at low-power levels, so the Class A mode is usually devoted to pianissimos and Class AB for the fortissimos. The savings in weight, size, and price are usually great, though a few critics claim to hear the switching and find the sound objectionable. Many amps that are claimed to be Class A are really like these Class A/AB amps.

VACUUM-TUBE SOUND

Vacuum tubes are still with us, even though you'd be hard pressed to find one in most electronics stores. A cursory check revealed thirteen manufacturers marketing at least thirty-two vacuum-tube amplifiers, all of them quite expensive. A transistor is much, much cheaper to produce than a tube with its intricate hand-assembled innards. Many of the tube amps are meager in power output, such as the Audio Research D-79C, with 75 watts for \$6,000, and it isn't even the most expensive tube design. Other manufacturers of tube equipment, many of them American, include Beard, Counterpoint, David Berning, Con-Electro-Companiet, rad-Johnson, Esoteric, Audio Research, Precision Fidelity, Schug Electronics, and Luxman (one model).

A genuine novelty is the Futterman tube amplifier, which contrives, by use of banks of paralleled output tubes, to dispense entirely with the heavy and expensive output transformers that usually characterize tube amplifiers. The design is literally decades old, but the amp is still available, and in several versions, from New York Audio Labs.

Yet why tubes anyway? Why is the audio industry dabbling in antiquities? Inquire of a tube-gear manufacturer and he'll just switch

the thing on and play it for you. Since this practice has tended to generate sales on the spot, it is probably the best answer. For those who require verbal explanations, there are several making the rounds. One school of thought maintains that tubes clip more "gently" than bipolar-transistor output stages, which chop the waveform off brutally overload conditions are when reached. Some support for this argument is given by the popularity of transistorized amplifiers from NAD that incorporate "soft-clipping" circuits that simulate tube behavior. (Of course, many transistor designers would retort that an amplifier



tubes? Ask a tube-amplifier manufacturer and he'll just turn the thing on and play it for you.

has no business clipping anyway, and if it does, buy a bigger one.)

Another theory has it that tube designs somehow "gloss over" with flattering distortions a number of problems that transistor equipment brings right out in the open, sharply etched. A third idea (which I'll attribute to Threshold's Nelson Pass) is that vacuum tubes impose simplicity on the designer and that simple audio circuits have historically been applauded for sound quality. Dozens of transistors can be used in a solid-state amplifier, but only one dozen tubes is a very heavy complement for a vacuum-tube design.

The introduction of MOSFET's (metal-oxide semiconductor fieldeffect transistors) some years ago was expected to shed considerable light on the vacuum-tube question. In a number of respects, FET's behave more like tubes than transistors, and there is hope that, with FET ouput devices finally available, a transistorized amplifier that will satisfy even the most diehard tube enthusiasts is possible. FET ouput stages are now offered by such prominent manufacturers as Acoustat, Hafler, Hitachi, Kyocera, Perreaux, Sherwood, Soundcraftsmen, and VSP. Yet, as good as these are for most uses, I have heard no reports of tube amplifiers being abandoned by their loyal supporters. And there is another extremely at-(Continued on page 93)

MUSIC FOR YUPPIES

UPSCALE CLASSICS RECOMMENDED FOR THE TURNTABLES, TAPE DECKS, AND COMPACT DISC PLAYERS OF THE MOST AMBITIOUS YOUNG URBAN PROFESSIONALS

BY WILLIAM LIVINGSTONE



Rolex, Sony, and similar brand names confer status.

Fast food plays no part in the Yuppie life-style.

R EMEMBER the preppies? Well, they're not *in* anymore. As the Baby Boom generation has grown older and more sophisticated, the spotlight has fallen on a trendier group, the Young Urban Professionals, or Yuppies.

Ranging in age from twenty-five to forty-five, Yuppies live in or near major cities, go to the gym or run after work, have brunch on Saturdays and Sundays, drink Perrier and other designer waters, and give high priority to the goal of a six-figure income. Consumer electronic products are important to Yuppies.

The habitat, plumage, mating rituals, and ambitions of Yuppies have been described by writers Marissa Piesman and Marilee Hartley in *The Yuppie Handbook, The State-of-the Art Manual for Young Urban Professionals.* Published by Long Shadow, it is twenty-five dollars' worth of laughs for \$4.95.

Yuppies, who want to live life in the fast lane, are extremely inter-

ested in the status value of certain brand names. Like the Sony Walkman, such things as the Burberry trench coat, the Rolex watch (his), the Cartier tank watch (hers), the L.L. Bean duck-hunting boots, and the Gucci briefcase are very fashionable props for the properly attired Yuppie.

A Yuppie couple get extra points if their electronic equipment is installed in a media room. This room must contain an exercise mat so that the female Yuppie can do her workouts to the Jane Fonda fitness program on video cassette. Authors Piesman and Hartley do not indicate a status preference between Beta and VHS video-cassette recorders, but they have strong views on hi-fi furniture. Solid oak cabinets are good, they say, and black or white lacquer is excellent, but walnut veneer is not compatible with the Yuppie life style.

Leaving such details to decorators, I find the musical life of the Yuppie much more interesting. According to the *Handbook*, the Yuppie's day begins when the digital alarm activates a cassette recording of Pachelbel's Canon in D.

For a long time STEREO REVIEW'S "The Basic Repertoire" recommended a performance of the canon by the Jean-François Paillard Orchestra available on RCA or Musical Heritage Society, but our critic Stoddard Lincoln says that this version now belongs on a walnut-veneered shelf. It is far too bloated for Yuppies, who are devoted to less caloric nouvelle cuisine and the pursuit of physical perfection through aerobic exercise.

Lincoln recommends the leaner performance—on original instruments, of course—by Christopher Hogwood and the Academy of Ancient Music (Oiseau-Lyre DSLO 594). An extra point is given to this recording for spelling the title of the work as *Kanon* with the original *K*.

Piesman and Hartley have com-



Yuppie video monitors measure 19 inches max.

Yuppies avoid the giant speakers of the Woodstock generation

Consumer electronic products loom large in the Yuppie living space.

Yuppies strive for physical perfection through aerobics.

piled a short list of favorite Yuppie records, topped by Vivaldi's *Four Seasons* as transcribed for flute by James Galway (RCA LRL1-2284). In second place is Bessie Smith's "Empty Bed Blues" (Columbia G 30450). It's there, according to the authors, because Yuppies are fascinated by musical geniuses who died in miserable circumstances.

If that's the case, Yuppie collections must be well stocked with discs and tapes by the many jazz artists who died in miserable circumstances as well as by rock stars whose tragic deaths are as well documented as those of Mama Cass, Janis Joplin, and Elvis Presley.

For the benefit of Yuppies too busy to bone up on the miserable lives and deaths of some of the greatest musical geniuses in the classical field, I've run up a little list, something one could read before a meeting of the co-op board of directors. And I've chosen some suitably prestigious recordings of music by those geniuses to recommend to Yuppies in search of excellence.

DEATH IN VIENNA

First of all is Antonio Vivaldi himself (1669-1741). Quite successful in his church and teaching jobs in Venice, Vivaldi lusted after life in a faster lane. He converted his assets into cash and went to Vienna in 1740, but, failing to make it to the top at the court of Charles VI, he died there penniless the next year.

Galway's flute version of Vivaldi's *Four Seasons* is okay for background music for brunch, but a more upscale performance is the one by the English Concert conducted by Trevor Pinnock with Simon Standage as violin soloist. They've recorded it a couple of times, but you'll want the Archiv Produktion version (2534 003), which has the advantage (one extra point) of being recorded digitally. Give yourself *three* extra points if you have this one on Compact Disc.

Then there was Mozart, who ranks among the greatest musical geniuses in history. From the time he was a child, he was admired by the rich and famous all over Europe, but he never succeeded in billing adequately for his services. Constantly in financial difficulties, he really needed a good money manager. By the time he was thirty-six, he was so weakened by fatigue from overwork that he succumbed to what was probably typhus. The few friends who went to Mozart's funeral did not even accompany the coffin all the way to the cemetery, and he was buried in an unmarked pauper's grave.

For easing the fatigue of the overworked Young Urban Professional, I recommend the digital recording (Philips 6514 148) of Mozart's Piano Concertos Nos. 15 and 21 by Neville Marriner conducting the Academy of St. Martin-in-the-Fields with Alfred Brendel as so-

FONY FIYAL

ILUSTRATION BY



Mozart's Piano Concerto No. 21 is among his most familiar masterpieces. The poignant slow movement was used to great effect on the soundtrack of the classic Swedish film *Elvira Madigan*—about a beautiful young woman whose lover shot her to prevent her from starving to death.

BESSIE SMITH IS A FAVORITE BECAUSE YUPPIES ARE FASCINATED BY GENIUSES WHO DIED IN MISERABLE CIRCUMSTANCES.

Ludwig van Beethoven (1770-1828) towers above all other composers of the nineteenth century. He never lacked artistic recognition, but he suffered great anguish over the loss of his hearing, which began when he was only thirty. As his deafness progressed, he became bitter and morose, and his declining years were marked by isolation and depression.

Assuming that you bought recordings of Beethoven's nine symphonies and five piano concertos while you were still in college, I recommend that you amplify your collection with any of the piano trios recorded for Philips by the Beaux Arts Trio, especially the *Archduke* Trio (Philips 9500 895).

If you want more bankable names, get the recording of the *Archduke* by violinist Itzhak Perlman, cellist Lynn Harrell, and pianist Vladimir Ashkenazy (Angel DS-37818). Also highly recommended is the CBS Masterworks digital recording of Beethoven's Sonatas Nos. 1 and 2 played by pianist Emanuel Ax and the glamorous young cellist Yo-Yo Ma (CBS IM 37251). It won a 1983 Record of the Year Award from this magazine. The New Celibacy is a fact of the



Franz Schubert (1797-1828)

lives of many Yuppies—because they work so hard, not because of fear of sexually transmitted diseases. Things were different in the nineteenth century, when a few shots of penicillin might have altered the course of music history. Franz Schubert (1797-1828) was only one of the composers of that time who died of venereal disease.

Probably the greatest melodist of the Viennese school, Schubert lived his brief life near the poverty level, yet his music is filled with lyricism and beauty. In 1822 he contracted syphilis, which destroyed his central nervous system over the next six years. He was only thirty-one when he died.

Every record collection should contain Schubert's Unfinished Symphony (No. 8) and his Trout Quintet, of which there are many excellent recordings. Then, when you are ready for the Right Stuff or the Real Thing, go for the meditative, deeply moving works he composed in the last few months of his life.

Alicia de Larrocha, a wonderful artist at the height of her powers, has just recorded Schubert's last great piano work, the Sonata in B-flat Major (London LDR 71067). Get that one. I also recommend London's fine new digital recording (LDR 71071) of Schubert's Quintet in C by cellist Christopher von Kampen and the Fitzwilliam Quartet, an impressive young ensemble that all your friends may not yet have discovered.

PERISHING IN PARIS

The Public Broadcasting Service has brought opera into the lives of a lot of Yuppies. Among the operatic geniuses who came to miserable ends must be counted the composer Vincenzo Bellini (1801-1835).

After a number of triumphs in major Italian opera houses, Bellini went to Paris, where he had a brilliant success with *I Puritani*. His annual summer bouts of diarrhea turned out not to be the result of a change of water or diet but symptoms of chronic amoebic dysentery, which killed him before his thirtyfourth birthday. During Bellini's final illness his friends shunned him because his symptoms resembled those of cholera, which is highly contagious. He expired in a Parisian suburb alone.

Bellini's masterpiece Norma was a favorite vehicle of the superstar soprano Maria Callas (1923-1977), who sacrificed her career for life in the fast lane with Aristotle Onassis. After she lost him, life had little meaning for her. Though rich, she wasted away at fifty-four in Paris, depressed and (except for her servants) alone.

Callas still lives, however, in her recordings. I recommend her stereo version of *Norma* (Angel S-3615). Recorded in 1960, it has less than up-to-date sound, but its artistic value will enhance the quality of any record collection.

It was once thought that Georges Bizet (1838-1875), composer of the ever popular *Carmen*, died of a broken heart because that opera failed at its première. This story has been dismissed as melodramatic nonsense. *Carmen* had more than thirty

THE GREAT MELODIST FRANZ SCHUBERT CONTRACTED SYPHILIS, WHICH DESTROYED HIS CENTRAL NERVOUS SYSTEM. HE DIED AT THIRTY-ONE.

performances in its first season. Bizet's modern biographers suggest that a persecution complex and the rigors of an unhappy marriage lowered his resistance so much that one of his recurrent attacks of quinsy (severe tonsillitis) killed him at the age of only thirty-six.

Carmen has never been more popular than it is today, with several different versions before the public on stage and screen. I recommend the new Deutsche Grammophon recording (274 1025) with (Continued on page 100)



PROPER HOOK-UP IS VITAL TO GETTING THE BEST FROM YOUR STEREO AND VIDEO COMPONENT SYSTEMS.

IGURING out the best way to connect the components of a stereo system is as critical as deciding just which units to buy. After spending months carefully selecting components, many an unfortunate novice audiophile has found himself sprawled on the livingroom floor surrounded by empty boxes and poring over wiring diagrams trying to decide whether to connect a time-delay system ahead of a tape deck in the signal path (after is usually better) or whether it's okay to connect the audio output of a video-cassette recorder to the auxiliary input of a receiver (it is).

But connecting hi-fi and video components is relatively easy once you get the hang of it and learn to use the various connectors and adaptors that are available. And making the right connections will enable you to get the most out of your system.

CONNECTING SPEAKERS

Most of the source and signalprocessing components in a system come complete with cables for connecting them to an amplifier or receiver. With speakers, however, you generally have to buy the cable separately. You don't need super-thick cable, but avoid the 24-gauge zip

BY DAWN GORDON



cord that is sometimes sold as "speaker wire." STEREO REVIEW recommends using at least 18-gauge zip cord or 16-gauge heavy-duty zip cord. For long runs, use the heavier gauge. But if you think you need a thicker, "exotic" speaker cable, go ahead—it certainly can't hurt.

Beginners are sometimes confused by instructions to connect their speakers "in phase." It's actually very simple. A speaker is connected in phase if the positive (usually red) terminal on the amplifier is connected to the positive (red) terminal on the speaker and the negative (usually black) terminal on the amp to the negative (black) terminal on the speaker. Even with a very long cable run, you can keep the connections straight by using the coding incorporated in the cable itself: either the two conductors will be differently colored or else one of them will have a ridge or a groove in the plastic insulation around the wire.

Additional speaker pairs are connected in the same way, but if you plan on playing more than one pair at the same time, you need to be careful or you could blow out your amplifier. Check your amplifier's specifications to see what impedance it can handle, and then be sure that the combined load presented by your two (or more) pairs of speakers stays above that. To figure



out what the combined load is, follow this formula:

- $R_1 \times R_2$
- $R_1 + R_2$

where R_1 is the nominal (rated) impedance of one pair of speakers and R_2 is the impedance of the other pair. If you have, say, a pair of 8-ohm speakers in your living room and a 4-ohm pair in your bedroom, playing them together will present a combined impedance of only 2.6 ohms. A lot of amplifiers will balk at that, particularly since the impedance may fall even lower at certain frequencies.

Another approach is to buy an accessory speaker-switching unit. Devices are available that can handle from two to six pairs of speakers in any combination, ranging in price from \$5.95 (Radio Shack) to \$280 (Russound SD-4) for one with multiple independent volume controls. Most cost around \$80, and some include a protection circuit or an impedance-matching transformer so you can't blow an amp.

CONNECTING SOURCES

Stereo components sold in the U.S. typically use "RCA-type" phono plugs, generally connected with short lengths of shielded cable, for source inputs and outputs. Instead of positive and negative terminals as speakers have, each input and output consists of a pair of terminals for the two channels; the plugs at each end of the cable are differently colored so you can match them up correctly ("red for right" is an easy memory device since red is usually one of the two colors).

Inputs for a record player, tuner, or tape deck are normally identified as such on the back of a preamplifier or receiver. If there is no specific input designated for a digital or video source (a Compact Disc player, video tuner, PCM digital

Top photo shows three ways to terminate a speaker cable: bare wire, banana plugs, spade lugs. Next are three ways to plug one component into another: top to bottom, RCA-type phono plugs, stereo phone plug, and mini stereo phone plug. Third photo shows video connectors: clockwise from top, 75-to-300-ohm matching transformer, F connector at end of coaxial cable, signal splitter. Bottom photo shows a video switcher. All of these parts are from Radio Shack. tape recorder, VCR audio output, etc.), the "auxilary" input can be used. *Never* try to use the "phono" input for one of these "high-level" sources.

High-level sources can also be connected using a tape input if you're not using it for a tape deck. The tape input is especially flexible because, unlike the other inputs, it is paired with an output. Since most people will want to record on a tape deck as well as using it to play back recorded tapes, there have to be

IF THE PREAMPLIFIER OR RECEIVER HAS NO SPECIFIC INPUT DESIGNATED FOR A DIGITAL OR VIDEO SOURCE, USE THE AUXILIARY OR TAPE INPUT. NEVER TRY TO USE THE PHONO INPUT FOR ONE OF THESE HIGH-LEVEL SOURCES.

connections enabling signals to travel both ways, *from* the preamplifier to the tape deck and from the tape deck *to* the preamp. This inputoutput circuit is called a *tape loop* (or *tape-monitor loop*). Preamplifiers and receivers vary in the elaboration and flexibility of their tape circuits, but these days most of them that can handle two or more decks have built-in dubbing connections so that one deck can function as the program source for the other.

In the overall signal path from a program source to the loudspeakers, the tape loop comes before the preamplifier's volume and tone controls. Thus, the signal to the tape heads is not affected by these controls. This makes it possible to use a tape loop to connect various signalprocessing components such as an equalizer, a noise-reduction system. or a dynamic expander. Ordinarily, these components are connected into the preamplifier's tape inputoutput terminals, and then the tape deck, if any is used, is connected into similar terminals on the signal processor. The tape-monitor switch on the preamplifier permits use of

the signal processor whether or not the tape deck is being used.

If you have a separate preamplifier and power amplifier, or if you have an integrated amplifier with a set of pre-out/main-in jacks, you can avoid tying up a tape loop by connecting a signal processor between the preamp and power-amp sections. This is particularly desirable if you have a time-delay or ambience-synthesis system with a separate power amplifier for the rear speakers. If it's connected through a tape loop, you'll have to adjust the volume for the rear speakers separately every time you change the main volume setting. If it's connected between your preamplifier and the power amplifiers, you can set the optimum volume balance initially and then adjust the volume with the control on the preamp.

For some elaborate systems with many source components, even a high-quality preamplifier may not provide enough inputs. A *program route selector* may be the answer. Such a device connects like a signal processor and can switch various inputs and outputs through your system, from extra CD players to multiple tape decks with cross-dubbing facilities. Prices depend on the features offered and range from \$25 for a basic Radio Shack unit to \$230 for the versatile dbx Model 400.

POWER CORDS

Most components use some power, and if you have an elaborate system you might wonder what to do with all the power cords. Fortunately, only the power amplifier (or poweramplifier section of a receiver or integrated amp) is likely to draw a significant amount of power. It is perfectly safe, therefore, to use multiple-socket plugs to connect several components to the same wall outlet or to the same a.c. outlet on the rear of an amplifier or receiver. If your amplifier has both switched and unswitched outlets, use the switched outlet for components you want on only when the amplifier is on, the other(s) for those you don't mind having on all the time.

CONNECTING ANTENNAS

After you install a super multi-element TV/FM antenna with rotor on your roof for the entire neighbor-(Continued on page 98)





BY JULIAN HIRSCH

s prices drop, more and more Compact Disc players are being added to home hi-fi installations. New buyers are always concerned about the compatibility of the CD player and their existing equipment, and the CD's ability to produce high-level peaks through powerful amplifiers focuses attention especially on the power-handling ability of speakers.

Let's face it-the speaker power ratings supplied by manufacturers can be confusing. They run the gamut from none at all to detailed listings of the allowable power in each frequency range as a function of time. Most often, however, this specification is merely a range of power levels, such as the "50 to 500 watts" rating of the Ohm Walsh 4 reviewed in this issue.

This kind of specification is intended only to define loosely the range of rated amplifier power outputs that a manufacturer considers to be suitable for driving his speaker. The lower figure is the approximate minimum amplifier rating that will produce a comfortably loud listening level in a typical room, while the upper one is the highest rated output that the manufacturer feels can be used safely with the speaker.

It must be understood that these are extremely rough figures, not to be taken as gospel by the consumer. For example, Ohm's specification for the Walsh 4 states that the speaker requires only 1 watt input to develop an 87-dB sound-pressure level (SPL) at a 1-meter distance. A 10-watt input should produce an SPL of more than 90 dB in the listening area, which is loud enough to preclude comfortable conversation in the room. Most of the time, then, a good 25- or 30-watt amplifier would probably be perfectly satisfactory with this speaker.

Of course, most people sooner or later wish to play their music a little louder than they usually do. And what about the broad dynamic range of digital Compact Discs? As little as a barely noticeable 3-dB increase in SPL will double the power requirement to 50 or 60 watts per channel. The reason for the 50-watt lower limit in the Ohm specification should now be obvious.

The upper power limit in a speaker specification may be determined by the onset of unacceptable distortion or by the potential for actual physical damage to one or more of the drivers in the speaker system. In most cases, the determining factor is physical damage, either deformation or destruction of the mechanical system (cone or suspensions) or thermal burnout of the voice coil. Which limit applies depends on the size of the driver and the frequency range in which it is operated.

The lower-frequency drivers (the woofer and the lower-midrange driver in a four-way system) usually have to handle the largest part of the total signal power supplied to the system. The maximum sustained power levels in most orchestral music occur at frequencies below 1,000 Hz. To radiate acoustic power in this frequency range requires a considerable cone or diaphragm amplitude range (acoustic-suspension woofers can be capable of a total excursion of an inch or more at 30 Hz). Thus, the most likely source of damage is actual tearing of the cone or its suspension. Sometimes the voice-coil form is pulled away from the cone's apex, or the wire may separate from the form on which it (Continued on page 94) is wound.







Systems Audio and Video Merge in A PRODUCER'S DINING ROOM

BY GORDON SELL

West Coast producer of music videos, Randi Michaels frequently entertains friends and associates who are also involved with music professionally. "When I first bought the projection TV, I put it in the den with my hi-fi equipment," she says. "At parties, everyone crowded around to watch videos. So I moved the screen and my KEF's into the dining room. Now that's where I spend most of my time."

Another advantage to the location was the presence of a small pantry off the dining room. It is now filled with LP's, CD's, audio and video tapes, video discs, and all the components needed to play them.

The audio equipment, which is mostly from Denon, includes a DP-100 turntable, DCD-1800 Compact Disc player, DR-M33 cassette deck. TU-767 tuner, PRA-6000 preamp, two POA-8000 200-watt-per-channel Class A mono power amps, and an open-reel tape deck. Also in the installation are a Sony open-reel deck, NEC Beta Hi-Fi and Panasonic VHS video-cassette recorders, a Pioneer LaserDisc player, and three NEC TV tuner/timers. The projection TV is by NEC, and the speakers are KEF 105.4's.

What's next? "VHS Hi-Fi when it comes out," Ms. Michaels says. "Then perhaps a surround-sound system. I started out by getting equipment for my work. Then I got hooked on it."



RECORD MAKERS

AND STEVE SIMELS

IF the four members of the British rock group Queen look especially serious, perhaps it is because they have been working with some very serious artistic material. Their newest video, Radio GaGa, is intercut with scenes from Fritz Lang's silent sci-fi film classic Metropolis. Interestingly, the band had to purchase the rights to the footage from disco producer Giorgio Moroder (of Donna Summer and Flashdance fame), who now owns Metropolis and plans to rerelease it with an electronic soundtrack of his own. Queen is slated to contribute to the score of Moroder's project as well.

T HE first video-cassette release from Video Arts International, a newly formed company specializing in cultural videos, presents some of Russia's greatest dancers in some of its most celebrated ballets. Included is the *Carmen Ballet* to mu-



Vasiliev as Spartacus

sic of Rodion Shchedrin, danced by Maya Plisetskaya, and Khachaturian's full-length ballet Spartacus, with Vladimir Vasiliev, as well as a full-length Swan Lake with Plisetskaya. For a complete list and prices write VAI at P.O. Box 153, Ansonia Station, New York, N.Y. 10023.

LAST year an album featuring George Shearing and Mel Tormé on the Concord



Queen takes the classics seriously on video

Jazz label won Tormé his first Grammy, for Best Jazz Vocal Performance (Male). It was recorded the year before at the annual summer festival held at the Paul Masson winery in Saratoga, California, from which a number of other recordings and films for television have come. A schedule of this vear's concerts and other events is available free by writing to Paul Masson Summer Series, P.O. Box 1852, Saratoga, Calif. 95070. Cheers!

HE just-released Angel re-T cording of violin concertos by contemporary American composers Robert Starer and Earl Kim performed by Itzhak Perlman and the Boston Symphony under Seiji Ozawa represents a couple of firsts. It results from the first grant for a recording ever awarded by American Express and one of the first large grants awarded to a major orchestra by the National Endowment for the Arts through its Music Recording Program. American Express and the National Endowment contributed \$20,000 each to make the project possible. \Box

T HE cast of A Chorus Line 2001? No, just those lovable spud boys of Devo, keeping a collective eye out for their newly released video album "We're All Devo" (see review on page 78). It's a collection of nearly all the group's promotional films since their underground, pre-Warner Brothers days, including the original Satisfaction and Jocko Homo. The program also includes guest appearances by Saturday Night Live's Larraine Newman (as Donut Rooter, numero uno Devo fan and teeny-bopper heart-throb) and former Sixties acid guru

Aboveground and lovable, Devo salutes video



Dr. Timothy Leary, whose reading of lines indicates that his brain pan has not yet been completely fried. Available in Sony VHS stereo, Beta Hi-Fi, and Pioneer LaserDisc formats.

His year's Metropolitan T Opera historic broadcast album is a live recording of Gounod's Roméo et Juliette with soprano Bidú Sayão and tenor Jussi Bjoerling in the title roles. Billed as "a performance still cited with a certain hushed reverence." it dates from the Saturday matinee of February 1, 1947. which was broadcast nationwide by Texaco. The album is available as a gift to those who contribute \$125 or more to the Metropolitan Opera Fund, P.O. Box 930. New York, N.Y. 10023.

B^{IZET'S} Carmen has al-ways been a popular opera, but perhaps never in its hundred-plus years has it come in for so much "treatment" (some would say mistreatment) as in the past few months. This has been particularly true in films and on records. The latest entry is a film directed by Francesco Rosi that presents the opera straightforwardly as written. It has the American soprano Julia Migenes Johnson in the title role and Placido Domingo as Don José. Lorin Maazel conducts. The film won't be released in this country until late summer or fall, but RCA is already selling Erato's soundtrack re-

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> RENAULT THE ONE TO WATCH

RECORD MAKERS

cording of *Carmen* complete or as a single album of excerpts on both LP and tape. Compact Discs will follow.... A live recording of a 1982 Peking production of *Carmen*, sung in Chinese (!), is available now on the Stil label, an AudioSource import.

T HE current American tour of the English National Opera was preceded by a fair amount of controversy. It arose over the company's otherwise acclaimed production of Verdi's Rigoletto, to which a couple of Italian-American groups took exception-for its updated setting, in Manhattan's Little Italy section downtown, and its explicit references to the Mafia. Anyone unable to see and hear the production for himself fortunately can fall back on the "original-cast" re-cording, sung in English, with John Rawnsley in the



Rigoletto as Godfather

title role. Angel is releasing it this month. Note, though, that the booklet accompanying the recording has been "corrected" for the American market.

MORE VIDEO NEWS: Just out from MGM/UA is "Cool Cats," a new home video program that proves once again that in rock-androll the look is just as important as the sound. Subtitled "25 Years of Rock-and-Roll



Don José (Placido Domingo) threatens Carmen (Julia Migenes Johnson) in the new film of Bizet's opera.

Style" (and based on the book of the same name from Delilah publishing compa-ny), "Cool Cats," like the earlier "Complete Beatles" and "Girl Groups" made by the same creative team, is a marvelous nostalgic glimpse of some legendary performers and bands, including Elvis Presley, David Bowie (looking far more flamboyant than he usually does in these pages), Blondie, Janis Joplin, the Stray Cats. and lots more. Commentary is supplied by noted pundits, including the Who's Pete Townshend. Also new and noteworthy from MGM/ UA: "The Everly Brothers Reunion Concert," a slightly longer version of the special aired recently on HBO. Both programs are available in VHS stereo, Beta Hi-Fi, and both disc formats.

Bowie as Cool Cat



T HE National Portrait Gal-lery in London has just hung a painting of former Beatle Paul McCartney by Humphrey Ocean. It is only recently that a work of art representing a living British subject was accepted by the gallery, and until now rockand-rollers, living or dead. have never been among them. The McCartney portrait resulted from an awards program sponsored by John Player, the cigarette manufacturer, in which Ocean was a 1982 winner.

RACENOTES. The new Yes Gvideo, Leave It, the follow-up to their comeback smash Owner of a Lonely Heart, was delivered to the media in eighteen slightly differently edited versions as part of an April Fools Day prank by directors Kevin Godley and Lol Creme (formerly of 10cc). A spokesman for the band claims that the video is a remarkably innovative piece of work, with "no women or vintage automobiles or desert sands to be seen." . . . End of an Era: The legendary Gold Star Studio in L.A., used at various times by everybody from Eddie Cochran to the

Bee Gees but best known as the home of Phil Spector's "Wall of Sound" (thanks to the studio's unduplicable echo chamber), has been bulldozed to make way for a commercial building. The irrepressible Flo and Eddie (a.k.a. Mark Volman and Howard Kaylan) are hard at work composing the score for the first home video-disc adventure game. Tentatively titled "Quest," the game's music will be entirely computer generated. The game itself was designed by Rick Dyer, who did "Dragon's Lair," the first arcade laser-disc game..... JEM Records has just released an album that may well overtake "Thriller" as the all-time sales champ, at least among sentient nonhumans. Entitled "Beatle Bark-



McCartney as art

ers," the LP collects twelve Lennon and McCartney classics as performed by an uncredited rock band and an ensemble of dogs and various barnyard animals. Wait till you hear the a cappella woofing on Paperback Writer.... STEREO REVIEW Record of the Year Awardwinning pop-rocker Marshall Crenshaw is at work on his third Warner Brothers album. This time the production is being handled by Mitch Easter, who did the "Murmur" sublime for Georgia psychedelic revivalists R.E.M.



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BEST OF THE MONTH

THIS IS SPINAL TAP: A DEVASTATING BUT AFFECTIONATE AND CONVINCING SEND-UP OF HEAVY-METAL ROCK



Polydor's new soundtrack album has the same virtues as the film. While it's a devastating send-up of the most banal clichés of heavymetal, you can also tell that its creators take furtive, guilty pleasure at being able to reproduce the genre's idiocies so convincingly.

Largely responsible for this splendid lark is one Chris Guest, who's done similar parodies on *National Lampoon* albums. The approach is to take an aspect of the subject—for instance, the preposterous adolescent mysticism that's one of heavymetal's secondary themes—and burlesque it. It's that direct. So when you hear a cut called *Stonehenge*, say, you should bear in mind that, as my late colleague Noel Coppage once observed, "Hard satire has to bypass a lot of throwaway laughs to stay on the point." Be assured, however, that there are some blatantly, deliberately ridiculous things here that are guaranteed to leave you writhing on your floor in helpless laughter. Frankly, I can't even hear some of the song titles without breaking up. My personal fave is *Tonight I'm Going to Rock You Tonight* (kind of says it all, don't you think?).

Perhaps the cream of the jest is that the band members—including Saturday Night Live alumnus Harry Shearer and Michael McKean, better known as Lenny from Laverne and Shirley—actually play their own instruments. And all the songs were written by Guest, Shearer, McKean, and director Rob Reiner, whose collective lyric-writing talent is nothing less than awesome. ("You're too young and I'm too well hung" might be the greatest line in the history of rock-and-roll.)

This Is Spinal Tap may not put the real-life bands it evokes so brilliantly out of business, but whether you love heavy-metal or hate it, this is a good show. Steve Simels

THIS IS SPINAL TAP (Guest, McKean, Shearer, Reiner). Originalsoundtrack recording. Christopher Guest (vocals, guitar, mandolin); Michael McKean (vocals, guitar); Harry Shearer (vocals, bass); David Kaff (keyboards); R. J. Parnell (drums, percussion); Harlan Collins (synthesizer). POLYDOR 817 846-1 \$8.98, © 817 846-4 \$8.98.

REFRESHING MODERN PERFORMANCES OF HANDEL CONCERTOS

Having been inundated with recordings of the music of the Baroque masters performed on early instruments in the authentic style, I find it refreshing indeed to hear Handel's beautiful concerti grossi performed for a change on modern instruments in a contemporary manner. Not that there is anything wrong with authentic instruments and styles, but some of the proponents of the "more authentic than thou" school tend to reject the validity of modern expression.

In a new Philips recording led by violinist-conductor Iona Brown, the Academy of St. Martin-in-the-Fields proves beyond a shadow of a doubt that Handel's music sounds just as invigorating on modern instruments as on early ones. These wonderful performances of the Op. 6 concertos bring out Handel's unique blend of energy and lyricism



BEST OF THE MONTH



Anderson: exotic juxtapositions

through straightforward, no-nonsense readings. The recorded sound is first-rate too. Stoddard Lincoln

HANDEL: Concerti Grossi, Op. 6. Academy of St. Martin-in-the-Fields, Iona Brown cond. PHILIPS © 6769 083 three discs \$35.94, © 7654 083 three cassettes \$35.94.

LAURIE ANDERSON'S FANTASTIC, HYPNOTIC ''MISTER HEARTBREAK''

ISTENING to "Mister Heart-L break," Laurie Anderson's new album, for the first time, I felt as if I'd been lifted from my office desk by a giant hand, set down on a tropical island on the other side of the earth, and handed a ringing telephone. That's how disorienting Laurie Anderson is. "Mister Heartbreak" is the performance artist's Robinson Crusoe. The music is primitive, incantatory, hypnotican organic blend of African percussion and wind instruments, with the occasional intrusion of electric guitar and bass, upon which Anderson's Vocoderized vocals are superimposed.

"Mister Heartbreak" juxtaposes the everyday and the fantastic. It's like walking into your bedroom and finding the furniture nailed to the ceiling. In Sharkey's Day, Anderson describes a man who's troubled by dreams he can't quite remember. The connection between his environment and his conscious self has been short-circuited. The music is as dense and alive as a swamp inhabited by a thousand small birds, bugs, and furry mammals. Above this buzzing thicket of sound—including Adrian Belew's screeching guitar—Anderson's matter-of-fact vocals are strangely calming.

It is the great paradox of Laurie Anderson's voice that it is so reassuring when everything around it seems like a soundtrack for Hieronymus Bosch. Nowhere is this so striking as in *Langue d'Amour*, a strange retelling of the fall of man in which love is the forbidden fruit and boredom, not pride, is Eve's undoing. Anderson's rich, measured voice is positively seductive when she describes the tongue of the snake as a flicker of fire.

"Mister Heartbreak" is brimming with the puzzling and the exotic. It yields up its meaning gradually and only with some effort, but the effort is well rewarded. Mark Peel

LAURIE ANDERSON: Mister Heartbreak. Laurie Anderson (vocals, Synclavier, violin, Vocoder, percussion); Adrian Belew, William S. Burroughs, Peter Gabriel, Bill Laswell, Nile Rodgers, David Van Tieghem, Phoebe Snow, others (vocal and instrumental accompaniment). Sharkey's Day; Langue d'Amour; Gravity's Angel; Ko-KoKu; Excellent Birds; Blue Lagoon; Sharkey's Night; WARNER BROS. 25077-1 \$8.98, © 25077-4 \$8.98.



Conductor Brown: no nonsense

SUPERB PLAYING IN TWO ROMANTIC VIOLIN CONCERTOS

F OR a work as well loved as Wienawski's Second Violin Concerto, it is astounding to find only four current recordings. The newest, on DG, has Itzhak Perlman



Perlman, Barenboim: fine proportion

as soloist with Daniel Barenboim conducting the Orchestre de Paris. All around, it is probably the most attractive version of the work since the incomparable mono record by Isaac Stern with Eugene Ormandy was deleted some years ago.

The Saint-Saëns Third Violin Concerto, which shares the new disc, is also superbly played. Perlman shows the same fine sense of proportion that Stern brought to the work in his CBS recording with the same conductor and orchestra. This is marvelous music making, and the sound is gorgeous. *Richard Freed*

SAINT-SAËNS: Violin Concerto No. 3, in B Minor, Op. 61. WIENAWSKI: Violin Concerto No. 2, in D Minor, Op. 22. Itzhak Perlman (violin); Orchestre de Paris, Daniel Barenboim cond. DEUTSCHE GRAMMOPHON @ 410 526-1 \$11.98, © 410 526-4 \$11.98; @ 410 526-2, no list price.
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LAURIE ANDERSON: Mister Heartbreak (see Best of the Month, page 68)

THE COUNTRY GENTLEMEN: Good As Gold. The Country Gentlemen (vocals and instrumentals); instrumental accompaniment. Good As Gold; I Just Got Tired of Being Poor; Guysboro Train; Hard Times; When They Ring Those Golden Bells; and seven others. SUGAR HILL SH-3734 \$7.98.

Performance: A joy Recording: Fine

The trouble with most bluegrass albums is that they sound the same from start to finish. If there is any variation at all, it's usually in the choice of lead singer, the tempo of the songs, or the inclusion of the obligatory instrumental tune. What a joy, then, to hear the new Country Gentlemen album, "Good As Gold," on Sugar Hill.

One of the first bluegrass bands to strive for a "progressive" sound, the Gents have probably converted almost as many people to bluegrass as Flatt and Scruggs. Part of their success must surely be traced to lead singer/guitarist Charlie Waller, the founder of the group and one of the most authoritative and affecting voices in bluegrass music. Waller is in even better form than usual on this album (his delivery of the late Stan Rogers's Guysboro Train is positively bonechilling), probably in celebration of the return of mandolinist/tenor Jimmy Gaudreau, who performed on all the Gents' classic material from the late Sixties and early Seventies.

There's not a slow moment on the entire LP. In the end, it's apparent that the Country Gentlemen are the bluegrass band most other groups only aspire to be, and "Good As Gold" is the album they can only hope for. A.N.

MENUDO: Reaching Out. Menudo (vocals); instrumental accompaniment. Like a Cannonball; Indianapolis; Heavenly



THOMAS DOLBY

THOMAS DOLBY'S EP "Blinded by Science" struck a nearly perfect balance between technology and pop music, rhythm and melody, mystery and slap-stick. His new album, "The Flat Earth," never quite catches this balance. The songs lie at two extremes. At one, Dolby seems to be trying to outdo the rhythmic complexity of "Science." At the other, he works toward a softer, more subdued and overtly emotional effect. The first group includes Dissidents, Mulu the Rain Forest, and Hyperactive, which are elusive, exceedingly busy, and largely unap-proachable. The second group—*Flat Earth, Screen Kiss, White City*, and the Dan Hicks ballad I Scare Myself-while packed with Dolby's characteristic rhythmic tinkering and suffusion of sound effects, are far more appealing because they hold to a central melodic theme.

In general, "Flat Earth" is far less dense texturally than "Science." More important, Dolby steps out from behind his machines to take on a larger vocal presence.

Angel; Because of Love; Motorcycle Dreamer; If You're Not Here (By My Side); and four others. RCA AFL1-4993 \$8.98, © AFK1-4993 \$8.98.

MENUDO: A todo rock. Menudo (vocals); instrumental accompaniment. Indianapolis; Piel de Manzana; Chicle de amor; Una buena razon; Todo va bien; He may be flat a good part of the time, but he is a zealous and sensitive interpreter, and his lyrics are clever and frequently disturbing.

Dolby also uses the human voice as a prop. There are half a dozen conversations going on here, the most intriguing one at the conclusion of *White City*, in which the subject, a man completely selfabsorbed in drug use, discourses convincingly but incoherently until he realizes no one is listening: "Oh, you're not there either." It's just one of many arresting, though essentially nonmusical, flashes of inspiration that make Dolby, at least this time out, a far more interesting story teller than music maker. *Mark Peel*

THOMAS DOLBY: The Flat Earth. Thomas Dolby (piano, effects, vocals); vocal and instrumental accompaniment. Dissidents; The Flat Earth: Screen Kiss; White City; Mulu the Rain Forest; I Scare Myself; Hyperactive. CAPITOL ST-12309 \$8.98, © 4XT-12309 \$8.98.

Explanation of symbols:

- Digital-master analog LP
- \odot = Stereo cassette
- Digital Compact Disc
- 8 = Eight-track stereo cartridge
- Φ = Direct-to-disc recording
- 𝕲 = Monophonic recording

Si tu no restas; Amor en bicicleta; and three others. RCA INTERNATIONAL IL8-7241 \$8.98, © IC8-7241 \$8.98.

Performances: The usual Recordings: Good

Menudo's first English-language album, "Reaching Out," consists of translated versions of their biggest-selling songs in Spanish. The release raises the question of whether this super-popular Hispanic group, or its material, loses in translation. It doesn't. A close comparison with Menudo's latest Spanish-language album, "A todo rock," reveals no major differences in attack or effect. The consistency is readily apparent in Indianapolis, the only song that appears on both albums. A tribute to that most American of all sporting events, the Indianapolis 500 auto race, the song sounds virtually the same in both versions-though it is perhaps more fun to hear the title pronounced in Spanish as "In-dian-a-polees!'

The Spanish album is also a little more fun because it contains two numbers with a pronounced Caribbean flavor, *Piel de Manzana* and *Todo va bien*, the latter having a carnival spirit. In general, the songs on both albums are strictly mainstream, inoffensive, maybe even bland, but undeniably appealing. All according to formula, true, but Menudo's formula works. *P.G.* MISSING PERSONS: Rhyme & Reason. Missing Persons (vocals and instrumentals). The Closer That You Get; Now Is the Time (For Love); Surrender Your Heart; Clandestine People; and six others. CAPITOL ST-12315 \$8.98, © 4XT-12315 \$8.98.

Performance: By prescription only Recording: Over the counter

If "Rhyme & Reason" came in bottles, you'd need a prescription for it. As it is, I lost five pounds listening to this speededup second album by Missing Persons, which is led by its drummer and fronted by a Bride-of-Frankenstein vocalist. Drummer Terry Bozzio pushes the group through the music at what-would be an ungovernable pace for most bands, yet they never miss a beat. His platinumwire-haired wife, Dale, carries off her role as Blonde with the precision of a Blade Runner android. As a singer and as a sex symbol, she seems less human than electronic. The best I can say for the lyrics here is that they do rhyme. But as a strong dose of sonic and kinetic thrills, "R & R" M.P. gives fast, if temporary, relief.

DOLLY PARTON: The Great Pretender. Dolly Parton (vocals); vocal and instrumental accompaniment. Save the Last Dance for Me; Turn, Turn, Turn (To Everything There Is a Season); She Don't Love You (Like I Love You); We'll Sing in the Sunshine; and six others. RCA AHL1-4940 \$8.98, © AHK1-4940 \$8.98.

Performance: Twilight Zone Recording: Too much top end

Back in her old syndicated TV days, Dolly Parton would often open her shows with spirited rock offerings such as *Takin' Care of Business, Burnin' Love*, or whatever other pop song happened to catch her fancy that week. Her voice would soar over the melody with such verve and spirit that those of us who were then only marginal country fans would ache for the day when she would break out of her straight-country confines. Now, some eight years later, along comes a whole collection of pop, soul, and early rock-and-roll classics, but I'm sorry to say it's an almost total disaster.

The blame lies not with Parton but with producer Val Garay, who has paired one of popular music's most emotional singers with some of the most vapid and vacuous instrumental tracks since the old 101 Strings albums. In the midst of this mess, however, is one of Parton's most affecting and wistful performances, a reworking of Troy Seals and Donnie Fritts's We Had It All that probably cuts closer to the bone than anything else she's ever done. A.N.

STEPHEN FUNK PEARSON: Hudson River Debut. Stephen Funk Pearson (gui-

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tar). Thusslegarth; Ardea Herodias Waltz (Dance of the Great Blue Heron); Brunella the Dancing Bear; Tricoscopie 1, 11, 111; Tubescent; and three others. KYRA K1001 \$8 (from Kyra Records, 5 Willow Dock Road, Highland, N.Y. 12528).

Performance: Promising Recording: Good

The cover photo of Stephen Funk Pearson's debut album shows the young guitarist sitting on a chair in a rubber boat. wearing a jaunty bow tie and newsboy's cap, and oblivious to the ice floes that surround him. Inside, naturally, one ex-

pects to find an eccentric folk artist who chortles on in witty lyrics about this warp-jawed world of ours, or perhaps an urban blues artist whose middle name was born of musical preference. Instead, the album reveals Pearson to be an unusually inventive instrumental performer (no lyrics) as well as a composer of a sophisticated hybrid of classical and popular music. Some of the eight selections, performed on the gut-string guitar, are melancholy and somber, while others, including Brunella the Dancing Bear, are charming and fanciful in a childlike way. An impressive bow. A.N.

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QUEEN: The Works. Queen (vocals and instrumentals); other musicians. Radio GaGa; Tear It Up; It's a Hard Life; Man on the Prowl; Machines (or 'Back to Humans'); and four others. CAPITOL ST-12322 8.98, © 4XT-12322 \$8.98.

Performance: Overwrought Recording: Humongous

I've resisted, even actively loathed, Queen's bombastic and self-mythologizing output in the past, but I find I'm developing a sneaky admiration for them and their new record. Suddenly the sledgehammer beat, the ridiculous sonic excess, the insanely layered background vocals begin to strike me as hilarious.

That's not to say that some of this stuff can't be taken straight. In fact, there's actually interesting music here-for example, Radio Gaga (the single), a skillful merger of contemporary synth-pop and old-time Brill Building panache, and Hammer to Fall, a devastating piece of Sixties hard rock successfully passing itself off as Eighties heavy-metal. Still, it's the calculated absurdity of "The Works" that puts the whole thing over. S.S.

THIS IS SPINAL TAP (see Best of the Month, page 67)

TRACEY ULLMAN. Tracey Ullman (vocals); instrumental accompaniment. Breakaway; Bobby's Girl; Shattered; Life Is a Rock; and six others. MCA MCA-5471 \$8.98, © MCAC-5471 \$8.98.

Performance: Fun Recording: Good

Singer-comedienne Tracey Ullman, a big star in England, has appeared over here a few times, most notably on the Tonight Show. Obviously a topflight comedic actress, she specializes in impersonations of classic British types drawn mostly from the lower-middle or working classes. In these she can be hilarious. On records she also does some impersonations, in this case centering on the frantic "girl group" sound. When it works, as it does in Oh, What a Night and Bobby's Girl, the results are also hilarious and oddly touching. When it doesn't, as happens too often here, the results are strident and forced. I like her best when she just sings out on her own, as she does so well in the album's best track, Breakaway. P.R.

COLLECTION

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Performance: Consistently interesting Recording: Inconsistent

Trouser Press was probably the first above-ground magazine to document the





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emergent independent singles scene that flourished in the wake of Patti Smith's trail-blazing mid-Seventies *Hey Joe*. This cassette-only release presents the editors' favorites. Not everything will be to everybody's taste, but since the music runs a ridiculously wide gamut, from deliberately accessible pop to deliberately inscrutable avant-garde, chances are everything here will be to *some*body's taste.

High points include Underwater Girl, an adorable Merseybeat confection by Boston's Tweeds; Martha Hull's Feelin' Right Tonight, a Fifties-style rouser featuring backup by rockabilly kingpin Tex

Rubinowitz (!); the Residents' Booker Tease, a sinister instrumental whose appearance here clears up an old mystery, namely, was it originally meant to be played at 331/3 or 45 rpm?; the Bizarros' great garage-punk stomper, appropriately titled I, Bizarro; and, saving the best for last, The Independent Hitter, a tribute to a freelance killer by my long-time hero (and a former resident of the Elmira Reformatory) Armand Schaubroeck. Altogether, this is a terrific package, and just about everything rewards attention. As usual, ROIR has provided detailed and informative notes. 2.2.

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RICK DERRINGER: Rock Spectacular. Rick Derringer (vocals, guitar); Karla De-Vito, Southside Johnny (vocals); Ted Nugent (guitar, vocals); other musicians. Easy Action; Is This a Cool World, Or What?; Honey Hush; Five Long Years; Rock 'n' Roll Hoochie Koo; Have You Heard; Party at the Hotel; Cat Scratch Fever; Hang On Sloopy; and two other. SONY VIDEO LP VHS \$24.95, Beta \$19.95

Performance: Below standard Recording: Pretty good

Well, not quite "spectacular." In fact, in terms of memorability, this particular concert video (shot in 1982 at the Manhattan club The Ritz) rates somewhere between a middling rerun of The Midnight Special and the 5:00 a.m. rock turns you see on an average telethon. Nobody makes a buffoon of himself other than Ted Nugent (and, of course, that's his job), but with the exception of Is This a Cool World, featuring Karla DeVito at her most squirrelly charming, and a gruffbut-compelling blues segment with Southside Johnny, the music is mostly second-rank mid-Seventies mainstream rock. The VHS sound is better than average, however, and the concluding all-star rendition of Hang On Sloopy is good for a few nostalgic moments. L.M.

DEVO: We're All Devo. Devo (vocals and instrumentals). Introduction; Satisfaction; The Day My Baby Gave Me a Surprise; Whip It; Girl U Want; Freedom of Choice; Beautiful World; Peek-a-Boo; Through Being Cool; Love Without Anger; and four others. PIONEER ARTISTS LaserDisc SPPA-84-069 \$24.95; SONY VIDEO LP VHS \$24.95, Beta \$19.95.

Performance: Funny and danceable Recording: Very good

This is clearly the sharpest collection of videos by a single band so far made available for home consumption, though I realize that, given the competition, that's not saying much. What's most interesting here, actually, is that though it's programmed as a Greatest Hits package, it anticipates an audio album that does not (as yet) exist. What's more, the familiarity of both the songs and (most of) the videos induces an almost nostalgic glow, which is the last reaction I would have expected.

Devo, of course, is a one-joke act whose post-industrial robot-rock has lost whatever power it may have had to surprise. If anything, what "We're All Devo" proves is that the group was never much more

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Lee A france

than a slightly tonier version of the Coneheads from Saturday Night Live. Nonetheless, these guys are funny, the visuals are consistently imaginative and witty, and, as this program makes abundantly clear, Devo has turned into one of the better dance bands of our time. L.M.

THOMAS DOLBY: Live Wireless. Thomas Dolby (vocals, keyboards); other musicians. Europa and the Pirate Twins; Windpower; One of Our Submarines; Radio Silence; New Toy; Urban Tribal; Samson and Deliah; She Blinded Me with Science; Flying North; Jungle Line; and two others. PIONEER ARTISTS LaserDisc EP \$24.95.

Performance: Look ma, no hands! Recording: Excellent

The title here is something of a misnomer. Thomas Dolby is indeed caught in concert, but, given the amount of prerecorded backing tapes he and his band employ, "Canned Wireless" would be more like it. It hardly matters, though. Even if you think that Dolby's archly mannered, deracinated Bowie-esque future-funk is the Bees' Knees, you're likely to be bored by this one. Shot somewhere in England,



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For Dealer Nearest You Call TOLL-FREE 800-633-2252 Ext. 875 CIRCLE NO. 50 ON READER SERVICE CARD the visuals are straightforward to the point of tedium. Most of the time you're not watching Dolby and his functional but faceless band but rather a variety of vaguely related images projected on screens at the back of the stage. The LaserDisc sound is impressive, a spectacular demonstration of machine-tooled purity. Audio-wise, a great demo disc. L.M.

TONY POWERS: Don't Nobody Move (This Is a Heist). Tony Powers (vocals); other musicians and actors. Don't Nobody Move (This Is a Heist); Odyssey; Midnite Trampoline. SONY VIDEO LP VHS \$24.95, Beta \$19.95.

Performance: Strained Recording: Okay

Tony Powers, a successful tunesmith in the mid-Sixties, now seems to feel that if an old colleague like Neil Diamond can act, then he-Powers, that is-can make videos. The three clips collected here, featuring extremely brief cameo appearances by the likes of Treat Williams and Marcia (Mrs. Kotter) Strassman, seem designed to show Powers off as a sort of elder, street-wise New York version of Bryan Ferry, and they're being hyped to a farethee-well. They are, however, extremely tepid both musically and visually. Odyssey is an overdone ballad featuring yet another mysterious woman of the night (not yet the all-time rock-video cliché, but close), and Midnite Trampoline, supposed to be a parody of Italian art films, looks more like low-budget porn. Only the title piece, an amusing bit of cautionary funk that has Powers negotiating his way through the 42nd Street sleaze pits, works up any kind of juice. L.M.

TREASURE ISLAND (Hal Shaper-Cyril Ornadel). Frank Gorshin, Christopher Cazenove, Piers Eady, others (vocals); Royal Philharmonic Orchestra, Alexander Faris cond. PIONEER ARTISTS LaserDisc stereo PA-83-062 \$24.95.

Performance: Calling Wallace Beery Recording: Fine

This show was apparently a big hit in London; the liner notes say it copped the Ivor Novello Award for Best Musical 1974-1975. That could justify the English punk explosion all by itself. This is, in fact, a basically tuneless musical version of the Robert Louis Stevenson chestnut, and a pretty silly one as well. If you ever had trouble accepting the ballet-dancing street gangs in West Side Story, you're going to have serious problems watching this bunch of English chorus boys making like buccaneer Baryshnikovs. The production is handsome enough, the cast is fine (though Frank Gorshin, the lone Yank, sticks out like a sore thumb), and the old story works pretty well during the nonmusical numbers. But once these folks open their mouths in song or start to two-step around the mizzenmast, it's pretty hard to take-a prime example of the kind of thing Gene Lees had in mind when he coined the phrase "Quack Opera." Very good picture and sound though. L.M.

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CHRIS CONNOR: Love Being Here with You. Chris Connor (vocals); instrumental accompaniment. The Thrill Is Gone; How Little We Know; Rio; Baia; and five others. STASH ST 232 \$8.98.

Performance: Excellent Recording: Not so good

Scarcely heard in the Seventies, Chris Connor has recently been recording again for some of the smaller labels, her latest album being this one from Stash. The engineering gives the accompanying quartet presence at the singer's expense, and the pressing could be better, but Connor sounds wonderful. This one should delight old Chris Connor fans and generate quite a few new ones. C.A.

DIZZY GILLESPIE: One Night in Washington. Dizzy Gillespie (trumpet, vocals); orchestra. The Afro Suite; Hobnail Boogie; Caravan; and three others. ELEKTRA/MUSICIAN 60300-1 \$9.98, © 60300-4 \$9.98.

Performance: At times Dizzying Recording: Fair remote

It happened at Club Kavakos, Washington, D.C., almost thirty years ago. Dizzy Gillespie, yearning to play with a big band again, made an appearance with the same local band that had disjointedly accompanied Charlie Parker a couple of years earlier. This time, however, band and soloist played *together*. Except for Dizzy's scat vocal on *Hobnail Boogie*, the recording is quite good. Dizzy himself is full of fire and imagination, which makes this previously unissued set a worthwhile addition to the catalog. *C.A.*

WOODY SHAW: Night Music. Woody Shaw (trumpet); Bobby Hutcherson (vibraphone); other musicians. Orange Crescent; To Kill a Brick; and two others. ELEKTRA/MUSICIAN 60299-1 \$9.98, © 60299-4 \$9.98.

Performance: Articulate Recording: Good remote

This is the second album recorded on a February night in 1982 when Woody Shaw's quintet took over the now defunct Jazz Forum in New York's Greenwich Village. Like the first release ("Master of the Art"), it continues the flow of ideas documented on Shaw's Columbia albums, and again it offers a brilliant display of ensemble work and individual artistry highlighted by the leader's logically constructed solos. Enhancing the quintet's sound is Bobby Hutcherson, an artist who deserves wider recognition. C.A.



THE MAGIC OF EARL HINES

MONG the jazz musicians whose careers stretched from the Twenties into the Seventies or Eighties, Earl Hines was very special. I can think of no other player whose musical expressions were as consistently fresh.

If there was a low period in his career, it was the ten- to fifteen-year stretch that ended in the mid-Sixties. But, things being relative, what was low for Hines most artists would have considered pretty smooth going. Two recent releases of material from this period, recorded nine years apart, show both what he had to do to get by and what he should have been doing all along.

Storyville's "Earl Hines at Club Hangover" captures the pianist in 1955 during some of his weekly CBS network radio broadcasts from San Francisco. The material here was old-fashioned even by Hines's standards of thirty years earlier, but there is nothing wrong with the way his excellent sextet plays it. As Dixieland goes, this is a fine album.

I much prefer, however, a two-disc Muse reissue of recordings Hines made in 1964 at the last of three remarkable weekend concerts at the Little Theater in New York City. The performances that so impressed all of us who heard them at the time might have lived only in our memories had it not been for Mort Fega, one of the few truly knowledgeable disc jockeys of the period. Awed by what he heard at one of the earlier concerts, Fega proceeded, against great odds, to have the final one recorded.

Seven of the selections were originally available under the title "The Real Earl Hines" on Fega's own Focus label in the U.S. and on Atlantic in England; the rest were added for two Muse volumes released on the Deluxe label in 1979. These were Hines's first appearances as a headliner, and he asked the audiences not to think of them as concerts but to imagine that they were gathered as friends in a large living room. We are still gathering, and the magic of those evenings rests comfortably in the grooves of this set.

Since my enthusiasm could easily continue to the last page of this issue, suffice it to say that I would not consider my collection complete without these 1964 recordings. Music of this caliber deserves better packaging (the two discs are stuffed into one jacket) and more insightful annotation, but let us rejoice that it is once again available at all. Chris Albertson

EARL HINES: At Club Hangover, Vol. 5. Earl Hines (piano); Marty Marsala (trumpet); Jimmy Archey (trombone); Darnell Howard (clarinet); Ed Garland (bass); Joe Watkins (drums). Deep Forest; Darktown Strutters Ball; Some of These Days; Back o' Town Blues; Ballin' the Jack; Jazz Me Blues; St. James Infirmary; Honeysuckle Rose; Lady Be Good. STORYVILLE SLP 4063 \$7.98, SC 44063 \$7.98.

EARL HINES: The Legendary Little Theater Concert of 1964, Vols. 1 & 2. Earl Hines (piano); Budd Johnson (tenor saxophone); Ahmed Abdul-Malik (bass); Oliver Jackson (drums). Stealin' Apples; Fats Waller Medley; Sweet Lorraine/ Mandy Make Up Your Mind; Tangerine/ Speak Low/The Continental; Brussell's-Hustle; Rosetta; Canadian Sunset/Lullaby of Birdland; Lester Leaps In; Birth of the Blues/Black Coffee/Blues Jam; Out of Nowhere; Blues for Jazz Quartet. MUSE MR 2001-2 two discs \$11.98.

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DISCS AND TAPES REVIEWED BY RICHARD FREED DAVID HALL GEORGE JELLINEK STODDARD LINCOLN ERIC SALZMAN

J. S. BACH: Trio Sonatas (BWV 525-530; Schübler Chorales (BWV 645-650). Ton Koopman (organ). DEUTSCHE GRAM-MOPHON ARCHIV © 2742 006 two discs \$17.96.

Performance: Brilliant Recording: Great

Any organist who can get through Bach's trio sonatas without falling off his perch deserves the highest praise. Not only does Ton Koopman remain firmly seated, but he turns in virtuoso performances full of energy and excitement. The organ—at the Waalse Kerk in Amsterdam—is a splendid instrument, and Koopman exploits its contrasting registers to bring out the individual threads of Bach's complex textures. The results are stunning. *S.L.*

BRAHMS: Variations on a Theme by Paganini, Books I and II, Op. 25. SCHU-MANN: Symphonic Etudes, Op. 13. Dimitris Sgouros (piano). ANGEL • DS-38075 \$12.98, © 4XS-38075 \$9.98.

Performance: Good, but no cigar Recording: Good

The young Greek pianist Dimitris Sgouros seems to be able to learn complex works literally overnight and to play the pants off them. Mstislav Rostropovich brought Sgouros to our shores two years ago to perform with him and the National Symphony at Carnegie Hall and subsequently presented him in concerts he conducted at Wolf Trap and in London. At the time Sgouros was only eleven or twelve years old.

Now, at the ripe old age of fourteen, Sgouros is making his recording debut in two of the most demanding works in the solo literature. Sure enough, he does play the pants off them, but the impression these exciting and highly charged performances leave is that the undertaking may have been a bit premature. For all Sgouros's unquestionable technical command and the obvious seriousness as well as abundant energy he brings to his playing, there is very little here in the way of mellowness or introspection at appropriate points. The exuberance is exciting, the technical brilliance impressive, but



ASHKENAZY'S PICTURES

S OME fairly bizarre transcriptions of Mussorgsky's *Pictures at an Exhibition* have found their way into concert halls and onto discs in recent years. But Vladimir Ashkenazy's symphonic arrangement, now available on a London recording with Ashkenazy conducting, is relatively sobersided. Ashkenazy has orchestrated the entire work, including the "Promenade" omitted by Ravel in his celebrated and widely performed version, and he has done so on the basis of Mussorgsky's original, which Ravel did not have at his disposal at the time of his commission (1922).

There are some striking differences between the Ashkenazy and Ravel versions. In Ashkenazy's, for example (and in his solo-piano recording), the start of "Bydlo" is a forthright *forte*, and the concluding *diminuendo* is the only dynamic change. As Ashkenazy points out in his sleeve note, however, it would be fairly simple to bring details of the Ravel orchestration into accord with the notes of the original Mussorgsky piano work.

there is a breathless feeling about it all. If this obviously gifted youngster would just stop to take a breath or two, I think, he would surely emerge as one of the major musical figures of our time. R.F.

DVOŘÁK: Symphony No. 9, in E Minor, Op. 95 ("From the New World"). Chicago Symphony Orchestra, Sir Georg Solti

As for Ashkenazy's instrumentation, there is less sheer razzle-dazzle than in Ravel's but there are a few very effective touches. Among them are the whip-crack in "Bydlo" and the use of massed woodwinds instead of brass at the opening of "The Great Gate at Kiev." The use of solo violin instead of muted trumpet in the "Two Jews" episode is also effective, in its own way, although Ravel's portraiture in this instance is more vivid.

The performance of Borodin's Polovtsian Dances that fills out the disc is one of the very best among the many recorded versions. The chorus is not quite so dominating here as it sometimes is, and the whole thing comes off with enormous verve and brilliance. The recorded sound is very good too. David Hall

MUSSORGSKY/ASHKENAZY: Pictures at an Exhibition. BORODIN: Polovtsian Dances. London Opera Chorus (in Borodin); Philharmonia Orchestra, Vladimir Ashkenazy cond. LONDON **O** 410 121-1 \$11.98, © 410 121-4 \$11.98.

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cond. LONDON @ 410 116-1 \$11.98, © 410 116-4 \$11.98; © 410 116-2, no list price.

Performance: Straight and strong Recording: Very good

Here is the sixth digitally mastered New World to find its way into Schwann. Oddly enough, its strongest competitor, interpretively and sonically, is from the same orchestra under James Levine on RCA. In contrast to Levine's frankly sensational (and wholly electrifying) treatment of this thrice-familiar score, Sir Georg Solti gives a very "straight" reading with a stress on fine detail that pays off most tellingly in the slow movement. In the finale, his pacing, like Levine's, is swift and urgent. D.H.

ELGAR: Symphony No. 1, in A-flat Major, Op. 55. Philharmonia Orchestra, Bernard Haitink cond. ANGEL O DS-38020 \$12.98, © 4XS-38020 \$9.98.

Performance: Loving Recording: A bit tight

The two Elgar symphonies pose a major challenge to any conductor who dares to essay them: their end movements, those of the A-flat especially, are complex both



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For Dealer Nearest You Call TOLL-FREE 800-633-2252 Ext. 868 CIRCLE NO. 37 ON READER SERVICE CARD in architecture and textural density. Bernard Haitink, like Sir John Barbirolli before him, takes a more deliberate view than others of the A-flat Symphony. In the magnificent opening theme, which appears and reappears throughout, he is drawn less to its solemn tread than to its lyrical aspirations. In the main body of the end movements he lets the music unfold at a natural pace rather than driving it, but in the scherzo he adheres to an urgent yet steady quick-step tempo.

My only major criticism of this disc is the rather tight ambiance of the recorded sound, presumably a result of close miking. I'm sorry that the performance was not done with Haitink's own Concertgebouw Orchestra in Amsterdam, for the acoustics of that hall would have provided just the added glow this music needs. D.H.

HANDEL: Concerti Grossi, Op. 6 (see Best of the Month, page 69)

D'INDY: Piano Quartet in A Minor, Op. 7 (see SAINT-SAËNS)

LALO: Cello Concerto in D Minor (see RODRIGO)

LUTOSLAWSKI: Concerto for Oboe and Harp (see R. STRAUSS)

MARTINU: Nonet; Trio in F for Flute, Cello, and Piano; La Revue de Cuisine. Dartington Ensemble. HYPERION A66084 \$13.98 (from Harmonia Mundi USA, 2351 Westwood Boulevard, Los Angeles, Calif. 90064).

Performance: Delicious Recording: Fresh

Bohuslav Martinu was one of the first Europeans to take up jazz, and he used it very cleverly, as *La Revue de Cuisine* makes clear. The piece is a sextet made out of music from a ballet whose movements consist of a stylized tango and a bouncy Charleston preceded by an off-beat fanfare and march and followed by a lively jazz-tinged finale.

The Trio in F, from 1944, and the Nonet, written in 1959 shortly before Martinu's death, reflect nothing of the traumas—international or personal—of those years. They are pure neo-Classical idealism, beautifully written, good-humored, and wonderfully played by these musicians from the contemporary music center of Dartington in England. A nice and fresh recording. E.S.

MOZART: Requiem (K. 626). Margaret Price (soprano); Trudeliese Schmidt (mezzo-soprano); Francisco Araiza (tenor); Theo Adam (bass); Leipzig Radio Chorus; Dresden State Orchestra, Peter Schreier cond. PHILIPS 6514 320 \$11.98, © 7337 320 \$11.98; © 411 420-2, no list price.

Performance: Excellent soloists Recording: Seamless

Peter Schreier is a rare case of a singer turned conductor, and, as might be expected, he shows here a great feeling for

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the vocal shape, as opposed to the symphonic shape, of the Mozart Requiem. All the more reason, then, to wonder at the relative recorded treatment of the soloists and chorus in this co-production between Philips and the East German state record company.

The choral sound is clear, creamy, and "white," though it seems to me to lack articulation. The solo voices, however, with the partial exception of Margaret Price, seem a bit wan, which is especially unfortunate with such good singers. Otherwise this is an excellent recording. ES

RAVEL: Boléro; La Valse; Alborada del gracioso; Rapsodie espagnole. Orchestre National de France, Lorin Maazel cond. CBS O IM 37289, © IMT 37289, no list price.

Performance: Mannered Recording: Spacious and airy

Among Lorin Maazel's early recordings that I particularly cherish are those he did for Deutsche Grammophon of the two Ravel operas, L'Heure espagnole and L'Enfant et les sortilèges. On this new disc, I find that only the Rapsodie espagnole matches that standard. There is exquisite limning of detail here, and the fine sound affords a vivid sense of depth and localization. The performance of Alborada del gracioso is respectable enough, although it is missing the snap and ginger of Eduardo Mata's digitally mastered RCA recording. With the perfunctory Bolero and the mannered La Valse, I'm afraid, it is downhill all the way. D.H.

RODRIGO: Cello Concerto. LALO: Cello Concerto in D Minor. Julian Lloyd Webber (cello); London Philharmonic Orchestra, Jesús López-Cobos cond. RCA ARL1-4665 \$10.98. © ARK1-4665 \$10.98.

Performance: Excellent Recording: Excellent

Joaquín Rodrigo's Cello Concerto was premiered by Julian Lloyd Webber, for whom it was written, in 1982, but it is certainly hard to think of it as a work of the late twentieth century. Except for the orchestration, which is very distinctive and imaginative, the concerto is a light, highly flavored, Spanish-style work of a most traditional character. This is not to deny its charm-a quality certainly in short supply these days. The Lalo was written well over a century earlier. Unlike the composer's Symphonie espagnole for violin and orchestra, it has only a trace or two of Spanish flavor. The first movement is conventional Romantic bombast. but the middle movement, an intermezzo, is quite elegant, and the lively finale is engaging.

Julian Lloyd Webber (Andrew's brother) is an excellent cellist and makes a fine impression in this music. It was his idea to go to Spain to seek out Rodrigo and convince him to write a concerto, and he has recorded it in fine style. E.S.

SAINT-SAËNS: Violin Concerto No. 3, Op. 61 (see Best of the Month, page 70)

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SAINT-SAËNS: Piano Quartet in B-flat Major, Op. 41. D'INDY: Piano Quartet in A Minor, Op. 7. Cantilena Chamber Players. PRO ARTE O PAD-164 \$10.98, © PCD-164 \$10.98.

Performance: Exquisite Recording: Very good

The Cantilena Chamber Players is a firstclass piano quartet, and I would like to be more enthusiastic about the repertoire on this recording. But the Saint-Saëns is so sure, so careful, so conservative and tame that it leaves me dreaming of other times, other places. I awake with a start. I forget to listen to the music! The D'Indy, an early work, has more profile but is ultimately only a little more memorable. The effect of these pieces, however, is certainly maximized by the performances, which are sympathetic and exquisite. *E.S.*

SCHUMANN: Symphonic Etudes, Op. 13 (see BRAHMS)

SHOSTAKOVICH: Piano Trio No. 2, in E Minor, Op. 67. Borodin Trio. Piano Quintet in G Minor, Op. 57. Borodin Trio; Mimi Zweig (violin); Jerry Homer (viola). CHANDOS O ABRD 1088 \$13.98, © ABTD 1088 \$13.98 (from Harmonia Mundi USA, 2351 Westwood Boulevard, Los Angeles, Calif. 90064).

Performance: Thoughtful, intense Recording: Mostly solid

Shostakovich's Second Piano Trio is a powerful work, and here it gets a consistently satisfying performance by the Borodin Trio, an ensemble of emigré Soviet musicians. Except for the slowish scherzo, the reading is notably intense, whether in the eerie cello harmonic that opens the piece, the deeply somber cadences of the third-movement passacaglia, or the terrifying *danse macabre* of the finale.

The quintet is lighter but beautifully put together musically. The highlights are the fugal adagio second movement, with its strong lyrical impulse, the lovely intermezzo with its echoes of Bach, and the magical coda of the fifth-movement finale. The finest playing here is in the slow movements—the faster ones are taken a bit too slowly for my taste. The sound is rich but a shade over-reverberant, with more body on the trio side. D.H.

SOUSA: Peaches and Cream. The Stars and Stripes Forever; La Reine de la mer; The Gliding Girl Tango; The Thunderer; Myrrha Gavotte; Peaches and Cream Foxtrot; and six others. Cincinnati Pops Orchestra, Erich Kunzel cond. Vox CUM LAUDE © D-VCL 9063 \$7.98, © D-VCS 9063 \$7.98; © MCD 10005, no list price.

Performance: Rousing Recording: Brilliant

There is nothing as rousing as a Sousa march, especially in performances as rousing as these by the Cincinnati Pops under Erich Kunzel. The orchestra produces a splendid sound with a strong beat that keeps the body on the move whether the music happens to be a march or one

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of the dances, which are real charmers. Wonderful sound, too. S.L.

R. STRAUSS: Oboe Concerto. LUTOS-LAWSKI: Concerto for Oboe and Harp. Heinz Holliger (oboe); Ursula Holliger (harp); Cincinnati Symphony Orchestra, Michael Gielen cond. VOX CUM LAUDE O D-VCL 9064 \$7.98, © D-VCS 9064 \$7.98; © MCD 10006, no list price.

Performance: The best Recording: Impressive

This is a very attractive recording. Richard Strauss's Oboe Concerto was written in 1945, near the very end of his life, and the composer chose to make it a lighthearted, neo-Classical romp in the style of *Der Rosenkavalier* or *Ariadne*—only more so. The Double Concerto by Witold Lutoslawski, written for Heinz Holliger and his wife, is a curious and effective hybrid of modernism and lyricism.

Holliger may be, as some people think, the greatest oboist alive today. He certainly seems to have the widest musical range and the greatest virtuosity. His tone is strong and attractive, and his musicianship and powers of expression are unrivaled. As for the orchestra, it is beginning to sound as if Michael Gielen has rebuilt the Cincinnati Symphony into a worldclass ensemble. These are impressive performances all around, and the quality of the digital recording is first-rate. *E.S.* R. STRAUSS: Daphne. Lucia Popp (soprano), Daphne; Reiner Goldberg (tenor), Apollo; Ortrun Wenkel (contralto), Gaea; Kurt Moll (bass), Peneios; Peter Schreier (tenor), Leukippos; others. Bavarian Radio Chorus and Symphony Orchestra, Bernard Haitink cond. ANGEL @ DSBX-3941 two discs \$25.98, @ 4X2X-3941 two cassettes \$19.98.

Performance: Very good Recording: Very good

A verbose libretto is a prerequisite in a Richard Strauss opera. The slowly winding melodic deliberations depend on that element and frequently offer rich rewards. Such is the case with *Daphne*, a "bucolic tragedy in one act." That act takes nearly two hours to perform and makes for a very long evening in the theater. In the home, on records, regarded as an extended vocal/orchestral tone poem, it can be an aural treat. The vocal writing looks ahead to the Four Last Songs in its soaring lyricism and serenity, and the orchestral sounds are ravishing.

In this new recording, Bernard Haitink captures the Straussian sonorities with exquisite refinement, and the three principals, all of whom sing music of extraordinary difficulty, deserve high praise. Lucia Popp is a touching Daphne, pure in tone even in the most passionate moments and despite occasional effortful stresses in music that simply cannot be sung effortlessly. Reiner Goldberg and Peter Schreier, who sing her rival lovers, likewise raise their lyric voices against the often unreasonable vocal demands Strauss makes on them. And for once the principals are supported by a strong ensemble of singers in the minor roles. A welcome release. *G.J.*

STRAVINSKY: Le Sacre du printemps. Israel Philharmonic Orchestra, Leonard Bernstein cond. DEUTSCHE GRAMMOPHON © 2532 075 \$11.98, © 3302 075 \$11.98; © 410 508-2, no list price.

Performance: Straight to the point Recording: Very good

Whether readers will agree with my assessment of the recording here as "very good" will depend on whether they agree that the dryish acoustic of the Israel Philharmonic's Mann Auditorium is well suited to Stravinsky's music in general and to Le Sacre in particular. While I find this acoustic a disaster for Mahler. I think it's just fine for delineating the texture and rhythmic impact of Stravinsky's 1913 masterpiece. And, of the three Leonard Bernstein recordings of Le Sacre, this one is the freest from mannerism and the closest to what Stravinsky wrote. DH

WIENAWSKI: Violin Concerto No. 2, Op. 22 (see Best of the Month, page 70)

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POWER AMPS

(Continued from page 53) tractive advantage to FET ouput stages: they are very rugged and eliminate the need for complex protective circuits and their troubles.

POWER SUPPLIES

The configuration of the power supply has the greatest influence on the size, weight, and cost (including shipping cost) of a power amplifier. The classic "good" power supply consists of a huge power transformer, huge filter/storage capacitors, and a not necessarily huge but definitely electronically husky rectifier bridge that converts the a.c. to d.c. That's all that's needed. But economically the formula is inefficient. What are the alternatives?

"Switching" and "smart" power supplies have proved the most popular so far. Switching-supply technology, still very much in its infancy for audio applications, takes advantage of the fact that raising the a.c. powerline frequency above the nominal 60 Hz permits corresponding reductions in the size of transformers and capacitors for equivalent performance.

"Smart" power supplies use control circuitry to govern their operation, with the most straightforward type of control being strict regulation to prevent the supply voltage from changing no matter what demands are made on the ouput stage. Perfect regulation is an impossible dream, but many designers consider close-to-perfect regulation well worth pursuing.

Other designers think that this sort of supply regulation is foolish and inefficient, so they incorporate circuits that cause the power supplies to change state according to the requirements of the audio signal being processed. Apt and Carver have been the major proponents of this signal-tracking scheme. Soundcraftsmen's PCR800 purports to combine advantages of ultra-stiff regulation with the flexibility of state-changing circuitry.

PERFECTION

So suppose you decide that you want an amplifier with, say, an input section from manufacturer A. the drive stage from manufacturer B, the output configuration used by C, and a power supply made by D. There is no way you could put together such an amplifier. And even if you could, it wouldn't be such a good thing. An amplifier can work well only if its component parts interrelate compatibly, and substitutions usually court disaster.

Obviously there are many ways of building a good amplifier, and the choice of one particular way is probably only a reflection of where the designer's mind was at the time a germinal thought occurred to him. All this information simplifies the choosing of an amplifier not at all, of course, but it does make the situation a little less anxious. Furthermore, it justifies the advice that most amplifier designers themselves give: Listen to the thing, preferably with the source and loudspeakers you'll be using. You'll have to do a lot of listening if you're determined to own the "best." But. then again, if you choose wisely, you'll do a lot more listening later on, with pleasure.

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- Paul Terry Shea **Rolling Stone**

⁴⁴In our listening test, the PS-10's delivered a smooth, balanced sound...its compact size and unobtrusive looks should enable it to fit in almost anywhere both aesthetically and acoustically." – Julian D. Hirsch

** The overall sound is smooth, clean, and detailed. Bass is surprisingly well maintained for so small a speaker. Imaging is also outstanding, with firm, stable stereo localizations and a good sense cf spaciousness and depth "

- The Editors Hich Fidelity

To these ears they provided a very open and transparent kind of sound, with excellent and stable stereo imaging." - Len Feldman Cvation

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(Continued from page 60)

Fortunately for our speakers, a low- or middle-frequency driver will usually produce unmistakable sounds of distortion before it is irreversibly damaged. The rasping, buzzing, or clattering sound of a voice-coil suspension hitting bottom will often given sufficient warning to turn down the volume. The heavy-duty voice coil of a low-frequency driver is usually able to dissipate a large amount of power without burnout, which is only likely to occur in sustained high-power operation (as in the amplifying systems used for live rock music). Sometimes this sort of abuse will actually set the speaker on fire, although improved adhesives and form materials permit some of today's speakers to operate at temperatures that would be more appropriate inside an oven.

High-frequency drivers are a different matter. Their diaphragms usually small, light domes of paper or plastic—do not move visibly, and in use it is next to impossible to damage them or their suspensions. Distortion of their acoustic output is usually not audible as such, for the harmonics fall in the upper reaches of human hearing or higher. Intermodulation distortion components can be generated at lower frequencies, but a typical tweeter diaphragm is too small to radiate such frequencies efficiently.

A CYMBAL CLASH CAN DEVELOP ENORMOUS OUTPUT AT THE HIGHEST FREQUENCIES, ESPECIALLY ON CD.

The sonic effect of a tweeter overload is likely to be a compression of the program dynamics, since the sound intensity no longer increases in proportion to the amplitude of the electrical signal waveform. With any well-designed speaker, this is not a serious problem at reasonable listening levels, but that situation may well change with the growing use of CD's and other digital program sources having a greatly expanded dynamic range.

What high-frequency (and uppermiddle-frequency) drivers are very vulnerable to is excessive electrical input. To keep the moving mass low, tweeter voice coils are wound with very fine, light wire. It takes little current to heat up these voice coils to the point where they burn out, and their low mass permits this to happen very rapidly. The speaker designer may elect to provide increased heat dissipation by using a material such as ferrofluid in the magnetic gap, in contact with the voice-coil winding, so that it can conduct heat to the higher mass of the magnet and its structure. This helps but does not eliminate the possibility of voice-coil burnout.

One might well ask how such drivers can absorb the high peak power levels that are known to occur in the higher frequency ranges of recorded music. A cymbal clash, for example, can develop an enormous acoustic output at the highest frequencies, especially on a Compact Disc. The key word is *peak*. These



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high power levels exist for very short times, on the order of milliseconds. Since voice-coil burnout is caused by excessive *average* power input, it is possible for a driver to absorb incredible power levels (more than 1,000 watts) without harm if the time is brief and the occurrences infrequent.

If, say, a 1,000-watt pulse is applied only one thousandth of the time (such as 1 millisecond on and 1 second off), the average power level is only 1 watt, which is unlikely to damage any speaker. On the other hand, increasing the repetition rate of the pulse or tone burst by a factor of ten, to ten times a second instead of once, increases the average power to 10 watts, which will burn out almost any tweeter in a few seconds.

As you can see, a reasonably complete power-handling specification for a speaker system can be quite complex, involving separate definitions for each of the drivers and usually being stated in the form of "x watts for no more than y seconds at a frequency of z Hz." A graph would be even more desirable—but even more difficult for the average person to interpret! The simplified form in which this information is usually presented is quite sufficient for most users, so long as they realize that the stated power limits, both upper and lower, are *very* general and not to be taken literally.

Basically, interpreting power-handling specs is pretty much a matter of common sense once you have a slight appreciation of the problems involved. Driving a single 6-inch speaker with a 500-watt amplifier is clearly an invitation to disaster even if you are careful. Accidents can always happen, and this sort of mismatch leaves no margin for error. Dropping the phono pickup or accidentally knocking it across the record could easily wipe out such a speaker with a 500-watt amplifier, but the same mishap would do no damage with a 50-watt amplifier. At the other extreme are those few speakers having heavy-duty voice coils in all their drivers, such as most Ohm Walsh models or the Bose 901 series. It is unlikely that you could burn out a voice coil of one of these speakers with any amplifier, no matter how powerful.

Our peak-power speaker tests use short-duty-cycle tone bursts, which are not likely to burn out the most delicate tweeter voice coil. We look for signs of nonlinearity in the acoustic output of the speaker rather than exploring the safe limits of its operation. Most of the time, the amplifier's power capacity, rather than the speaker's power-handling capability, is the limitation in this test. Only in the bass region can we reach the limits of a speaker cone with only a few hundred watts of power, and there our ears alert us to the onset of distortion.

To sum it up, therefore, most speakers can handle a lot of power for very brief periods, often far more than the speaker's ratings would indicate. It is continuous high-power operation that causes problems. Unless your normal listening level is very loud, you should be able to play Compact Discs at the same volume you are accustomed to without risk to your speakers. But you may consider upgrading them if you want to take advantage of everything else that digital technology has to offer.





CONNECTIONS (Continued from page 59)

hood to marvel at and then route the cable down to your living room, you may be in for a surprise. Most coaxial TV and FM antenna cables are terminated in an F-style connector. This type of 75-ohm plug is found on most video cables, and today's FM tuners have the appropriate inputs for it. But if you happen to have a tuner from a few years back, there may be no 75-ohm input, just the more familiar 300-ohm twin-lead terminals.

What you need in this situation is a 75-to-300-ohm matching transformer, available at any local Radio Shack for about \$3. Only slightly bigger than a standard headphone plug, the transformer simply screws or pushes onto the F-connector at the end of the antenna cable, and its other end is connected to the standard 300-ohm terminals the same way a twin-lead or dipole antenna



is. (In the event that you have the opposite mismatch, you can reverse it to use as a 300-to-75-ohm transformer instead.)

VIDEO TO AUDIO

If you're using a combination TV/ FM antenna, you'll have to separate the different signals coming down the cable and feed one set to your TV and the other to your FM tuner. For this you need a *video splitter* to divide the signal into two outputs. One goes to your FM tuner, the other to the 75-ohm antenna input on your TV set or video tuner.

Video equipment often uses RCA-type phono plugs as well, and you'll need cables equipped with these if you want to get the best possible performance from a high-quality component video system. The r.f. modulation in conventional TV sets and video tuners can degrade the program quality from nonbroadcast video sources such as video discs and tapes. The picture will look better if you bypass the tuner circuitry and feed the signal directly into the video circuitry.

This sort of direct or composite video connection usually requires RCA-plug cables or F-connectortype coaxial cables. Simply connect a set of cables between the video outputs of the disc or tape player and the video inputs of a component TV monitor (conventional TV sets don't have the right inputs). Use another pair to connect the player's audio outputs to an auxiliary or tape input in your stereo system. Place your speakers on either side of the TV screen (but not too close if the speaker system or the TV set isn't magnetically shielded), and get ready to enjoy audio/video performance far beyond anything you've heard or seen from broadcast TV.

MAKING ENDS NEAT

Routine maintenance of system connections is a good idea. Every year or so, unplug everything, wipe all the plugs with paper towels, and reinsert them tightly, twisting the phono connectors as you do so. This will ensure good, firm contacts.

When you're putting your system together in the first place, plan everything out beforehand, know where everything goes, and be aware of the different types of connectors that each component needs. You should have little trouble making the right connections.



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YUPPIES

(Continued from page 56)

Agnes Baltsa in the title role and Herbert von Karajan conducting. A digital recording, it is also available on cassette and Compact Disc.

GAY LIFE AND DEATH

The way of life described in *The Yuppie Handbook* encompasses several subcultures, including those of Buppies (Black Urban Professionals), Guppies (Gay Urban Professionals), and Juppies (Japanese Urban Professionals). Each of these has made contributions to the Yuppie mainstream. Guppies, for example, are credited with a major role in the Art Deco revival and with discovering Peter Allen records. A straight Young Urban Professional may tell you that some of his best friends are Guppies.

Czarist Russia, however, was not so tolerant of homosexuality. Consequently, the great Russian composer Peter Ilyich Tchaikovsky (1840-1893) was tormented by guilt over his sex life and by fear of being exposed as a homosexual. This may account for the pervading melancholy in much of his music.

Until lately it was thought that Tchaikovsky died of cholera contracted by rashly drinking a glass of unboiled water during an epidemic. More recently musicologists have entertained the theory that he poisoned himself when a "court of hon-

TCHAIKOVSKY WAS TORMENTED BY GUILT OVER HIS SEX LIFE AND FEAR OF BEING EXPOSED AS A HOMOSEXUAL

or" made up of his former lawschool classmates ordered him to commit suicide to avoid a scandalous disclosure of details of his private life. Either way qualifies as a miserable end.

Tchaikovsky's *Nutcracker* Suite is okay for kids, and the scores of his ballets *Swan Lake* and *Sleeping Beauty* provide some rhythmic music for fitness workouts. For the Yuppie collection I recommend a hot performance of Tchaikovsky's dramatic Piano Concerto No. 1 by Martha Argerich with Charles Dutoit conducting the Royal Philharmonic Orchestra. It is being rereleased in May in Deutsche Grammophon's Signature Series (DG 254 3503), and, paired with Liszt's Concerto No. 1, it is a super value at \$6.98.

Tchaikovsky's melancholy side can be heard in his Piano Trio in A Minor. It has been beautifully recorded by Perlman, Harrell, and Ashkenazy (Angel SZ-37678) and by violinist Elmar Oliveira, cellist Nathaniel Rosen, and pianist Mikhail Pletnyov (CBS M 35855).

BRAIN DEATH

Little is known of the details of the private life of the French neo-Classicist Maurice Ravel (1875-1937). A composer of highly polished works for solo piano, he was also a superb orchestrator. Just as he was receiving his greatest accolades-an honorary doctorate from Oxford, a street named for him in his home town-he began to suffer attacks of aphasia and difficulty in muscular coordination. They signaled the onset of a brain disease that gradually imprisoned his active mind in a body that would not respond to his commands. He died after an unsuccessful brain operation.

Ravel's *Boléro*? Well, it's all right for Bo Derek fans, but Yuppies will want a classier act. I recommend pianist Martha Argerich's recording of Ravel's *Gaspard de la nuit, Sonatine*, and *Valses nobles et sentimentales* (Deutsche Grammophon 253 0540). It's an analog recording available only on LP but excellent nonetheless.

Being struck down by incurable diseases is not a fate limited to European musical geniuses. The immensely talented American composer George Gershwin died after unsuccessful brain surgery, coincidentally in 1937, the same year as Ravel. At that time Ravel was in his sixties, but Gershwin was only thirty-eight.

If Gershwin were alive today, he would be a sort of super-Yuppie. Phenomenally successful as a songwriter and author of Broadway shows, he had a bicoastal career, working in Hollywood as well as New York. He was a very serious musician who also composed symphonic works and even an opera. His most ambitious composition, *Porgy and Bess*, will have its Metropolitan Opera première next year.

For Yuppies willing to explore

opera beyond *Carmen*, there is a complete recording of *Porgy and Bess* with soloists, chorus, and orchestra of the Houston Grand Opera conducted by John DeMain (RCA ARL3-2109). When it was released in 1977, our reviewer pronounced it the best recording *Porgy and Bess* had ever received.

Both Telarc and RCA have some instrumental works by Gershwin on Compact Disc, but it seems to me that the ultimate record for a Young Urban Professional's collection is the performance of Gershwin's twopiano versions of his Concerto in F and Rhapsody in Blue played by the sister team of Katia and Marielle Labèque (Philips 9500 917). It's Gershwin with a French accent, and the aura of international glitz and glamour that surrounds the Labèques finds its way appropriately into the performance.

RAVEL'S BOLÉRO MAY BE ALL RIGHT FOR BO DEREK FANS, BUT YUPPIES WANT A CLASSIER ACT

Not all musical geniuses died young or in miserable circumstances—J. S. Bach, Brahms, Verdi, and Richard Strauss, for example, lived long, productive lives. The recommended recordings of music by those who did die miserably are not limited in their appeal only to young lawyers or other professionals who bill their clients for sixty hours a week. In fact, they can be enjoyed even more by someone who can take time to savor them.

Maybe life in the fast lane prevents people from enjoying music to the fullest. If I could make only one musical recommendation to Yuppies (or anybody else), it would be to slow down a little and take time really to listen to music, to receive its spiritual message, to bathe in its healing power.

If, like me, you prefer ginger ale to Perrier, you may find Hogwood's performance of Pachelbel's *Kanon* on original instruments somewhat undernourished. I still like Paillard's version, and there's another lush one by Leonard Slatkin and the St. Louis Symphony on Telarc. And, after all, what's so bad about walnut veneer?

(Continued from page 45)

have less dynamic range and thus be less demanding of amplifier power than the table predicts.

The level labeled "Cannon fire (peak)" is approximately correct for a 105-mm howitzer firing blanks at a distance of about 100 yards, as called for in the score of a wellknown Tchaikovsky overture.

A HIDDEN VARIABLE

Until now we have been operating on the assumption that amplifier power ratings can be taken at face value. Unfortunately, not all amplifiers will deliver their rated power into a real loudspeaker. The figure on a manufacturer's amplifier spec sheet is measured with a pair of 8ohm test resistors connected to the amplifier in place of speakers. But most "8-ohm" speaker systems have an impedance that falls to 5 ohms or less at some frequencies, causing them to draw more current than the resistor would.

In addition, a loudspeaker presents a reactive load to the amplifier, which may under certain signal conditions increase the current demand still further, to as much as several times that demanded by a simple resistor. Since it is the current, not the voltage, that actually moves the speaker cone, output current capability is what limits most amplifiers' outputs. Check the manufacturer's spec sheet for how an amplifier behaves with 4- and 2ohm loads. Ideally, its output with lower impedances should be substantially higher than with an 8ohm load. Then test the amplifier with your speakers before buying.

MORE IS BETTER

It may actually be riskier to use an underpowered amplifier or receiver than an overpowered one. Some amplifier protection circuits can, when tripped, produce ultrasonic oscillation at full power for long enough to burn out a tweeter.

Don't be afraid of buying a more powerful amplifier if you can afford it, especially if you like the features that come with the extra power. That power will be used primarily on very brief musical peaks, and even a modest speaker system can absorb several hundred watts for a few milliseconds with no damage.

In any case, be sure you have enough power that the sound *won't* hurt your ears!



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LEVINSON ML-3

(Continued from page 46) performance was essentially identical. That statement is still valid, since I was unable to make a *direct* comparison between the sound of the ML-3 and that of any other amplifier. But even before making any measurements, I could not help being impressed by the utterly effortless and transparent sound of my regular system as modified only by the use of the ML-3 and its special cables and connectors.

The ML-3 simply sounded the way one would *expect* a \$5,400 amplifier to sound. It could be described, I suppose, as having a "gold-plated" sound that was immediately apparent to me regardless of the program source. Interestingly, our measurements showed a subtle departure from ruler-flat response. and that may have been responsible for some of these impressions.

My impressions were undoubtedly influenced as well by what I saw inside the ML-3. Twenty-five years in the electronics engineering world has given me some appreciation of the distance between consumer products, no matter how "deluxe," and top-quality laboratory- or military-grade electronic equipment. The Mark Levinson ML-3 power amplifier is the only consumer product I have seen that bridges that gap. What else can I say? If cost were no object, this is the amplifier I would choose for myself.

For more information on the ML-3, write to Mark Levinson Audio Systems, Ltd., Dept. SR, 2081 South Main Street, Route 17, Middletown, Conn. 06457.

HIRSCH-HOUCK LAB MEASUREMENTS

S INCE the two channels of the ML-3 are completely independent (they even have separate power supplies), we made our measurements driving only one channel. For the one-hour preconditioning period, however, both channels were driven at 1,000 Hz to the required one-third-power output (67 watts) into 8-ohm loads.

The output transistors of the ML-3 draw a fairly high quiescent current, so the heat sinks became moderately warm during idling, but they did not become significantly hotter (and never uncomfortable to the touch) during subsequent high-power testing.

Driving an 8-ohm load at 1,000 Hz, the output clipped at 312.5 watts for a clipping headroom of 1.94 dB. The output power at clipping was 530 watts into 4 ohms (for a clipping headroom of 1.22 dB). With a 2-ohm load, the protective relay operated long before any waveform clipping was observed, at about 162 watts.

The true capabilities of the ML-3 were evident in its 1,000-Hz dynamic output with a 20-millisecond tone-burst signal. The clipping levels in this dynamic-power test were 371, 663, and 1,126 watts, respectively, into loads of 8, 4, and 2 ohms. The dynamic headroom for the rated impedances of 8 and 4 ohms was 2.68 and 2.19 dB. The ML-3 is not designed to sustain its full output at ultrasonic frequencies. so its slew factor is unspecified and cannot be measured in the usual manner. Its square-wave response was excellent, however, and the amplifier was perfectly stable with a complex simulated speaker load. Instead of the typical ringing that we find in amplifier outputs when driving this

load, the ML-3 showed only a single small overshoot. Amplifier sensitivity measured 84 millivolts for a 1-watt output, and the A-weighted noise level was 86 dB below 1 watt.

The frequency response was within ± 1 dB from 20 to 20,000 Hz, but our expanded-scale frequency-response plot shows a broad high-frequency rise (+0.8 dB from 6,000 to 10,000) and a slowly sloping low-frequency response (-1.25 dB at 20 Hz). These characteristics should be audible in a direct comparison with an amplifier that has flatter response.

The 1,000-Hz total harmonic distortion into 8 ohms was extremely low at normal home output levels, increasing smoothly from 0.0006 per cent at 3 watts to 0.0015 per cent at 10 watts and 0.014 per cent at 300 watts (just before clipping occurred). The 4-ohm distortion varied from 0.0019 per cent at 3 watts to 0.0165 per cent at 350 watts. Even a 2-ohm load did not significantly increase distortion, which ranged from 0.0019 per cent at 1 watt to 0.037 per cent at 100 watts, the highest measurable power.

The amplifier's distortion across the audio frequency range (with an 8-ohm load) was under 0.002 per cent from about 50 to 1,000 Hz at any power output, climbing slightly to about 0.005 per cent at 20 Hz and with a steeper rise at the high frequencies. At rated power and half power, the distortion was about 0.01 per cent at 3,000 Hz and just over 0.1 per cent at 10,000 Hz. At one-tenth rated power the readings were 0.01 per cent at 5,000 Hz, 0.025 per cent at 10,000 Hz, and 0.2 per cent at 20,000 Hz, all totally inaudible distortion levels.

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BY RALPH HODGES

ORIGINS OF THE SPECIES

T ODAY the vast bulk of home audio equipment is made on the assembly lines of large Far Eastern corporations, for profit. But way back in the beginning, the bulk and there was nothing vast about it—of high-fidelity equipment was made on workbenches in basements and garages, for love, or rather for the easement of frustration.

The Avery Fishers, Herman Scotts, and others who established the concept of high fidelity in this country did not initially have money on their minds. They had deep and urgent musical interests that could not be satisfied by anything then available in the appliance stores. So they built what they wanted themselves, for themselves. But, of course, they had friends who also had deep and urgent musical interests, and before they really understood what was going on they were sucked into entirely new careers. The hi-fi industry was born, and, after some difficulty in educating the public, it prospered.

The so-called "high end" of the audio industry today is the lineal descendent of high fidelity's first flowering. Most of its manufacturers began as one or two people with a passion for music and a dissatisfaction with what they could buy to reproduce it. Most of them labored to please themselves first and the rest of the world later—maybe. Of course, they knew there was also money to be made. But money was not an adequate motivation for the work involved. Music was.

A few random examples: Jon Dahlquist once decided that the original Quad electrostatic loudspeaker was the best midrange speaker he had ever heard, so he tried to build something that had that same midrange and some bass and treble as well. Bob Waterstripe and Steve Eberbach reasoned that a speaker with the cleanest possible response to impulse would sound better and *be* better, so they created the DCM Time Window. Mark Levinson believed that the finest materials and most imaginative but conservative engineering available had to result in a superior amplifier, so he invested heavily in both.

These engineers all became manufacturers, and they now probably spend more time at desks than at workbenches. But the high-end phenomenon keeps producing newcomers to hone its cutting edge. For instance, Richard Marsh is a scientist at Lawrence Livermore Labs who wouldn't dream of being in the audio business full time, but he designs amplifiers because he sees so many potential design refinements. His partner, William Westerfield, is a former piano student whose hopes for a concert career were dashed by a bout with polio. Together they produce an amplifier, the Moraga 935, that reportedly will soon be in service at companies that could obtain any amplifier they wished.

Now, how was this amplifier, from a brand-new and extremely obscure supplier, chosen over dozens of much more likely contenders? Does it have more power, lower noise and distortion, more graceful overload characteristics, more sophisticated protective circuitry? Well, any and all of those factors could have been involved, but the bare fact seems to be that the engineers who made the selection did not really test the amp. They listened to it. And that's the way Marsh claims he designs an amplifier. He may get around to doing a few lab tests eventually, for curiosi-



ty's sake, but his overriding concern is how the device sounds. To quote him (loosely): "There are very few amplifiers around that won't produce good numbers in the laboratory, but at the same time there are very few good amplifiers. We're missing something. If the numbers won't get you where you want, it's pointless to cling to them."

Several questions are immediately raised: (1) Why don't the numbers for distortion, noise, frequency response, power output, etc. tell us in advance how an amplifier will

MOST OF THEM LABORED TO PLEASE THEMSELVES FIRST, THE REST OF THE WORLD LATER—MAYBE.

sound? (2) If they don't, are there other numbers that will? (3) If so, why don't those numbers appear in equipment reports?

The answers, according to proponents of the high end, are: (1) Don't know. (2) Perhaps. (3) Their nature hasn't been identified yet. And the response of the high end to all these unresolved matters has been to forget about them and proceed with the task of making something that's pleasant to listen to.

But what is "pleasant"? Another quote from another manufacturer: "If it doesn't sound like music, the genuine experience of music, then it's not perfected. If some people don't know what music really sounds like, let them buy what they wish. But I do know, and I've not been able to buy it in any audio store from here to Tokyo. Everyone claims that recording techniques, listening-room acoustics, you name it, are to blame, and I agree completely. But I'm also aware that the products I've come up with get me closer to what I want. If someone comes up with a reproduction system that gets me all the way, I'll gladly retire. But not until." Amen.

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