Stereo Review's

$2.95

# TAPE RECORDING & BUYING GUIDE 1981

THE LATEST AUDIO & VIDEO TAPE MACHINES & ACCESSORIES

CASSETTE DECKS ★ CAR STEREO ★ VIDEO RECORDERS

FULL SPECIFICATIONS ★ FEATURES ★ LATEST PRICES

ALSO: How to buy a cassette deck...
Choosing the best cassette tape...
Microphone placement techniques.

BONUS: EQUIPMENT TEST REPORTS

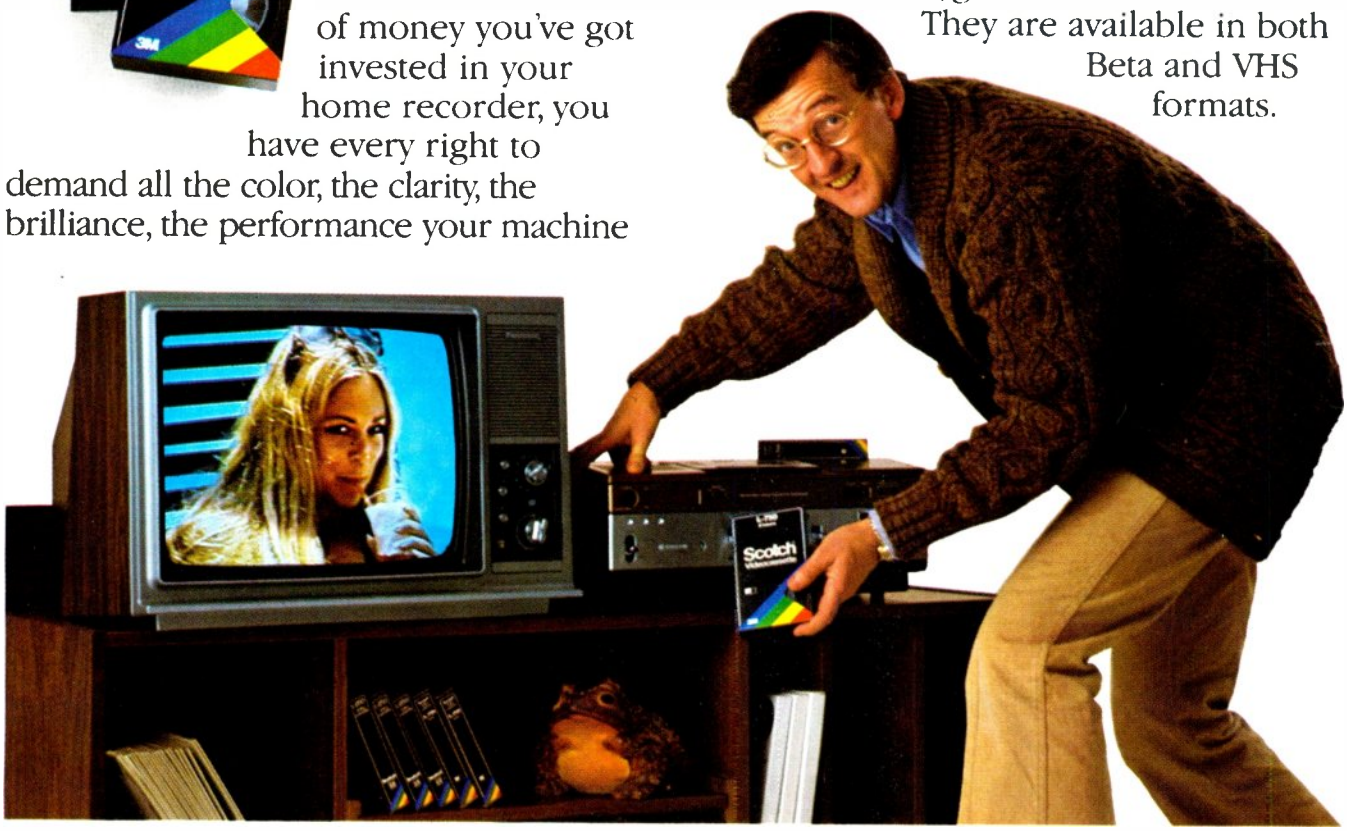
# TRUE NETWORK COLOR AND CLARITY MAKES ITSELF AT HOME.

With the kind of money the networks put on the line every time they tape a TV show, they have to get it right the first time. The picture has to be sharp and bright, with brilliant, true color. That's why the major networks use Scotch® video tape.


With the kind of money you've got invested in your home recorder, you have every right to demand all the color, the clarity, the brilliance, the performance your machine can deliver. And there's one sure way to get it. Get Scotch Videocassettes.


They're specially formulated and engineered to give you true color and clarity.

To show your true colors when you record at home, get Scotch Videocassettes. They are available in both Beta and VHS formats.




**SCOTCH® VIDEOCASSETTES. THE TRUTH COMES OUT.**

3M

CIRCLE NO. 11 ON READER SERVICE CARD

# AIWA AD-M800U STEREO CASSETTE DECK

## Three heads...and a brain.

Only the very best decks have three heads. But Aiwa's metal compatible deck adds wireless remote control. And a brain ... DATA. Aiwa's exclusive, microcomputer Digital Automatic Tape Adaptation.

**THE DATA SYSTEM**

In less time than it takes to read what DATA does ... DATA does it. Set DATA's computer and press START. LEDs begin to flicker. One each for LH, FeCr, $CrO_2$ and METAL.

DATA's electronic senses analyze the tape and an LED lights up as the others go out. Now you—and DATA—know the kind of tape being used.

Another LED flickers and lights. BIAS is set for best frequency response using a built-in 6 kHz reference signal. The next LED flickers and lights. Dolby* levels are calibrated and set using a 400 Hz reference signal.

Two LEDs remain. One flickers and lights. EQ-M is set ... equalization for the mid-range 5-10 kHz. Then the next, EQ-H ... equalization for the high, 10-18 kHz range is set.

Further down the panel an LED lights. It's green. OK! You're ready to record. But ... if the red LED lights instead, the machine's not wrong. The tape is. Get another tape or switch to manual over-ride.

Once DATA is set, you record with maximum sonic quality, regardless of whose tapes or what type you're using. And DATA stores the tape analyses—at your command—in its memory bank. Four different tapes of your choice.

Cassette recording was never so precise. So simple. And so fast.

**IT ALL ADDS UP**

Precise sophistication like DATA deserves features and performance to match. You've got them, starting with built-in wireless remote control for full-function performance from across the room, using dependable, invisible infrared projection.

You have 3-head performance using linear, ultra-hard sendust heads with Aiwa's exclusive V-cut geometry for contour effect elimination doing away with roughness at low frequencies. And each head is designed for best performance at its specific function.

Add Double-Dolby*; IC logic controls; dual motor drive; backlit VU meters with 5-step peak reading LEDs; auto-repeat; memory replay; oil-damped eject and more.

The sum of the parts is frequency response of 30-17,000 Hz using metal tape. S/N ratio of 68dB with FeCr, Dolby on. Wow & Flutter 0.04% WRMS.

This is one of the finest decks you can get at any price. If you prefer, it's available in black with rack handles as the AD-M800BU.

Aiwa's AD-M800U is like having your own recording engineer tucked away in a small but powerful chip. The power's there for you. Listen to an Aiwa. Or write Bob Fisher, national sales manager for more information.

*Dolby is a registered trademark of Dolby Laboratories.


*Upgrade to...*

AIWA®

**AIWA AMERICA INC.,**
35 Oxford Drive, Moonachie, New Jersey 07074
Distributed in Canada by: Shriro (Canada) Ltd.

CIRCLE NO. 1 ON READER SERVICE CARD

# LUX AMPLIFIERS ARE WHAT MAKES LUX CASSETTE DECKS BETTER.

Lux decks start with half a century of amplifier expertise because while the record and playback heads are the senses of a deck, the recording amplifier is the heart.

Only DC amplification provides low inherent distortion, wide dynamic bandwidth and the headroom to take advantage of metal tape. Then Lux adds the features essential for total performance.

Look at Lux's K-8 and K-15. Wherever possible, mechanical operations are replaced by electronics. Both decks have full IC logic controlled solenoid operation so any function, in any order, is a finger-stroke away.

Meters have been replaced by instant-response fluorescent peak level indicators with a special, 3dB added scale for metal tape. The electronic digital tape counter is precise, easy to read, and shows tape motion as well.

Bias and equalization settings are provided for all tapes, and variable bias control lets you add the final adjustment for *your* ears only. Other features include automatic play/rewind/repeat functions complete with memory. And Dolby* NR, of course.

Both units are exquisite examples of mechanical, electronic and human engineering in sleek, contemporary rosewood cabinets.

**Sophistication ... and then some**

Lux's K-15 goes even further, with DC playback amplification as well for even lower distortion. And, Dolby*HX, a new circuit offering at least 10dB additional headroom in the record mode.

Dolby HX works with the Dolby NR circuitry, monitoring the signal being recorded. The HX system is automatic, continuous variation of bias and equalization in response to signal content, particularly at the high frequencies.

Tape saturation is reduced, and while Dolby NR gives you *less noise*, Dolby HX gives you *more signal*. The improvement is significant and very noticeable when played back on any machine with Dolby NR. Dolby HX works with any tape ... and makes it better.

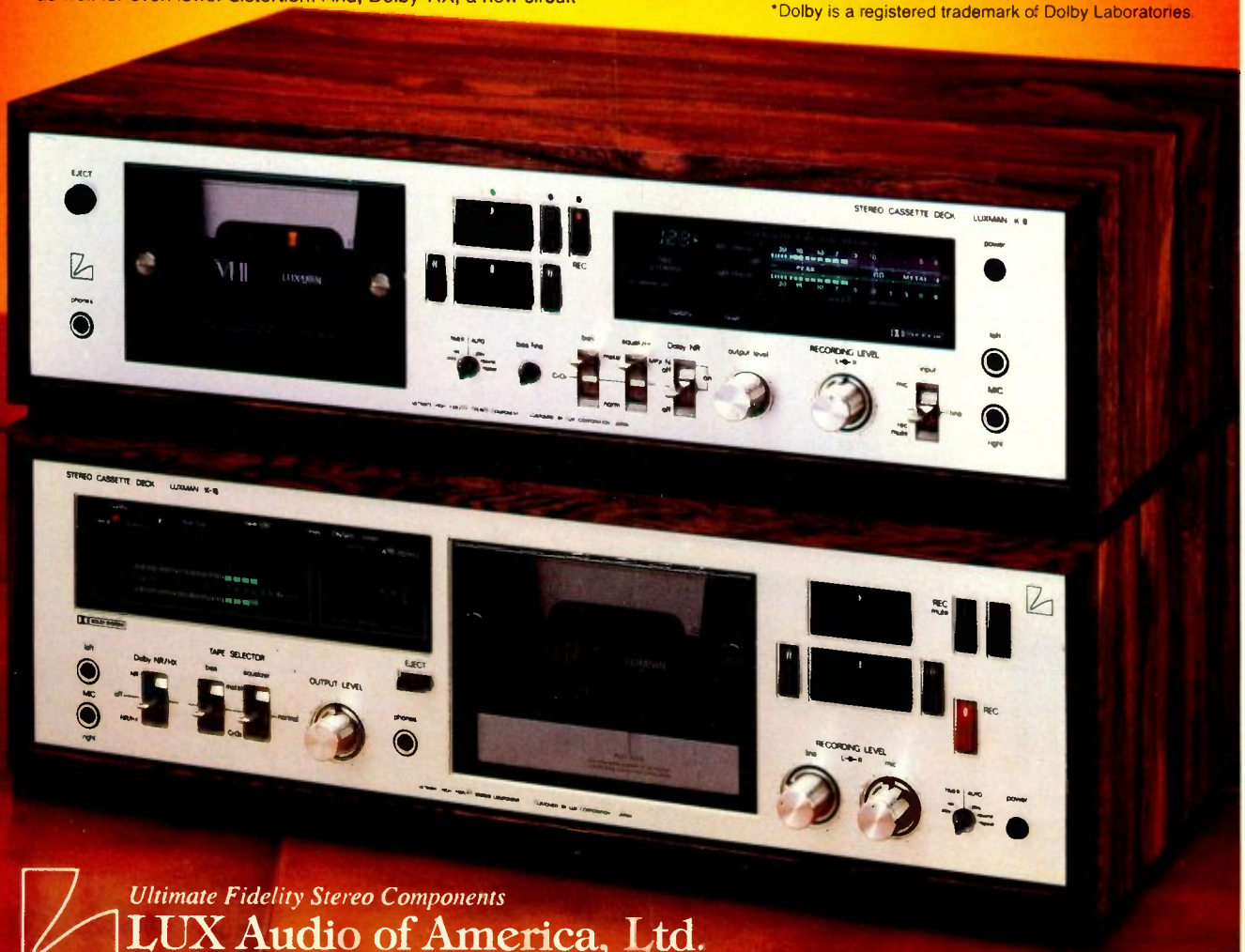
**Lux K-8:** 2-heads; DC servo motor drive. Frequency response 20-20,000 Hz, metal tape. S/N ratio 65dB, metal tape, Dolby on. Wow & Flutter 0.055% WRMS.

**Lux K-15:** 3-heads; 2 DC servo motors; dual-capstan closed loop system. Frequency response 30-20,000 Hz (±3dB), metal tape; S/N ratio 69dB, metal tape, Dolby on. Wow & Flutter 0.04% WRMS.

Other exceptional decks in the Lux line range in price from $299 to $1995 and include the 5K50 professional deck with 3 heads, 3 motors and dual DC amplification; K-12, 2-head, 2-motor deck with dual DC amps; K-5A with 2 heads and Lux bridge motor drive; K-1, 2-head, servo motor drive. All are metal compatible and have Dolby NR.

The Lux cassette deck ... better because it's built with the Lux Amplifier.

*Dolby is a registered trademark of Dolby Laboratories



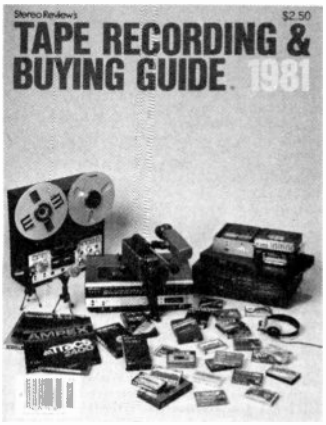

*Ultimate Fidelity Stereo Components*

## LUX Audio of America, Ltd.

*Reflecting Tomorrow's Technology in Today's System*

160 Dupont Street, Plainview, NY 11803 / (516) 349-7070 • West Coast Office: 11200 Chandler Blvd., North Hollywood, CA 91603 / (213) 985-4500 • Canada: Lux Audio of Canada, Ontario M1S 3R3

CIRCLE NO. 10 ON READER SERVICE CARD




**Cover Photo:** Justin and Barbara Kerr

**Cover Equipment** (from left to right, front to back): AKG D330BT Dynamic Microphones with stands; Tandberg TD 20A-2 Open-Reel Tape Recorder; JVC Vidstar HR-6700U VHS Video Cassette Recorder; Panasonic WV-3200 Color TV Camera; Vector Research VCX-600 Cassette Deck: Sanyo Plus N55 Super D Tape Noise-Reduction System; Alpine 3002 Power Amplifier; Alpine 7307 AM-FM Tuner/Cassette Deck; Alpine 3000 Graphic Equalizer. Blank Tape: Ampex, Audio Magnetics, BASF, DAK, Fuji, Maxell, Memorex, Realistic, RKO, Scotch, Sony, and TDK.



**Editorial, Executive, and Circulation Offices**
One Park Avenue
New York, New York 10016
212-725-3500
Assoc. Publisher, Robert J. Ur, Sr.
Adv. Director, James J. Sullivan
National Adv. Mgr., Richard J. Halpern
Eastern Adv. Rep., Charles P. Watson

**Midwestern Office**
The Pattis Group
4761 West Touhy Avenue
Lincolnwood, Illinois 60646
312-679-1100
Arnold S. Hoffman

**Western Office**
3460 Wilshire Boulevard
Beverly Hills, CA 90010
213-387-2100

**Japan**
James Yagi
Oji Palace Aoyama
6-25 Minami Aoyama
6 Chome
Minato-Ku, Tokyo
407-1930/6821
582-2851

**1981 TAPE RECORDING & BUYING GUIDE** is published annually by the Ziff-Davis Publishing Company, One Park Avenue, New York, N.Y 10016. Also publishers of Stereo Review, Popular Electronics, Electronic Experimenter's Handbook, Communications Handbook, and Stereo Directory & Buying Guide.

Stereo Review's

# TAPE RECORDING & BUYING GUIDE 1981

## FEATURES



## PRODUCT INFORMATION



SIDNEY HOLTZ, **Publishing Director** • ARTHUR P. SALSBERG, **Editorial Director**
HAROLD A. RODGERS, **Executive Editor** • DIANE NAKAMURA, **Directory Editor**
EDWARD I. BUXBAUM, LESTER FRIEDMAN, **Art** • JOHN KIRBY, **Editorial Assistant**
ROBERT J. UR, SR., **Associate Publisher** • JAMES J. SULLIVAN, **Advertising Director**
RICHARD J. HALPERN, **National Advertising Manager**

TAPE RECORDING & BUYING GUIDE is published annually by Ziff-Davis Publishing Company at One Park Avenue, New York, New York 10016.

# DIRECTORY OF MANUFACTURERS

**ADC PROFESSIONAL PRODUCTS,** Div. of BSR (USA)
*Route 303, Blauvelt, NY 10913*

**ADS, ANALOG & DIGITAL SYSTEMS, INC.**
*One Progress Way, Wilmington, MA 01887*

**AHB by AUDIO MARKETING, LTD.**
*652 Glenbrook Road, Stamford, CT 06906*

**AI ALARON, INC.**
*185 Park St., Box 550, Troy, MI 48099*

**AIWA AMERICA INC.**
*35 Oxford Dr., Moonachie, NJ 07074*

**AKAI AMERICA, LTD.**
*2139 East Del Amo Blvd., P.O. Box 6010, Compton, CA 90224*

**AKG,** Phillips Audio Video Systems Corp.
*91 McKee Dr., Mahwah, NJ 07430*

**ALLSOP AUTOMATIC, INC.**
*P.O. Box 23, Bellingham, WA 98225*

**ALPINE ELECTRONICS**
*3102 Kashiwa St., Torrance, CA 90505*

**AMPEX CORPORATION,** Magnetic Tape Div.
*401 Broadway, Redwood City, CA 94063*

**R.B. ANNIS COMPANY**
*1101 N. Delaware St., Indianapolis, IN 46202*

**ASHLY AUDIO, INC.**
*100 Fernwood Ave., Rochester, NY 14621*

**ASPEN LIMITED**
*P.O. Box 92, Englewood, CO 80151*

**AUDIOARTS ENGINEERING**
*286 Downs Rd., Bethany, CT 06525*

**AUDIO CONTROL**
*6520 212th S.W., Lynnwood, WA 98036*

**AUDIOKIT by AUDIOMARKETING LTD.**
*652 Glenbrook Rd., Stamford, CT 06960*

**AUDIONICS, INC.**
*Suite 160, 10950 SW 5th, Beaverton, OR 97005*

**AUDIO PULSE,** Div. of Gould, Inc.
*4323 Arden Dr., El Monte, CA 91731*

**AUDIO-TECHNICA, U.S., INC.**
*33 Shiawassee Ave., Fairlawn, OH 44313*

**AUDIOTEK CORPORATION**
*1447 N. Carolan Ave., Burlingame, CA 94010*

**AUDIOTEX,** GC Electronics
*400 S. Wyman St., Rockford, IL 61101*

**AUDIOVOX CORP.**
*150 Marcus Blvd., Hauppauge, NY 11787*

**BANG & OLUFSEN OF AMERICA, INC.**
*515 Busse Rd., Elk Grove Village, IL 60007*

**BASF SYSTEMS,** Div. of BASF Wyandotte Corp.
*Crosby Dr., Bedford, MA 01730*

**BENJAMIN ELECTROPRODUCTS, INC.**
*180 Miller Pl., Hicksville, NY 11801*

**BEYER/DYNAMIC INC.**
*5-05 Burns Ave., Hicksville, NY 11801*

**BIAMP SYSTEMS, INC.**
*9600 SW Barnes Rd., Portland, OR 97225*

**BIB HI-FI ACCESSORIES, INC.**
*3363 Garden Brook Dr., Dallas, TX 75234*

**B•I•C/AVNET**
*South Service Rd., Westbury, NY 11590*

**BURWEN RESEARCH, INC.**
*145 University Ave., Westwood, MA 02090*

**CALECTRO,** GC Electronics
*400 South Wyman St., Rockford, IL 61101*

**CALIBRE** CBS Specialty Stores, Div. of CBS
*1313 53rd St., Emeryville, CA 94608*

**CERTRON CORPORATION**
*1701 South State College Blvd., Anaheim, CA 92806*

**CERWIN-VEGA INC.**
*12250 Montague St., Arleta, CA 91331*

**CHELCO SOUND, INC.**
*22 Craigwood Rd., Avenel, NJ 07001*

**CLARION CORPORATION OF AMERICA**
*5500 Rosecrans Ave., P.O. Box 749, Lawndale, CA 90260*

**COBRA,** Div. of Dynascan Corp.
*6460 West Cortland Ave., Chicago, IL 60635*

**CONCEPT,** CBS Specialty Stores, Inc., Div. of CBS
*1313 53rd St., Emeryville, CA 94608*

**CONCORD ELECTRONICS**
*6025 Yolanda Ave., Tarzana, CA 91356*

**CRAIG CORPORATION**
*1950 Estes Ave., Elk Grove Village, IL 60007*

**CROWN INTERNATIONAL, INC.**
*1718 W. Mishawaka Rd., Elkhart, IN 46514*

**DAK INDUSTRIES**
*10845 Vanowen St., North Hollywood, CA 91605*

**dbx INCORPORATED**
*71 Chapel St., Newton, MA 02195*

**DENON AMERICA, INC.**
*27 Law Dr., Fairfield, NJ 07006*

**DRACO LABS, INC.**
*1005 Washington St., Grafton, WI 53024*

**DUAL,** United Audio Products, Inc.
*120 S. Columbus Ave., Mount Vernon, NY 10553*

**DUBIE CORPORATION**
*1725 Ladera Trail, Dayton, OH 45459*

**ELECTRO-VOICE, INC.,** Sub. Gulton Industries, Inc.
*600 Cecil Street, Buchanan, MI 49107*

**ERCONA CORPORATION**
*2492 Merrick Rd., Bellmore, NY 11710*

**EUMIG USA, INC.**
*Lake Success Business Park, 225 Community Dr., Great Neck, NY 11020*

**EVENTIDE CLOCKWORKS, INC.**
*265 West 54th St., New York, NY 10019*

**EV GAME, INCORPORATED**
*186 Buffalo Ave., Freeport, NY 11566*

**FIDELITONE, INC.**
*3001 Malmo Rd., Arlington Heights, IL 60005*

**FINCO,** The Finney Company
*34 W. Interstate St., Bedford, OH 44146*

**FISHER CORPORATION**
*21314 Lassen St., Chatsworth, CA 91311*

**FOSGATE ELECTRONICS**
*2923 North 33rd Ave., Phoenix, AZ 85017*

**FUJI PHOTO FILM USA, LTD.**
*350 Fifth Ave., New York, NY 10001*

**FUJITSU TEN CORP OF AMERICA**
*19281 Pacific Gateway Dr., Torrance, CA 90502*

**FURMAN SOUND**
*616 Canal St., San Rafael, CA 94901*

**GC ELECTRONICS**
*400 S. Wyman St., Rockford, IL 61101*

**GENERAL ELECTRIC**
*Television Business Dept., 1 College Blvd. Portsmouth, VA 23705*
*800 Third Ave., 29th Fl., New York, NY 10022*

**GLI**
*29-50 Northern Blvd., Long Island City, NY 11101*

**GTE SYLVANIA**
*700 Elliott St., Batavia, NY 14020*

**HARMAN/KARDON,** Div. Harman International Industries, Inc.
*55 Ames Court, Plainview, NY 11803*

**HITACHI SALES CORP. OF AMERICA,** Audio Component Div.
*401 W. Artesia Blvd., Compton, CA 90220*

**INFINITY SYSTEMS, INC.**
*7390 Deering Ave., Canoga Park, CA 91304*

**INTEGREX, INC.**
*P.O. Box 747, Havertown, Pa 19083*

**INTERSOUND**
*P.O. Box 1864, Boulder, CO 80306*

**IRISH MAGNETIC RECORDING TAPE,** Div. of Morhan Nat'l Sales Co., Inc.
*270-78 Newtown Rd., Plainview, NY 11803*

**JENSEN SOUND LABORATORIES,** An Esmark Company
*4136 N. United Parkway, Schiller Park, IL 60176*

**J.I.L. CORP. OF AMERICA, INC.**
*737 W. Artesia Blvd., Compton, CA 90220*

**JVC,** US JVC CORP.
*58-75 Queens Midtown Expressway, Maspeth, NY 11378*

**KENWOOD ELECTRONICS, INC.**
*75 Seaview Dr., Secaucus, NJ 07094*

**KLH RESEARCH AND DEVELOPMENT CORP.**
*145 University Ave., Westwood, MA 02090*

**KOSS CORPORATION**
*4129 N. Port Washington Ave., Milwaukee, WI 53212*

**KRACO ENTERPRISES, INC.**
*505 E. Euclid Ave., Compton, CA 90224*

**LAKE COMMUNICATIONS INC.**
*5743 Howard St., Niles, IL 60648*

**LINEAR POWER**
*11545 D Ave., Auburn, CA 95603*

**LOGICAL SYSTEMS**
*3314 H St., Vancouver, WA 98663*

**LT SOUND**
*P.O. Box 1061, Decatur, GA 30031*

**LUX AUDIO OF AMERICA LTD.**
*160 Dupont St., Plainview, NY 11803*

**MAGNESONICS** Sales & Manufacturing Co.
*P.O. Box 758, Ventura, CA 93001*

**MARANTZ CO., INC.,** Subs. Superscope, Inc.
*20525 Nordhoff St., Chatsworth, CA 91311*

**MARLBORO SOUND WORKS,** Div. of M.I.C.A.
*170 Eileen Way, Syosset, NY 11791*

**MATRECS ELECTRONICS, INC.**
*805 Woodman Ave., Winslow, IL 61089*

**MAXELL CORP. OF AMERICA**
*60 Oxford Dr., Moonachie, NJ 07074*

**MEMOREX CORPORATION**
*San Tomas at Central Expressway, Santa Clara, CA 95052*

**MITSUBISHI AUDIO SYSTEMS,** Melco Sales Inc.
*3030 E. Victoria St., Compton, CA 90221*

**MITSUBISHI CAR AUDIO,** Melco Sales, Inc.
*7045 North Ridgeway Ave., Lincolnwood, IL 60645*

**MULTIVOX by SORKIN MUSIC CO., INC.**
*370 Motor Pkwy., Hauppauge, NY 11787*

**MURA CORPORATION**
*177 Cantiague Rock Rd., Westbury, NY 11590*

**MXR INNOVATIONS INC.**
*247 N. Goodman St., Rochester, NY 14607*

**NAD (USA) INC.**
*675 Canton St., Norwood, MA 02062*

**NAKAMICHI RESEARCH (USA), INC.**
*1101 Colorado Ave., Santa Monica, CA 90401*

**NEAL-FERROGRAPH**
*652 Glenbrook Rd., Stamford, CT 06906*

**NEUMANN,** Gotham Audio Corp.
*741 Washington St., New York, NY 10014*

**NIKKO AUDIO**
*16270 Raymer St., Van Nuys, CA 91406*

**NORTRONICS COMPANY, INC.**
*8101 Tenth Ave. N., Minneapolis, MN 55427*

**ONKYO U.S.A. CORP.**
*42-07 20th Ave., Long Island City, NY 11105*

**OPAMP LABS INC.**
*1033 N. Sycamore Ave., Los Angeles, CA 90038*

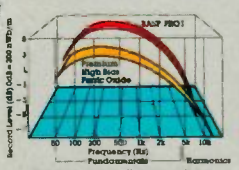
**OPTONICA,** Sharp Electronics
*10 Keystone Pl., Paramus, NJ 07652*

*(Continued on page 49)*

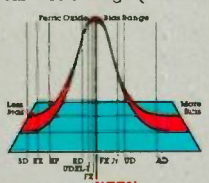
# The Tape Guide

## Professional·I. The one tape that stands up when you crank it up.


Premium ferric oxide tapes have more headroom which allows higher maximum recording levels (MRL). Among all premium ferric oxides PRO I has the best MRL for loud recordings. Uniform maghemite particles provide increased headroom for very accurate and loud recordings with virtually no distortion. In the fundamental music range (20Hz-5kHz) PRO I can be recorded louder and driven harder than even high bias tapes. PRO I is the internationally accepted reference tape, whose bias point is specifically matched to the Type I/normal/ferric position on today's high quality cassette decks.




Greater headroom allows more distortion-free recording.



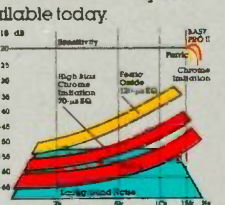

PRO I is designed to be compatible with the normal bias setting of stereo cassette decks than any other ferric tape.

## Professional·II. The world's quietest tape puts nothing between you and your music.


High bias tapes consistently provide wider frequency response and less tape noise (hiss or background noise) than any other tape type. Among premium high bias tapes PRO II is in a class by itself. It is the second generation chromium dioxide tape with superb frequency response and outstanding sensitivity in the critical (10kHz-20kHz) high frequency range. It also has the lowest background noise of any other competitive tape available today.

The pure chromium dioxide particles in the PRO II, unlike ferric oxide particles, are homogeneously shaped and universally sized to give this tape superior performance.

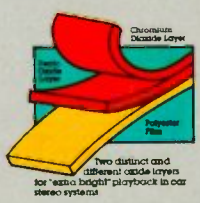
PRO II will capture the many subtle harmonics of the most demanding recordings and play them back with the reality and presence of a live performance. PRO II is the tape for the Type II/chrome/high bias position that comes closest to Metal tape performance for half the price.



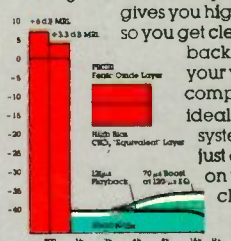

PRO II has the best high frequency sensitivity and the least background noise of any high bias tape.

## Professional·III. The only car tape that eliminates the car.


Ferrichrome tapes combine the benefits of chromium dioxide and ferric oxide tapes for superior performance in car stereos. The top layer is pure chromium dioxide for unsurpassed highs and low background noise. The bottom layer is ferric oxide for superior lows and great middle frequencies. And it also gives you higher recording levels, so you get clearer, louder playback without cranking up your volume control to compensate. PRO III is the ideal tape for car stereo systems and performs just as well in the home on the Type III/ferrichrome position.




Two distinct and different oxide layers for "extra bright" playback in car stereo systems.




PRO III provides a higher maximum recording level (MRL) than high bias tapes, and effectively boosts the highs to overcome road and car noise.

## GUARANTEE OF A LIFETIME

**"The guarantee of a lifetime."** All BASF tape cassettes come with a lifetime guarantee that covers everything. Should any BASF cassette ever fail—for any reason—simply return it to BASF for a free replacement.

**Patented "Jam-Proof" Security Mechanism (SM):** All BASF tape cassettes come with our exclusive SM—Security Mechanism. Two precision arms actually "guide" the tape in a smooth, exact and consistent track, so that winding is always even, no matter how often the cassette is played. SM puts an end to tape jamming.

# BASF

Crosby Drive, Bedford, Massachusetts 01730

CIRCLE NO. 4 ON READER SERVICE CARD

# CASSETTE TAPE

## A few simple at-home tests can help you choose the best tape type and brand for your machine

A CASSETTE tape can be considered a component like any other part of your system, and it pays to choose one with as much care and consideration as you would devote to selecting a phono cartridge, a speaker, or any piece of electronic gear. In fact, when you consider that you can easily invest as much—or more—in blank cassettes over the years as you do in a good amplifier or receiver, care in choosing a tape that will bring out the best in your equipment is only common sense. The selection process is most effective if it is done in two steps: first, narrow your choice down to the *type* of tape that best suits your intended use; second, discover which *brand(s)* of that type give you the best results.

### The Right Type

On the face of it, it might seem that you would get better fidelity from the more expensive cassettes in a given manufacturer's line than from his less expensive ones. The matter is rather more complicated than that, however. For example, if you are recording speech, dubbing from discs with limited frequency range, or the like, there's no sense in paying the premium price that a super-fidelity tape commands. Most major manufacturers sell "low-noise" cassettes that handle such simple jobs almost as well as their most expensive tapes. The way to determine whether a tape is adequate for your purposes is first to make a test recording on it of the material you want to capture and then to repeat the test using a slightly more expensive tape. If there's no audible difference between the two when played back on your equipment, the less-expensive tape is the one to buy for that particular recording job. More demanding program material will probably require a better tape, but be sure your machine is one that will bring out its advantages.

This doesn't mean that just *any* low-price tape will do, however. A manufacturer who has a valuable brand name to protect will make his economy cassettes as carefully as he does his premium ones. That means a precisely milled and applied magnetic coating with a firm binder to hold the particles to a strong plastic base, precise tape slitting, *and* a carefully constructed cassette shell, the whole designed to minimize response variations, dropouts, weaving, stretching, or jamming.

For demanding applications, such as music with wide frequency and dynamic ranges, many audiophiles choose a high-bias premium tape. Such tapes require 70-microsecond ($\mu$sec) equalization and, of course, a high bias (both settings are marked "$CrO_2$" or "II" on many tape decks). They have extremely low noise and high output for wide dynamic range, plus a wider, flatter frequency response. There are many excellent *low*-bias premium tapes available as well. Using 120-$\mu$sec equalization and "normal" or "low-noise" bias settings, such tapes give results quite similar to those obtainable with high-bias tapes. (Note that signals recorded on high-bias tapes without proper bias and equalization are likely to be distorted and to have a peaked treble response.)

With those decks equipped to record on them properly, the new metal tapes deliver greatly improved high- and low-frequency response, more headroom at high frequencies, and a 7- to 12-dB wider dynamic range than typical premium tapes. All this results in greater freedom from overload as well as vanishingly low noise during quiet passages. These tapes can be *played back* on *any* tape deck with 70-$\mu$sec or "$CrO_2$" equalization, but attempting to record on them without the correct "metal" bias and equalization will result in extreme distortion and frequency-response problems.

### How to Test

Tape formulations and tape decks vary widely, so the tape of a given type which sounds best on your neighbor's machine may *not* work best for you unless you both have the same model tape deck (even then, there can be individual internal-adjustment differences). Therefore, finding the tape that provides the optimum match for critical recording on *your* deck means that you will have to make some simple tests. All you'll need to buy for these tests is a "cross-section" assortment of well-known tape brands and types. And don't feel that this is any waste of money: you will get at least *good* results from all of them. Getting the *best possible results*, however, is the purpose of your tests.

First, you'll want to test frequency response. The best quick test is to record interstation FM noise, for this signal contains all the audio frequencies (up to about 15,000 Hz or so) at once. For your test signal, turn your FM interstation-noise muting off and tune to the spot on the dial where the "hiss" is cleanest, with as few irregular noises as possible (it may help to disconnect your antenna). Switch your tuner or tape deck to "mono," or use a Y-connector between your system output and your tape deck's inputs, to make sure that both inputs receive exactly the same signal. Keep the volume through your speakers moderate and *don't* turn up the treble control (the noise signal's high-frequency energy at very high levels could burn out your tweeters).

Now switch your machine's Dolby circuits off and set its controls for the bias and equalization recommended for the tape you are about to test. The recording level should be set for exactly −20 dB as read on the machine's meters. Record a few minutes of interstation noise, and then leave a blank, unrecorded portion. Do this on each of the tapes you're testing, resetting bias and equalization as required each time. If you have a three-head deck with separate record and playback heads, you can compare the actual "live" FM noise and your recording of it by switching back and forth between the two with the source/tape monitor switch. If not, you'll have to rewind the tape and play it back to make the com-

By John Dale

"... FM high-frequency noise can be a boon when it comes to selecting the best tape for your machine."

parison. Either way, make sure the "live" noise from the tuner and the playback of the noise recorded on the tape are carefully matched in loudness. Pay particular attention to the higher frequencies (the "hissy" part of the noise), because this is where the differences will be most apparent.

The greater the audible similarity between the tuner's FM noise and your recording of it, the wider and flatter the frequency response you're getting. As you make your comparisons between tapes, you will find that some tapes come much closer to the original sound than others. With these close matches, go back and forth a few times, listening carefully, until you're sure which tape sounds best on this test. (Again, differences will usually be most obvious in the highs.)

Next to be checked are the tapes' residual noise and dynamic range. This is done (rather roughly) by comparing noise levels on the *un*recorded portions of each tape. Again, set the tape deck's output-level control so that the output levels on the *recorded* portions match the "live" FM-noise signal level. With the Dolby circuits off and all output levels the same, the noise levels on the unrecorded portion will give some indication of the tape's relative dynamic range—the lower the noise, the wider its dynamic range. (It is not, of course, an *absolute* indication, for it takes into account only the tape's sensitivity and residual noise, not its maximum output level or possible machine noise.)

Frequency response and dynamic range are just part of the story, however, so it is also advisable to take the tapes that scored best on these first two tests and record wide-range music from discs on them. Distortion is most likely to show up in loud sounds, particularly those that are rich in high-frequency content: tambourines, cymbals, snare drums, and the like. The higher the level you can record without audible distortion, and the lower the noise, the wider the dynamic range.

Listen too for crisp, clear sound that lets you pick out individual instruments. Go back to your original disc and compare to be sure that both low and high notes are as prominent and as well-defined in your tape recording as they are in the original—but not *over*-prominent or strident. If your tape sounds "better" than the original program, it usually means that a high-frequency boost has somehow occurred. Make sure that this is not accompanied by distortion and noise.

## Test Program Material

Your test material should naturally include the type of music you normally listen to, for your familiarity with it will help you to analyze what you are hearing. But it should also include other types of music, even if you don't listen to them normally. Rock, for example, usually provides a better test of high-frequency headroom than classical music does, because of its greater high-frequency content. Classical music, however, with its combination of loud and soft passages, requires a greater dynamic range, and it more frequently includes truly *low* frequencies and strong low-bass transients (such as sudden organ chords, timpani attacks, and the like). The plucked strings of some acoustical instruments—guitars, for example—provide excellent tests of transient response too.

Records—especially the new direct-to-disc, digital, and other premium "audiophile" products—are probably the best source material you can find—if they're not worn or dirty. (*High-quality* FM broadcasts will also do in a pinch, but they are hard to find in most sections of the country.) A list of records suggested for test purposes is appended below.

THE FM interstation-noise test, which requires no test equipment other than your ears, has other uses too. Aside from its use in finding the best tape for your machine, it can also be employed to determine the best bias and other settings for any tape. It is almost comically paradoxical that high-frequency *noise*, the bane of tape recordists, can be a boon when it comes to selecting the best tape for your machine and optimizing its performance! □

**John Dale,** *vice president and general manager of the Magnetic Tape Division of Fuji Photo Film U.S.A., Inc., has considerable experience with video as well as audio tape.*

## DISCS TO EVALUATE TAPES BY

HERE are some disc recordings sonically demanding enough to give your tape, deck, recording abilities, and ears a good workout when you dub them. The results should either show off the quality or show up any deficiencies of the tape you're using.

● **STRAVINSKY:** ***The Firebird, Suite*** (good feedback and rumble test). **BORODIN:** ***Prince Igor, Overture*** (check if the tape dub holds the overall balance at the end). ***Polovtsian Dances*** (listen for the sound of the player's breath going through the flute at the beginning). Atlanta Symphony Orchestra and Chorus, Robert Shaw cond. TELARC ◑ DG-10039.

● **TCHAIKOVSKY:** ***1812 Overture*** (listen for triangles, cannon, cymbals, brushes on snare drum). ***Capriccio Italien*** (listen for triangles). Cincinnati Symphony Orchestra, Erich Kunzel cond. TELARC ◑ DG-10041.

● **MEL LEWIS:** ***Naturally.*** Mel Lewis and the Jazz Orchestra. TELARC ◑ DG-10044.

● **ROSIE O'GRADY'S GOOD TIME JAZZ BAND:** ***Dixie*** (listen for cymbals, brushes, and brass on side two, band one). DIRECT-DISK ⓓ DD-103.

● **CREATION:** ***Super Rock in the Highest Voltage*** (good highs and lows on side one, band two). TOSHIBA ⓓ ELF-95016.

● **PAUL JACKSON:** ***Black Octopus*** (side one, band one—check bass in opening, highs at end of cut; side one, band two—bass in opening). Paul Jackson Jazz Band. EAST WORLD/TOSHIBA ⓓ EWLF-98006.

● **FLATT AND SCRUGGS:** ***Greatest Hits*** (side two, band one—*Earl's Breakdown* has a wide range, good banjo highs). COLUMBIA CS 9370.

● **LARRY McNEELY:** ***Confederation*** (check the bass and violin in *Liza Jane*—side one, band one). SHEFFIELD LAB ⓓ 9.

# The continuing story of TDK sound achievement.

## Part One.

Music has gone through many transitions. Its rhythms, tones and forms have changed dramatically. As have the means of reproducing it. From the first wax cylinder to today's music machine: the TDK cassette.

TDK pioneering in ferrite technology began over forty years ago. This led TDK engineers to develop microscopic particles which, through their long shape and uniform size, could translate magnetic energy into flawless sound. By 1968 TDK had created TDK SD. The world's first high fidelity cassette. In 1975, TDK created a revolution. Super Avilyn. Ultra-refined gamma-ferric oxide particles were bombarded with cobalt in a proprietary ion-adsorption process. The resulting TDK SA cassette had higher signal to noise. Higher coercivity. Low noise. A maximum output level superior to anything heard before. Overnight, TDK SA became the high bias reference.

TDK has a philosophy of sound. A belief that total performance is the outcome of a perfect interplay between the parts. It all begins with *Part One*, the TDK tape. Magnetic powder is first converted into TDK magnetic material in the form of a coating paint or binder. On a giant rotary press and in a dust-free atmosphere, jumbo rolls of tensilized polyester are coated evenly with TDK binder. The tape rolls are edited and leader is inserted at precise intervals. Surgically sharp knives then cut the tape into predetermined widths. The edges perfectly straight. All along the way, TDK tape undergoes thousands of checks. It's polished to micron smoothness to give better head contact, increase sensitivity and maintain stable output. TDK binder, recently improved, packs more particles on the tape surface. And the whole process is done automatically. Controlled by a central computer brain. From the very first, TDK tape runs true. And so does the sound.

The TDK story will unfold in future chapters. You'll learn about other key parts and their sound synergy in a TDK cassette. And you'll draw only one conclusion. Music is the sum of its parts.


TDK®

The machine for your machine



CIRCLE NO. 19 ON READER SERVICE CARD

# A BASIC VOCABULARY OF TAPE RECORDING

## to make your shopping just a little easier

By David Ranada

RECORDING tape and the machines that use it have evolved at a rate unmatched by any other component in our audio systems. The resulting expansion of capability, versatility, and features in a profusion of new products (particularly in the cassette area) has created a parallel expansion in the vocabulary used in component advertising, in test reports, and in technical articles.

For the ordinary consumer, this often bewildering thicket of new terms has further complicated the already challenging task of shopping, with the result that he needs buying guidance more than ever. Since knowing the lingo is at least half the battle, we have prepared the definitions in the basic tape-recording vocabulary that follows as much as possible in layman's language. We've tried to make reading the definitions as interesting and painless as possible, so there's also a good deal of hi-fi trivia included (do *you* know what Sendust is made of?). To save space, references to other defined terms are printed in *italics* within the definitions.

---

**Alignment**—The geometrical relationship between *head* gap, tape guides, and tape. The most important alignment is azimuth alignment, which requires that the head gap be perfectly perpendicular to the direction of tape travel. Aspects of performance which depend on azimuth alignment include high-frequency response, phase response, and compatibility with tapes recorded on other machines. All heads in a recorder must be aligned, especially the record and play heads in *three-head* machines. Some three-head cassette decks have their record and play heads installed side by side in the same housing, thus reducing the alignment problem (see p. 70).

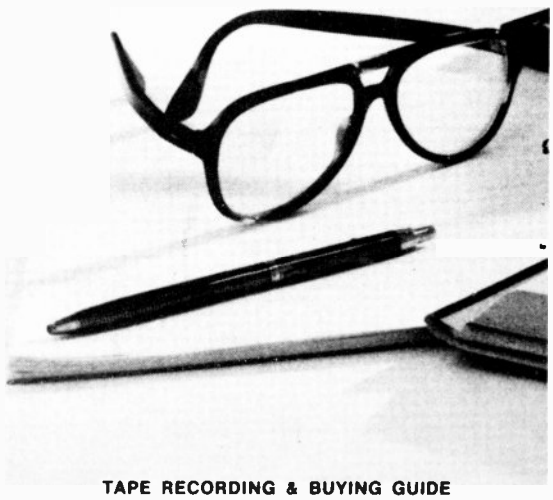
**ANRS**—A complementary *noise-reduction system*, developed by JVC, which operates on low-level high-frequency signals as a *Dolby B* circuit does. There is some compatibility between ANRS and Dolby B. Super ANRS, in addition to the actions of an ANRS circuit, compresses high-level high-frequency signals during recording and expands them during playback to increase high-frequency *dynamic range* and decrease high-frequency distortion.

**Back coated**—Some tapes have the back side of the plastic base material (the side opposite the magnetically coated side) covered with a conductive compound. The surface texture of the compound improves the tape's traction through the recorder.

**Bias**—A large ultrasonic signal of constant frequency and level sent to the record head along with the audio signal. The bias signal is applied to the tape to reduce noise and distortion which would otherwise be generated by the recording process. The correct bias level is crucial to obtaining best performance with a given tape formulation: too high a bias level gives a rolled-off high-frequency response, and too little bias reduces the *signal-to-noise ratio* and increases distortion.

**Capstan**—The driven spindle or shaft in a recorder which rotates against the tape. In conjunction with the pinch-roller, it pulls the tape through the machine at constant speed. The capstan's rotational speed and diameter determine tape speed. Some advanced professional machines do not use a pinch-roller but instead use only a large-diameter, servo-controlled capstan and reel drive.

**Chromium dioxide (chrome, $CrO_2$, Crolyn)**—A high-*coercivity* magnetic material, particles of which are used in magnetic



tape. The high coercivity of chromium dioxide permits greater high-frequency output at slow tape speeds than that possible with "standard" ferric tapes. Chrome tapes are *not* more abrasive than other types and do *not* wear down heads faster than other tapes.

**Closed-loop drive**—A tape-*transport* system which drives both incoming and outgoing tape in order to control the portion of the tape contacting the heads and isolate it from the reels or cassette hubs. There are several closed-loop geometries regularly used with open-reel recorders, but *dual-capstan* drive is the most popular for both open-reel and cassette tapes.

**Cobalt doped**—Tape utilizing a combination of "standard" gamma ferric oxide and cobalt as the magnetically active portion of the coating in order to improve *maximum output level* at low and high frequencies.

**Coercivity**—The magnetic field, measured in oersteds (Oe), required to reduce the magnetization of a *saturated* material to zero. Coercivity is proportional to the high-frequency capabilities of a tape as well as of the recording, *bias*, and erase levels that it requires.

**Compander**—A type of *noise-reduction system* that compresses all or part of a signal during recording and expands it in a complementary way during playback. In general, such companders as *ANRS*, *dbx*, and *Dolby B* must be used during both recording and playback, otherwise the signal may be unlistenable or at least have boosted highs. Anomalies in the record-playback process (involving frequency-response irregularities or level changes) will cause some sort of mistracking between the input and the output halves of the companding process. The effects of this may or may not be audible.

**dbx**—Refers either to a series of *dynamic-range* enhancement devices, or to a complementary *compander* system, developed by dbx Inc. The companding system translates every 2-dB change in the overall input signal level to a 1-dB change fed to the recorder. During playback, the reverse process takes place: every 1-dB change is retranslated to a 2-dB change at the dbx output. The dbx system can provide up to 30 dB of noise reduction over the entire audio band.

**Decibel (dB)**—A ratio of quantities expressed in logarithmic terms. The number of decibels between voltage A and voltage B is twenty times the logarithm of A divided by B.

**DIN (Deutsche Industrie Normenausschus)**—A set of standards and specifications promulgated by German manufacturers and covering such audio-related matters as connectors, frequency weighting, measurement techniques, and specifications. Similar to the ASA (American Standards Association).

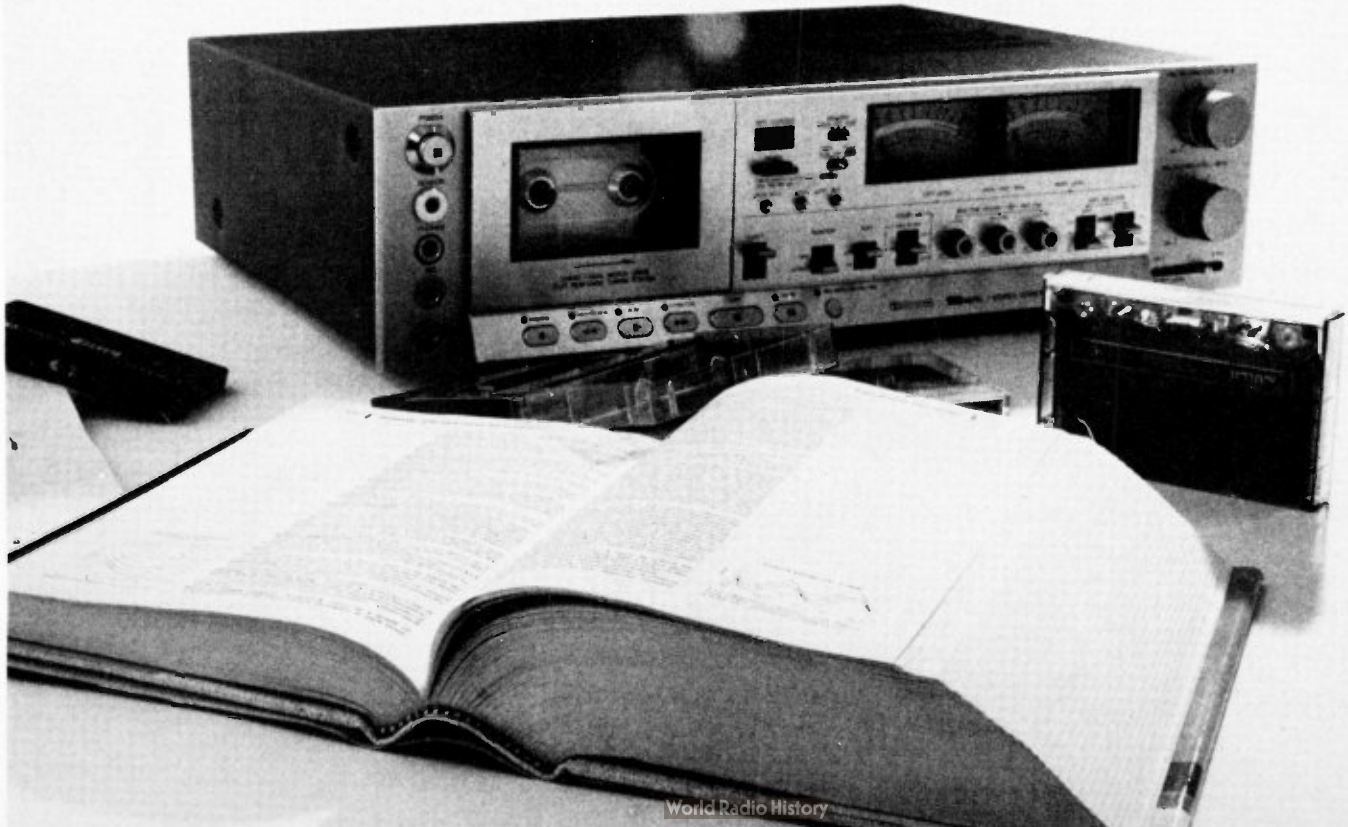
**Dolby B**—A complementary *noise-reduction system* designed to reduce tape (and FM) hiss. A Dolby-B circuit boosts low-level high-frequency signals during recording and reduces them, along with the tape's added noise, in a complementary fashion during playback. Noise can be reduced up to 10 dB above 5 kHz with the Dolby-B system. It is now in virtually universal use in cassette decks.

**Drop-out**—A momentary drop in signal level caused by a loss of the required close tape-to-head contact. Drop-out problems can be minimized by choosing a high-quality tape, cleaning the recorder regularly, and protecting the tape and recorder from mishandling, dust, dirt, and fingerprints.

**Dual capstan**—A tape-drive system in which the tape is pulled by two capstan/pinch-roller combinations, one on either side of the head assembly. This form of tape drive isolates the movement and tension of the tape over the heads from any motion irregularities at the *feed* or take-up reels.

**Dynamic range**—In a recording system, the range in decibels (dB) between the maximum undistorted output level and the noise level. Just how distorted the "undistorted output level" is depends on whose spec sheet is being read, and the interpretation of "maximum" output can range from the *maximum operating level* to *saturation*. Dynamic range varies with frequency. The dynamic range of a program is the range through which its volume changes. See *noise*, *weighting*, *decibel*.

**Equalization (EQ)**—The process of selective amplification or attenuation of certain frequencies or frequency bands in a recording system so as to give a flat overall frequency response, minimize noise, or create a special effect. Equalization is performed in tape re-



# TAPE TERMS...

corders for the first two reasons. The better cassette recorders provide a choice of equalization in order to obtain the best performance from various tape formulations. Cassette playback equalizations (70-microsecond "*chrome*" and 120-microsecond "*ferric*"), along with open-reel playback EQs (NAB, CCIR), have been standardized to assure intermachine compability of recordings.

**Feed reel**—The reel (or cassette hub) from which tape is drawn during recording or playback. Also known as the supply reel.

**Ferric**—The original tape formulation, available today in many variations, based on magnetic particles of gamma ferric oxide ($\gamma$ $Fe_2O_3$). See *cobalt doped*.

**Ferrichrome**—A tape formulation with a layer of "*ferric*" particles beneath a thin layer of *chromium-dioxide* particles. Benefits claimed for this tape include increased low- and high-frequency *headroom* over standard chromium-dioxide formulations.

**Ferrite**—A family of nonmetallic, ceramic-like materials usually made from ferric oxide in combination with other oxides. The magnetic properties of ferrites and their exceptional hardness make them suitable for magnetic heads.

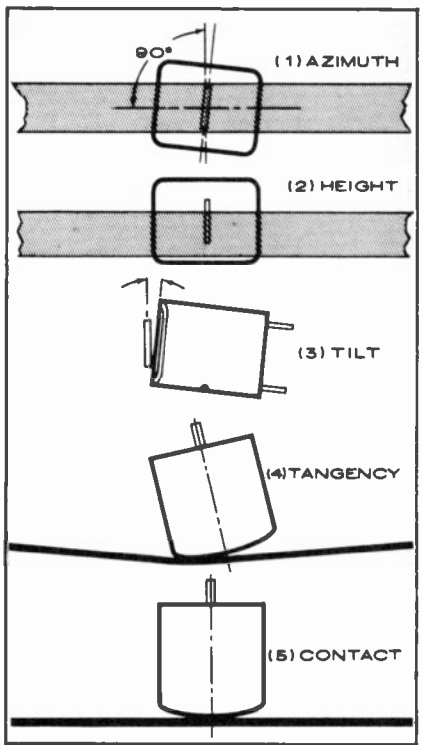
**Frequency response**—An indication of a recorder's ability to reproduce all the audio frequencies supplied to it without altering the original balance among them. A perfect frequency response would extend at least from 20 to 20,000 Hz (the traditional and numerically convenient limits to human hearing) with a ±0-dB deviation. The record-playback frequency response of a tape recorder varies with the recording level: as the overall recording level increases, high-frequency response decreases. When comparing record-play specifications make sure that the recording levels are equal.

**Harmonic distortion**—Distortion in which spurious harmonics (arithmetic multiples) of the original input frequencies appear at the output. Usually expressed as a percentage of the output signal and abbreviated HD or THD (total harmonic distortion). Harmonic distortion in tape recorders varies with *bias* and overall recording levels.

**Head**—A generally broken-ring-shaped electromagnet over which the tape is drawn. A head can: (a) erase a previous recording by producing a large, rapidly alternating magnetic field; (b) make a recording by converting an electrical signal to a varying magnetic field which is picked up and retained by the tape; or (c) play back a recording by sensing the varying magnetic patterns on a tape and converting them to electrical signals. The break in the "ring" of a head is called the gap, the length and width of which help determine the *frequency response* and *noise* of the playback system.

**Headroom**—The range between a reference recording level and the *maximum output level* available at a specific frequency or band of frequencies. See *noise*, *weighting*, *dynamic range*, *signal-to-noise ratio*.

**Flutter**—Rapid, periodic variations in tape speed causing rapid changes in pitch and volume. Flutter and *wow* are sometimes specified in mutually un-comparable ways by different manufacturers. Differences in wow and flutter measurement methods (peak versus *rms* versus average) and frequency *weighting* should be noted. In its test reports, Hirsch-Houck Labs uses both a weighted-rms method popular in Japan and a *DIN* peak-weighted method.



Various tape-head adjustments

**Hiss**—The most noticeable form of tape *noise*. The human ear is most sensitive to noise in the 2,000- to 8,000-Hz range—which is heard as hiss. In fact, it is this region of frequencies that gives wideband "white" noise (which contains all audible frequencies) its "hissy" quality.

**Light-emitting diode (LED)**—An electronic device which converts a current directly and instantaneously into light. This property makes the LED suitable for peak-reading or peak-indicating audio displays. At present only red, yellow, and green lights are commercially available.

**Liquid-crystal display (LCD)**—An alphanumeric display that uses liquid crystals which interact with an external source of polarized light. Originally used in watches, they are now found in calculators and various hi-fi readouts. LCDs require very little power, but the earlier types had very slow response and were temperature sensitive.

**Logic controlled**—A tape *transport* with its functions switched by digital-logic circuitry activated by front-panel switches or a remote control. Logic control theoretically does not permit an improper or potentially damaging series of commands to be executed by a tape deck, and it is likely to be found only in *solenoid*-operated machines.

**Maximum operating level*** or **maximum recording level (MRL)**—The magnetization level of a tape which results in a specified level of distortion. The MRL varies with the applied *bias* level and frequency: as the MRL at 1,000 Hz rises, the MRL at 10,000 Hz falls.

**Maximum output level (MOL)***—The playback level produced by a tape after it has been saturated with a signal (typically 333 Hz). At other frequencies maximum output level is the point at which an increase in the recording level produces a decrease in the playback level (a result of a phenomenon known as self-erasure).

**Metal tape**—Tape in which the magnetically active portion of the coating is made up of particles of iron as opposed to particles of ferric oxide or chromium dioxide. Metal-particle tape has very high *coercivity* and *retentivity*, leading to improved high-frequency performance. Special circuitry and heads are needed to record on metal tape. (See Julian Hirsch's "Technical Talk" column this month.)

**Multiplex (MPX) filter**—A filter designed to reduce or remove the 19-kHz stereo pilot tone present in all stereo FM broadcasts. This pilot tone, usually filtered out by tuners and receivers, must be removed when using a *Dolby B* circuit to record a stereo FM broadcast, for the Dolby circuit will otherwise mistake the tone for a high-frequency audio signal, leading to improper performance. Most good tuners and receivers have adequate 19-kHz filtering built in. For those that don't, the use of the MPX filter on the cassette deck is necessary for successful taping off the air.

**Noise**—Unwanted electrical signals of a mathematically random nature. There are many types of noise in tape recording, most of which sound like hiss. Noise is added to a tape when it passes through the *bias* and erase fields of the recorder and by the signal itself during the recording process (modulation noise). Tape noise can be minimized by the choice of tape, careful setting of bias and recording levels, regular cleaning and demagnetizing, and use of a . . .

**Noise-reduction system**—An electronic circuit that attempts to achieve a reduction of noise level without changes in musical con-

*(Continued on page 14)*

* Some authorities use the abbreviation MOL to refer to maximum *operating* level; others use the same abbreviation to refer to the maximum *output* level.

# Free details on a different kind of record club

offering... BACH, BEETHOVEN, BRAHMS,
FLEETWOOD MAC, LINDA RONSTADT, CHICAGO, KANSAS
BARRY MANILOW, BOSTON, ELTON JOHN, JAMES TAYLOR,
JEAN-LUC PONTY, CROSBY, STILLS & NASH, STEVE MILLER BAND,
PETER FRAMPTON, BARBRA STREISAND, EAGLES, CHUCK MANGIONE
and every other composer and artist in print.

You can now own every record or tape that you may ever want . . . **at tremendous savings** and with **no continuing purchase obligations.** You can get valuable **free dividend certificates,** you can get **quick service** and all the **100% iron-clad guarantees** you want.

Now you can **stop price increases** that leave you with less music for your record and tape budget. You can guarantee yourself **more music** for **less money** through membership in Discount Music Club.

Look at these benefits:

**TREMENDOUS SAVINGS** on every record and tape in print—no "agree-to-purchase" obligations of any kind.

**DISCOUNTS OF 43% TO 73%** off mfg. suggested list . . . special catalog features hundreds of titles and artists.

**ALL LABELS AVAILABLE** including most imports through special custom ordering service. If we don't stock it we'll get it for you.

**SCHWANN CATALOG** lists thousands of titles; classical, pop, jazz, ballet, opera, musical shows, folk, rock, vocal, instrumental, country.

**DISCOUNT DIVIDEND CERTIFICATES.** Dividend Gifts—Every shipment carries a dividend gift or dividend certificate. Certificates redeemable immediately for extra discounts.

**NEWSLETTERS.** Happenings in the world of music; concerts, critiques, new releases . . . special super-sale discounts of up to 73%.

**DISCOUNT ACCESSORY GUIDE.** Diamond needles, cloths, tape cleaners, etc. Discount Music Club is your complete one stop music and accessory buying service.

**QUICK SERVICE.** Same day shipping on many orders . . . rarely later than the next several days. Partial shipments always made in the event of unforeseen delay . . . all at no extra cost to you.

**100% IRON-CLAD GUARANTEES** on all products and services. Everything is guaranteed factory fresh and free of defects or damages of any sort. Your total satisfaction is unconditionally guaranteed.

**Discount Music Club is a no-obligation membership club that guarantees tremendous discounts on all stereo records and tapes and lets you buy what you want...when you want...or not at all if you choose.**

**These are just a few of the money-saving reasons to write for free details. You can't lose so why not fill out and mail the coupon for immediate information.**

dmc **Discount Music Club**
Department 33-0880
650 Main St., New Rochelle, N.Y. 10801

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

CIRCLE NO. 5 ON READER SERVICE CARD

# TAPE TERMS...

tent. There are two basic types of noise-reduction systems: *companders* (complementary record-playback systems) and single-ended (playback only) systems. A compander is used for noise reduction during the record-playback cycle, while a single-ended system is used for removing noise from already recorded material.

**Pressure pad**—A small, feltlike pad designed to press the tape into intimate contact with a head. Although few modern open-reel machines have them, a pressure pad is built into every tape cassette, where it helps maintain high-frequency response. Pressure pads in open-reel machines should be kept clean and should be replaced when worn.

**Print-through**—The undesired transfer of recorded signals from one layer of tape to adjacent layers. At worst, print-through will cause distinct pre- and post-echoes. Print-through depends on a tape's thickness and its magnetic properties, on the recording level, and on tape-storage conditions. To minimize print-through, use as thick a tape as possible, be conservative with recording levels, and store the recording in a played, "tails-out" condition under stable temperature and humidity conditions.

**Retentivity**—The maximum possible magnetization that will remain after *saturation* of a magnetic material. Maximum low-frequency output level is directly proportional to retentivity. Measured in gauss (Gs).

**rms (root-mean-square)**—A method of mathematically averaging an a.c. signal such as audio. As used in *wow*, *flutter*, *noise*, and amplifier power measurements, rms relates to the energy of the signal. An rms-reading meter will respond to a transient faster than an average-reading meter but slower than a peak-reading meter.

**Saturation**—Magnetic overload. In effect, a saturated material has been magnetized "as far as it can go," and no increase of magnetizing force will produce an increase in the material's magnetic intensity. In analog audio recording, both heads and tape may saturate when handling high recording levels, with very high distortion resulting.

**Scrape flutter**—Vibration in a tautly stretched tape caused by the tape's friction against heads, pressure pads, tape guides, and other objects. Scrape flutter has audible characteristics similar to those of modulation *noise*: both impart a harsh quality to the sound. Many recorders have scrape-flutter "filters"; these usually consist of no more than a small roller touching the tape and damping the vibrations.

**Sendust**—An alloy of iron, aluminum, and silicon. Its great hardness and special magnetic properties make it especially suitable as a material for tape heads.

**Servo controlled**—A method of regulating *capstan* speed and/or reel tension. As the capstan rotates, it generates a voltage or frequency proportional to its speed. The voltage or frequency is compared with a reference voltage or frequency and the difference is used to shift the motor speed up or down. When the capstan-generated voltage or frequency matches the reference, the difference signal goes to zero and the motor speed is stabilized. The whole comparison-with-a-reference process is called a servo loop.

**Signal-to-noise ratio (S/N, SNR)**—The ratio, expressed in decibels, between (1) a signal at a specified reference frequency and output level and (2) the output *noise*. The signal-to-noise ratio varies with frequency and is subject to innumerable mutually incompatible methods of measurement. See *noise*, *weighting*, *dynamic range*, *headroom*, *decibel*.

**Solenoid**—An electromagnet with a movable core. When the coil is energized, the core moves, providing a mechanical action that is used to control a tape *transport*.

**Source/tape monitoring**—A feature on some tape recorders that permits listening to and switching between the signal being fed to the recorder and the signal just recorded on the tape (as provided by the playback-head amplifiers). Source/tape monitoring is possible only with *three-head* tape machines.

**Three head**—A recorder with separate erase, record, and play heads, as opposed to a two-head deck in which both the record and play functions are performed by a single record/play head. A properly designed three-head machine can have its record and play heads optimized for their individual duties. (In some cassette decks both heads are in a single housing.) In particular, playback frequency response is improved by the narrower gap possible in a play-only head (a record head requires a wider gap). A three-head recorder also offers the advantage of *source/tape monitoring*. See *head*, *alignment*.

**Three-motor transport**—A transport similar to a *two-motor transport* but having a separate motor for each reel or hub. This makes for a simpler mechanical design and permits better control of tape tension. See *closed-loop*, *dual-capstan*.

**Transport**—The mechanical portion of a tape recorder responsible for moving the tape across the heads with no variation in speed or alignment. Transport controls such as rewind, play, and fast forward are either mechanical or electronic ("*logic controlled*," "feather touch"). In general, the savings in cost possible with a mechanically controlled transport are outweighed by the simpler mechanical design and higher reliability of one that is electronically or *solenoid* controlled.

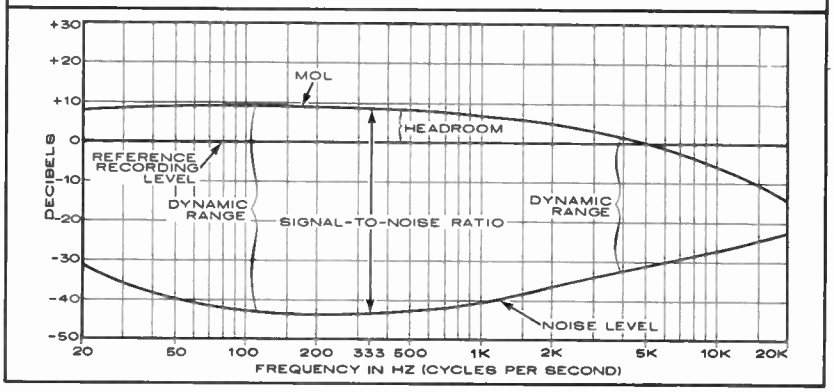
**Two-motor transport**—A transport in which one motor drives the *capstan(s)* and another drives the *feed* and take-up reels. This arrangement is often used in cassette decks.

**VU meter**—A meter used to display audio signal levels in decibels relative to a fixed 0-dB reference level. A "true" VU meter, rarely found in consumer audio equipment, has standardized ballistic (mechanical) and electrical characteristics that allow professionals to judge signal levels regardless of the associated equipment. See *decibel*.

**Weighting**—The assignment of relative importance to certain measurement figures so as to take into account the ears' varying sensitivity with frequency, loudness, and energy distribution. For example, "A-weighting," commonly used in *signal-to-noise* measurements, gives less prominence to low frequencies because of the ears' low sensitivity to low-frequency noise.

**Wow**—A slow, periodic variation of tape speed resulting in slow changes of playback pitch. Wow can originate in the *transport* or from tape-related causes: uneven tension in the reels or hubs, friction against the reels or cassette shell, and low-quality, poorly manufactured, or damaged tape. Fast wow is called *flutter*. □

Chart shows the dynamic range of a typical cassette recorder without noise reduction. Signal-to-noise ratio is the span between the upper curve and a weighted average of the lower curve at a specified frequency, here 333 Hz.



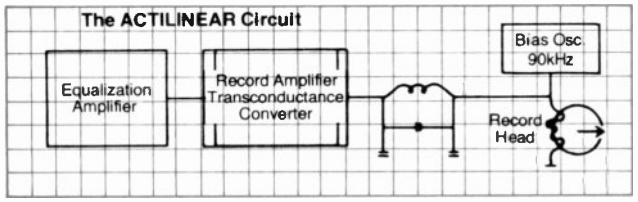
# ACTILINEAR (Patented)

# DYNEQ (Patented)

# Two of the most important new words in tape recording

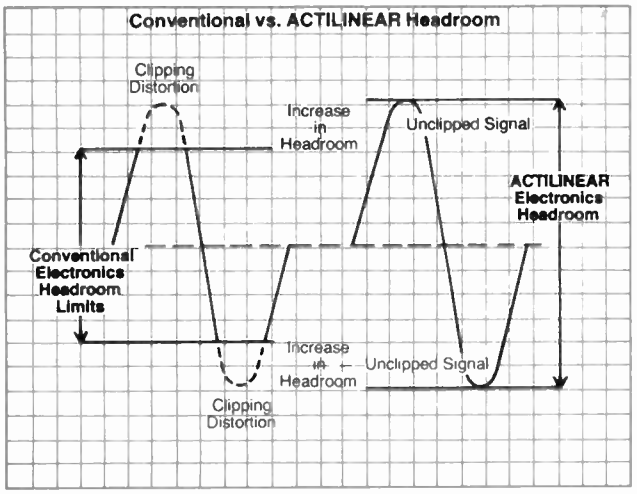
**Problem:**

Traditionally, tape recorder electronics have had insufficient headroom to fully exploit the greater performance capability of the new high coercivity tapes, such as metal tape. The goal of Tandberg engineers was to improve the headroom of tape recorder electronics by 18-20 dB so it can be used with metal tape.




**Cause:**

In conventional recording systems the summation of record & bias current in the record head is done through passive components, leading to compromise solutions which have their distinct and pronounced weaknesses—primarily a limited headroom for the signal.




**Solution:**

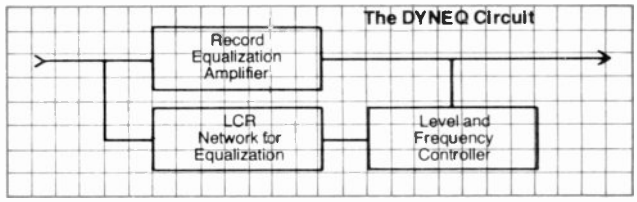
Tandberg engineers developed &patented a new recording technology without these compromise solutions (See curves above). In the new ACTILINEAR system, featured in our TCD 440A & TCD 420A cassette recorders, the passive components have been replaced with an active Transconductance amplifier. Among the benefits of this exclusive new recording system are:

- Up to 20 dB more headroom.
- Less Intermodulation due to Slew Rate limitation.
- Improved electrical separation and less interference between bias oscillator and record amplifier.
- No obsolescence factor—usable with any type of tape available now or in the years to come.

**Problem:**

High frequency limitations inherent in the cassette (i.e., low speed) tape medium. Tandberg engineers have developed an exclusive Patented circuit that is not just a technical refinement, but a fundamentally new approach to tape recording.

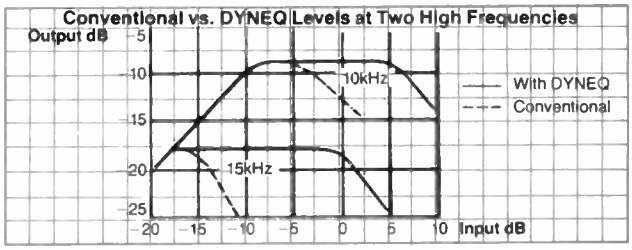
Whereas ACTILINEAR overcomes the limitations of electronics at *any* speed, DYNEQ overcomes tape limitations at *low* speeds.




High frequency saturation (overload) is of particular importance with today's new direct-to-disc and digitally-mastered recordings as they deliver more energy in the high frequency range than ever before.

**Cause:**

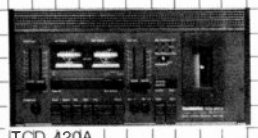
The high frequency overload—i.e., "the cassette sound"—of which tape recording purists complain is not simply a question of reaching a point where the tape can hold no more signal. At high frequencies, excessive input levels not only produce enormous amounts of distortion, but actually lower the signal level played back from the tape. In other words, once you have reached the saturation point on the tape, the more signal you try to put in, the less you actually get out.




**Solution:**

If, just at the point where high frequency saturation (overload) begins to occur. you could automatically lower the amount of record treble boost supplied by the equalization circuit, you could increase the high frequency output of which the tape is capable, and drastically lower high frequency distortion (See curves above). In brief, this is precisely what Tandberg's exclusive new dynamic equalization circuit does.

Yet another benefit is that the DYNEQ circuit, featured exclusively in Tandberg's TCD 440A & TCD 420A recorders, not only gives improved performance with the new metal particle cassettes, but also delivers a *significant* improvement in performance with today's better premium tapes.


TCD 420A

# TANDBERG

Setting the standards in tape recording for over 30 years

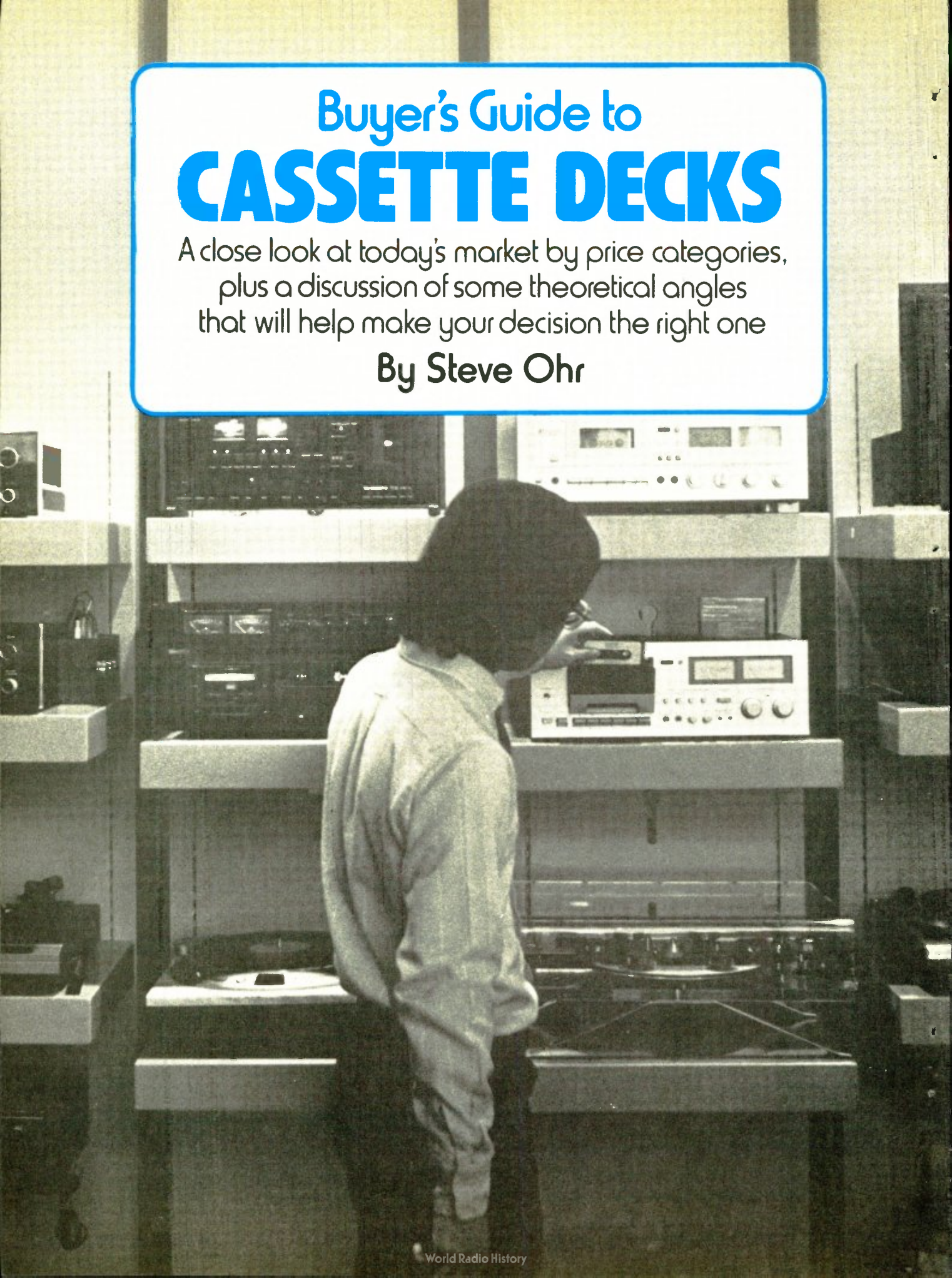

TCD 440A

# Perhaps *the* most important word in tape recording.

# Buyer's Guide to
# CASSETTE DECKS

A close look at today's market by price categories, plus a discussion of some theoretical angles that will help make your decision the right one

**By Steve Ohr**



# CASSETTE DECK FOREGROUND:
## A practical approach to buying

SHOPPING for a cassette deck must be a lot of fun; we know people who've been doing it for years. It's actually deciding which deck to *buy* that seems to be the hard part. With all the improved specifications and the dazzling new features available, it's very easy to become uncertain about what is really important for one's own purposes, and it's particularly confusing if your budget is limited. So get systematic. The best way to make a decision is (1) see what level of performance and which features are available in a given price bracket, and then (2) discover the best possible buy (without too much compromise) in the bracket your budget can handle.

● ***Under $150.*** The least expensive cassette decks naturally have the fewest features. And, too, their performance specifications are not generally terribly impressive, so they are rarely given in great detail. Frequency response, when it's listed at all, will usually be stated as about 50 to 13,000 Hz (with no clue as to how flat it might be), and signal-to-noise ratios will average about 55 dB with Dolby. There are a few decks *without* Dolby (or some other type of noise-reduction system) in this price class, but these are best ignored.

Some listeners consider these inexpensive decks suitable only for the spoken word, but others find them quite adequate for music. In any case, if your budget has you tied down in this neighborhood, be sure to *listen* carefully to any deck under consideration. If your intention is to record music, be sure to check whether the unit has a recording-level control knob and meters (a few very low-price decks have only automatic level control). These days, even inexpensive decks are likely to have at least one switch to set the deck to handle either "normal" tapes (low bias and a 120-$\mu$sec equalization curve) or "$CrO_2$-type" ones (high bias and 70-$\mu$sec equalization). Such decks can *play* the new metal tape (on the "$CrO_2$" setting), but they can't record on it. (Incidentally, almost all of the cassette technical terms you'll encounter in this article are defined in David Ranada's detailed tape glossary starting on page 68 of this issue.)

In practically all cassette decks, the erase and record/playback heads are mounted on a separate internal platform with the pinch-roller. When the recording or playback mechanism is engaged, the platform slides the tape heads into the openings along the edge of the cassette housing, bringing the heads into contact with the tape and the pinch-roller into contact with the capstan. In decks in this price range (as well as in some more expensive ones), the platform is moved into position mechanically and latched by pressure on the "piano-key" play lever. This type of operation provides a reliable means of bringing the tape heads into contact with the moving tape and engaging the capstan/idler mechanism. Wow and flutter specifications are likely to be

# CASSETTE DECK BACKGROUND:
## Some theoretical aspects of performance

AS cassette-deck performance improves, there is a natural tendency to compare cassette and open-reel machines. The gap between the two is certainly narrowing, but it still exists. Open-reel tape for home use is 1/4 inch wide (some multitrack *studio* decks use 1/2-inch to 2-inch tapes) and crosses the tape heads at speeds from 3¾ to 15 ips, with 7½ ips most commonly used.

Cassette tape, in comparison, is only 1/8 inch wide, and the slow normal recording speed (1⅞ ips) means that the cassette must pack the same amount of musical information into far less space than an open-reel tape has to. Cassette tapes therefore have a great tendency to suffer magnetic saturation (overload), especially at high frequencies where the information must be packed even more tightly on the tape. This acts as a limitation on both dynamic range and frequency response. (The wow and flutter specification is potentially higher, too, since lower rotational speeds in a deck's mechanical parts means there is less speed-smoothing momentum. In practice, however, the wow and flutter specification of the best cassette decks is about equal to that of most open-reel models.)

The printed frequency-response specifications for the best cassette decks rival those of open reel. That results, in part, from the industry's concentrated effort to advance cassette-tape and cassette-recorder technology for the very good reason that that's where the need, the potential benefit, and the market size are all greatest. Some of the comparable figures, however, result merely from a difference in the way open-reel frequency response and cassette frequency response are measured.

*No* consumer tape deck's frequency response is specified as having been measured at a recording level of "0 dB." Open-reel decks are usually measured at −10 dB and cassette decks at −20 dB. That's really not hocus-pocus, since in much music—particularly classical—there's less energy in the high frequencies than in the midrange. So when you're recording music with an indicated "0 dB" on peaks, depending on the content of the program material, the high frequencies may well be recording at a level of −10 to −20 dB.

The frequency-response difference is evident in Hirsch-Houck Laboratories reports on cassette decks or in the specifications of the few metal-tape-compatible tape decks that provide response figures for both the

◀ *Photographed at Park Avenue Audio, New York City, courtesy Yetkin Yetikyel*

## CASSETTE DECK FOREGROUND...

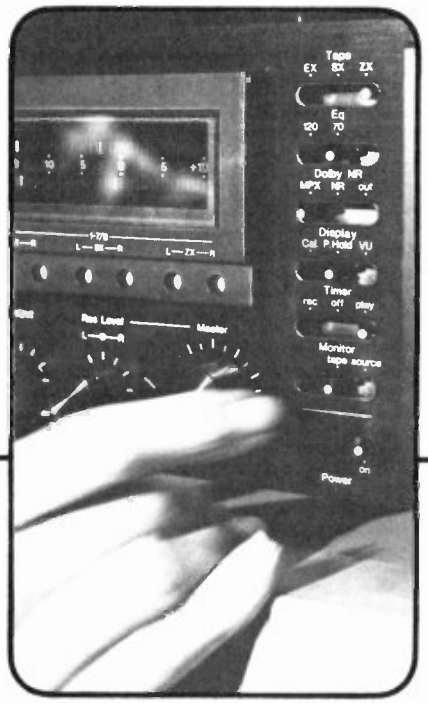
just below 0.1 per cent. This should be inaudible, except possibly on drawn-out notes on the flute or piano. A mechanical tape counter is standard in this price bracket, as are meters that indicate the average (rather than peak) recording levels over a range of about 22 dB.

● ***$200 Range.*** Until recently, you would be hard put to find a $200 cassette deck whose frequency response extended flat out to 15,000 Hz. It is now possible, however, to find decks in this price range that can record on metal-particle tape. If a deck is to use metal-particle tape, its manufacturer has to soup up the bias oscillator and redesign the record and erase heads. When they do, they find that they have also extended the high-frequency performance to close to 20,000 Hz—with metal tape, of course.

Peak limiters are available in this price range, as are MPX filters. The peak limiter can be switched into the recording circuit to prevent tape-overload distortion when recording sonic material that contains sudden loud peaks. The MPX filter, used when recording stereo FM broadcasts, will remove the remains of the 19-kHz FM "pilot-carrier" signal which may not have been adequately suppressed by the FM tuner or receiver.

Decks in this price bracket have lower wow and flutter than the under-$150 units, sometimes as low as 0.05 or 0.06 per cent, owing to better-built capstans and motors. Piano-key actuation of functions is the rule here, as are standard recording-level meters. Features remain essentially basic, although some small extras occasionally appear: there may be peak LEDs that flash to indicate instantaneous musical peaks too fast to be registered on the meters, separate input- and output-level controls, provision for operation by an external timer, and, in at least one case, a circuit that can stop the tape between recorded selections.

Also to be found in this category are a number of cassette decks with mechanical "memories" that work in conjunction with the digital tape counter. You can mark the beginning of a particular tape segment by setting the tape-index counter to 000, and when the tape is rewound (with the memory button on) the deck will automatically stop at that setting on the counter.




● ***$300 Range.*** In this price category we first encounter claims of extended frequency response (say, 20 to 18,000 Hz and above—*without* metal tape). And most decks whose specs claim such response can achieve it—give or take an unknown number of decibels. Better indices to performance are the "secondary" frequency-response curves shown in the specifications; these state response within ±3 dB and are therefore more representative of the deck's actual audible response. This response can be achieved either with or without metal-tape capability (though, in this price range, many decks already have it, and virtually all of those making their debut this year certainly will).

One method of increasing the frequency response is to double the tape speed (from 1⅞ to 3¾ ips, thus, of course, halving the playing time), and several companies have decks that do just that. The idea is to obtain the dynamic range and frequency response of open-reel in the cassette format. By doubling the amount of tape that passes over a recording head in any given period you effectively double the area available for recorded information. This produces a significant improvement in the signal-to-noise ratio, dynamic range, and high-frequency response. It also reduces the wow and flutter slightly. While most conventional single-speed cassette decks offer a frequency re-

## CASSETTE DECK BACKGROUND...

conventional −20-dB and higher levels. The frequency response at the higher recording level will be far more limited and the difference will also be far more pronounced with conventional tapes than with metal ones, which are harder to saturate.

Some manufacturers choose to trade off some of a tape's high-frequency potential for other benefits such as greater dynamic range, while others prefer the reverse. Your ears will tell you which approach is right for you. And you should know that the price has a tendency to climb with frequency-response-range potential. Each extra kilohertz of response makes a smaller audible contribution and costs more than the previous thousand hertz of improvement. It's up to you to decide at what point the increased cost begins to outweigh the importance of improved sound.

● ***Metal tape.*** The most extended high-level frequency response is to be obtained with those decks that can record on metal tape (virtually *all* new models over $300, and many at the $200 level). But extended response isn't the principal benefit, as a close look at the specifications will show. On many decks, the frequency response for metal tape is equaled by that obtained with $CrO_2$ or ferrichrome (FeCr) formulations; on others, the difference is a mere kilohertz or so.

If you record material that is rich in high frequencies (such as much rock and electronic music—and live music with good mikes), you may hear a bigger difference than the metal-tape specs might indicate. That's both a direct and an indirect result of an important property of metal tape: high-frequency "headroom." In practice, you can get a bit more performance out of metal tape by recording at slightly higher levels, thus raising the signal further above the noise. The tape's extra headroom will minimize the high-frequency overload distortion (unless the sound source is unusually rich in highs). The instructions for some decks recommend setting the controls for +3 dB on peaks with metal tapes.

What are the disadvantages of metal tape? First, their cost—roughly double that of other premium tapes—not to mention the additional cost of a new deck if your current deck can't record on these new tapes. Second, availability: although all the major tape makers have joined the metal-tape brigade, metal tapes are still somewhat harder to find in stores than other types. What about head wear? The same rumors that for a while dogged chromium tapes are now dogging metal—with, it seems, just as little cause. Metal tapes are no more nor less abrasive than ferric types.

Is metal tape worth it? That depends both on your ears and on what you intend to record. The more demanding the material you tape, the more the difference will be audible. If all you do is tape FM programs or

sponse that extends out to 15,000 or 18,000 Hz, a two-speed deck can extend frequency response by another 2 to 3 kHz or more.

Another feature which has just begun to appear in this price range is gas-discharge, LED, or fluorescent bar-graph level indicators. These displays offer a number of advantages over conventional mechanical meter movements. In addition to looking sleek, modern, and (in some cases) colorful, these lighted bar-graph displays are all-electronic—meaning that, unlike the slow-moving meters, which usually indicate *average* signal levels, they can show *instantaneous* signal peaks.

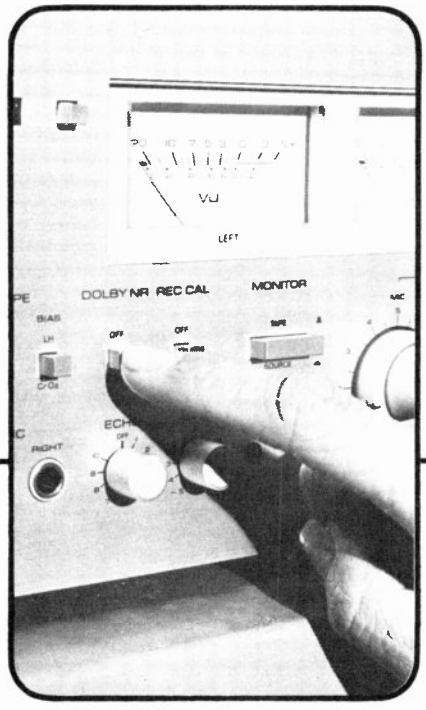
Good as they are for registering fast signals, however, these displays are no match for meters when it comes to making fine technical adjustments using steady-state signals. Electronic displays operate in discrete increments, but meter needles move through an infinite number of positions, and the eye can easily judge whether a stationary needle is right on the "0" line or just a hair below it. On normal musical signals, though, even a fourteen-step bar-graph usually gives the eye all the information it needs or can use to adjust recording level.

● ***$400 Range.*** A number of solid mechanical conveniences begin to appear more frequently in this price range. For example, the use of two motors usually provides a better wow-and-flutter rating (the capstan motor need handle only the capstan), and it nearly always ensures faster rewind time and greater reliability (individual motors are usually far more reliable than the mechanical linkages used to distribute a single motor's rotational energy to three separate drive points).

The dual-motor approach, using electrical switching in place of mechanical linkages, also facilitates solenoid operation. The user merely touches an electrical pushbutton rather than activating the mechanical linkages of a piano-key control. The button switches in appropriate motor-control circuits and activates (in recording or playback) a solenoid which pulls the heads and the pinch-roller that presses the tape against the capstan into place. Solenoid operation not only reduces the effort required to engage the playback mechanism, but it also reduces the time it takes for the deck to swing into action. The result is a more responsive, sturdy, and reliable tape-recording/playback system.

With electrical pushbuttons controlling the cassette deck, *remote* control then becomes possible. Most remote controls are at the end of a thin cable connected to the deck, but a few high-price machines have "wireless" controls that use infrared signals to send commands back to the deck. As a natural accompaniment to solenoid operation you'll very often find IC (integrated-circuit) logic controls. These electronic circuits automatically sequence the tape transport to respond smoothly and safely to the command signals you've fed in via the electrical pushbuttons. For example, when the deck is in a fast-wind condition, the tape should come to a stop before the "play" or "record" mechanism is engaged. Otherwise the tape can become jammed or broken—perhaps not immediately, but later as a result of tensions set up in the "pack" on the hubs. The IC logic controls assure that a proper, smooth transition will take place no matter how fast you key the controls—or in what order.

On some machines, dual capstans (one at each end of the cassette flanking the tape heads) isolate the tape flow from such influences as friction, tape-pack binding, and hub drag, any one of which could cause speed fluctuations. Dual capstans also provide a more even tape tension across the heads. Such decks commonly have two motors, but the second motor drives the tape take-up and rewind hubs, *not* the second capstan. *(Continued overleaf)*




your own voice through a $19.95 mike, you may never hear the difference. Reserve metal tape for those recordings where metal's extra qualities *will* make a difference. And since any metal-capable deck is also going to be a new one, such a deck will probably give you better performance on conventional tapes, too.

● ***Variable bias level and EQ.*** The switches that adjust bias and equalization for different tape types don't do an absolutely *perfect* job of matching the deck to whatever tape you're using. Individual tape formulations differ within each tape-type category, and so do their requirements.

It would be good, for that reason, to have a way of optimizing tape decks for each tape used—and tape-deck manufacturers now offer several such systems. The oldest and simplest of these tape-adjustment systems is a simple bias fine-adjustment knob, which varies the recording bias just enough to match virtually any tape of the type the switches are set for. Although it is possible to "tune" such knobs by ear, listening for the best compromise between noise, distortion, and frequency range, it is better to do it using some sort of test signal to guide you. Several new tape decks provide test-tone oscillators whose output(s), when taped, can be read on the deck's own meter(s) or on a simple LED indicator.

As soon as there were indicators available to keep the user from grossly misadjusting the deck, manufacturers got a bit more daring and added "trim" adjustments for recording calibration (the signal level fed to the tape for "0" meter reading) and, in a few decks, *recording* equalization. *Playback* equalization is standardized for both "normal" and "high-bias" tapes; variable recording EQ merely tailors the signal fed onto the tape so that it will play back "flat" with a standard playback EQ.

The ultimate, of course, is to have the deck itself make all these adjustments for you automatically during a preliminary test run with a given tape. And a growing number of decks will do just that—at a cost commensurate with such luxury. Short of that ideal, a two- or three-position bias switch will bring a deck very close to optimum performance with the majority of quality cassettes, even if it doesn't put them precisely "on the money." If you standardize on one tape, you may find that your hi-fi dealer's service department can adjust your deck (or at least its bias current) to match that tape precisely. The adjustment can be made when you buy your deck, but it should be rechecked periodically—settings *can* drift. And the adjustment should be rechecked and readjusted, of course, if you change tape brands. Your ears should be able to tell when readjustment is needed.

● ***Two heads versus three.*** A greater and greater number of cassette decks, especially in the upper price ranges, are "three-head" models with electrically separate erase, record, and playback heads. Some three-head decks may appear to have only two heads because the recording and playback heads

## CASSETTE DECK FOREGROUND...

The dual-capstan design is often used in auto-reverse decks (which also begin to make their appearance in this price range); these play tapes in both directions without your having to flip the cassette over to play the other pair of tracks. (Some dual-capstan auto-reverse decks, however, use the second capstan only to pull the tape in reverse mode, rather than using both capstans at once as described above.) Auto-reversing decks use four-channel playback or record/play heads, the second pair of head gaps scanning the top pair of tracks during reverse play. The few auto-reverse decks that will *record* as well as play in both directions will be found in higher price brackets.

Other useful features appearing on more and more cassette decks at the upper end of the $400 price range are microprocessor-controlled clocks, timers, and tape-search functions. Cassette decks with microprocessor controls can be programmed to start and stop automatically and to seek out any selection on a tape. The more expensive models can even play these selected sequences in any pre-arranged order.

Also to be found in this price range are "three-head" decks, so called because their record, playback, and erase heads are electrically independent (though the record and playback heads are frequently "sandwiched" into a single housing). There are two advantages to this: with an independent playback head, you can monitor directly from the tape and check quality while the recording is being made. And heads designed to handle only recording *or* playback can be optimized to do that one job better than a compromise combination head can. For best performance, the head gap should be wide on a recording head and narrow on a playback one.

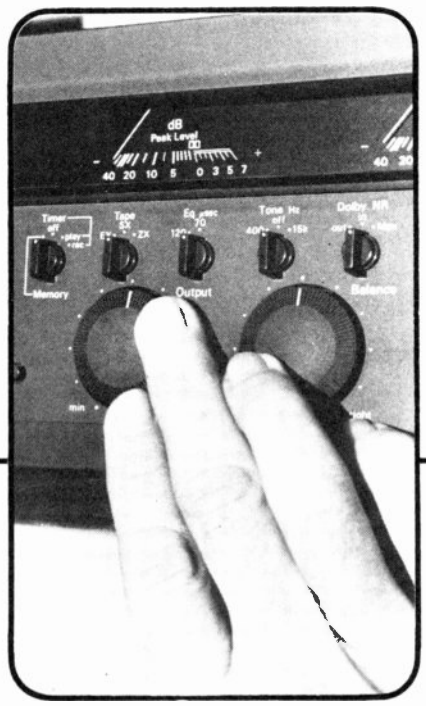
The ability to monitor the tape is more important in decks at this price range because many of them permit slightly greater control over quality through bias fine-adjustment knobs. Listening as you record and using the monitor/source switch to compare the recorded signal to the input signal will let you know quickly whether the bias is set right.

Another feature designed to meet the needs of serious recordists is the individually controlled line and microphone inputs found on some decks. These make it possible to mix live sound from the microphones with music coming from other hi-fi components so as to make effective "voice-over" tapes.

● ***Over $500.*** In this price class, many decks offer elaborate tape-matching adjustment systems. The record bias adjustment is joined by adjustments for optimum recording level, and these are often accompanied by built-in oscillators (to provide the necessary test tones) and by built-in indicators (either separate or as extra functions of the recording-level meter) to show when they have been set correctly. Many decks also switch between "normal" and "$CrO_2$-type" tapes automatically by sensing special notches found in the housings of most $CrO_2$-type tapes.

Many models also feature a "peak-hold" function on their fluorescent or LED meters. The peak-reading meters will indicate the highest peak obtained within some short period of time. The meter is actually presenting the highest recent peak as well as the current peak and the general drift of the recording level.

With so much attention currently focused on LED and fluorescent bar-graph displays, it's easy to overlook some of the very useful features of *conventional* meter movements. Some of them (in this price range, at least) are calibrated to register audio signals across a range extending from −40 to +6 or +8 dB. *(Continued on page 22)*




## CASSETTE DECK BACKGROUND...

are made to share a common housing. That's done for a couple of reasons: first, because the cassette shell has only a few openings into which separate heads can fit (the pressure pad is built into only the center opening), and second, because the tape can skew between physically separate recording and playback heads, causing high-frequency losses.

A three-head system has two advantages over a two-head system (which has an erase head and a head that serves alternately for both recording and playback). First, and most important, separate heads can have their gaps optimized for recording *or* playback. Since the optimum *recording* gap is from 3 to 5 microns wide and the *playback* gap should be 1 micron or less for best high-frequency performance, a compromise gap must to a certain degree compromise performance. Second, it is important that separate heads let you monitor the recording directly from the tape as it is being recorded.

If you listen to the monitor output, comparing it with the signal you're feeding to the tape, your ears will tell you if you have noise, overload, or frequency response problems *while there's still time to correct them.* Without monitoring, you'd have to wait until the recording was done, then rewind and listen, or make some test recordings first. When dubbing, listening in the monitor-switch position is also an easy way of telling when the tape has ended—no sound, no tape.

It is only on three-head decks that you'll find the descriptive term "Double Dolby." This doesn't mean a circuit that offers twice the normal noise reduction, but that there are separate Dolby circuits for recording and playback—so that when you monitor a Dolby-encoded tape it will sound the same as during normal playback.

A few *four*-head decks also exist. The fourth head facilitates recording in both directions. It is an additional erase head that encounters the tape before the record head when recording in the reverse direction.

● ***The mechanical transport.*** A tape deck is half electronic, half mechanical; tape heads, too, are a little bit of both. The mechanical half of the deck is, of course, the tape transport. Its purpose is to move the tape smoothly across the heads, a job that—on the surface, at least—seems deceptively simple.

Consider how the transport works. The tape's speed is basically controlled by a metal capstan that turns at a constant speed. When you switch into the record or playback mode, a rubber pinch-roller presses the tape against the capstan to drive the tape much as wet laundry was driven through the rollers of an old-fashioned washing-machine wringer. At the same time, the transport mechanism must turn the take-up hub to wind the tape up after it passes the capstan, and it must also apply


# MADE FOR EACH OTHER.

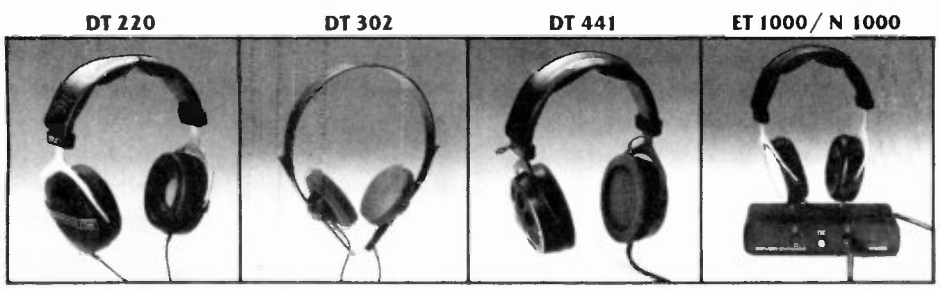
Earphones are made for ears. Yours. That's why the Beyer DT 440 has sound so natural and is so light and comfortable you don't even know it's there, even after many hours.

At 9.6 ounces, it is one of the lightest headphones available. And its weight is evenly distributed among the sponge-padded earcups and air-filled headband. There's no great weight suspended from your head, and your ears never get squeezed.

Some people complain about the isolation of headphones that close them off from the world. So we built the DT 440 with a high velocity open design, to allow a natural mixture of recorded music and environmental sound.

How does it sound? Most people say "spectacular." A great combination of impact and intimacy. The overall sound is wonderfully smooth and transparent. With clean, rich bass response. Powerful, lifelike midrange. Crystal-clear, undistorted highs. And perfect stereo imaging.

For sound – and for comfort – nothing beats a Beyer. We'd like to make one for you.




Beyer Dynamic

**BURNS AUDIOTRONICS, INC.**
5-05 Burns Avenue, Hicksville, NY 11801
(516) 935-8000 • In Canada, H. Roy Gray, Ltd.

# CASSETTE DECK FOREGROUND...

Some meter movements are switchable from an average VU setting to a peak-reading mode. And one manufacturer puts two scales and pointers in the same meter—one for peak and the other for standard VU indications—with separately selectable peak-hold functions. All the new decks in this price range can record on metal tape. And at least one takes special advantage of that tape's wide frequency range by providing the option of recording at 15/16 ips, *half* the normal cassette speed, thus providing 90 minutes per side of high-quality performance without resort to fragile C-180 tapes.

## Decision Time

In case you haven't quite gotten the picture by now, there is an abundance of cassette-deck features that are useful and important, and others that are just plain fun. Many of them, accompanied as they are by enhanced specifications, don't come cheap. Matching what you need, or what you would like to have, against what you can afford may not be easy.

One method that may be helpful is to check out, as best you can, the *top-of-the-line* models even though you may not at the moment be able to afford them. You can't really know which of those exotic features you can't live without until you've actually seen them in action. After seeing—and hearing—what the very best can do, you'll be in a better position to say which features or performance levels are on your "must-have" list—the danger being, of course, that having seen the very best, you'll never be completely satisfied with less.

Living within your budget may not be merely a matter of forgoing some frills and features, but of compromising somewhat on performance as well. Manufacturers upgrade both as they go up the price scale, and some features (such as independent playback and recording heads) carry performance advantages too. Within a given price range, however, you may find that one manufacturer is offering more features while another offers a bit more performance. *Listening* to the decks can help you decide how much the performance difference means to you; *playing* with them will help you determine which features you really "need."


It is good to remind yourself from time to time that you can buy a high-quality cassette deck with wide frequency response, good signal-to-noise ratio, Dolby noise reduction, a d.c. servo-controlled capstan motor, a stable mechanically operated transport, two heads, a two-position selector switch for bias, and EQ and VU meters with separate LED peak indicators for $250 to $300. Additional features beyond those will cost you more, though not necessarily in the $100 increments into which we've divided this survey.

When you find yourself zeroing in on two or three favored models, try whenever possible to make live *vs.* recorded comparisons. With a two-head deck, you need first to record a section of a disc; then rewind the tape and compare its sound with the sound of the original by using the tape-monitor switch on the amplifier. *No* recording will match the original exactly, but on the better machines it will come *very* close. Be sure to keep the recording level below zero on peaks when making a test recording.

KEEP in mind that the prices mentioned in this article are manufacturer's list prices. Many items are already discounted, and others might be discontinued (and therefore reduced in price—if still available) by the time you reach the store. □

# CASSETTE DECK BACKGROUND...

some sort of hold-back tension on the supply hub. In fast-forward or rewind, the transport must release the pinch-roller so the tape can move freely and apply a faster rotational drive to the take-up or supply hub.

The most critical part of the transport's job is to maintain speed stability, especially to avoid short-term, cyclical speed variations—wow and flutter. Wow and flutter specifications vary from about 0.03 to 0.2 per cent for current cassette decks (open-reel decks vary between about 0.02 and 0.2 per cent).

Wow and flutter specifications will also be affected by the tension of the tape itself across the tape heads. On most cassette decks, the tape tension is maintained by the resistance of the tape-feed reel; that is, the tape is usually pulling against the slip clutch in the supply reel. Since cassette tape is tissue-paper thin, controlling tape tension is obviously important. One way to do this, a method adapted from open-reel practice, is to use dual capstans.

A dual-capstan cassette deck (one can seldom be had for less than $500) is designed so that the capstan in the normal position is pulling at a slightly faster rate than the capstan near the feed hub. Both capstans are usually driven by one motor.

● ***About motors.*** Additional motors will effectively increase the reliability of your cassette deck. The capstan drive motor is probably the single most important item in the tape-transport mechanism, and it is frequently overworked in less expensive tape decks, for it must not only drive the capstan, but must also move the take-up-reel hub. With all its belts and pulleys and gears, this mechanism can become fairly cumbersome, opening the way for slippages and speed inaccuracies.

In cassette decks costing over $500, two and sometimes three motors handle the transport functions. One tightly regulated motor will turn the capstan while another drives the take-up or feed-reel hubs. The advantage of this "dedicated" function design is that it not only simplifies the transport mechanism, but increases the life of the motors as well. Beyond this increased longevity, a multi-motor design has the additional useful feature of shorter fast-wind and rewind times. Since the intermediate mechanisms between capstan and tape hubs are simplified, the motors drive the tape hubs more directly, providing a rewind or fast-forward time of 60 to 90 seconds for C-60 cassettes. □

---

**Steve Ohr,** *components editor of* Electronic Design, *has taught courses on audio systems at the New School in New York City and occasionally writes on audio topics.*

# Stereo Review's

# 'HOW TO' REPRINT SERIES

Whether you are about to buy your first high-fidelity component or your fifteenth, you need to have all the facts you can get your hands on if you want to insure your complete satisfaction. Yes, the audio field is a complicated one, but *Stereo Review* has been running a kind of monthly seminar on the subject for almost two decades now, furnishing the kind of basic buying, installation, and operating guidance you can get nowhere else. Today, over 525,000 readers use it monthly as the first, best textbook in their on-going audio educations. If you have come a little late to class, here's your chance to catch up. Any questions you may have about *How to Buy, How to Set Up, How to Use,* or *How to Understand* audio equipment are probably answered in one or more of the reprints listed below.
Reprints are $2.00 each. Minimum order $5.00.

40896 ROOM ACOUSTICS (How to Correct Your Room Acoustics)
40897 GUIDELINES TO SPEAKER SHOPPING
40898 RECORD DEFECTS (Their Causes & Cures)
40899 LOUDSPEAKER POWER NEEDS (How Much Power Do You Need for Your Speakers)
40900 HOW IMPORTANT IS AUDIO-COMPONENT COMPATIBILITY?
40901 GUIDE TO UPGRADING YOUR COMPONENTS
40902 HOW TO SELECT A MICROPHONE
40904 HI-FI TROUBLESHOOTING CHARTS
40905 SPEAKER MYTHS (How to Avoid Bad Choices)
40907 HOW TO SELECT AN FM TUNER
40908 HI-FI DEMONSTRATION DISCS
40909 AUDIO EQUALIZERS (Understanding and Choosing Equalizers)
40910 CLEAN UP AND TUNE UP YOUR AUDIO SYSTEM
40912 USING FM INTERSTATION HISS TO TEST RECORDERS AND SPEAKERS
40914 HOW TO BUY A PHONO CARTRIDGE
40915 THE PROFESSIONAL APPROACH TO TAPE RECORDING
40916 HOW TO ELIMINATE RADIO-FREQUENCY INTERFERENCE
40926 ALL ABOUT NOISE REDUCERS
40961 HOW TO BUY HI-FI (A Beginners Guide To Hi-Fi)
41066 HOW TO MAKE YOUR OWN DEMO TAPES (Semi Pro Recording)
41088 HOW TO BUY A RECEIVER
41090 ALL ABOUT HOME VIDEO TAPE RECORDERS
41091 DIRECT-TO-DISC RECORDINGS
41092 LOUDSPEAKER FORUM—(Answering Questions On: Electronic Crossovers, Biamplified Systems, Wide vs Limited Dispersion, Power Ratings.)
41365 ANTENNAS
41366 TIME-DELAY SYSTEMS
41367 HI-FI EQUIPMENT RACKS
41368 HOW TO UNPACK, HOOK UP, TEST AND INSTALL YOUR NEW EQUIPMENT
41369 UNDERSTANDING PHONO CARTRIDGES
41370 UNDERSTANDING RECORD PLAYERS
41371 BUYING GUIDE TO AUTO SOUND EQUIPMENT
50041 A DOZEN RECOMMENDED DIGITAL DEMO DISCS
50042 A BUYER'S GUIDE TO AMPLIFIERS
50043 A BASIC VOCABULARY OF TAPE RECORDING
50044 A BUYER'S GUIDE TO CASSETTE DECKS
50049 SUBWOOFERS

Reprints are $2.00 each. Minimum order $5.00.

STEREO REVIEW REPRINTS
P.O. Box 278, Pratt Station
Brooklyn, New York 11205

Please send the reprints listed below:

| Reprint # | Quan. | Reprint # | Quan. |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

NUMBER OF REPRINTS ORDERED _____

TOTAL ENCLOSED (MINIMUM ORDER $5) _____ *

Print Name _____

Address _____

City _____

State _____ Zip _____

* Residents of CA, CO, DC, FL, IL, MI, MO, NY STATE, and VT add applicable sales tax. Outside U.S.A. add $2.00 per order.

# THE DOLBY HX SYSTEM

BY CRAIG STARK

Most serious recordists would probably agree that the greatest limitation of the cassette medium lies in its inability to handle high-level, high-frequency signals. If the record level is kept low enough—say, −20 dB—frequency response can be made impressively flat throughout the audio-frequency spectrum. But recording at that low a signal level would provide an intolerably poor signal-to-noise ratio. Specifically, tape hiss would be so prominent that it would overwhelm the soft parts of the music and would be annoying even during loud passages. But when the record level is raised to a level at which the loud sections register 0 dB on the indicators, appreciable high-frequency content in the music easily saturates the tape, reducing the actual high-frequency output and creating prodigious amounts of high-frequency distortion. The difference in available output at various record levels is shown in the accompanying figure, which is based on data derived from a top-quality deck and tape.

While most music dubbed from FM or conventional discs does not contain enough high-frequency energy (relative to the low frequencies which tend to show up more on the record-level meters) to cause serious treble saturation, the increasing numbers of digitally mastered, direct-to-disc, and disco LPs, with their characteristically "hot" high end, can easily drive cassettes into severe overload.

One solution to the problem is the newly introduced "metal-particle" cassette tapes, which have an inherently higher storage capacity for high-level high frequencies. But two very interesting *electronic* approaches to alleviating this traditional cassette problem were demonstrated at the recent Consumer Electronics Show in Chicago—one from Dolby Laboratories and the other from Tandberg. While these two new systems differ in principle, either can be used with any type of tape (metal or conventional), and neither requires any additional coding/decoding apparatus, so the recorded tapes can be played back on any normal deck. This month I'll discuss the Dolby "HX" headroom extension system, and I'll take up the Tandberg Dyneq circuit next month.

Readers familiar with the operation of the regular Dolby-B noise-reduction system are aware that it works by selectively boosting very *low-level* high-frequency signals during recording, thus raising the *recorded* level of the highs in comparison with the fixed residual hiss contributed by the tape. In playback, *all* treble frequencies (including the tape hiss) are reduced by precisely the same amount. The playback decoding thus simultaneously restores the original high-frequency levels of the music and lowers the residual tape hiss (which came in *after* the treble boost) by a maximum of approximately 8 to 10 dB.

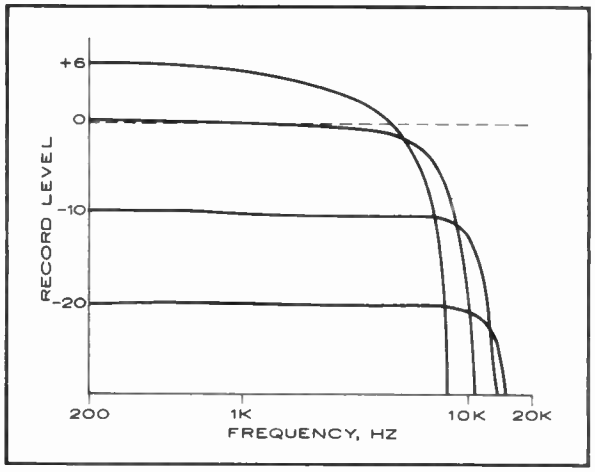
One reason the Dolby-B system works so well is that it is both frequency-sensitive and level-sensitive. *High-level* high frequencies are not boosted at all, or treble saturation would undoubtedly occur. In general, the less the high-frequency content of the material being recorded, the greater the record treble boost, and the boost also varies with frequency (the higher the frequency, the greater the amount of treatment). This kind of variable-level, variable-frequency control of the Dolby encode/decode operation calls for a detection system that responds quickly and accurately to the frequency content and level of the original music signal.

That, in essence, is how the Dolby-B noise-reduction system operates. However, since the control signal is already there in any Dolby-equipped deck, could it not be used for a *second* purpose as well, in addition to its primary function of controlling Dolby encoding of the low-level high frequencies? This was the question that occurred to Kenneth Gundry, senior engineer at Dolby, and his answer is the Dolby HX headroom-extension system.

To understand the Dolby HX system requires one additional piece of information about the way tape behaves. When a tape-deck manufacturer adjusts the "proper" bias of his machine for a given tape, he normally does so on the basis of the maximum output and/or minimum harmonic distortion obtained at a rather low frequency, such as 315 Hz. This bias level is somewhat greater than that which would produce maximum output at a high frequency such as 10,000 Hz. The result is that "normal" bias actually doesn't take advantage of much of the high-frequency signal capacity of the tape. Reduce the bias a bit, and the treble sensitivity goes up, which is desirable under certain circumstances.

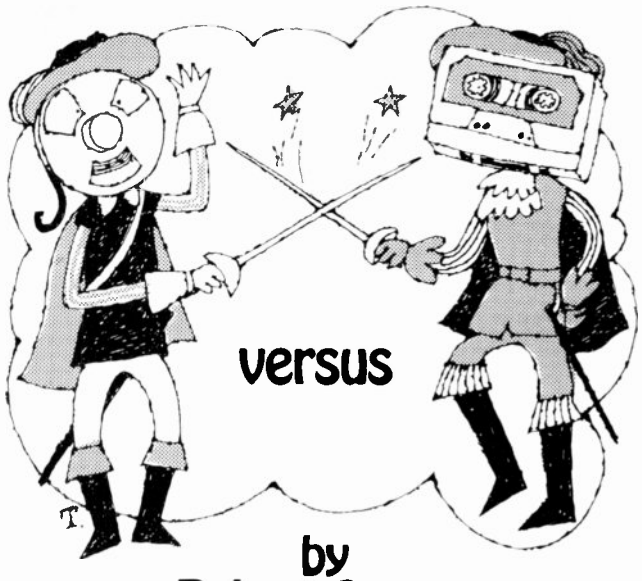
As you may have guessed, this is precisely what the Dolby HX headroom-extension system does. Working with the same control signal that operates the Dolby encoding process, the HX system *lowers* the bias *at those instants* when high-level high frequencies (which would normally cause tape saturation) are present and the Dolby system is, in effect, being bypassed. At the same time that the bias is lowered and treble sensitivity is increased, the normal record boost (equalization) is correspondingly reduced. The net result is that overall flat response is maintained, but more high frequencies can actually be "fitted" onto the tape.

Will everyone jump on the bandwagon, so that, at the cost of only a few dollars, the next generation of Dolbyized cassette decks will be HX-equipped? Time will tell. There still remains some question as to whether, during those moments when the bias is lowered, low-frequency distortion will be sufficiently increased to become audible. Before we can answer that, we need HX-modified machines to measure and, above all, to listen to. □




Because of tape limitations, a typically biased cassette deck exhibits "normal" high-frequency losses as recording level increases. Reducing bias would, among other things, reduce losses.

# Cassette versus Open-Reel



by Robert Greene

In a way, the present recording capability of the cassette format is considerably more of a technological wonder than that of open-reel. The latter was originally designed to meet professional requirements, so the ingredients for relatively easy qualitative improvement were always present—the tape was wide enough and it could be moved fast enough right from the beginning. The cassette, however, was originally designed by Philips for use in small, portable "Sound Cameras," machines intended largely for dictation. For such a purpose, lo-fi sound reproduction served quite nicely; there was little or no thought back around 1963, when the first such units appeared, that they would ever be used to record music or play other roles requiring high fidelity. With tape only about ⅛ inch wide moving at only 1⅞ inches per second, this was perfectly reasonable. Given the technology of the time, there simply wasn't enough tape surface to achieve a decent dynamic range or signal-to-noise ratio, and the low tape speed (the patent holder, Philips, would permit no higher one) just did not leave room for high-frequency response. Also, editing a tape sealed up in a little plastic box was at least chancy, if not totally out of the question.

The format did have one big factor in its favor, though: it was far more convenient than open-reel—no threading the tape through a maze of heads, tape guides, pinch-rollers, and capstans. And cassettes are even easier to play back than discs! Convenience has great appeal to the buying public, of course, and manufacturers, seeing a huge potential market, began to make previously unthought-of improvements both in the decks and in the cassette tape itself. Several open-reel recorder manufacturers, Bell & Howell and Ampex among them, tried to counter the convenience of the cassette by bringing out various types of self-threading open-reel units—the tape fed itself through to the take-up reel with little or no help. This wasn't enough, however, for cassette machines kept right on coming, constantly being improved along the way.

When we wrote on the subject back in 1973, there was still a wide selection of open-reel machines at all prices; cassette machines were becoming more common, but the true audiophile would almost always opt for open-reel because of its higher quality of reproduction. Today's best cassette equipment, despite the design constraints still imposed by Philips, is suitable for all but the most demanding live-music recording. The cassette format has now virtually taken over the home audio market, and the open-reel machine, with very few exceptions, is now at least a semi-professional piece of equipment and consequently large and expensive.

For most of us, the first thing to consider in buying a piece of audio equipment—or anything else for that matter—is price. The situation today is that open-reel recording is no longer a game for those with a limited budget. There are still a couple of perfectly respectable units available in the $400 to $500 range, and a few more from $700 to $800. The bulk of them, however, are $1,000 or more (sometimes *lots* more). These are large, complicated, frequently multichannel machines that are intended for use by the really serious recordist.

Among cassette decks, on the other hand, there is something for nearly every home audio system and for all but the slimmest pocketbook. Prices start around $150; for this you won't get the highest fidelity, but you can get a simple machine that's adequate for use in a modest, entry-level system. At the other extreme, you can pay $1,600 or so for a top-flight cassette machine that, with the new pure-metal tapes, will provide performance almost equal to that of the best open-reel units, along with a great many features an individual user may or may not need. For those mainly concerned with dubbing phonograph records (all but the very best audiophile discs) or from FM radio, there is any number of units between these two price extremes that will serve very nicely, depending on the quality of your associated equipment (no use paying for performance you won't hear) and the specific features you desire. A deck costing between $500 and $600 should be adequate for most home systems.

Two limitations of the cassette format may also affect a decision. The first is playing time. The maximum available on one side of a cassette is 1½ hours (the C-180; the C-120 has an hour on each side), whereas a 10½-inch reel of 1-mil tape has more than 3 hours at 3¾ ips. Further, some deck manufacturers advise against using extra-long cassettes in their units, and 45 minutes per side (a C-90 tape) is the practical uninterrupted maximum for many machines.

The other limitation on the cassette format is still performance. For most home applications cassettes are more than adequate, but if you require the ultimate in performance, you might not be satisfied. The accompanying table shows sample specifications for the best-selling cassette and open-reel machines. It should be borne in mind that specs for tape machines are not stated in as uniform a manner as those for amplifiers. The "wrms" wow-and-flutter measurement used for cassette units almost always gives a 30 to 50 per cent "better" reading than the "DIN peak-weighted" measurement used for professional and, frequently but not always, home open-reel equipment. Moreover, the frequency-response figures for cassette units reflect lower signal levels than those for open-reel, the narrower and slower cassette tape being incapable of handling the higher levels without saturation and overload problems. Nonetheless, who, sixteen years ago, would even have thought such figures possible? □

| Cassette Deck (1⅞ ips) | |
|---|---|
| Frequency response (±3 dB) | 25-17,000 Hz |
| Wow and flutter (wrms) | 0.04 per cent |
| Signal-to-noise ratio (no noise reduction) | 59 dB or more |
| **Open-reel Deck (7½ ips)** | |
| Frequency response | 30-24,000 Hz |
| Wow and flutter | 0.05 per cent |
| Signal-to-noise ratio | 58 dB |

# RECORDING AS NATURE INTENDED

BY RALPH HODGES

SHOCKING and incredible as the idea may be to some, an amateur can often make recordings that sound better than those made by professionals, despite the fact that the latter have superior equipment available in copious quantities. Sometimes, as it turns out, there is great virtue in simplicity, and nature and the laws of physics have conspired to make recording exemplary of that principle.

An anecdote may help to demonstrate some of the needless evil that can be perpetrated through undue complexity:

It was to be a typical recording session (details of time and place are not pertinent to this discussion), and once it began, our little party of journalists took just five minutes to zero in on the best seats from which to hear the orchestra. What we heard as the music unfolded was indeed magnificent. As I sat, spellbound by the glorious sound, I could almost visualize my own microphones hanging there just so far off the floor and just the right distance from the front desks of musicians.

However, that wasn't where the mikes were at all! For one thing, instead of the two or perhaps three I had visualized, there were some two dozen (neither the producer nor the engineer could recall the exact number) and they were strewn around the orchestra like raisins in a fruit cake. The treatment of French horns was particularly puzzling. Sound-reflecting panels had been erected a short distance behind them, which seemed logical because the bell of the horn faces to the rear and the back wall of the stage reflects the sound out to the audience.

Since the recording team had brought the orchestra off the stage and out into what would be the audience seating area —a very common practice in U.S. orchestra recording—something was needed to take the place of the stage's enclosure. What seemed less logical was that the mikes were not in front of the horns but behind them, a few feet away from the reflecting panels. Now if God intended the French horn to be heard with its bell pointing away from the listener or the microphone, what were mikes doing behind the horns and in line with the bell openings? Certainly the sound in the control room did nothing to throw light on the matter.

I suppose I have heard worse emanating from a set of monitors, but that's not saying much. When, for example, the producer wanted to make sure the brass did not drown out the strings, he had the engineer turn up the string mikes—often to the point where the violins became shrill caricatures of themselves. With microphones sprinkled hither and yon throughout the orchestra, there were no landmarks by which a listener could get his bearings in the stereo image. Perhaps this was just as well, for a more plausible perspective that churned and twisted as this one did (because of the continual changes in instrumental balance that were being dialed in), might have caused motion sickness. The tympani were getting into all the microphones, thus losing their crispness and much of the "snap" of their impact. It was discouraging to realize that this sound was the product for which many dollars per minute were being spent, when you could walk 30 steps into the hall and hear just how wrong it all was.

● ***Miking the Space.*** A reaction against this sort of recording technique has been underway for some time now. As a concept it might be termed "miking the space." Instead of trying to pick up 40 violins, 25 violas, 20 cellos, 10 string basses, 2 oboes, etc., you adopt the outlook that you're going to try to capture every acoustic event that takes place in an area of, say, 80 by 40 feet—the sort of area a symphony orchestra might occupy. The nature of the acoustic event doesn't matter—it might be a concert of music, a tap-dancing competition, a game of dice, or a fly buzzing around. What matters is that the event as recorded sounds natural; that it seems to occupy the amount of space that it did in reality; and that its aural perspectives are preserved. If something is happening in the rear or over to the left, the sound should come from there when the finished recording is played back.

Of course, this is not the sort of recording technique you use if you are trying to cover up deficiencies in the performance or flatter the sound in some way. What actually takes place is what the microphones hear and the tape preserves, warts and all. Nor is it a technique that is easy to bring off in every environment. But if you accept the idea that the space need not be a nice neat rectangle as long as your performing forces can be squeezed into it, and if you realize in advance that the minimum number of microphones required is usually best, with additional microphones often proving detrimental, you can usually manage something.

Here is a procedure I very often find helpful, although like everything in audio, it is fallible. First consider the recording environment, because it will determine the character of the reverberation present on the finished tape. A small auditorium, for example, is usually less reverberant than a stone church. This means that microphones can usually be placed a bit farther away from the performers without loss of clarity. An advantage can be realized here when working with very few microphones, because a more distant mike means less variation in performer-to-mike distance for any given performer and fewer problems with balance. If the performers know how to balance themselves, the recording will be balanced. See Fig. 1.

A church may require closer miking if reverberation is not to interfere with clarity. In this case, you might want to try more closely spaced mikes and group the performers in an arc around them; in other words, the "space" you're defining now becomes a rough semicircle instead of a rectangle. These suggestions are perforce very general; every recording situation is a cut-and-try proposition.

● ***Setting Up.*** Once the mikes are roughly placed (and before the performers arrive), send your assistant to stage center and have him move forward and back, continuously announcing his distance from an imaginary line connecting the microphones. When the monitor system yields what seems to you the most pleasing balance between the sound coming directly from him and the reverberation his voice sets up in the environment, you've established an approximate "subjective distance" for the performance—subjective because you will usually find that he is somewhat closer to the mikes than he sounds to be. Have him mark his position on the stage floor with a strip of that indispensable silver tape.

Then, while he faces forward and talks continuously, have him move left and right on a traverse that approximately encompasses the width you expect the performing group to occupy on stage. If at any time during his traverse his voice seems to recede, have him move forward until the original sense of distance is restored and mark that position with tape. (And, of course, have him move back appropriately if his voice seems to approach the micro-

phones.) When this process is over you will have established a base line for the front row of performers. Ultimately you'll be able to move them slightly forward or back of this line to establish final balances.

Finally, your assistant should cavort around the performing area stamping his feet, clapping his hands, and making as much noise as possible, but never stepping forward of the base line. As he does his act, you should get a vivid sense of continuous movement within a well-defined space. The space may not sound quite like the area blocked out on stage, but it should seem plausible.

● ***The Inevitable Little Things.*** By this time you should be in pretty good shape for the arrival of the performers, who it is to be hoped will give you a few minutes of run-through so you can set final balances. If the environment is reverberant and you have had to mike fairly closely, you may find that sibilants are exaggerated in vocals. Raising the mikes somewhat and instructing the performers *not* to sing at the mikes but instead straight out into the presumed audience is the usual remedy.

A frequent problem that can be baffling unless you're prepared for it is the initial sound reflection that comes from the performer, caroms off the floor just in front of him, and reaches the microphone an instant after the direct sound. As a rule this is the strongest reflection you'll have to deal with, and it can have an appreciable influence on the sound. The easiest remedy is a sound absorber at the exact bounce point. Church-pew cushions can be highly recommended as absorbers. Do not, however, overdo the treatment at first. Start with a single cushion at the bounce point—which can be easily worked out when you consider that the angle of reflection will equal the angle of incidence—and work up from there as necessary. See Fig. 2.

If the performance calls upon the performers to move—or if they move whether required or not—you have a special problem. Practical stereo microphone setups simply do not respond to movement as two ears attached to a human head do. To get the most natural-sounding effect, you will probably have to discuss their movements with them in advance, using the subjective-distance base line as a guide. Even then there are likely to be difficulties.

● ***. . . and It Works.*** You may not believe it now, but with luck, application, and a mere two microphones, it is possible to get startlingly credible and satisfactory results with this basic technique, as many brilliant tapes produced by persevering amateurs have shown. Even large-studio professional recordists, who sometimes seem incapable of believing, have inadvertently proven it. Here, an anecdote might serve. It may be apocryphal in some details, but I believe it to be true in the overall sense.

Back shortly before the era of stereo, a major label had proposed to do an LP of excerpts from *Swan Lake* with a well-known orchestra. Evidently, the production was to be a quick and easy job just to fulfill contractual agreements. But there was a hitch—the orchestra was going to be on tour on the date for which the session was scheduled, and the engineers knew nothing about miking the hall in which the recording would have to be made. Worse yet, there was no time to experiment.

This was an intimidating state of affairs because recording engineers and the particular hall had had a long history of enmity. Engineers had found the place prone to echoes, lack of clarity, unfortunate balances, and almost any other sonic ill you can name. The only statement that could be made in the hall's favor was that expert listeners have long found it to be one of the most thrilling and satisfactory environments in the world for listening to symphonic music. In the end, not knowing what else to do, the engineers hung a single microphone above the orchestra on stage and crossed their fingers.

The recording that resulted was peculiar in a number of respects. The strings sounded like strings instead of strident implements of aural torture; you could sense that the brasses could totally overpower them unless held in check by the conductor; and the instruments in the back of the orchestra actually sounded more distant than those in the front. The bass drum was a special revelation; when it went off, you knew something had really hit you—right in the gut. In short, the record had a signal on it that actually managed to represent a symphony orchestra with some plausibility.

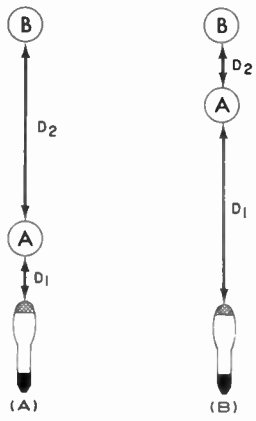



FIG. 1

*Fig. 1: In (A), if $D_2$, the distance between performer A and performer B, is four times the distance to the microphone, A is picked up at a level 14 dB higher than B. In (B), where the microphone is four times as far from A as A is from B, A is picked up only 2 dB louder.*

*Fig. 2: In (A), sound from the performer A reaches the microphone along two paths—direct and after reflection at point $P_0$. The resulting phase difference causes a comb filter effect and, often, severe coloration. Rays reflected at $P_1$ and $P_2$ are innocuous and contribute to ambience. Absorptive material at $P_0$, as in (B), attenuates the offending ray. Note that at each point, the angles of incidence and reflection are equal.*

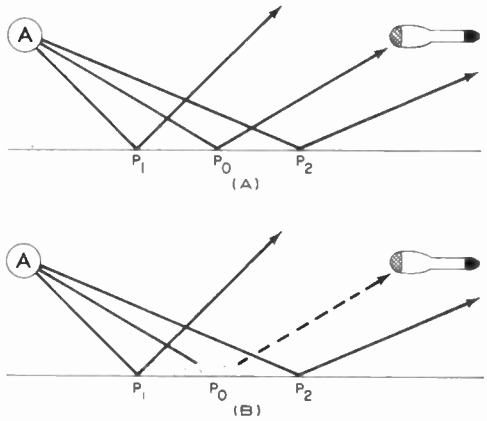
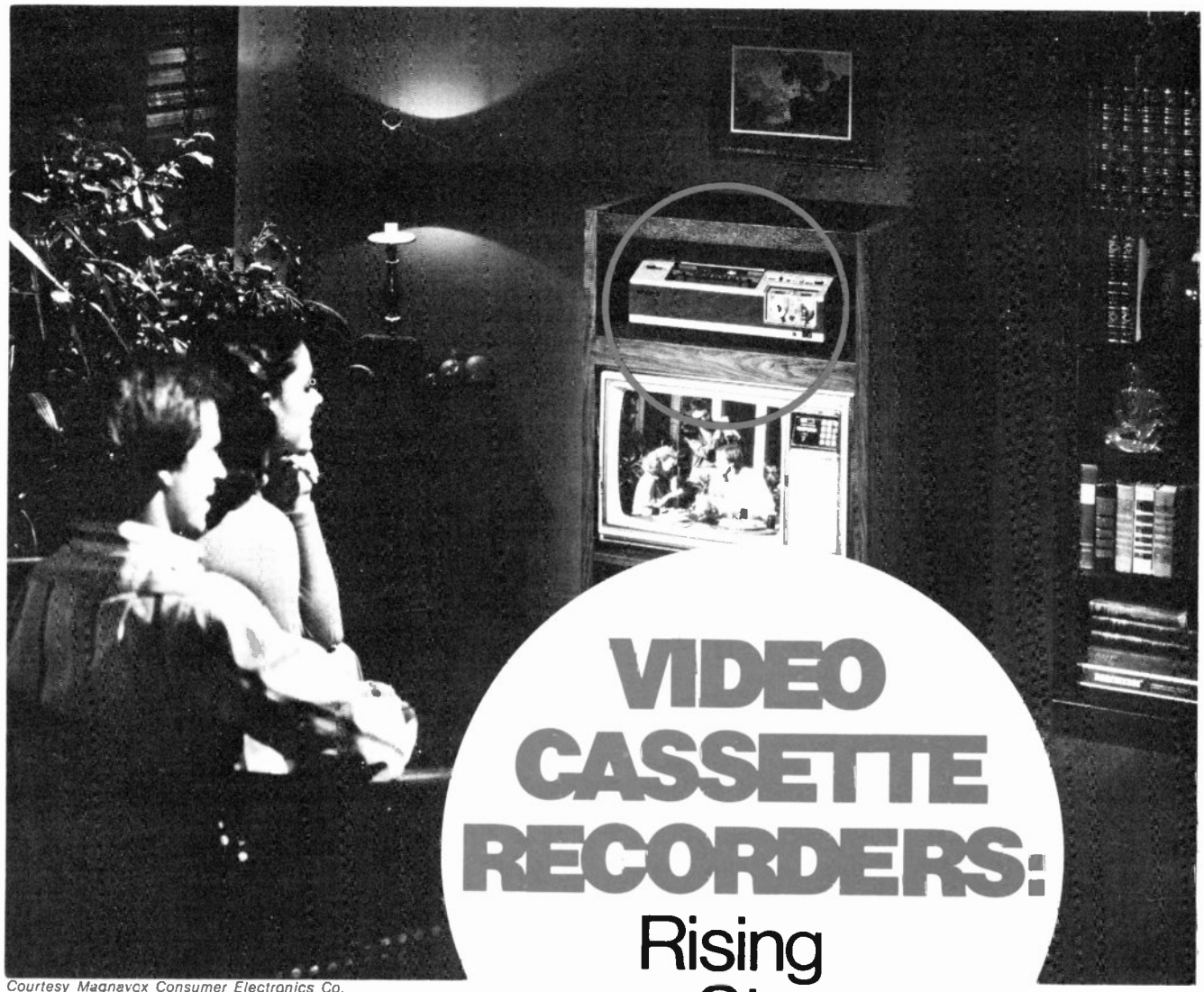



FIG. 2

And this recording sold—not immediately or in great numbers, but strongly and steadily. The company, convinced it had discovered a hitherto secret love affair between the American record-buying public and *Swan Lake*, some years later issued a two-LP stereo set of excerpts played by the same orchestra. This time, however, the engineers were on familiar ground and were able to fuss around with mikes and mike placements to their hearts' content. Imagine their surprise when the new, much more lavishly produced recording didn't sell.

As adamant as my ears may be on this point, I can't prove that the differences in recording technique alone account for the wide variation in sales between the two versions. But I suspect that, given the chance to compare, anyone who has no investment in the status quo in recording will prefer the results of simple miking over the multimike "forest" technique, at least for classical music. If you have the opportunity, try it for yourself. □



Courtesy Magnavox Consumer Electronics Co.

# VIDEO CASSETTE RECORDERS: Rising Stars of Home Entertainment

BY IVAN BERGER

THE more you know about what goes on inside home video cassette recorders, the more you'll marvel at how little they cost, all things considered. But a price that is relatively small for the technology involved can still loom large in the household budget. And when suggested retail prices range from $735 (for Sears' Model 5305) to $1775 (for Magnavox's 8273), it pays to know just what you're getting for the extra money so that you'll be able to make good value judgments. Let's start by looking at some of the technology that makes VCRs "high ticket" machines.

● ***How VCRs Work.*** Audio tape recorders are hard pressed to handle signals up to 20,000 Hz, but home video recorders handle signals well above 2 MHz —and at slower tape speeds than used by audio cassette recorders. This might seem paradoxical since any user of a multi-speed audio recorder can confirm that the faster the tape-to-head speed, the higher the frequencies you can record. Furthermore, higher speeds gobble up tape and thereby increase recording costs. Home VCRs solve this problem much as professional video recorders always have: they feed tape slowly, for economy's sake, while sweeping the heads across the tape at the high speeds needed to achieve video frequencies. This system, used in both VHS- and Beta-format recorders, is called "helical scan." The heads are mounted on a wheel which spins them diagonally across the tape so that the path followed by each head is a portion of a helix.

In reality there are two heads on the drum, spaced 180° apart. A pair of heads is used because a video picture is made up of alternating "fields" of lines —the odd lines in one field and the even ones in the other—which are interlaced to make a complete "frame" on the picture tube's screen. In the U.S., a frame has 525 lines, and 60 fields ap-

*(Continued on page 30)*

# We gave our engineers a free hand. They gave us the remarkable KX-2060.


## THE KENWOOD KX-2060 STEREO CASSETTE DECK

Recently, we challenged our designers and engineers to solve an extremely difficult assignment: design a cassette deck that each of them would be proud to own.

The result is an impressive array of engineering, performance and styling features. The remarkable KX-2060.

**Twin oscillator variable fine-bias adjustment** allows you to precisely adjust frequency response to get the best performance from every cassette tape formulation, including metal.

**Three head, Double Dolby* design** provides true monitoring of Dolby-encoded signals while you're recording. And our unique Dolby calibration system lets you match input and output characteristics with the sensitivity of each tape for perfect recording and playback.

**Fluorescent peak meters** provide fast, 10 millisecond response to give you the most accurate musical peak information.

**High stability tape transport** uses our unique double back tension system to maintain constant tape tension and reduce wow and flutter.

There are even more innovative performance and convenience features engineered into our new KX-2060. Like light-touch solenoid function controls. 4-position equalization switching. Memory indexing. MPX filtering. And more.

See your Kenwood dealer for a demonstration of the new KX-2060. Why settle for any cassette deck, when you can own something truly remarkable.

Performance Specifications:
Frequency Response:
20 Hz to 19,000 Hz (Metal)
Signal to Noise Ratio:
70dB (Dolby ON, Metal)
Wow and Flutter:
0.04% (WRMS)

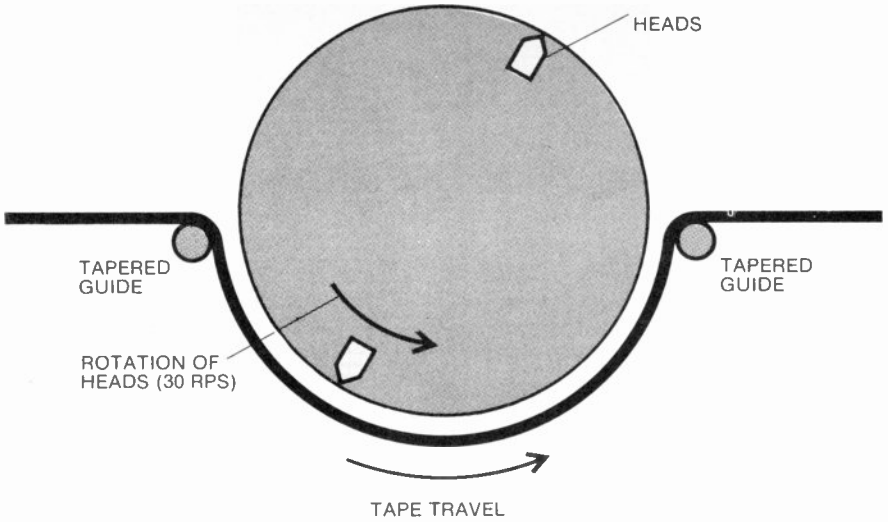
For the Kenwood dealer nearest you, see your Yellow Pages, or write Kenwood, P.O. Box 6213, Carson, CA 90749.

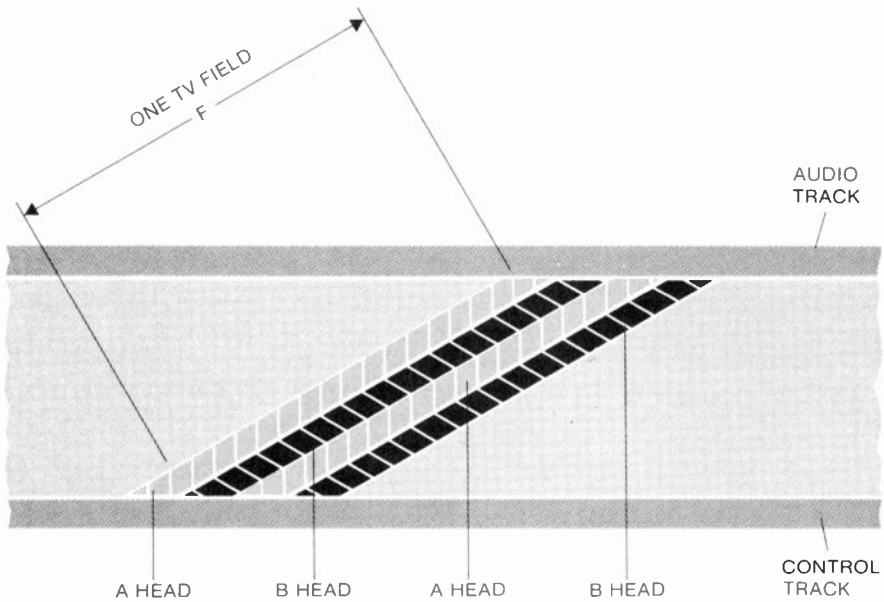
*Dolby is the trademark of Dolby Laboratories, Inc.

KENWOOD®



CIRCLE NO. 8 ON READER SERVICE CARD

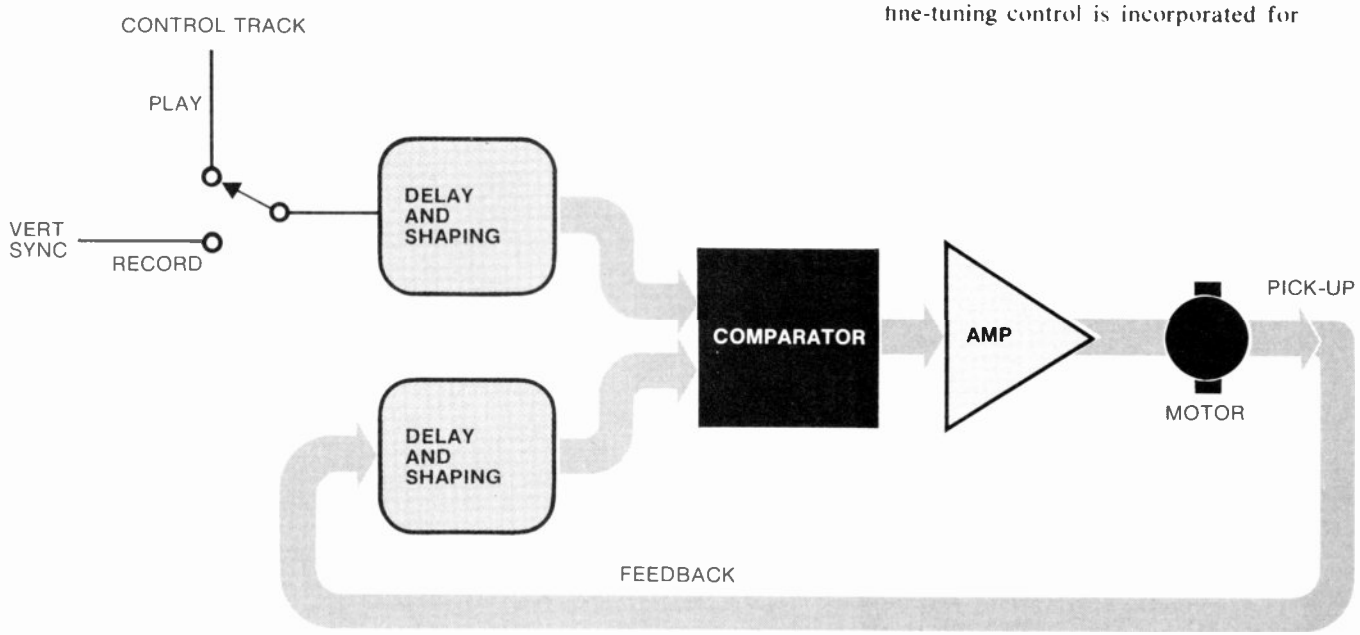



pear each second. Each sweep of a single head across the tape therefore records one complete field of $262\frac{1}{2}$ horizontal lines. The switchover between heads occurs in the brief interval between fields and should not be visible on the screen. The tape wraps halfway around the drum so that the two heads contact the tape alternately. (On some new VHS-format decks, there are actually four heads, though only two are used at any given moment.) Obviously, there is a tape head synchronization challenge here. Some other technical problems are created because recorded tracks on the tape are packed close together for high recording density. This saves tape, but adds crosstalk and noise problems.

Crosstalk is alleviated by a technique called "azimuth recording." Head gaps are not at right angles to the track, as in audio recorders, but are tilted a few degrees (6° for VHS recorders, 7° for Beta decks). The two heads incline in opposite directions, leaving crosstalk signals from adjacent tracks 12° or 14° out of alignment to the head contacting the tape. At video frequencies, the purposeful "misalignment" greatly attenuates crosstalk. At lower frequencies, such as those used by the chroma signal, azimuth differences are not enough to reduce crosstalk sufficiently, so adjacent tracks are recorded in opposite phase, permitting cancellation of undesired signals in playback.

It's equally vital that each head line up with the correct track during playback. To ensure this, the recorded tapes also carry a track of vertical sync pulses (60 Hz) that control the headdrum's servo motor. A separate, stationary "control" tape head is employed for this purpose. Moreover, a fine-tuning control is incorporated for



user adjustment of tracking accuracy.

Narrow tracks and slow speeds exacerbate noise and dropout problems, which appear as short streaks on a TV picture. To handle noise, high-frequency pre-emphasis is added to the luminance or brightness signal during recording, but reduced when the signal is strong enough to override the noise. For dropout compensation, decks contain delay lines that store one line of video, ready for substitution in the event a line is dropped. Substituting another line is not noticeable since a few sequential lines contain almost the same information.

● ***Beta vs. VHS.*** Beta and VHS tape formats are similar in their basic technology. The main differences between them are in the size of the cassette (the VHS version is larger and holds more tape) and in the way the tape is wrapped around the head drum.

Beta-format decks have a single, swinging arm that draws the tape out of the cassette and wraps it around the drum and the stationary audio, control-track and erase heads, in a rather complex path. VHS decks pull the tape out with two parallel arms providing tension between it and the head drum. The VHS "M-load" system (so-called because of the shape of its tape-path) is slightly quicker, but the tape must be released from this path before fast-forward or rewind. Therefore, while a Beta machine can go directly from play into rewind or fast-forward, a VHS deck requires a few seconds for the tape to unload from the heads before proceeding—and wait again for the tape to reload before you resume play. VHS counters with the advantage of longer recording time (currently 6 hours maximum to Beta's 5), and slightly greater popularity (60% of the market to Beta's 40%). In practical terms, greater popularity may make VHS tapes and commercially recorded software slightly easier to find, and you may locate a few more friends to swap tapes with if you choose VHS.

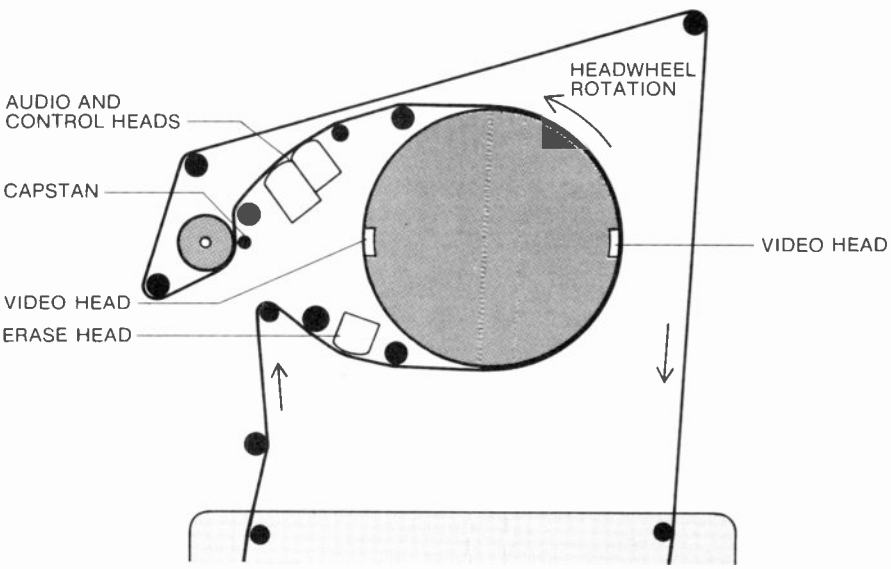
● ***Times, Speeds, and Operating Features.*** Most Beta and VHS decks now offer the user a choice of two or three recording speeds: slower speeds to use less tape while sacrificing some picture quality, or higher speeds to attain better picture quality at the expense of using more of the tape. (The difference in quality is not always obvious, however; some machines seem to record equally well—or equally badly—at normal and low speed, a point you will want to check when you are shopping for your recorder.)

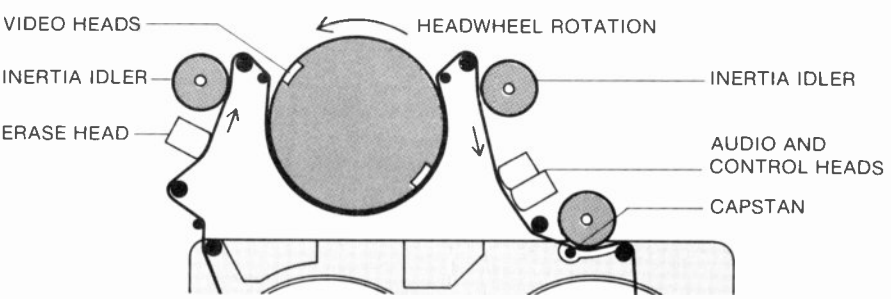
Most Beta decks offer two recording speeds (×1 and ×2) giving maximum recording times of 3 hours, 20 minutes or 5 hours, respectively, with L-830 tape (3 or 4½ hours on the more readily available L-750). Few, if any current decks can record at the original Beta speed (1½ hours maximum on L-750 tape), but most Sony models can still play it back. All of today's two-speed Beta decks can record both the long-playing Beta speed (×2) and the extra-long-play speed (×3). Approximately one-third of all current Beta decks play only the ×2 speed.

VHS decks have as many as three recording speeds, for recording capacities of 2, 4, or 6 hours. However, nearly half the decks on the market have only one or two speeds. Of these, the most common (and probably the oldest) models are those offering the 2-hour and 4-hour speeds while JVC, MGA, Mitsubishi, and Sharp have 2-hour/6-hour models. JVC also has some 2-hour-only models, and Akai's Actividéo portable records only in the 4-hour mode.

As with most VCR features, it's hard to pin down what extra speeds cost you. The more speeds, the more other features the deck is likely to have. Oddly enough, the average price of 1-speed VHS decks (about $1200) is slightly higher than the average for 2/4 hour models (about $1150), while the average prices of 2/6-hour and 2/4/6-hour VHS decks are both about $1350. In Beta decks, however, single-speed operation will probably save you about $200 over two-speed, though you'll find some other features missing, too. Beta ×2 decks average about $1050, ×2/×3 decks about $1250. Note, also, that different areas have different discount structures, so the foregoing may not always hold true.

Then there are "extra" playback speeds on some new VHS and Beta decks, still-frame, frame-by-frame advance, slow-motion, fast-motion, and high-speed scanning. Of these, the high-speed scan function will probably be most often used. With it, you can see where you are on the tape as you fast-forward or rewind your way through it. (Some video decks call this feature Cue and Review.) Tape speed may be a bit less in this fast-search

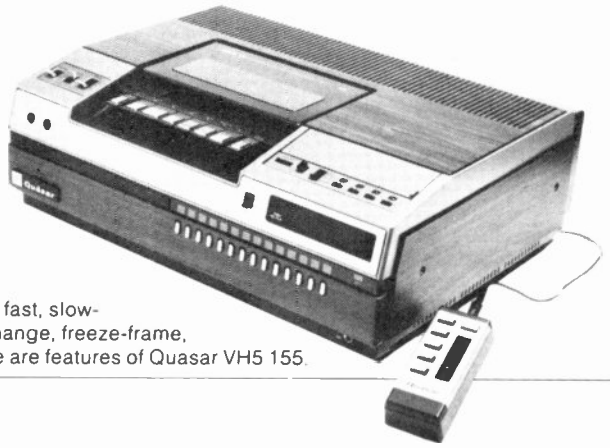


## home VCR sampler

Microprocessor-controlled Sharp VC-6700 can fast-wind to any tape location programmed on its 10-key pad.

Sony SL-5600 has visual fast-search and can record up to four different programs over a 14-day period.



Remote-controlled fast, slow-motion, channel change, freeze-frame, and frame advance are features of Quasar VH5 155.

mode than in normal fast-forward or rewind, though not necessarily by much. (Mitsubishi, for example, has fast-search at 15× normal speed, and Sony's BetaScan is 13×.) But finding what you want is usually quicker, as you needn't switch to "play" to check the tape.

Not all decks with visible search can scan the tape in both directions. Fast-playback speed, usually about 3 times normal, is also available on some decks. This can be used to speed up commercial breaks when playing back off-the-air tapes (especially if you can trigger fast play by remote control), or to home in on a program segment that the faster visible-search feature might overshoot.

Still-frame, which lets you watch any single frame as a still picture or, in some cases, advance through the tape one frame at a time, is found on more and more home decks. If this feature is important to you, check for freedom from "noise bars" (bands of "snow") across the picture. Some decks have variable-speed slow motion (often adjustable all the way down to still-frame), while others offer variable speedup.

As features usually come in packages, it's hard to pin down exactly what any one costs. But in general, freeze-frame is the easiest feature to find, and is very prevalent among decks in the $1000-$1500 range. Fast playback, though nearly as common, comes only in slightly more expensive decks—$1125-$1525. Fast visible search, the least expensive of these special-speed features, is available in $1000-$1350 decks, while slow motion is common in the $1200-$1500 range. Variable-speed playback, available on $1125-$1400 decks, includes many with slow motion.

● ***Secondary Features.*** All VCRs have tape counters that help the user fast-wind to any desired location on the tape—provided he's noted down the counter number and remembered to reset the counter to zero at the beginning of the tape. Quite a few also have memory rewind that stops tape rewind (or fast-forward) at the point when the counter resets to zero.

Some VCRs automatically put a cue signal on the tape at any point where recording is begun, and come to a halt from fast-winding when any of those cue signals is reached. If you record 12 half-hour shows on a 6-hour tape, you can fast-wind directly to the start of each of them. If you recorded two shows in a row on the same channel, though, the tape would only stop at the start of the first show. I've encountered this on Panasonic, Quasar and RCA VCRs, all made by Matsushita, and it may exist on other brands.

Sharp's VC-6800 has APLD (Auto Program Locate Device), an interesting variant on this idea that can record up to 99 cue tones on the tape, wherever you want them. To reach any given cue, you punch in its number and start fast-winding toward it. The tape will automatically stop at the correct point. Alternatively, you can key in a tape-counter number and have fast-wind stop automatically when it is reached. These features appear to be unique to this $1295 deck, for the moment.

VCRs have long had built-in tuners and timers to let them tape programs off the air, even when unattended. Only the portables, which have tuner/timer units as accessories, currently lack these features.

Tuners now tend to fall into two classes. First is the old standby mechanical system, with one detented knob for tuning vhf channels and a second for uhf. Typically, these are found in decks costing from about $750 to $1350. Next is electronic tuning, with direct, single-touch selection of any desired station, usually via 12 or 14 push-buttons, each of which can be tuned to any channel. Such tuning generally adds about $100 to the price, though other features are sometimes included. Make sure, however, that there are enough buttons to cover all the channels on the air or cable in your area.

A VCR's built-in tuner has its obvious applications: taping one program while you watch another or, with the timer, taping *in absentia*. But it can have other uses, too. A VCR with remote channel switching can make that function available to a TV receiver that lacks it. And in some cases, especially with older TV sets, the VCR may have the more sensitive tuner. The reverse,

of course, is also possible.

Timers are also getting more sophisticated. While those of older machines and today's less expensive models could only record a single program, those of today's "programmable" models can tape anywhere from 3 to 7 programs per week, switching channels automatically (thanks to electronic tuners) and turning the tape off between shows. Sony and Zenith have models that can operate over a 2-week period. Most programmable sets (including the 2-week models) can be set for up to 4 programs. Prices of such sets fall mostly into the $1000–$1500 range. Toshiba's two programmables (around $1300) can only store three programs. Decks that can store 5 programs (Sanyo's VCR-5500), 6 programs (JVC's HR-6700U and Mitsubishi's HS-300U) or even 7 programs (Sharp's VC-6800) cover a narrower price-range ($1300–$1500) than the 4-program models, but average only about $30 more. Long-term programming is a great asset with low tape speeds and long recording times.

Programmable timers can be rather formidable to operate, though. However, more experience on the part of designers is leading to better human engineering. An example is the change from arbitrary day numbering (e.g., today is "Day 0") to the use of day names. And a few VCRs have battery back-up to ensure they'll stay programmed during brief power interruptions.

● ***Shooting on Location.*** A growing number of owners of VCRs are moving them from their sedentary positions next to the TV sets to mobile operation (with cameras) in the production of home "tapies." Portables are getting lighter (under 12 pounds, with batteries, for some current models) and may get lighter yet (the Funai, for example, will weigh 9.5 pounds). Currently, portables deliver an hour or more of recording time per battery charge.

Portable video equipment costs—and weighs—more than comparable home movie gear. But video offers lower operating cost. Tape costs far less than film and processing, even if you don't reuse it! And instant-playback via the TV set is more convenient than using a projector and screen that must be stored and set up for each use.

If the portable tickles your fancy, pay attention to such factors as battery life and how easily the controls can be operated when the recorder is hanging from your shoulder. If you'll be shooting major projects, look for one whose batteries can be recharged externally—that way you can recharge a spare while using up the charge in the other.

Cameras offer a wide choice of options: optical viewfinders are less expensive, lighter, and draw no current from the battery. But electronic viewfinders—miniature black-and-white TV screens—show exactly how the taped image will look and allow focus or exposure inaccuracies to be corrected. Electronic finders can also be pressed into service as playback monitors.

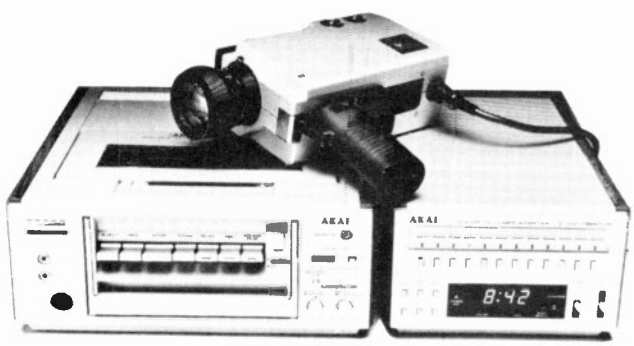
Zoom and power-zoom lenses can add special effects and make it easier to frame your subject. But they, too, add cost, weight, and, in the case of power zooms, some added battery drain.

Check also to see how easily your camera can be set to match the color of the light by which you're shooting. (Daylight is comparatively blue, incandescent light comparatively red.) Many color cameras have built-in, calibrated compensation systems to match the light precisely, while others have color filters to do the same job more cheaply—and less accurately.

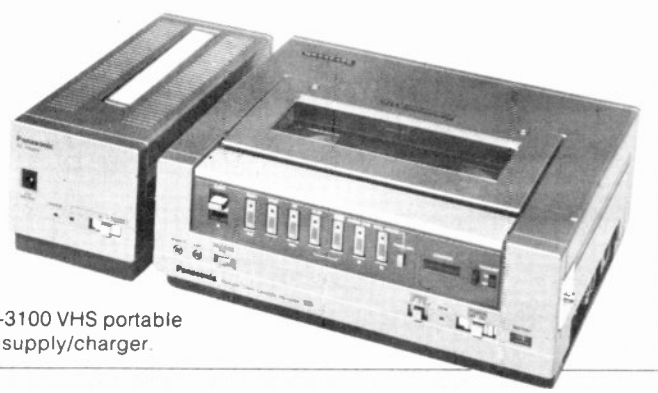
Portables are modular systems, consisting of recorder, battery, camera, charger, and tuner/timer (usually combined with a charger). You can use them in several combinations, so they're usually priced separately. When shopping, be sure you know what the quoted price includes. You'll find that, even without a camera, a portable system will cost more than an equivalent, single-unit, stay-at-home VCR—about $1200–$1300 without tuner/timer, about $1350–$1800 with (Akai's Activideo is an exception, at $1125 with tuner/timer). So far, the only programmable portable seems to be J. C. Penney's. The basic recorder costs $1075 in its 2/4/6-hour version ($975 for 2/4-hour recording), with a choice of battery charger ($115), dual-dial mechanical tuner ($249), electronic tuner/timer ($295), or programmable 4-program/7-day tuner/timer ($389). However, Panasonic will shortly offer programming for its new 3000-series portables, and Quasar may follow soon as well.

● ***Four-head VHS Decks.*** Some of the new, 6-hour VHS decks have four heads: one pair for the 2-hour speed and the other for the 6-hour and (on 3-speed decks) 4-hour speeds. Each pair of heads makes tracks of different widths, maybe even four dissimilar ones. The reason is that slow-speed recording requires thinner diagonal tracks, with heads to match. However, using such heads for 2-hour recording would sacrifice signal-to-noise ratio. In addition, narrow-track 2-hour tapes would play back very noisily on wide-track, 2-hour heads, which pick up noise on each side of the recorded

## *portable VCR sampler*




Typical portable setup has recorder, tuner-timer and color camera, as in this Akai Activideo system.



Panasonic PV-3100 VHS portable with ac power supply/charger.

track. With one wide-gap and one narrow-gap head pair, there's no problem.

Even the two members of each pair may have dissimilar track widths—at least on those decks which have such special effects as still-framing. (On Panasonic's 3-speed, still-framing decks, for example, the 2-hour heads are 70 and 90 microns wide; the slow-speed heads are 26 and 31 microns.) Using asymmetrical tracks offsets the noise bars inherent in still-frame operation, so that they can be made to occur outside the visible portions of the frame. On decks without still-framing, heads are symmetrical.

## Do We Need Disc *and* Tape?

By this time next year, we may be flooded with video formats: Beta (two speeds), VHS (three speeds), the BASF and Toshiba LVRs, the Funai, and perhaps even the Philips system—plus three disc systems. One of those disc systems, the MCA/Philips laser-scanned system, is already on sale in seven U.S. cities (perhaps more, by the time you read this). Magnavox, which first offered this disc to the public, is about to be joined by Universal-Pioneer (already selling players to industrial markets).

Meanwhile, RCA has promised national distribution of its SelectaVision disc system by early 1981, and Matsushita (parent of Panasonic and Quasar) has announced plans to introduce the VHD disc system developed by affiliate JVC. Neither disc system is compatible with the other—nor with the Magnavision disc.

Why disc *and* tape? For the same reasons that we have both in audio. Tape systems can record, disc systems can't. On the other hand, discs offer much less expensive duplication, plus instant access to any part of the recording.

Discs have been touted as the low-cost alternative to tape for those who want to play commercially recorded programs. Both players and discs, it's been predicted, will be less costly than VCRs and video cassettes. But VCR prices and tape consumption have been coming down, while prices of the Magnavision disc player and discs (so far the only ones available) have been creeping up. LVR systems, with fewer parts and faster tape duplication, *could* wind up costing less than disc players and recordings.

● ***Up the Price List.*** What does your money buy in VCRs? The first $700 to $1000 (suggested retail price) brings basic technology: a recorder, mechanical tuner/timer, and probably a pause control and memory rewind.

At higher prices, you'll get more recording time (which may pay for itself in tape economy) and programmability, which makes that longer recording time more useful. You'll get aids in locating programs or program segments, and such extras as fast-motion, slow-motion, freeze-frame or frame-by-frame advance—which you may or may not need. Features like these are sold as packages, like new-car options, which makes it hard to assign costs precisely.

Your local dealer's reputation is worth considering, too. Some are more cooperative in handling service and other problems than others. (Unfortunately, but predictably, the dealers with the biggest discounts tend to be the least helpful after the sale.) Manufacturers' warranties almost all cover a full year on parts, and 90 days on labor. However, there are some exceptions. Sony's is a bit shorter (90 days for parts and labor), while longer warranties are offered by Curtis Mathes (4 years parts, 90 days labor), MGA and Mitsubishi (1 year/6 months), and Sanyo and Sears (both 1 year on parts and labor).

The VCR designers' goal has been to make their products as easy to use as audio cassette decks—and, perhaps, as popular. With refinements now offered, they're beginning to approach that goal. VCR sound quality, though, is lagging far behind. Audio tracks are narrow (and about to get narrower, with the coming introduction of stereo sound), and tape speeds are slow (no current home video format runs at even half of audio cassette speed). Consequently, frequency response rarely exceeds 12,500 Hz, if it goes that high, and signal-to-noise ratios run to around 40 or 45 dB. (Dolby is coming, though.) This will suffice for much of what TV sound has to offer, but it cannot capture the medium at its best on those occasions when the networks and PBS broadcast music with the full fidelity they're capable of transmitting (up to 15 kilohertz).

● ***Some Future Formats.*** Beta and VHS recorders have a lot in common. Their tape cassettes are dual-hub designs, a bit like audio cassettes, but large enough to hold half-inch tape, and greater lengths of it. (The VHS cassette is larger and holds more than the Beta.) Unlike audio cassettes, however, VHS and Beta cassettes only play in one direction, and have protective lids over the tape (the lids open automatically when the cassette is loaded.)

Video 2000, a new system now being sold in Europe by Philips, also uses tapes one-half inch wide, but they are recorded in a dual-track, flipover format like the audio cassette's. In addition to servo control of the head drum, the Video 2000 has its head mounted on piezoelectric crystals that can be electrically adjusted to "fine-tune" head positions so they'll precisely match the track. This allows higher track density and better tape economy. It also ensures perfect tracking of tapes recorded on other decks. A "cue" track on the tape can be used to help locate specific portions of the record-

## Stepping-Stone to Digital Sound

Digital sound recording requires tremendous bandwidth—by audio standards. By video standards, though, that bandwidth is nothing special. PCM adapters are already available (from Optonica, Sanyo, Sharp, Sony and Toshiba, so far) to make and play back digital recordings on home VCRs. But these adapters cost far more than the VCRs do. Cost (and the infrequency with which home recordists really need to record something with about 85 dB of dynamic range) limit their sales largely to professional markets. And so far, only one digital recording is available on home VCR tape: Ry Cooder's *Bop Till You Drop*, now available with Sanyo's PCM adapter.

If the video disc catches on, though, it could prove the perfect medium for digital sound at home. The format and its convenience are already familiar to audiophiles, and playback-only equipment should cost far less than record/play gear will. So far, Matsushita's VHD system seems likeliest to engender a matching audio disc system. Prototypes of that audio disc (called AHD) have already been shown, as have prototypes of players to handle both the video and audio discs. Philips has shown a prototype audio disc that uses the same laser technology as its video disc system, but requires a separate player. On the other hand, the Philips Compact Disc, only 4½ inches in diameter, could lead to in-dash players for car sound, or possibly even portables. RCA (surprisingly for one of the world's largest record companies) has said nothing about a possible digital audio disc based on Selectavision . . . at least, not yet.

ing. Tape speed is higher than in VHS or Beta, improving audio; but economy is served too, since only half the tape is used in each pass.

Grundig (which helped develop the system) and Siemens have also adopted it, and Blaupunkt (which has shown prototypes of a similar, but incompatible system) may do so as well. Magnavox (now owned by Philips) may possibly bring the Video 2000 into the U.S.

Totally unlike any of these systems are two new ones due this year from Toshiba and BASF. Neither system has a revolving head drum. Instead, they move the tape rapidly past a fixed head. To get reasonable recording times, both systems also use multiple tracks (300 for Toshiba, 72 for BASF).

Both systems also bear the same initials: LVR. But from that point on, all similarities (even what the initials stand for) cease. Toshiba's Longitudinal Video Recorder uses an endless loop of tape, running at 5.5 meters (18 feet) per second; the 135-meter loop runs through the recorder in only 24.6 seconds on each track. With 300 tracks, the total recording time is two hours.

In BASF's case, "LVR" stands for Linear Video Recorder. This system does not use an endless loop, but instead reverses at the end of each of its 72 tracks. With a tape length of 600 meters (1968 feet) and a speed of 4 meters (13.1 feet) per second, each track lasts 150 seconds, or two-and-one-half minutes. Track-switching time is a bit longer than Toshiba's (100 as opposed to 28 ms), but occurs only about one-sixth as often. While Toshiba's tape will measure the standard half inch (13 mm), BASF's will only be 8 mm wide.

Both systems have advantages over helical-scan systems: mechanisms can be simpler (Toshiba claims a one-third saving in parts), and cost less (Toshiba hints at recorders for about $500, and playback-only machines for about $300). Access to any part of the tape is quicker, too: Toshiba cites a maximum access time of 8.4 seconds to get from the first to the last track of its LVR, with 33 seconds the worst possible access time to any point on the tape. Both also open the possibility of cheaper commercially recorded cassettes. Tape costs will be low and duplicators will be able to make copies in far less time than required for helical-scan tapes.

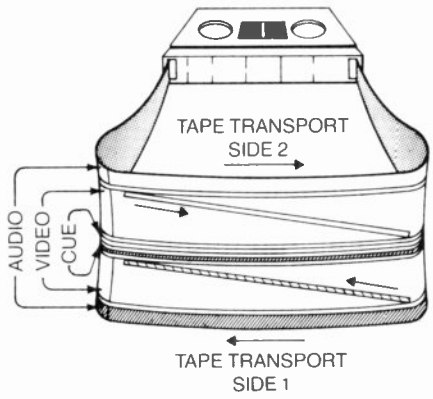
BASF's LVR, already sold in Europe, will be built in a California plant now in operation, and should be on the market soon. Toshiba's will probably be available late this year. Toshiba also hopes to have the ultimate video portable—a camera with recorder built in—in about 2 years. As BASF's cassette is even smaller, they're likely to come out with a similar product.

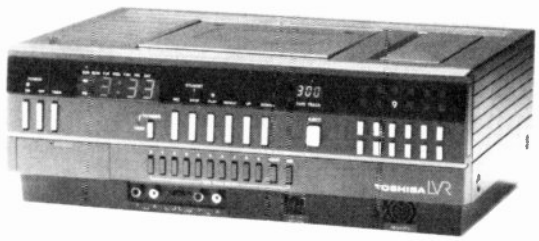
But the smallest tape cassette is probably Funai's. Its CVC (Compact Video Cassette) system records for 30 minutes, and uses quarter-inch tape, so its cassette is only about one-fourth the BASF cassette's size, and its player is about the size and weight of a large portable audio cassette recorder. Technicolor may import this helical-scan system into the U.S. Other than that, few details have yet been released on the CVC. □

## *specifications of VCR formats*

| Tape Format | Tape Speed (ips) | Tape Consumption (sq ft/hr) | Cassette Size (in.) (mm) | Maximum Tape Time (hr) |
|---|---|---|---|---|
| **Standard** | | | | |
| Beta I | 1.57[1] | 19.7 | 6.1 × 3.8 × 1<br>156 × 96 × 25 | 1.7 |
| Beta II | 0.79 | 9.8 | same as Beta I | 3.3 |
| Beta III | 0.53 | 6.4 | same as Beta I | 5 |
| VHS SP | 1.31 | 16.4 | 7.4 × 4.1 × 1<br>188 × 104 × 25 | 2 |
| VHS LP | 0.66 | 8.2 | same as VHS SP | 4 |
| VHS EP | 0.44 | 5.5 | same as VHS SP | 6 |
| **Nonstandard** | | | | |
| Akai VT-350[2] | 2.75 | 34.3 | 6.0 × 3.9 × 1<br>151 × 98 × 23 | ½ |
| BASF LVR | 157.4 | 17.2 | 4.5 × 4.2 × .67<br>114 × 106 × 17 | 3 |
| Funai CVC | n.a. | n.a. | 4.2 × 2.7 × .5<br>106 × 68 × 12 | ½ |
| Toshiba LVR | 216.5 | 18.4 | n.a. | 2 |
| Philips 2000 | 0.96 | 6.0 | 7.2 × 4.4 × 1<br>183 × 110.5 × 26 | 8 |

*Notes:*
1. Recorders for this speed no longer made, though some current decks can play it.
2. Black and white only.

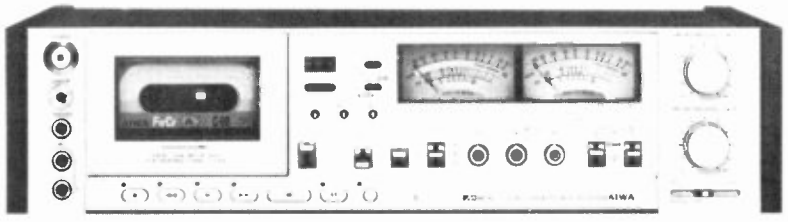


*Among new formats for the future are the Philips Video 2000 system shown diagramatically at left. Half-inch wide tapes are recorded like audio cassettes with two tracks running in flipover format. The Toshiba LVR, above, uses an endless loop cartridge with a direct capstan drive at its center. It has 2 hours of recording time.*

# TAPE DECK TEST REPORTS

## By Hirsch-Houck Labs



### AIWA AD-6900 Cassette Deck

The premier feature of Aiwa's deluxe Model AD-6900 cassette deck is a simple, effective means for optimizing bias and recording levels for virtually any tape formulation without external instruments or technical skills. Operation of the front-loading, three-head deck is controlled by solenoids through a sophisticated logic system. An optional remote-control unit duplicates the functions of the front-panel control buttons. Recorder operation can also be controlled by certain Aiwa record players to make the deck go into record mode when a disc is being played and pause when the disc stops.

Most of the deck's controls are conventional, but there are a couple of departures from usual practice. For example, the rewind and fast-forward buttons are labelled REW/REVIEW and F.FWD/CUE, respectively. Touching either button while the tape is at normal play will move the tape rapidly (at half the usual fast speed) in the indicated direction for as long as the button is pressed. Releasing the button instantly restores normal operation. During "cueing," the tape is close enough to the playback head that a high-pitched sound is heard when a recorded section of tape passes.

For normal rewind and fast-forward operation, the STOP button must be pressed first. After this, the rewind or fast forward button need be touched only momentarily to place the tape into high speed motion, with no sound heard from the outputs. If either cueing button is touched while the deck is recording, operation automatically goes to PLAY and continues in that mode when the button is released. LEDs indicate the selected mode.

The dual meters are certainly an effective means of setting up a cassette deck for full-fidelity recording. Using the PEAK HOLD feature, one can determine the maximum input level of the loudest passage of a program.

The tape adjustment system worked as claimed, in less time than it takes to describe it, and made frequency response essentially independent of the tape used. The small remaining response differences between tapes are mostly at frequencies beyond 10,000 Hz and are relatively subtle in their audible effects. Actually, the audible differences between tapes are more likely to result from differences in noise and distortion levels and in high-frequency saturation characteristics. This was demonstrated when we recorded white noise (FM hiss) and compared the source and levels. The longer red pointer shows PEAK levels of as little as 10 ms duration and has a slower decay time of 1.5 seconds. The VU scale range is from −20 to +5 dB, while the PEAK range is from −50 to +10 dB. The two types of meter indications can be switched on separately. A button labelled PEAK HOLD freezes the PEAK meter pointers at their highest attained levels for at least 30 minutes.

Bias and equalization for the three basic tape types are selected separately by two small lever switches. The switches are labelled LH (normal ferric-oxide tapes), FeCr (for ferri-chrome tapes), and $CrO_2$ (for either $CrO_2$ or high-performance ferric tapes that require high bias and 70-microsecond playback equalization.) Since individual tape brands within each category differ somewhat in their exact bias requirements and output levels, vernier controls are provided for each setting of the BIAS switch. Concentric with each control is a screwdriver-adjust control for setting recording level for that particular type of tape to give a standard Dolby-level output from the built-in oscillator.

Other front-panel controls provide for monitoring from either the SOURCE or the TAPE playback signal and control the Dolby system. The latter contains the usual filter to prevent FM pilot carrier leakage from affecting the frequency-sensing circuits.

The tape transport of the AD-6900 uses separate motors for driving the capstan and tape hubs, with the hub drive operating at normal tape speeds to provide the correct tape tension and winding torque. In the fast speeds, it alone moves the tape. The goal of this tape transport design was to provide the low flutter of a closed-loop dual-capstan drive in a lower-cost mechanism. The capstan is driven by a frequency-generator-feedback-stabilized dc motor.

The deck measures 17¾ inches wide × 13 inches deep × 4¾ inches high (451 × 330 × 121 mm) and weighs 20.9 pounds (9.5 kg). Optional wooden side panels and rack-mounting handles are available. Price: $890.00.

● ***Laboratory Measurements.*** According to Aiwa, the AD-6900 had been set at the factory for Maxell UD-XL I (LH), Sony Ferrichrome (FeCr), and TDK SA ($CrO_2$) tapes, which we used for our measurements. We also checked the record/playback frequency response with several other tapes to verify the effectiveness of the bias adjustment system.

Playback equalization was first checked with TDK AC-337 (120-μs) and Teac 116SP (70-μs) test tapes. The output at 120 μs (ferric EQ) varied only +1/−1.5 dB from 40 to 12,500 Hz. The response at 70 μs (chrome)

EQ) was +0.5/−1.5 dB from 40 to 8,000 Hz, but fell off to −5 dB at 10,000 Hz.

Overall record/playback frequency response with UD-XL I was flat within ±3 dB from 25 to 19,000 Hz at a −20-dB level. Response at a 0-dB recording level was within ±1.5 dB from 28 to 9500 Hz, which is unusually good for a cassette recorder. It fell below the −20-dB curve above 13,000 Hz. Sony FeCr tape gave a similar response but with a slightly more extended high-frequency output, varying ±3 dB from 25 to beyond 20,000 Hz. Its 0-dB recording level crossed the −20-dB curve at 15,500 Hz. Flattest overall response was measured with TDK SA tape—within +1/−3 dB from 25 to 20,000 Hz, also with a 15,500-Hz intersection of the 0-dB and −20-dB response curves. Almost identical results were obtained with Memorex High Bias and Maxell UD-XL II ($CrO_2$) and with TDK AD (LH). The TDK AD had noticeably less high frequency peaking, with a +1/−2-dB response from 27 to 17,000 Hz.

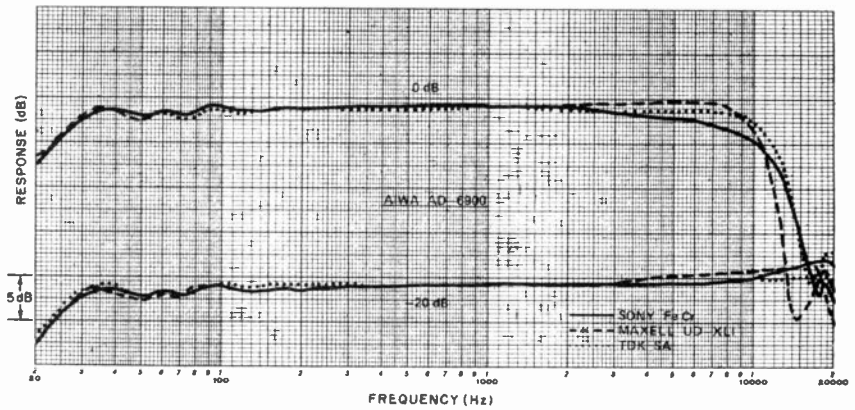
The Dolby circuits tracked well at all signal levels, probably due in part to the matching of the output level of each tape to Dolby requirements. There was never more than a 2-dB change in response at any frequency up to 16,000 Hz at levels from −20 to −40 dB when the Dolby system was switched in and out. The multiplex filter cut in sharply above 16,000 Hz, reducing the response at 19 kHz by at least 20 dB. The playback head is specially designed to minimize low-frequency-response irregularities, and our tests revealed relatively little response fluctuation due to head-contour effects.

For a 0-dB recording level, the line inputs required a 50-mV signal at 1000 Hz at maximum sensitivity, and the microphone inputs required 0.18 mV. The microphone preamplifier stage overloaded at 50 mV, a fairly safe figure. Playback output from a 0-dB recorded signal was about 0.4 volt with TDK SA and Sony FeCr and 0.48 volt with UD-XL I. Third-harmonic distortion in a 0-dB playback signal was 0.56% with SA, 0.71% with UD-XL I, and 1.3% with FeCr. Respective input levels required for 3% playback distortion were +7, +7, and +4.5 dB.

Unweighted signal-to-noise (S/N) ratios, referred to the 3% distortion levels, were not outstanding. They ranged from 42 to 39.5 dB. With A-weighting, these figures improved considerably, to about 57 dB for SA and UD-XL I tapes and 54.7 dB for FeCr tape. With the Dolby system in use and CCIR/ARM weighting, S/N was 63.5 dB from the first two tapes and 62 dB with FeCr tape. At maximum gain through the microphone input, the noise level increased by 11.7 dB; but at normal gain settings, the increase was much less.

Calibration of the Dolby levels on the meters was exact. When set to the VU operating mode, the meters were much more heavily damped than true VU meters, which should indicate 99% to 101% of a steady-state signal level when driven by 0.3-second tone bursts of 1000 Hz at a 1-Hz repetition rate. Aiwa's meters indicated about 60% of steady-state values in this test. However, the PEAK meters gave exactly the same indications for continuous and burst signals.

Flutter was measured with TDK AC-342 and Aiwa test tapes, which gave similar results and confirmed the impressive claims made for the transport mechanism. JIS (weighted rms) flutter was 0.038% to 0.04%, and CCIR (weighted peak) flutter was +0.07% at the beginning of the test cassette. At the end of the cassette, JIS flutter had gone up slightly to 0.045%. Tape speed was 0.1% to 0.2% slow at the beginning of these tapes and 0.4% slow at the end. On a combined record/playback flutter measurement, readings were higher, as would be expected. They were 0.07% JIS and ±0.12% CCIR. In the fast speeds, the deck wound through a C-60 cassette in 62 seconds.



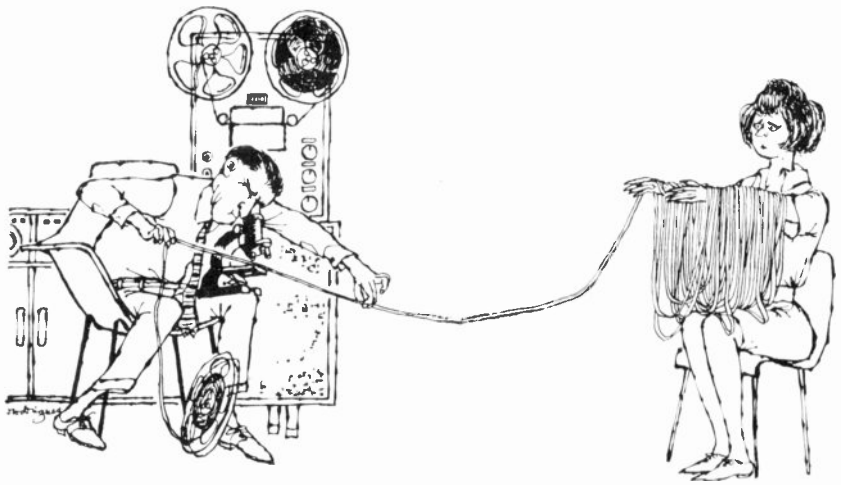

Frequency responses at 0 and −20 dB for three different tape types.

● ***Comment.*** The deck operated with a smooth, positive action and freedom from "bugs" or idiosyncrasies. There was a slight "clunk" from the solenoids as they operated, but the buttons themselves required almost no activating pressure, and the control logic appeared to be as foolproof as claimed. The EJECT lever, for example, can safely be pressed while the tape is in any mode, including fast winding.

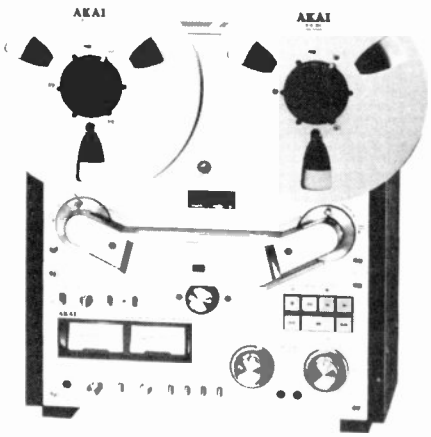
The dual meters are certainly an effective means of setting up a cassette deck for full-fidelity recording. Using the PEAK HOLD feature, one can determine the maximum input level of the loudest passage of a program.

The tape adjustment system worked as claimed, in less time than it takes to describe it, and made frequency response essentially independent of the tape used. The small remaining response differences between tapes are mostly at frequencies beyond 10,000 Hz and are relatively subtle in their audible effects. Actually, the audible differences between tapes are more likely to result from differences in noise and distortion levels and in high-frequency saturation characteristics. This was demonstrated when we recorded white noise (FM hiss) and compared the source and playback signals. With any of the tapes used, it was possible to make a nearly perfect recording of the noise at some level between −20 and 0 dB. However, reducing the level increased the extreme high-frequency response slightly while increasing the level reduced the high frequencies slightly.

Our conclusion from these tests was that the AD-6900, used with any good-quality tape, can make recordings from FM radio or records without any audible difference between source and playback signals. This is about all one can expect from any cassette deck. The flutter in particular—as low as we have ever measured on a cassette deck—speaks eloquently for the construction of the AD-6900, as well as its design.



# AKAI GX-635D Stereo Tape Deck




FOR a small but solid core of recording enthusiasts, the open-reel tape machine continues to be the device of choice, offering potentially higher performance, greater flexibility, and—in the view of some—the most appealing mix of "professional" and "consumer" features. The Akai GX-635D provides an excellent example of such features combined in a mid-price deck. It is capable of accommodating studio-type 10½-inch reels, yet it also operates in the normal home quarter-track stereo format at tape speeds of 3¾ and 7½ ips and provides auto reverse in both the playback and record modes.

The GX-635D uses three motors: one each for the reels and a third servo-controlled a.c. motor that directly drives the capstan, eliminating the need for belts and speed-reducing pulleys. On either side of the centrally placed capstan are two complete sets of record, playback, and erase heads (a total of six in all). The record and playback heads use Akai's "GX" (glass and crystal) construction, which is said to minimize wear—a genuine concern at open-reel speeds. Because the two sets of heads are symmetrically located with respect to the capstan, equal performance can be achieved in either direction of tape travel with full source/tape monitoring. At either end of the head nest are large, rubber-covered, low-inertia rollers, each of which works in conjunction with a spring-loaded, oil-damped tension arm. The tension arms lock out of the way during tape threading, and the right-hand roller operates a tape counter that reads directly (at 7½ ips) in minutes and seconds—far more useful than the usual counters, which register only revolutions of the take-up (or supply) reel and whose readings vary according to the amount of tape on the reel. The tension arms are equipped with contacts to activate the auto-reverse functions when they sense a piece of special foil attached to the tape backing.

Below the head nest are a power switch and a three-position switch that sets the machine either to play just to the end of the tape in one direction, to complete one entire forward-reverse cycle, or to play continuously. (While the GX-635D can record bidirectionally, it must *start* recording in the "forward" direction. Further, if the deck is in the record rather than the play mode, it will halt at the end of one complete forward-reverse cycle, even if set for continuous operation, to prevent accidental erasure.) Adjacent to the three-position switch is a button to select the proper tension for 10½-inch or smaller reels and an orange button, with associated flashing LED indicator, that temporarily mutes the signal during recording, permitting the insertion of pauses between selections. Beneath these controls are a pair of illuminated VU-type meters calibrated from −20 to +5.

Under the head nest on the right side are pushbuttons that control the logic-activated solenoids for the transport functions: REWIND, STOP, FAST FORWARD, RECORD, PAUSE, PLAY FORWARD, and PLAY REVERSE; the last four of these have associated LED indicators. Below the transport buttons are two large, dual-concentric controls for mixing microphone and line-level inputs. Each of these is equipped with an adjustable "memory stop" ring so that during fade-down and fade-up operations one can easily return to a predetermined setting.

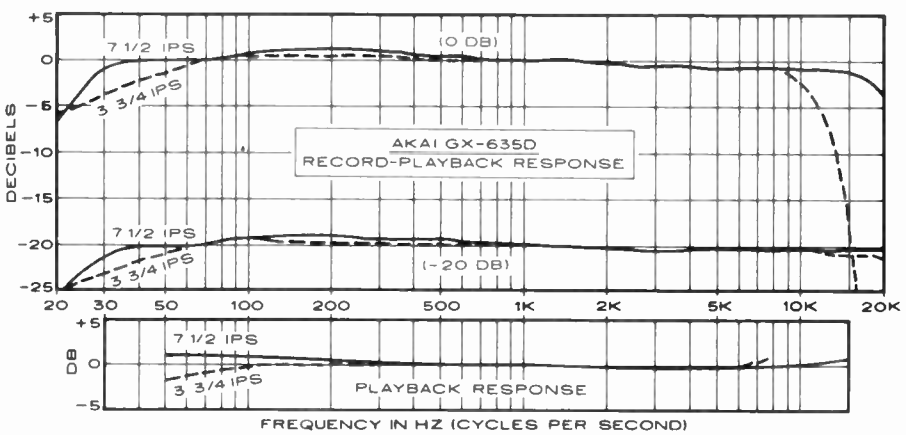
At the bottom of the front panel is a headphone jack with volume control (the control also affects the rear line-output jacks but not the VU-meter readings); a source/tape monitor switch; a timer-start switch; and four pushbuttons to set tape speed, bias for two types of tape, and left- and right-channel RECORD MODE safety switches. Standard phone jacks are also on the front panel to accommodate medium-impedance (600-ohm) microphones. The rear panel has the customary phono-jack line inputs and an eleven-pin socket for connecting a remote-control accessory ($57.75).

The Akai GX-635D measures approximately 17½ inches wide, 19 inches high, and 10 inches deep, and it weighs about 46½ pounds. Price: $995. The same unit is available as the Model GX-635DB, with built-in Dolby-B noise reduction, for an additional $100.

● ***Laboratory Measurements.*** The instruction manual that comes with the GX-635D divides many of the currently popular audiophile tapes into two groups: low-noise and wide-range, for which there are corresponding bias-selection pushbuttons on the machine. The test material that came with our sample indicated that its "low-noise" position had been adjusted for 3M 176 (equivalent to 3M 211, which we used) and its "wide-range" position for Maxell UD (which we also used). In checking the effect of switching between the two bias positions with a variety of tapes, we found that the difference was rather slight—perhaps 2 dB at 20,000 Hz. With the wide-range position, a very slightly better signal-to-noise ratio could be obtained with 3M 206; arguably the best overall performance seemed to be with Memorex Quantum used in the low-noise position! All of this suggests that, while the audible differences are not great, users should not hesitate to experiment somewhat to find the best combination of tape and bias-switch setting for a given tape.

We checked the playback frequency response with Ampex test tapes. As the accompanying graph indicates, response was commendably flat throughout the range of our calibrated sources. More commendable: even at the highest frequency on the tape (15,000 Hz at 7½ ips) the response discrepancy between forward and reverse was less than 1 dB.

A line-level input of 55 millivolts was sufficient to produce a 0-VU indication on the meters, and obtainable output at this level was 775 millivolts, as specified. Using the



recommended 600-ohm source impedance for the microphone input, 0.024 millivolt produced a 0-dB reading, and overload of the microphone section did not occur until an input of 55 millivolts was applied.

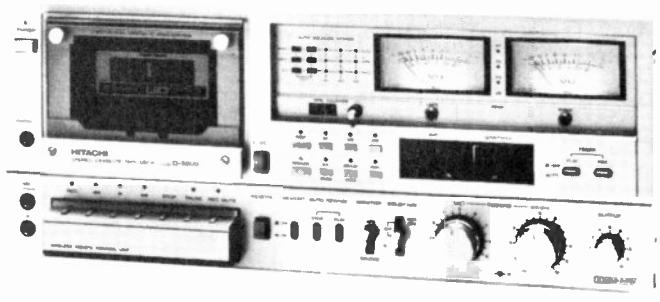
Since the forward and reverse record-playback responses matched so closely, a composite trace of the two directions is shown in the graph. At a −20-dB level, response was down less than 2 dB at 20,000 Hz with any of the tapes tested and at either speed; indeed, at 7½ ips the sharp cutoff did not take place until approximately 26,000 Hz—well beyond the scale of our chart paper. At a 0-VU recording level, however, the difference between the two speeds showed up very clearly. The 3¾-ips performance was not markedly better than that of a top-rated cassette deck, but at 7½ ips the response was down only about 4 dB at 20,000 Hz.

The playback distortion of a 1,000-Hz tone recorded at a 0-VU level ranged from 0.2 to 0.4 per cent, depending on tape and speed. The 3 per cent distortion point was not reached until an input of between +9 and +10 dB was supplied, and the resulting signal-to-noise ratios (plus or minus a decibel or so for different tapes) averaged approximately 62 dB (unweighted), 68 dB (A-weighted), and 64 dB (CCIR/ARM-weighted) at the 7½-ips speed. At 3¾ ips the figures averaged about 4 db lower. Noise from the microphone inputs added a maximum of 5 dB, less than that at normal control settings.

Fast-forward and rewind times were 100 seconds for 1,800 feet of tape on a 7-inch reel. The tape pack, though not wound perfectly, showed no signs of overly tight or loose winding. The range of the pitch control somewhat exceeded ±7 per cent. The metering, though highly legible, was a slight disappointment. The 0-VU indication was referred to the old "Ampex Operating Level" of 185 nanoWebers/meter (well below the capacity of today's best tapes). Presumably this low level compensates for the rather slow response time of the meters, which underread by 20 to 30 per cent relative to true VU characteristics.

● ***Comment.*** The Akai GX-635D proved a more than capable performer not only on our test bench but in our listening tests. Tape handling was smooth and positive, even with the heavy load of 10½-inch reels. The plastic reel adaptors for large reels are ingeniously designed to accommodate both the thicker plastic and the thinner aluminum hubs. The turnaround cycle from forward to reverse was somewhat slow (taking between three and four seconds), yet even this had its redeeming aspect in that no combination of "fast button" exercises could induce the deck to snarl or snap at tape. And, overall, the sound quality far exceeded that needed for dubbing any source material we could find.

---



# HITACHI D-5500 Cassette Deck

THE Hitachi D-5500 is one of the very few available cassette decks capable of setting recording bias, equalization, and level for virtually any cassette tape formulation (except metal types) and then storing the settings in an internal memory. It is also a three-head machine whose "double Dolby" circuits permit monitoring from the tape with proper Dolby decoding while recording. The D-5500 uses a direct-drive capstan motor and has a separate motor to drive the tape hubs.

Aside from the above-mentioned automatic optimization feature, which Hitachi calls ATRS ("Automatic Tape Response System"), the D-5500 is a full-feature deck with separate mixing inputs for line and microphone sources, adjustable playback-output level, and front-panel headphone and microphone jacks. It is a front-loading machine whose cassette door opens with a damped action at the touch of the EJECT button. The entire cassette is visible through a window in the door.

The tape transport is solenoid-controlled through light-touch pushbuttons. Switches control the Dolby system (which can be used with or without a 19-kHz FM MPX filter), tape or source monitoring, and the memory-rewind system. This last can be set to stop the tape when the index counter reaches 000 in rewind mode or to go automatically into play after it stops. The recorder has two large illuminated level meters, between which are three LED's that glow at signal levels corresponding to 0, +3, and +7 dB.

On the rear apron of the D-5500 are duplicate sets of input and output jacks, marked FIXED and VARIABLE, selected by a recessed switch. In the FIXED mode, the front-panel level controls are inoperative. Another recessed switch is marked MICROPROCESSOR RESET; it is used to "clear" the ATRS computer memories (the memory circuits are powered by batteries so that the machine retains stored information even when it is not connected to an external power source).

Another unusual feature of the Hitachi D-5500 is its wireless remote-control system. When it is employed, the actual transport-control section of the deck becomes the remote controller. Pushing the REMOTE REMOVAL button next to it causes the entire assembly to pop out so that it can be removed; when it is, a flat plate appears from within the recorder to cover the opening. The control module, powered by internal batteries, transmits pulse-width-modulated signals over an infrared carrier to a receiving sensor in the cassette deck. When the module is inserted into the opening in the front of the deck for normal operation, its transmitter "window" abuts the deck's sensor "window" and the control module is powered from within the recorder.

The functions provided by the control module include fast forward and rewind, play, stop, pause, REC, and REC MUTE (this removes the incoming signal when its key is held down during recording). Colored LED's on the panel of the D-5500 show the operating mode.

The ATRS uses a four-bit microprocessor to control four audio-frequency oscillator signals, several analog-to-digital and digital-to-analog converters, variable-gain amplifiers, and the frequency response of two electronically controlled equalizer circuits. The purpose of all this circuitry is to duplicate what a skilled technician, using the appropriate test instruments, would do to optimize a tape recorder for a specific tape. However, the D-5500 does it at the touch of a button in less than 20 seconds and then stores the resulting data in one of three memories so that one can use that particular type of tape at a later time without having to repeat the calibration.

To use the ATRS system, one loads the tape and sets the machine to RECORD. Touching the TEST button on the panel initiates the automatic process (and disconnects any external incoming program). First, a 1,000-Hz test signal is automatically recorded and played back, and the output of a variable-gain amplifier is adjusted by the computer to give a playback level within the normal operating range of the other circuits (if the playback signal is too low or entirely absent, as on a leader-tape section, the machine stops and the TEST light blinks on and off). Then a 5,000-Hz signal is recorded by the computer and the bias is varied over a wide range in sixteen steps while the output

voltage from the tape is measured to establish optimum bias according to Hitachi's criteria. After this, the initial gain (sensitivity) adjustment is repeated at 1,000 Hz, since a bias change will affect this parameter. This assures correct Dolby-level calibration for any tape, since it compensates for any differences in tape sensitivity. Finally, 7,000- and 14,000-Hz signals are recorded in sequence and equalization is adjusted so that playback output at those frequencies equals that at the 1,000-Hz level. At this point, all the test data—bias, level, and equalization—are stored in the computer memory and the tape rewinds to the starting point and stops, ready for use. Pressing the TEST button and one of three memory buttons (M1, M2, or M3) transfers the stored data to the selected memory, from which it can be recalled at any time by another touch of the same memory button.

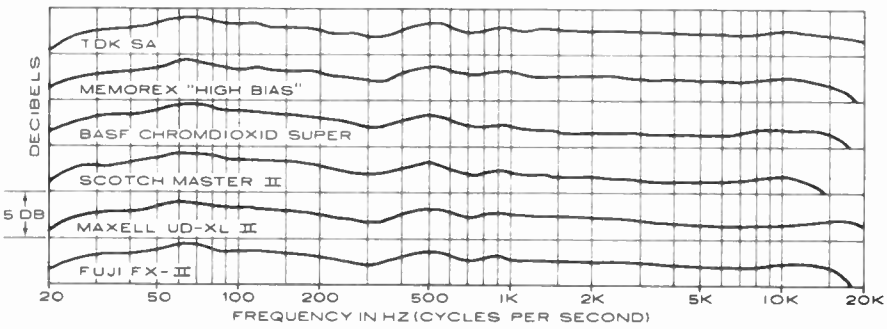
An array of colored lights above the ATRS controls flashes while the ATRS is operating. When the data have been stored in one of the memories, a LED display shows which tape type has been assigned to which memory. While the ATRS process is under way, two smaller meters to the right of the controls show the variations in bias and sensitivity and the final values selected by the computer in arbitrary percentage units. At any future time, a push on one of the memory buttons shows the stored values on the meters.

The D-5500 also has conventional tape-selection pushbuttons for Hitachi UD-EX (chrome equivalent) and UD-ER (ferric) tapes as well as for an unspecified ferrichrome tape. When a tape is first loaded into the machine, it switches the recorder automatically to factory-preset adjustments for UD-ER, or for UD-EX if the rear of the cassette has the special "chrome bias" notch that is used on all tapes requiring the high bias level of $CrO_2$ tape. For a ferrichrome tape or an older $CrO_2$ tape which has no identifying notch, the selection must be made manually by touching the appropriate button. For tapes other than these, the TEST button is pressed to initiate ATRS adjustments. It is of course possible to use ATRS with UD-ER and UD-EX if desired.

Because of the ATRS system, the frequency-response ratings of the Hitachi D-5500 are relatively independent of the type of tape used—30 to 15,000 Hz ±1.5 dB with ATRS and slightly better with the two specified Hitachi tapes and the factory-preset adjustments. Other key ratings include a very low flutter of 0.028 per cent (wrms) and a signal-to-noise ratio of 68 dB (A-weighted, referred to a level that results in 3 per cent distortion and with Dolby circuits in use).

The Hitachi D-5500 is 17⅛ inches wide, 12⅝ inches deep, and 7¼ inches high. The control unit, when extracted for remote use, is about 5 inches wide, 3¼ inches deep, and 1¼ inches high. The complete D-5500 weighs about 31 pounds. Price: $1,200.

● ***Laboratory Measurements.*** The test machine was supplied with a sample of Hitachi UD-EX tape, which we used to verify its performance in the $CrO_2$ bias mode. We also measured the record-playback frequency response with a large number of other tapes, including BASF Professional II; Fuji FX-I and FX-II; Maxell LN, UD-XL I, and UD-XL II (this last was essentially identical to the Hitachi UD-EX tape); Memorex $MRX_3$ and High Bias; Scotch (3M) Dynarange, Master I, Master II, and Master III; Sony FeCr; and TDK AD and SA. All the tapes gave responses well within the recorder's rating and were very similar in their overall performance after the ATRS processing. We selected the TDK AD as our "normal" tape and Sony FeCr as the ferrichrome tape for our other tests.




Hitachi D-5500 record-playback curves, measured at −20-dB reference level, for six different types of tape. In each case, bias, equalization, and other operating conditions were optimized by the recorder's ATRS and do not necessarily represent the tape's intrinsic performance.

The playback equalization of the D-5500 was within ±1 dB from 40 to 10,000 Hz for the 70-microsecond ($CrO_2$ and FeCr) characteristic when tested with a Teac 116SP test tape. The 120-microsecond response was within +2, −0.7 dB from 40 to 12,500 Hz with the TDK AC-337 test tape.

We measured the record-playback response of each of the three basic tapes at levels of 0 and −20 dB, using both the factory-set adjustments (MANUAL) and ATRS. There was very little difference between the two modes within the audio range, although MANUAL tended to give slightly more output at 20,000 Hz and above. This is reasonable, since the ATRS optimizes the high-frequency response at 14,000 Hz and one can expect some further response variations among various tapes above that frequency.

The Hitachi UD-EX response was +1, −3 dB from 20 to 20,700 Hz (MANUAL) and +1.5, −3 dB from 20 to 18,000 Hz (ATRS). The TDK AD gave a response of +1.5, −3 dB from 20 to 20,600 Hz (MANUAL) and +2, −3 dB from 20 to 18,500 Hz with the ATRS. With both tapes, the high-frequency headroom was excellent, attesting to the effectiveness of Hitachi's "two in one" format—record and playback elements housed in one head assembly. The intersection of the 0-dB and −20-dB response curves was in the region of 17,000 to 18,000 Hz with either tape.

The Sony FeCr tape, with MANUAL settings, had a response within ±2.5 dB from 20 to 20,000 Hz, but it was more easily saturated than the other tapes at high frequencies. The 0-dB curve sloped downward above 1,000 Hz and intersected the −20-dB curve at 15,000 Hz. With the ATRS system, the Sony tape's response was ±3 dB from 20 to 17,000 Hz at −20 dB.

The record-playback responses with all the other tapes were, for the most part, identical up to about 10,000 Hz and nearly so up to 15,000 Hz. Above that frequency, they tended to differ considerably. Memorex $MRX_3$, Maxell UD-XL II, and TDK SA continued practically flat to our 20,000-Hz measurement limit. Most of the others showed a slight fall in response between 15,000 and 20,000 Hz, but Scotch Master II, Maxell LN, Scotch Dynarange, Fuji FX II, and BASF Professional II dropped off more rapidly at the highest frequencies. However, these measurements serve to demonstrate that, within its control range (up to 14,000 or 15,000 Hz), the ATRS made the frequency response virtually independent of the tape used.

Of course, these tapes are not all alike, and one must expect differences between them. Signal-to-noise ratios (S/N), using CCIR/ARM weighting and the Dolby system and referred to the recording level giving 3 per cent total harmonic distortion on playback, varied from 63.3 dB for TDK AD (set by MANUAL) to 68.3 dB for Sony FeCr (set by ATRS). Using the ATRS system typically improved the S/N performance by 1 or 2 dB over the MANUAL mode. The 3 per cent distortion level corresponded to a recording input of +6 dB for TDK AD, +4 to +5 dB for Hitachi UD-EX, and +4.5 to +6.5 dB for Sony FeCr (the higher figures were obtained with the ATRS). The playback-output level was in the range of 0.5 to 0.6 volt from a 0-dB recording level, depending on the tape used and the adjustment mode. The noise level through the microphone input, at maximum gain, increased by about 8 dB over the line-input noise level.

For a 0-dB recording level, a line input of 56 millivolts or a microphone input of 0.29 millivolt was needed, and the microphone input overloaded at 56 millivolts. Although the meters are marked "VU," they are much too slow to be so designated, reading only 60 per cent of steady-state values on 0.3-second tone bursts (a VU meter should read 99 to 101 per cent in that test). However, the LED's responded rapidly and accurately at the indicated levels. The Dolby-level calibration of the meters was accurate to within 0.5 dB. The crosstalk between channels at 1,000 Hz was a fine −41 dB as measured with a TDK AC-352 test cassette.

The Dolby tracking of the Hitachi D-5500 was good, with the largest change in response between Dolby on and off conditions

being 1.5 dB at −20 dB and much less than that at levels of −30 and −40 dB. The multiplex filter, which functions during recording, has no significant effect below 15,000 Hz but reduces the 19-kHz response by about 20 dB to prevent a tuner's pilot-carrier leakage signal from affecting the recorder's Dolby system.

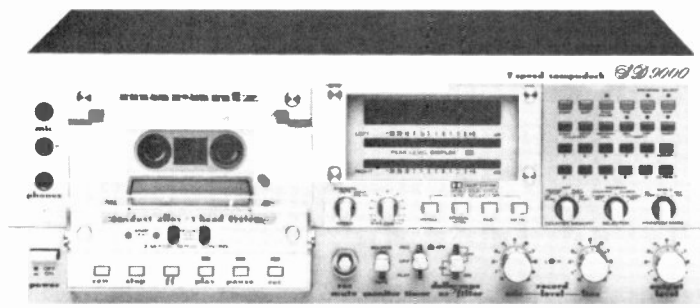
The tape transport, which operated very smoothly and quietly, had a very low flutter of 0.035 per cent (WRMS), or ±0.07 per cent weighted peak (CCIR). In a combined record-playback flutter measurement, the CCIR reading was a slightly lower ±0.05 per cent. The tape speed was 0.7 per cent fast at the beginning of a cassette and 0.5 per cent slow at the end. In fast forward or rewind, a C-60 cassette was run through in 95 seconds.

● ***Comment.*** The Hitachi D-5500 is a superb tape recorder that ranks among the best cassette decks we have seen and used. It is easy to operate, and the availability of *full* wireless remote control (not just one or two functions) should be a strong attraction for many people. The control system worked perfectly, whether at a distance or inserted into the machine. It is difficult to see many of the LED indicators except from directly in front of the machine, and some differentiation of size and shape of the transport controls would have been helpful. On the whole, however, it is difficult for us to contain our enthusiasm for the ATRS system, which solves the most important problem of the cassette recording medium: the necessity of matching tape and recorder characteristics if proper results are to be obtained. Nearly every time we have reviewed a cassette deck, we have been forced to emphasize that without a specific recommendation from the manufacturer (and sometimes not even then, due to variations in production of both tape and recorder) one has little chance of realizing the full performance potential of either the tape or the recorder. Even those machines with bias or equalization adjustment on the front panel often allow only one of these parameters to be varied, and not all of them have the user-accessible level adjustments and test oscillators that are needed to permit a Dolby system to operate properly following such changes in recording bias or equalization.

With Hitachi's ATRS it is easy to obtain close to optimum results with any cassette tape. Although a rather powerful small computer was needed to replace a human technician and a bench full of instruments, the trade-off is certainly a good one for the consumer! As for the sound of the D-5500, a comparison of input and monitor output signals from interstation FM tuner hiss revealed virtually perfect reproduction with the UD-EX tape. The TDK AD was slightly bright, and the Sony FeCr slightly dull; however, both effects were confined to frequencies above about 15,000 Hz. These comparisons were made after the ATRS adjustment for each tape. Music could be recorded and played back with perfect fidelity from records and FM broadcasts. We dubbed the Telarc recording of Stravinsky's *Firebird* onto the UD-EX tape, and in a direct comparison we were somewhat surprised to hear *no* difference in quality or dynamics, and only a small increase in noise level, between the record and the tape. (Perhaps some golden ears could have heard a greater difference, but in any case it would be a trivial one.) One could hardly ask for more from any cassette recorder.

While the price of the Hitachi D-5500 is admittedly high, what one buys is a superb recording mechanism plus a remarkably effective system that enables the consumer to realize the full potential of both the machine and any tape to be used with it. In short, we find the D-5500 a most impressive achievement in consumer-product engineering.

---



## Marantz SD9000 Cassette Deck

THE Marantz SD9000 is a two-motor, three-head, front-loading cassette deck with two notable features. First, it is capable of two-speed operation (the double-speed 3¾ ips and the standard 1⅞ ips), the higher of the two giving it the ability to provide extended frequency response and high-frequency headroom. Second, it has an unusually versatile, microprocessor-controlled transport section which, among other things, allows the user to program, in random order, the sequence in which up to nineteen recorded selections will be heard. Utilizing blank spaces (pauses) between selections to count forward or backward, the SD9000 will fast-forward or rewind under control of a programmed agenda or, at the touch of a different button, will play the selected sections in numerical order.

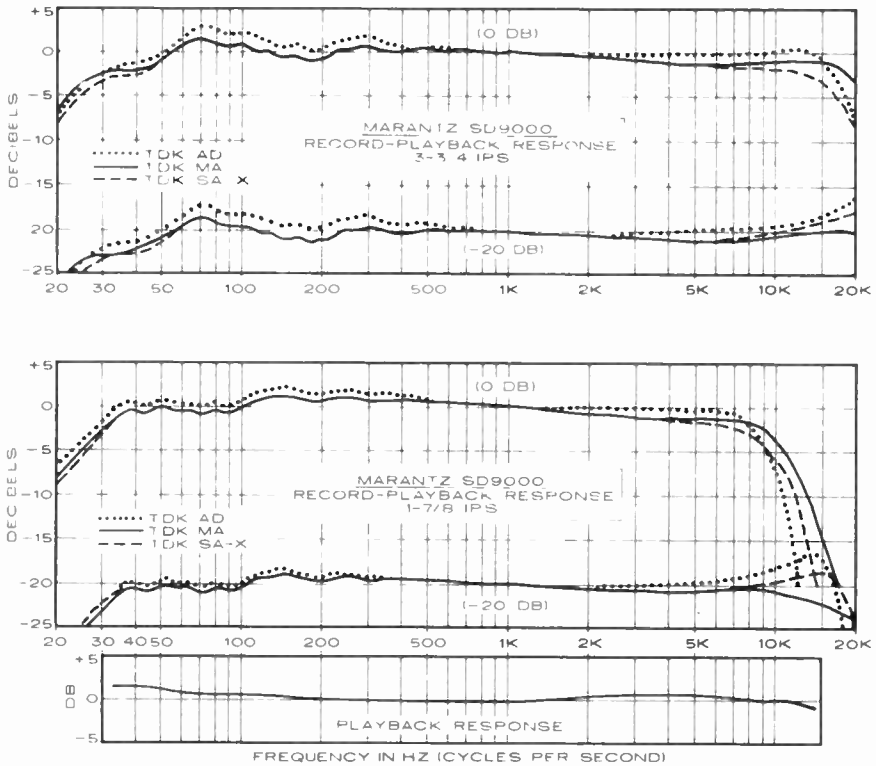
The transport portion of the SD9000 uses two d.c. motors, one servo-controlled for the capstan, the other to drive the reel hubs. There is no conventional cassette "well" and door. Instead, after flipping down a dust shield for the tape heads, cassettes are inserted, openings downward, directly against a front panel, making the entire label area visible at all times. All transport modes (REWIND, STOP, FAST-FORWARD, PLAY, PAUSE, RECORD) operate through logic-controlled solenoids, so any sequence of buttons can be pushed without snarling the tape. Light-touch SENSOR STOP switches are automatically activated if you remove the cassette while the tape is in motion.

The separate record- and playback-head elements are made of a Sendust alloy to ensure long life; they are contained in a single casing. Access to the heads for routine cleaning and demagnetizing is extremely easy, and, for any servicing requirements, slots are provided beneath the removable dust shield for azimuth adjustments.

In the central section of the front panel is a four-digit electronic readout that alternately serves—depending on switch settings—to indicate tape-counter readings or actual time. When the SD9000 is turned off, the display functions as an electric clock which can be set to turn the deck on and off at specified times. Directly below this are two twelve-segment peak-reading fluorescent displays that indicate the record and playback levels; they are calibrated from −30 to +6 dB, with the Dolby-level marking at the +2-dB segment. Directly below these indicators are a speed-selector switch, a ±15 per cent manual bias-adjust control with center detent, and interlocking pushbutton switches to select bias and equalization for NORMAL ("ferric"), SPECIAL (chromium dioxide or equivalent), FeCr (ferrichrome), and METAL tape types.

Along the bottom edge of the front panel are switches and controls for RECORD MUTE (to insert a brief silent space between recorded selections), microphone and line/source recording level (mike and line can be mixed), output level, source/tape monitoring, internal-timer function (play or record), and a three-position Dolby-circuit switch.

At the right side of the front panel of the SD9000 are some twenty-four pushbuttons (six with LED indicators) and three multiposition rotary switches that govern the operation of the "Compudeck" features. With these, the deck can be set to turn on and off at specific times (in the play or record mode), to play prerecorded selections either sequentially or in the order in which the user programs them, or to play/record between user-specified tape-counter settings.










FREQUENCY IN HZ (CYCLES PER SECOND)

A program-pause button and a "skip to the next selection" button are also provided, along with MEMORY CALL (it reminds you of the information you have stored in the deck's microprocessor memory) and CLEAR ENTRY/RESET for correcting any possible mistakes in pressing the correct sequence of pushbuttons.

The rear panel of the SD9000 contains the usual phono-jack input and output connectors, a remote-control connector (an optional accessory is available), a switched convenience outlet rated at 400 watts, and a 50/60-Hz slide switch that must be set to the power-line frequency. The unit measures 16⅜ x 5¾ x 11⅝ inches (width, height, and depth) and weighs approximately 22 pounds. A 19-inch rack-mount adaptor is available. Retail price: $800.

● ***Laboratory Measurements.*** Our sample of the Marantz SD9000 was supplied with the cassettes used for the factory setup (TDK MA for the metal-tape position, TDK SA-X for $CrO_2$-equivalent, TDK AD for ferric, and Sony FeCr for ferrichrome). We also tested a number of other premium-grade formulations—at both speeds—and found that, by using the manual bias-adjust control (which could alter the 15-kHz response by about +2 to −5 dB), we could achieve essentially the results shown in the two accompanying graphs.

Playback response was checked using Teac 216 (120-microsecond) and 316 (70-microsecond) test tapes. As the graph indicates, the frequency response was exceptionally flat, well within a ±2-dB variation throughout the 31.5-Hz to 14-kHz range of the test tapes. (The very slightly elevated response at the lowest frequencies is characteristic of a full-track test tape played on a stereo machine and would not occur in normal use.)

As the overall record-playback frequency-response graphs indicate, at either speed the metal-alloy tape provided greater high-frequency headroom at a 0-dB input level than the other tapes did, although the ferrichrome tape (Sony FeCr), which showed the least high-frequency headroom in the measurements, curiously *sounded* very close to the metal-alloy formulation (and slightly closer to the original than either the ferric or $CrO_2$-equivalent cassettes) in our informal listening tests. In any event, all the tapes met the manufacturer's ±3-dB specifications at 1⅞ ips. (The TDK AD had a ±3-dB peak at 14 kHz, and the metal tape was −3 dB at 20 kHz, but both of these could be brought closer by using the bias control.) At 3¾ ips, only the Sony FeCr (+4.5 at 20 kHz, again controllable with the bias-adjust facility) exceeded the same specification.

Using a 0-dB input signal of 1,000 Hz, third-harmonic distortion at 1⅞ ips measured 0.6, 1.6, 1.9, and 0.7 per cent for the TDK MA, Sony FeCr, TDK SA-X, and TDK AD tapes, respectively. Headroom margins—the additional signal level necessary to raise the third-harmonic distortion to the 3 per cent measuring point—were, respectively, 4.2, 2.4, 1.9, and 4.8 dB, and the corresponding signal-to-noise ratios, on an unweighted basis without Dolby, were 51.2, 47.5, 48, and 49 dB. Switching in the Dolby noise reduction and using CCIR/ARM weighting improved these figures to 65.4, 64.1, 63.1, and 63.1 dB, and using the more traditional 315-Hz test frequency for cassette signal-to-noise measurements added enough margin (using the Sony FeCr tape) to achieve the manufacturer's 69-dB specification.

At 3¾ inches per second the distortion at 0 dB was 0.88, 1.2, 1.5, and 0.7 per cent for the metal, ferrichrome, $CrO_2$-type, and ferric tapes, respectively, and the corresponding 3 per cent overload margins measured 4.2, 4.7, 2.8, and 4.8 dB. CCIR/ARM-weighted signal-to-noise ratios, using the Dolby system, registered figures of 66.2, 68.5, 65.6, and 63.9 dB (51.6, 50.5, 49, and 49.6 dB unweighted and without Dolby); again, using the conventional 315-Hz measuring frequency improved the signal-to-noise ratio somewhat.

The DIN peak-weighted wow and flutter at the two speeds measured 0.09 (1⅞ ips) and 0.03 (3¾); with the more widely used weighted-rms technique it was 0.044 and 0.025 per cent at the lower and higher tape speeds, respectively. Fast-forward and rewind times for a C-60 cassette were between 61 and 62 seconds, which is rather fast.

The Dolby indication was accurate (using a Teac MTT 150A test tape) within the resolution of the level display (itself accurate at the indicated points, as checked against our General Radio calibrated attenuator), and Dolby accuracy at −20, −30, and −40 dB was well inside the prescribed ±2-dB limit. An input level of 48 mV (0.048 volt) was required for a 0-dB indication on the display, the corresponding output level being 0.63 volt. With our 600-ohm generator, an output of 0.2 millivolt produced a 0-dB indication through the microphone input, which overloaded at 35 millivolts. The noise level, when using the microphone stage, increased by a maximum of 9 dB but registered only a 4-dB increase at more typical settings of the control.

● ***Comment.*** Is the improvement from recording at 3¾ ips worth the 50 per cent loss of recording time from a given tape (which also, of course, doubles the tape cost for any given recording)? We knew what our measured responses had indicated, but we were interested in what might show up in our listening tests. For most dubbing of LPs and FM broadcasts the SD9000 did a virtually impeccable job at *either* speed. A slight difference could be heard during direct A-B comparisons, and it became more distinct on the most demanding of our source materials: direct-cut and digitally mastered discs, master tapes, and FM interstation hiss. When we switched speeds and compared input and output directly, we found that a *very* slight "grainy," "gritty," or "edgy" quality at 1⅞ ips was markedly less at the 3¾-ips speed. There seemed to be more "air" (for want of a better word) surrounding the higher-speed recordings, and this difference was most noticeable when using the metal-alloy and the ferrichrome tapes. If you feel that *anything* that's detectable under *any* circumstance is significant, then for you the 3¾-ips speed is worthwhile. But it is likely that you won't be able to tell, without a direct A-B comparison, which of the alternative speeds is being used.

Throughout our test and audition period the Marantz SD9000 functioned well and reliably, and we have no hesitation in recommending its serious consideration by audiophiles who can appreciate its special features and performance.

# Nakamichi 582 Cassette Deck

THE Nakamichi Model 582 is the first of the new generation of "metal-ready" cassette decks we have been able to test in a genuine production-line (rather than prototype) version. But even without the ability to use the new tape, its many innovative design and performance features, attractive styling, and remarkable ease of operation would make it one of the finest cassette recorders we have tested.

The 582 is a front-loading deck that uses three d.c. motors in a dual-capstan, fully logic-controlled transport and has three separate heads (erase, record, and playback) to provide complete facilities for monitoring from the tape. The 582's PLL (phase-locked-loop) d.c. servomotor and dual-capstan drive system are not unusual in a high-priced deck, but the 582 goes a step further, using capstans of different diameters and flywheels of different sizes and masses to prevent the reinforcement of low-frequency "wow." Similarly, flutter is reduced through the use of what Nakamichi calls a "diffused-resonance" transport construction, in which metal and plastic parts are combined in such a way as to decouple and damp vibrational modes. The transport itself is not actuated either by mechanical levers or by electrically operated solenoids. Rather, the pushbuttons activate an entirely separate motor-and-cam system whose rotation is determined by a logic-controlled, integrated-circuit operational amplifier. In this way the release of the brakes, application of take-up torque, and movement of the head assembly against the tape are achieved without the noise and jarring that often accompany solenoid controls. A third d.c. motor is used to supply the drive to the tape hubs.

The head configuration is no less unique. The recording and playback heads are made of crystal permalloy and are housed in entirely separate cases, but they have been miniaturized to the point where both can fit within the center opening of the cassette, which Philips originally intended to house only a combination record/playback head. The close proximity of the two heads, combined with a playback head shield that protrudes sufficiently to push the cassette's pressure pad out of the way completely, provides several advantages, according to Nakamichi. First, excessive wear, scrape-flutter modulation noise, and high-frequency skewing errors introduced by the pressure pad are eliminated. Second, the design compromises inherent in a so-called "sandwich" head, in which separate record and playback elements are housed in the same case, are eliminated without introducing the inconvenience (normally associated with separate cassette record and playback heads) of having to readjust the azimuth (perpendicularity) of the record head each time a new cassette is inserted.

To minimize the effects of normal head wear, the record and playback heads on the 582 are slotted (by means of an exclusive etching process) at the top and bottom edges where the tape passes across them. This type of construction, unique (to our knowledge) among cassette decks, harks back to earlier professional open-reel days; it prevents the development of a "wear groove" on the surface of the head that can prematurely end its useful life. And the double-gap ferrite erase head of the 582, utilizing what Nakamichi calls the "direct-flux" principle, produced, in our tests, the highest degree of erasure on metal tape (a potential problem for some machines) that we have either measured or even heard claimed.

A touch of the EJECT button smoothly opens the lid of the illuminated cassette well on the left side of the 582, so that the cassette can be inserted, tape downward, into slides on the back of the lid. The front portion of the lid is made of clear plastic, affording a complete view of the label area and tape remaining on a side, and it is easily removed for access to the heads for routine cleaning and demagnetizing operations. Beneath the removable section of the cassette-well door are well-marked openings for adjustments to the tape guide and the height of the record and playback heads, as well as for record- and playback-head azimuth alignment. While most of these should be left to the technically advanced user, a supplementary instruction sheet gives clear guidance on adjusting the record-head azimuth (using the 582's built-in test-tone generator) to compensate for the possible effects of any jarring during shipment. We did not find any such adjustments necessary.

The headphone jack is located to the left of the cassette opening, and on its right are six touch buttons, each with a built-in LED indicator, that perform the transport-control functions: PAUSE/CUE, REC, F.FWD, REW, STOP, and PLAY. Each of these buttons has a light but positive "feel," and the PAUSE/CUE can be used in the two fast-wind modes as well as to interrupt PLAY and RECORD. When the PAUSE/CUE button is depressed during high-speed winding, the tape speed is reduced and the heads are brought nearly into contact with the tape so that one can hear the actual recorded material (though at a much higher pitch) and so find the exact beginning of a selection. All modes except record can be entered directly, without going through STOP, thanks to the logic circuitry.

Immediately above the transport-control buttons are the EJECT and COUNTER RESET pushbuttons and a series of twelve screwdriver-adjustable controls to optimize the bias and record levels (for Dolby-calibration purposes) of the left and right channels for ferric, high-bias ($CrO_2$-type), and metal tapes. Three large knobs on the right side of the front panel set the overall playback level, the overall record level, and the balance between channels. There are no separate microphone-level controls, though a suitably high-quality microphone mixer, powered from a socket on the rear panel, is available as an accessory.

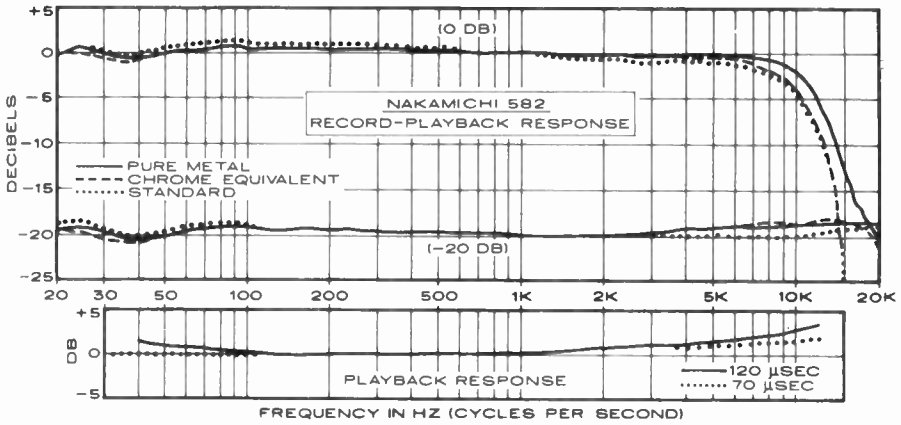
Also on the right side of the front panel is a series of seven switches plus the on-off switch. One is used to set the memory-rewind feature or to activate the deck (using an external timer) in either the play or record mode. The second and third set the bias and equalization to suit the type of tape chosen. Next is a switch for the built-in test-tone oscillators of the 582, which operate at either 400 or 15,000 Hz and are used to optimize the bias and Dolby-system levels for the particular tape being used. The Dolby noise-reduction switch has three positions: out, in, and MPX, the last of which inserts a shart cutoff filter (above 15 kHz) to prevent interference with proper Dolby decoding that might arise from FM's 19-kHz multiplex pilot signal. Finally, there is a small switch that permits monitoring either in the "source" or the "tape" mode. The peak-reading meters located above these switches are calibrated from −40 to +7 dB.

On the rear panel are the customary phono-jack input and output connectors, a DIN-type connector, and an accessory socket for powering a microphone mixer or a wired remote-control device. The 582 measures approximately 19¾ inches wide, 5⅛ inches high, and 13¾ inches deep; it weighs a little under 18½ pounds. Suggested retail price: $890.

● ***Laboratory Measurements.*** We measured the playback frequency response of the Nakamichi 582 using both TDK AC-337 ferric and BASF DIN-standard $CrO_2$ tapes. Both showed a slightly rising characteristic in the very high frequencies, which we have found in previous Nakamichi recorders and which Nakamichi explains by arguing that the test tapes themselves are manufactured to compensate for the treble losses in wider-gap playback heads. In any case, the rise is not significant, and it can easily be compensated for, if necessary, by a slight adjustment of the amplifier treble control. What we found astonishing, however, was that this was the first deck we have measured in which the response was identical (within ±0.1 dB) whether the test tapes were played in the normal forward direction or turned over and played on side two. Test tapes are recorded across the full width of the tape, and so *should* give the same response in either direction, but there is usually a discrepancy of a couple of decibels in the high-frequency response, indicating skewing error within the cassette. By eliminating the usual reliance on a pressure pad, the 582 has helped us to calibrate the differences in our calibrated alignment tapes with greater accuracy.

Overall record-playback frequency response, distortion, and signal-to-noise ratios were measured using the samples of Nakamichi EX-II (ferric), SX ($CrO_2$-equivalent), and ZX (metal) supplied with the machine, though checks with other premium-grade tapes in each category showed similar results. (Our tests of the metal-particle tape would indicate that our early samples were slightly overbiased by the 582, as indicated by a slight falloff in the highest frequencies, but this was easily corrected with the deck's bias control. As the accompanying graph indicates, the frequency response at the usual −20-dB measuring point was within +1.5, −1 dB throughout the 20- to 20,000-Hz range with all three tape types, which is truly extraordinary performance. At a 0-dB level, the advantage of metal-particle tape appears to begin at approximately 7,000 Hz, increasing progressively above that point. At the low end of the frequency spectrum the Nakamichi 582 exhibited virtually no trace of the "head-bump" effects present in almost every other tape recorder we have encountered, and its response was almost perfectly flat down to 20 Hz.

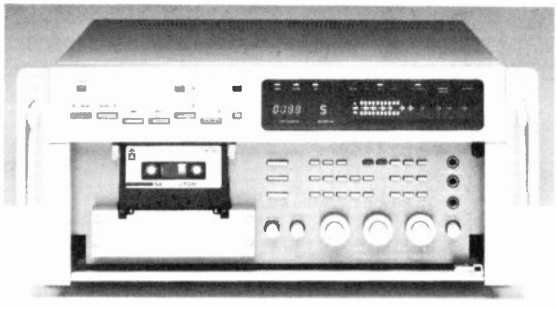
Record-playback distortion at 0 dB, which corresponds to the Dolby-level marking on the peak-reading indicators, was 0.45 per cent for the ferric EX-II and 0.36 per cent for the SX and metal ZX tapes; the 3 per cent third-harmonic distortion point on the three tape types was not reached until the input levels indicated +8, +7.7, and +9 dB, respectively. (All of these, being above the maximum +7-dB indication of the 582's meters, were read on an external laboratory voltmeter.) Referred to the 3 per cent distortion point, signal-to-noise ratios (unweighted and without Dolby noise reduction) were 52.4, 54, and 55 dB for the ferric, $CrO_2$-type, and metal tape, respectively. Using the Dolby system and CCIR/ARM weighting, these improved to 65.4, 67.1, and 69.4 dB, which are among the best figures we have measured for a cassette deck.

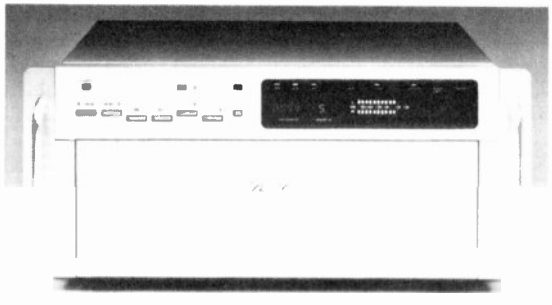



Wow and flutter measured 0.038 per cent (weighted rms) and 0.065 per cent (DIN peak-weighted) using a TDK AC-341 test tape, and we suspect that this is the residual error on the tape. Using a record-rewind-playback technique, the two figures read 0.052 and 0.08 per cent, respectively.

The Dolby (0-dB) marking on the meters of the 582 read +1 for both channels, but even without any readjustment the overall record-playback Dolby tracking was within ±0.5 dB. The slightly slow peak-reading meters registered perfect results (within our measurement capabilities) on the 300-millisecond tone bursts used to check VU characteristics, though they tended to under-read slightly with shorter tone bursts. Headphone volume was more than adequate with nominal 8-ohm phones, though it was a bit low with 600-ohm models. An input voltage of 54 millivolts was required for a 0-dB meter indication and provided an output of 0.67 volt. Fast-forward and rewind times for a C-60 cassette were a fast 51 seconds in either direction. The ability to erase metal tape, a potential problem, measured 70 dB at 100 Hz, and it was beyond our spectrum analyzer's measurement limits at 1,000 Hz and above.

● ***Comment.*** It was evident after all this that the Nakamichi 582 is one of the finest cassette decks we have tested, and subsequent listening evaluations reinforced that judgment. Using high-quality ferric or chromium-dioxide-type cassettes, we found no audible degradation, in direct A-B comparison, with any FM broadcast and its copy, and we detected only the slightest discernible high-frequency loss when using the most demanding direct-to-disc and master-tape material at our disposal. With the metal tape we could not detect even this loss, though we could detect an inconsequential difference when using "pink-noise" test signals whose record level was slightly above −10 dB on the meters. By no means cheap at $890, the Nakamichi 582 is plainly, however, one of the finest cassette recorders currently available.





## Phase Linear 7000 Series Two Cassette Deck

PHASE Linear components have long enjoyed a reputation for excellent performance and technical innovation, and their Model 7000 Series Two cassette deck maintains this tradition. Impressive both in its size and in its microprocessor-controlled features, the 7000 Series Two provides a pushbutton (there are thirty-seven of them!) for nearly every conceivable function; yet, despite this apparent complexity, it is basically an easy machine to operate.

The 7000 Series Two is a three-head, "metal-ready" front-loader. Its dual-capstan drive system isolates the tape during its passage across the tape heads, minimizing wow and flutter and the modulation-noise effects that might arise from longitudinal vibrations in the tape. The capstan system is driven by a d.c. servomotor whose speed is locked to the precise reference frequency provided by a quartz-crystal oscillator. The

crystal control may be overridden in the playback mode, if desired, by a pitch control with a ± 6 per cent range. A separate d.c. motor drives the reel hubs. All transport modes are solenoid-controlled through light-touch pushbuttons and a solid-state logic system.

The record and playback heads are separate, permitting their gap widths to be optimized for their different functions and making it possible to monitor the actual recorded signal a split second after it is put on the tape. The record and playback heads employ a wear-resistant unicrystal ferrite material and are so arranged that both will fit within the cassette opening originally intended for a single record/playback head. This eliminates the need for constant readjustment of the record-head azimuth (required by some three-head cassette decks because of the slight tape skewing within different cassette shells). The erase head uses a double-gap ferrite construction to provide the necessary erasing flux for the new metal-alloy tapes.

The lower section of the front panel of the 7000 Series Two, containing the cassette well and most of the controls, is concealed by a metal panel that tilts forward at a touch and slides underneath the deck. When closed, this makes for an attractive, uncluttered appearance, matching the other Phase Linear Series II components. The upper-left-hand portion of the panel contains the transport pushbuttons (REWIND, FAST FORWARD, STOP, PLAY, RECORD, and PAUSE), each of which has its own LED indicator. Also in this section are pushbuttons for power on-off, tape-counter reset, record mute (which, when depressed during taping, inserts silent "spaces" between selections), and a MicroScan button whose function will be explained below.

On the upper right side of the panel are a four-digit electronic tape counter, an electronic memory number indicator (used in conjunction with the MicroScan process), and a fluorescent level indicator. In a row above these three sets of indicators are ten more LED status indicators. Three of these (bias, level, and equalization) show the operation of the MicroScan system; four more are used to show the type of tape for which the deck is set (metal, standard, $CrO_2$, or FeCr). The remaining three light up when the Dolby noise-reduction system is switched in, when the memory/repeat feature is selected, and when the batteries that maintain the microprocessor memories need replacement after a year or so.

Opening up the lower portion of the front panel reveals both the cassette-loading area and all the other pushbuttons and controls. The heads are sufficiently exposed to facilitate routine cleaning and demagnetizing. A cassette is loaded, tape downward, simply by pressing it into place between the guides. When a cassette is inserted, any slack in the tape is automatically taken up. Behind the cassette is an illuminated panel, with markings toward each end, which shows the amount of tape on each reel and warns when only two or three minutes remain on a side.

Three large pushbuttons to the right of the cassette-mounting area switch in a 19-kHz multiplex filter (used when taping stereo FM), turn the Dolby system on and off, and switch the output of the deck to monitor either the incoming signal or playback from the tape. Beneath these are the pitch control (which has a center detent for normal-speed operation) and a four-position switch to select among the four tape types. To the right of these relatively small knobs are three large, dual-concentric controls for adjusting the level of the microphone and line inputs (which can be mixed) and for setting the tape-playback level. The output-level control is detented at its normal position, and it affects the fluorescent display as well as the headphone volume during playback. To the right of the output control is a manual center-detented bias adjustment.

In the central portion of this lower section of the 7000 Series Two are three horizontal rows of pushbuttons. The three in the top row set the deck up for operation via an external timer if desired. Below this is a group of five that control the fluorescent level display, giving it either peak-reading, peak-hold, or average-reading ballistic characteristics and selecting either bright or dim illumination levels. The third row (five pushbuttons) controls the memory and repeat functions, which can be set to stop or play again from the end of the tape or from a point within it where the counter has been zeroed.

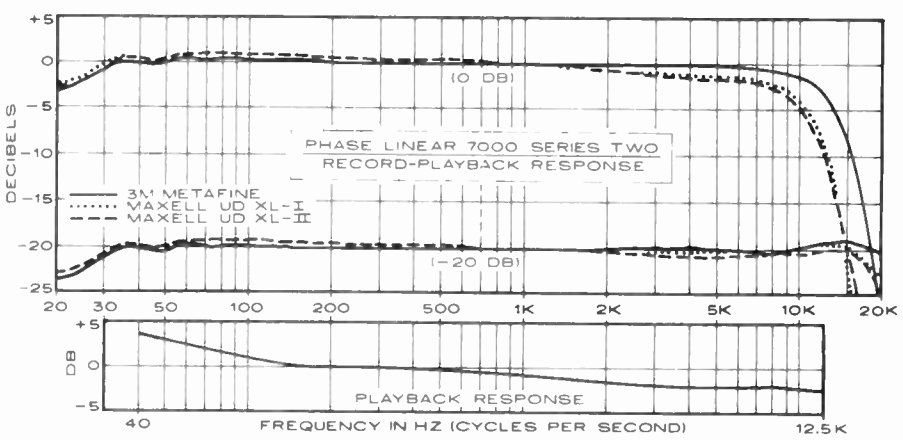
This leaves only the MicroScan buttons to be described. As most audiophiles are aware, tapes differ not only by basic type but also, to some degree, from brand to brand within the same general type. Optimum tape/recorder performance can be achieved, therefore, only if these minor differences—in bias level, record equalization, and tape sensitivity (level) are taken into consideration and adjusted for. With the advent of reasonably priced microprocessor integrated circuits, it became possible to automate the adjustment process—and this is the precise purpose of the MicroScan feature of the Phase Linear 7000 Series Two. When a cassette is inserted and the MicroScan button is pressed, the deck begins the adjustment process. It automatically goes into record mode, and the "bias" LED indicator begins to flash as the microprocessor rapidly steps through sixty-four bias levels, selecting the optimum one for the specific tape. It next shifts to a similar trial of different level adjustments, and then through another series of tests to obtain the same response at 10,000 Hz as at 400 Hz. When all three parameters have been computer-optimized, all three LEDs remain lit and the deck automatically rewinds to the point on the tape where it began its testing operations. The entire process takes between 40 and 50 seconds, and, of course, the test tones are erased when you begin recording.

The remaining sets of pushbuttons in the lower section of the front panel can now be used to store the computer-determined data for a specific tape brand and type in any one of nine memories. At any later time, you have merely to press RECALL and the appropriate button in order to set up the proper recording bias, equalization, and sensitivity parameters instantly.

The batteries that maintain the memory when the 7000 is shut off are contained in a small compartment on the rear panel; it also provides a spare set of inputs and outputs for direct connection to another recorder. The rear panel also contains an unswitched a.c. outlet (rated at 300 watts). The Phase Linear 7000 Series Two measures $18^{7}/_{8}$ inches wide, $8^{5}/_{8}$ inches high, and $16^{3}/_{4}$ inches deep; it weighs slightly more than 40 pounds. Suggested retail price: $1,350.

● ***Laboratory Measurements.*** We measured the playback frequency response of the Model 7000 with a TDK AC-337 test tape, using the known difference between the 70- and 120-microsecond equalization curves to check both equalizations. The slight downward slope, which did not reach the 3-dB point at the 12,500-Hz limit of the test tape, may reflect the use of a different test tape in making the factory adjustments of the deck, for it did not show up in any of the overall record-playback curves.

For the overall frequency response, distortion, and signal-to-noise measurements we used samples of Maxell UD XL-II ($CrO_2$ position) and of 3M Metafine (metal position) supplied by Phase Linear as the factory setup tapes. We also checked performance with TDK and Sony metal formulations and with BASF $CrO_2$, TDK SA, and Memorex Hi-Bias cassettes. Tests were also made with Maxell UD XL-I (ferric) and Sony FeCr (ferrichrome). Even without using the MicroScan processor, the 7000 Series Two seemed remarkably tolerant of differences between, for example, Ampex Grand Master, TDK OD and D, and Memorex $MrX_2$. But, aside from our measurements, we also put the machine through its paces as a consumer would. We used the MicroScan system when our ears told us (during monitoring) that it was clearly needed, and we used the standard factory settings when they were already very close



to optimal. With this approach we were able to obtain consistent performance (up to the inherent limitations of each) from almost every tape we tested. Ferrichrome proved beyond the computer's power to resolve, but with ferric, $CrO_2$-type, and metal-alloy cassettes response measured consistently within ±1.5 dB from 30 to 18,000 Hz (20 kHz with metal).

The record-playback distortion with 3M Metafine, Maxell UD XL-II, Maxell UD XL-I, and Sony FeCr measured 0.55, 0.85, 0.5, and 1.1 per cent, respectively, and the 3 per cent reference distortion point used was not reached until the very high input levels of +7, +4.8, +7.5, and +6 dB. Unweighted signal-to-noise ratios (without benefit of Dolby noise reduction) measured 56, 52.6, 55, and 53.5 dB, respectively, and adding Dolby and the CCIR weighting curve improved the figures to 69, 65, 64.5, and 68 dB for the four tapes.

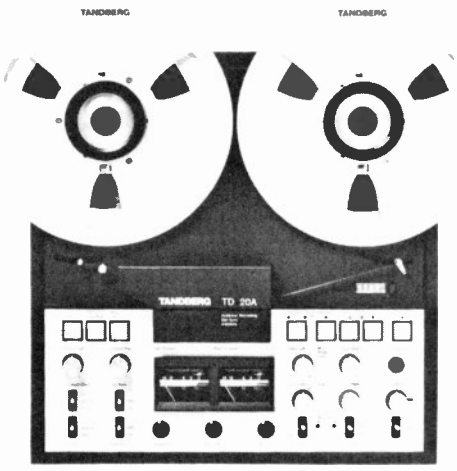
Wow and flutter was far below the residual level of our test tapes and therefore had to be measured by recording, rewinding, and playing back a generated 3,150-Hz test tone. Even so, on a weighted-rms basis, wow and flutter was only 0.03 per cent, increasing to between 0.04 and 0.05 per cent on the stricter, DIN peak-weighted measurement. Fast-forward and rewind times for a C-60 cassette were 77 and 75 seconds, respectively.

The fluorescent level display is calibrated from −30 to +8 dB, with +3 dB representing Dolby level when the playback control is at its detented, normal position. Indicated accuracy across the display scale was within ±1 dB down to the −20-dB level (where the spacing between segments becomes too broad to measure). Dolby level indicated 1 dB low when checked with a TDK AC-313 level tape, but, even so, overall record-playback response with the Dolby system switched in did not deviate more than the permissible +2 dB at a −20-dB input and was even closer than that at −30 dB. In the average-reading mode the display characteristics matched those of a standard VU meter very closely. The faster peak-reading mode will probably be more convenient for most users.

At the line-level inputs, a 68-mV signal produced a 0-dB meter indication, with the output measuring 460 mV. Microphone-input sensitivity was 0.27 mV, with no overload evident until a 65-mV signal was applied. There was only 2.5 dB of additional microphone-input noise at maximum gain—one of the lowest figures we have measured. Headphone volume was more than adequate when checked with both 200-ohm and 600-ohm phones.

● ***Comment.*** In our listening tests the Phase Linear 7000 Series Two sounded just about as good as its measurements suggested—in a word, superb. Neither FM nor disc programs were audibly degraded by dubbing. And, with metal-alloy tape, even FM interstation hiss was recorded without audible change until input levels were raised to a level of −6 dB. Tape handling was superb as well, and all of the features functioned precisely as described in the detailed and well-prepared manual. The price of the 7000 Series Two may put it beyond the reach of many who would appreciate its virtues, but those audiophiles who can afford the Phase Linear 7000 Series Two should count themselves fortunate in more than a purely financial sense.

---




# Tandberg TD-20A Open-Reel Tape Deck

TANDBERG has been making high-quality open-reel recorders for more than a quarter of a century, and its latest model, the TD 20A, lives up to its distinguished heritage. Capable of handling reel sizes up to 10½ inches in diameter, it is available in either quarter- or half-track stereo formats and with either 15/7½-ips or 7½/3¾-ips speed options. The unit we tested had the quarter-track heads and 7½/3¾ speeds used by most home recordists.

A total of four motors is used in the TD 20A. Each of the two reel tables is directly connected to its own drive motor for fast winding and takeup torque, and an a.c. synchronous motor is belt-coupled to the capstan. The fourth motor replaces the customary solenoids in controlling the brake bands and the rubber pressure-roller mechanism. This produces very quiet, smooth operation, in contrast to the usual sharp "clack" of solenoids. The reel motors receive a short electrical impulse when the stop button is pressed after threading the tape, taking up any slack. Spring-loaded tension arms on each side of the head assembly are similarly used to smooth the tape flow during normal operation, and a small precision roller inside the head nest acts as a "scrape-flutter" filter.

The heads themselves are of Tandberg's own design and manufacture, and are of ferrite, giving them exceptional resistance to wear. The playback head is fitted with a spring-loaded shield that swings into place when the tape gate closes; it provides additional protection against hum, but it does make it difficult to mark the tape for editing purposes. Inside the head assembly is an optical sensor that stops the deck in the event of a tape break or runout. A conventional four-digit counter registers the revolutions of the takeup reel.

The lower section of the TD 20A contains the controls and meters. Three large push-buttons turn the machine on and off, set the speed to high or low (there is no variable pitch control), and select the proper tensions for either large (10½-inch) or small reel sizes. Below these are separate left- and right-channel playback-level controls whose settings affect not only the outputs and headphone volume, but also the indications of the meters when the deck is in its playback mode.

Beneath the playback-level controls are four lever switches. A three-position PLAYBACK MODE switch connects the left channel to both outputs, the right channel to both outputs, or, in its STEREO position, each channel to its appropriate output. The MONITOR switch permits direct comparison be-

tween the signal fed to the tape and a playback of the same signal a split-second later. A SEL. SYNC. switch permits a previous recording made on the left channel only to be synchronized with a new recording made on the right channel by temporarily converting the left-channel record head to a playback function. And an EDIT/CUE switch activates the playback amplifier when the deck is stopped or in a fast-winding mode to facilitate finding a precise spot on the tape. One note of caution is in order: when using the CUE function during high-speed winding, turn down the playback level to prevent tweeter damage.

On the right side of the electronic section are five large pushbuttons, each with its own LED indicator, for RECORD, REWIND, STOP, WIND, and PLAY. All of these operate through integrated-circuit logic control, so no sequence of commands can snarl or break the tape. If the STOP and WIND buttons are depressed and then released simultaneously, the deck enters a FREE mode (also signaled by a LED indicator) in which the reel brakes are released, facilitating tape threading. If either or both of the two RECORD SELECTOR switches is shifted to ON, a STAND BY indicator is illuminated. In most tape decks, the record mode can be entered only by depressing the RECORD and PLAY buttons at the same time, but Tandberg has chosen to follow the professional practice of using record-selector switches in conjunction with a separate RECORD button. This allows the record mode to be entered directly while the tape is running, though for such "flying start" or "punch-in" applications it is also necessary to keep the PLAY button depressed.

Below these pushbuttons are four input-level controls plus a master input control. The INPUT 1 pair is dedicated to "line-level" sources (a preamplifier's tape-out jacks or another recorder, for example), while the INPUT 2 pair can be used to mix in either microphones, a second line-level component, or a "radio" output plugged into the European DIN-B socket on the rear panel. The master level control has an adjustable ring with a detent to allow return to a predetermined setting when fading in or fading out. A DIN-type jack for an accessory remote-control device and a microphone-sensitivity switch that inserts a 25-dB attenuator to prevent overload when using high-output microphones are also located on the right side of the front panel.

In the center section are jacks for headphones (nominal 8-ohm impedance, though we experienced no difficulty in using 600-ohm types) and a pair of microphone inputs that are rated to accept either balanced or unbalanced microphones of low to medium impedance (50 to 700 ohms). Above these jacks are the illuminated meters (indicating from −24 to +3 dB), which, in conformity with a long-standing Tandberg design philosophy, are not only peak reading (rather than VU) but are "equalized" as well. This means that during recording they register the effect of the necessary record high-frequency equalization, so they do not give the same reading for the same signal level at all frequencies. While this is an annoyance to a tester or equipment reviewer (record and playback levels cannot be made to agree on the meters, for example), it does assure the *user* that, no matter what the frequency content of the music, so long as the indicators do not exceed the 0-dB marking the person will get a virtually undistorted recording.

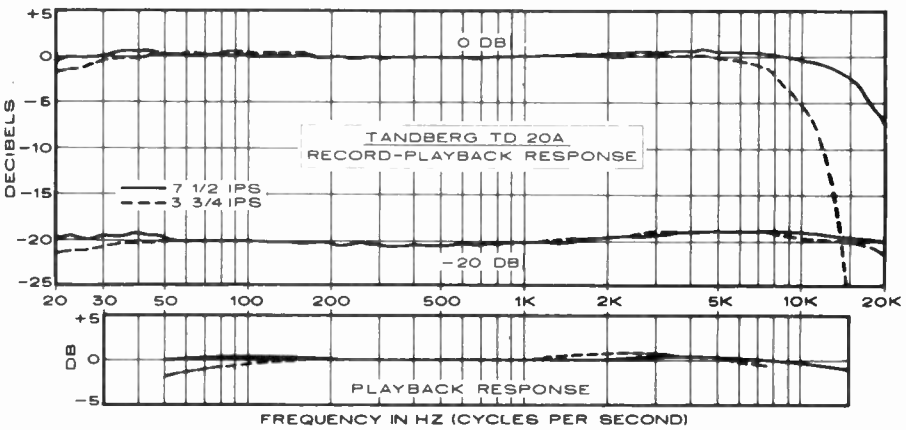
The rear panel of the TD 20A contains the necessary input and output jacks, which are inset into a cavity so that the deck can be operated in either a vertical or a horizontal position. The overall measurements of the TD 20A are 17¼ inches wide, 17¾ inches high, and 6 inches deep (not including the front-panel knobs); it weighs approximately 37½ pounds. Price: $1,500.

● ***Laboratory Measurements.*** The Tandberg TD 20A comes factory-set for use with Maxell UD-XL tape (which we used for our measurements), though it has screwdriver-accessible bias-adjustment holes on the front panel that permit optimization for nearly any conceivable tape type—including open-reel metal tapes, should these ever become available.

Playback equalization was checked using standard Ampex test tapes, which, within their frequency limits, showed near-perfect response as indicated in the graph. Overall frequency response, measured at the customary −20-dB level with the recommended Maxell UD-XL tape, was so flat at both 7½ and 3¾ ips that drawing the "curves" was essentially an exercise in futility. Response was not down by more than 3 dB at the low-frequency end until a frequency of 11 or 12 Hz was reached, and in the high-frequency region the −3-dB points extended to 21 kHz at 3¾ ips and to 33 kHz at the 7½-ips speed. At a 0-dB level the differences in high-frequency potential show up more clearly, yet even here the curves are perhaps slightly misleading: since the record-level meters are equalized, they deflected well off-scale at the higher frequencies when using the 3¾-ips speed, plainly warning the user to reduce the overall record level. Though making a straightforward frequency-response curve at this level overloaded the tape capacity, it did not overload the record amplifier, with its "Actilinear" circuit.

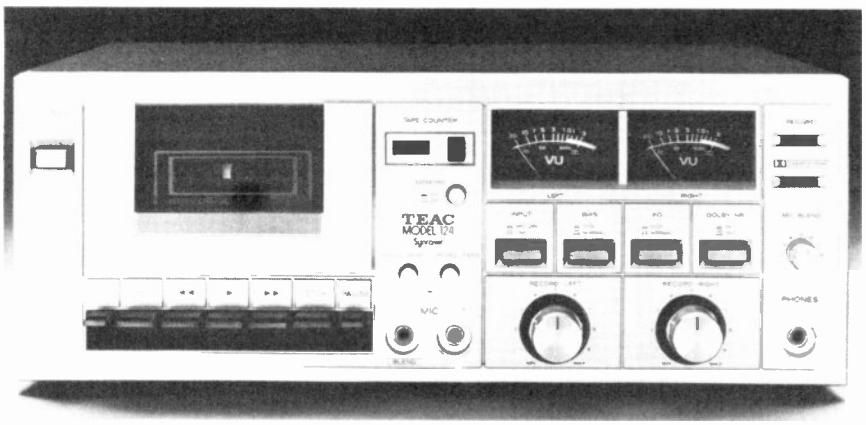
Because the TD 20A uses peak-reading rather than average-reading meters, it requires little or no headroom allowance to compensate for meter ballistics and unforeseen signal peaks. Distortion of a 1,000-Hz tone recorded at an indicated 0-dB level was less than 1 per cent at either speed, and the customary 3 per cent third-harmonic distortion level used for making signal-to-noise ratio (S/N) measurements was reached with an input level of +4 dB—1 dB above the meter scale. Unweighted S/N, referred to the output at this level, was 62 and 59.5 dB for the 7½- and 3¾-ips speeds, respectively. Applying the customary IEC A-weighting curve improved the figures to 69 and 66 dB. Wow and flutter was extremely low at 7½ ips, measuring between 0.015 and 0.018 per cent (wrms) and between 0.02 and 0.03 per cent on the stricter DIN-B peak-weighting standard. At 3¾ ips the figures increased to 0.055 and 0.1 per cent, respectively.

At the inputs, a signal level of 35 millivolts (mV) was required to produce a 0-dB indication when using the LINE 1 inputs, and the maximum output at this level was 1.2 volts. A signal level of 0.15 mV produced the same reading at the microphone input, and the overload point was reached at 24 mV. The 25-dB microphone attenuator raised these figures correspondingly. The fast-forward and rewind times for a 1,800-foot tape on a standard 7-inch reel were identical at 90 seconds.




● ***Comment.*** We would have preferred slightly larger meters and wish that when switching from "source" to "tape" during the record process the meters were switched as well (the meters read playback levels only in the play mode). And we wish that there were space in the head nest for a second (half-track) playback head so that tapes recorded in either format could be played. But these are only minor cavils.

Listening tests using a wide variety of material confirmed the excellent measurements we obtained. Even making copies of master tapes of live musical performances produced no audible loss of frequency response and added only the slightest amount of hiss, which is inherent in any dubbing process. In the several months we have used the TD 20A it has yet to snarl a tape, and it is so quiet in operation that we have several times inadvertently left it running without being aware of it. The Tandberg TD 20A is a superb audiophile deck, and, while not inexpensive, it is certainly well worth the price.



# TEAC Model 124 Stereo Cassette Deck

Teac's new Model 124 "Syncaset" is the first home cassette recorder capable of making "Simul-Sync" recordings. Available in open-reel recorders from Teac and other companies for some time, Simul-Sync has not been offered in the cassette format until now. This function makes it possible to record a program on one tape track and, while playing it back through headphones, record an accompaniment on the second track in exact synchronism with the first. The two tracks are then heard simultaneously in the normal stereo format during playback.

The 124 is a front-loading, two-head machine with the usual facilities for setting bias and equalization for different tape formulations and a Dolby noise-reduction system. Driven by a single servo-controlled dc motor, the tape transport is mechanically controlled by "piano-key" levers. The recording inputs can be switched to either line or microphone sources, but not both simultaneously. There is a separate MIC BLEND feature that can be used to mix the output of a single microphone equally between the two channels while a line source is being recorded.

All transport-control levers can be operated in any sequence without first pressing STOP, except when going into the record mode. The entire cassette can be seen through the window on the door.

Pressing in the SIMUL-SYNC button removes erase current from the left track of the erase head and connects the left channel of the combined record/playback head to the playback amplifier input. Illumination of the left meter is extinguished at the same time. (The deck has two large illuminated VU meters that are calibrated from −20 to +3 dB with the Dolby reference points at +3 dB.) When the deck is then put into the RECORD mode, recording occurs on only the right channel.

The line outputs of the deck can be monitored through the headphone jack or, preferably, through the headphone output of a separate amplifier, since the deck's own headphone output is at a fixed level. With SIMUL-SYNC engaged, the left-hand channel is heard in the left earcup, while the incoming signal being recorded on the tape's right channel is heard in the right earcup. Since the record and playback head gaps for the two tracks are precisely aligned, the two signals will be fully synced during playback. For some Simul-Sync recordings, a more pleasing playback effect occurs when the channels are partially blended. To allow this, a CROSS-FEED button operates on the recorder's playback outputs.

The MIC jacks are designed for use with microphones rated at 600 ohms or higher impedance. One MIC jack is also labelled BLEND. When recording from a line source, a microphone can be plugged into this jack and a small MIC BLEND control is used to inject an equal amount of its signal into both channels. This feature can also be used in playback, for superimposing voice announcements on a program. On the deck's rear apron are only the line input and output jacks and a DIN socket. The deck also features a built-in MEMORY feature that stops the tape when the counter reaches 000 in the rewind mode.

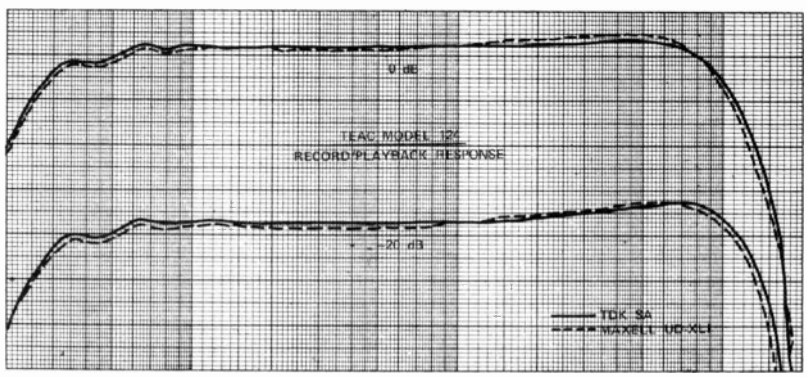
Overall size is $16^5/_{16}$ inches wide × $11^5/_8$ inches high × $6^1/_8$ inches deep (414 × 295 × 156 mm) and weight is 16.5 pounds (7.5 kg). Price: $449.

● ***Laboratory Measurements.*** Our test recorder had been factory adjusted for TDK SA (chrome) and Maxell UD-XL I (normal) tapes, which we used for our tests. A 0-dB recording indication on the meters required a line input of 60 mV and a microphone input of 0.21 mV. The microphone amplifier overloaded at 27 mV.

Playback output from a 0-dB recording was 360 mV with UD-XL I tape and 310 mV with SA tape. The reference 3% third-harmonic distortion level in the playback signal was obtained with a recording input of +6 dB with UD-XL I and +3 dB with SA tape. The unweighted S/N ratio referred to those levels was 45 and 41 dB, respectively, for the two tapes. With A-weighting these figures improved to 56.2 and 55 dB. With Dolby engaged and CCIR/ARM weighting, the S/N was about 62 dB with either tape. Through the microphone inputs at maximum gain, the noise increased by 12.5 dB. At a slightly reduced gain, the noise increase was only 3.7 dB.

The meters were calibrated correctly, relative to the standard Dolby level of 200 nW/m, and ballistic response was almost exactly that of a standard VU meter. The tape speed was very slightly fast—about 0.45% at the beginning and 0.3% at the end of a cassette. Flutter, measured with a TDK AC-342 test cassette, was ±0.09% weighted peak (CCIR) and 0.055% weighted rms (JIS). Combined record/playback readings were slightly higher at 0.13% and 0.08%, respectively. In the fast speeds, a C-60 cassette was moved from end to end in 82 seconds in fast forward and 79 seconds in rewind.

Record/playback frequency response was virtually identical with the two tapes at both −20-dB and 0-dB recording levels. At −20 dB, the high-frequency response rolled off a little earlier than in many cassette decks, but there was much less evidence of tape saturation at 0 dB than we are accustomed to seeing. Low-frequency head contour ripples were barely visible. Overall frequency response at −20 dB was ±2 dB from 31 to 11,500 Hz, relative to the 1000-Hz level. At 0 dB, the response was +0.5/−1.5 dB from 34 to 8000 Hz. We measured the 120-microsecond normal playback equalization with a TDK AC-337 tape and the 70-microsecond chrome equalization with a TEAC 116 SP tape. With normal tape, equalization was within +1/−1.5 dB from 40




Frequency responses at 0 and −20 dB for two different tape types.

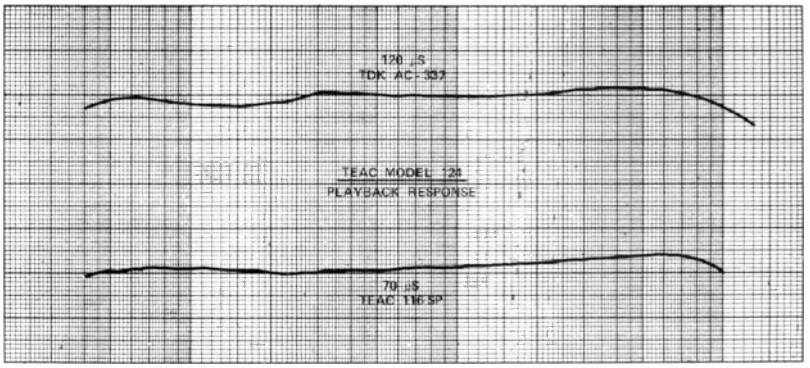
to 12,500 Hz, relative to the 315-Hz level, and with chrome tape, it was within +2/−0.7 dB from 40 to 10,000 Hz.

The Dolby tracking was consistent with the measured frequency response. When we measured the response at −20 and −40 dB, both with and without Dolby noise reduction, we noted how the Dolby system inherently exaggerates any departure from flatness in the recorder. Nevertheless, the differences were less than 1.5 dB and usually about 1 dB at all frequencies up to 11,000 Hz.

● *Comment.* The Model 124 will probably have its greatest appeal to people who have a need for its Simul-Sync capability. This feature is not limited to use in music recordings. Speech therapy, language instruction, and other educational activities often require that a student imitate or respond to a verbal instruction.

The numerical results of our laboratory measurements may seem lackluster compared to the frequency response and dynamic range data from other high-quality cassette decks. However, compensating for any lack of sheer bandwidth is the rather unusual high-frequency overload margin of the Model 124, which is substantially greater than we have found on any other two-head deck. Since one of the chief limitations of the cassette medium is its tendency to saturate the tape at high frequencies, thus dulling or compressing the sound, we put the Model 124 to the additional test of recording interstation FM-tuner hiss and comparing the playback to the original. The differences between the two, at a level of −10 dB, were very minor and much like those we have found in most good cassette machines. When we raised the level to 0 dB (something that one would not ordinarily consider doing with noise on a cassette recorder), playback was still barely distinguishable from the original. The perceived difference was no greater at 0 dB than at −20 dB. Normally, a 0-dB noise recording sounds intolerably dull on playback. S/N performance, also not quite the equal of some other cassette decks, nevertheless met Teac's specification and was adequate for the intended use.

In general, the Teac Model 124 proved itself to be a high-quality cassette deck. It is, clearly, oriented toward performing a particular, unique function. To the credit of the machine, this is accomplished while leaving normal home record/playback performance substantially intact. □




Normal playback equalization at 70 and 120 microseconds.

## DIRECTORY OF MANUFACTURERS

(Continued from p. 4)

**OTARI CORPORATION**
*981 Industrial Rd., San Carlos, CA 94070*

**PACE/ALTUS,** Div. of Pathcom, Inc.
*24049 S. Frampton Ave., Harbor City, CA 90710*

**PANASONIC,** Matsushita Electric Corp. of America
*One Panasonic Way, Secaucus, NJ 07094*

**PEARLCORDER by OLYMPUS CORPORATION OF AMERICA**
*4 Nevada Dr., New Hyde Park, NY 11042*

**J. C. PENNEY CO., INC.**
*1301 Ave. of the Americas, New York, NY 10019*

**PHASE LINEAR CORP.**
*20121 48th Ave. W., Lynwood, WA 98036*

**PHILCO,** GTE Products Corp.
*700 Ellicott St., Batavia, NY 14020*

**PHILIPS HIGH FIDELITY LABS, LTD.**
*P.O. Box 2208, Ft. Wayne, IN 46801*

**PICKERING AND COMPANY, INC.**
*101 Sunnyside Blvd., Plainview, NY 11803*

**PIONEER,** U.S. Pioneer Electronics Corp.
*85 Oxford Dr., Moonachie, NJ 07074*

**PIONEER ELECTRONICS OF AMERICA**
*1925 E. Dominguez St., Long Beach, CA 90810*

**PYRAMID INDUSTRIES**
*12970-7N Branford St., Arleta, CA 91331*

**QUASAR CO.,** Matsushita Electric Corp. of America
*9401 W. Grand Ave., Franklin Park, IL 60131*

**RCA AUTO SOUND,** RCA Distributor and Special Products Div.
*2000 Clements Bridge Rd., Deptford, NJ 08096*

**RCA** (Video Cassette Recorders)
*600 North Sherman Dr., Indianapolis, IN 46201*

**REALISTIC,** Div. of Tandy Corp.
*1400 One Tandy Center, Fort Worth, TX 76102*

**RECOTON CORPORATION**
*46-23 Crane St., Long Island City, NY 11101*

**REFERENCE,** CBS Retail Stores
*1313 53rd St., Emeryville, CA 94608*

**RKO TAPE CORP.**
*3 Fairfield Crescent, West Caldwell, NJ 07006*

**ROBINS INDUSTRIES CORP.,** Consumer Products Division
*75 Austin Blvd., Commack, NY 11725*

**ROLAND CORP. US**
*1285 Mark St., Bensenville, IL 60106*

**ROTEL OF AMERICA, INC.**
*1055 Saw Mill River Rd., Ardsley, NY 10502*

**RUSSOUND/FMP, INC.**
*P.O. Box 2369, Woburn, MA 01888*

**SAE,** Scientific Audio Electronics, Inc.
*701 E. Macy Street, Los Angeles, CA 90012*

**SANSUI ELECTRONICS CORP.**
*1250 Valley Brook Ave., Lyndhurst, NJ 07071*

**SANYO ELECTRIC INC.**
*1200 W. Artesia Blvd., Compton, CA 90220*

**SCOTCH,** 3M Company
*3M Center, St. Paul, MN 55101*
*600 3rd Ave., New York, NY 10016*

**H.H. SCOTT, INC.**
*20 Commerce Way, Woburn, MA 01801*

**SEARS ROEBUCK & COMPANY**
*Sears Tower, Chicago, IL 60684*

**SENNHEISER ELECTRONIC CORP.**
*10 West 37th St., New York, NY 10018*

**SHARP ELECTRONICS CORP.**
*10 Keystone Place, Paramus, NJ 07652*

**SHURE BROTHERS, INC.**
*222 Hartrey Ave., Evanston, IL 60204*

**SIGNET,** Div. of Audio Technica US, Inc.
*33 Shiawassee Ave., Fairlawn, OH 44313*

**SONTEC ELECTRONICS,** Sontecniques, Inc.
*10120 Marble Court, Cockeysville, MD 21030*

**SONY CORP. OF AMERICA**
*9 W. 57th St., New York, NY 10019*

**SOUND AIDS**
*395 Riverside Dr., New York, NY 10025*

**SOUND CONCEPTS INC.**
*P.O. Box 135, Brookline, MA 02146*

**SOUND WORKSHOP**
*1324 Motor Parkway, Hauppauge, NY 11787*

**SPARKOMATIC CORP.**
*Milford, PA 18337*

**SPECTRO ACOUSTICS, INC.**
*4500 150th Ave., NE Redmond, WA 98052*

**STANTON MAGNETICS, INC.**
*Terminal Dr., Plainview, NY 11803*

**STUDER/REVOX AMERICA, INC.**
*1425 Elm Hill Pike, Nashville, TN 37210*

**SUPEREX ELECTRONICS CORP.**
*151 Ludlow St., Yonkers, NY 10706*

**TANDBERG OF AMERICA INC.**
*Labriola Court, Armonk, NY 10504*

**TAPCO**
*3810 148th Ave. N.E., Redmond, WA 98052*

**TAPE-ATHON CORPORATION**
*502 South Isis Ave., Inglewood, CA 90301*

**TASCAM SERIES by TEAC,** Teac Corporation of America
*7733 Telegraph Rd., Montebello, CA 90640*

**TDK ELECTRONICS CORP.**
*755 Eastgate Blvd., Garden City, NY 11530*

**TEAC CORP. OF AMERICA**
*7733 Telegraph Rd., Montebello, CA 90640*

**TECHNICS by PANASONIC,** Div. of Matsushita Electric Corp. of America
*One Panasonic Way, Secaucus, NJ 07094*

**TELEX COMMUNICATIONS, INC.**
*9600 Aldrich Ave. So., Minneapolis, MN 55420*

**TOSHIBA AMERICA, INC.**
*82 Totowa Rd., Wayne, NJ 07470*

**TURNER,** Div. of Telex Corp.
*9600 Aldrich Ave. So., Minneapolis, MN 55420*

**UHER by WALTER ODEMER**
*1516 W. Magnolia Blvd., Burbank, CA 91506*

**URSA MAJOR, INC.**
*Box 18, Belmont, MA 02178*

**VECTOR RESEARCH, INC.**
*20600 Nordhoff St., Chatsworth, CA 91311*

**VISONIK OF AMERICA, INC.**
*701 Heinz Ave., Berkeley, CA 94710*

**WHITE INSTRUMENTS, INC.**
*P.O. Box 698, Austin, TX 78767*

**YAMAHA INTERNATIONAL CORP.**
*Box 6600, Buena Park, CA 90620*

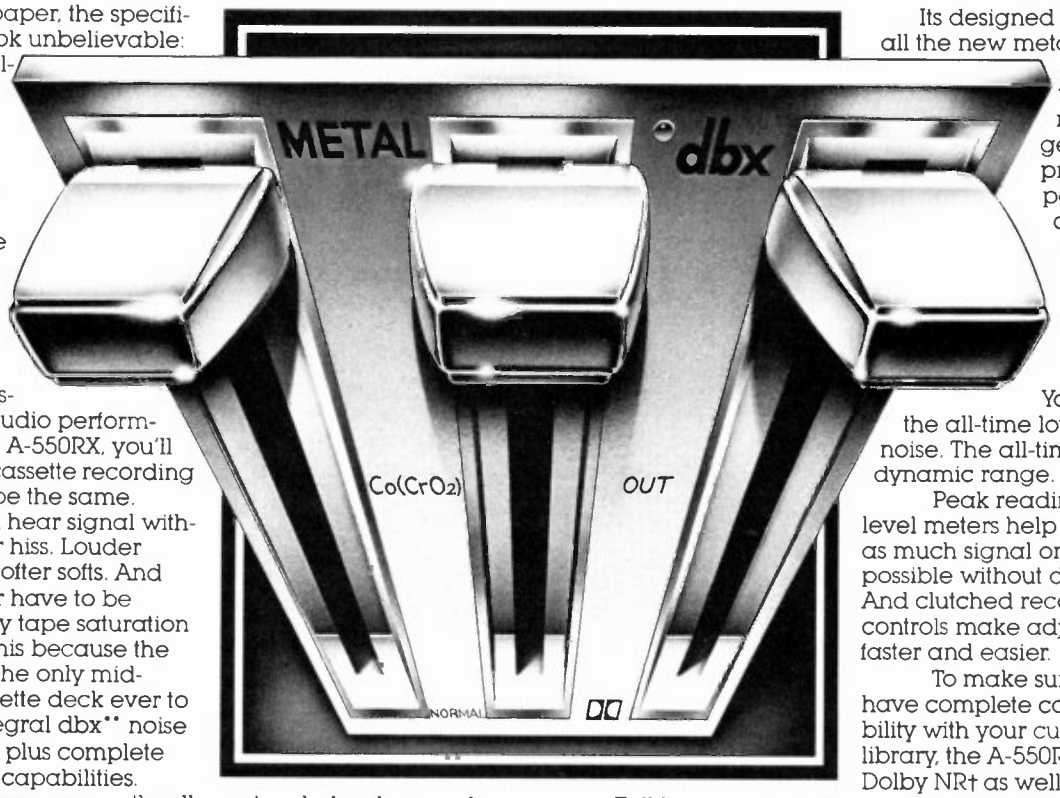
**ZAPCO,** Zeff Advanced Products Co.
*5018 Paradise Rd., Modesto, CA 95351*

**ZENITH RADIO CORPORATION**
*1000 Milwaukee Ave., Glenview, IL 60025*

# TEAC TODAY: THE ALL-TIME LOW IN TAPE NOISE.

On paper, the specifications* look unbelievable: 80dB signal-to-noise ratio, 95dB dynamic range and 15dB more headroom than you've ever had. The sound is so noise-free, it's scary. And once you listen to the audio performance of the A-550RX, you'll know that cassette recording will never be the same.

You'll hear signal without noise or hiss. Louder louds and softer softs. And you'll never have to be bothered by tape saturation again. All this because the A-550RX is the only mid-priced cassette deck ever to include integral dbx** noise elimination plus complete metal tape capabilities.




A few years ago, the dbx system helped us revolutionize professional recording. Now the same technology is helping us move cassette performance into a new era.

On the A-550RX, dbx II gives you broadband noise elimination and dramatically improved dynamic range. Signal articulation that's better defined than anything you've ever heard from a cassette tape.

And the A-550RX doesn't stop there.

Its designed to handle all the new metal tape formulations. Which means you get the unprecedented performance of dbx II with the additional improvements provided by metal tape. You'll hear the all-time low in tape noise. The all-time high in dynamic range.

Peak reading dB level meters help you get as much signal on tape as possible without distortion. And clutched record level controls make adjustments faster and easier.

To make sure you have complete compatibility with your current tape library, the A-550RX has Dolby NR† as well.

Full logic micro-switches control the high-stability transport. The A-550RX accepts our RC-90 remote control unit. And rack mounting hardware is available optionally.

So listen to something you've never heard before. The amazing A-550RX. You'll hear completely noise-free cassette recordings with the broadest dynamic range available.

**TEAC**

*Measurements made with metal particle tape
**dbx is a trademark of dbx, Inc
†Dolby is a trademark of Dolby Laboratories



CIRCLE NO. 20 ON READER SERVICE CARD

# 1 CASSETTE TAPE MACHINES

## AIWA

### AD-6900 Mk II U Cassette Deck

Front-loading wireless-remote-controlled metal-compatible stereo cassette deck with Dolby noise-

reduction system, 38-pulse FG servomotor in dual-capstan drive system, and three-head combination V-cut Ferrite Guard record/playback and erase heads. Features separate three-position bias and equalization for LH, FeCr, and metal tapes with automatic $CrO_2$ tape switching; ±20% bias fine adjust controls for LH, FeCr, and $CrO_2$ tapes and "Flat Response Tuning System;" two dual-scale peak/VU meters with peak hold, peak, and VU LED controls; separate mic and line recording level controls; output level slide control; tape/source monitor switch; feather-touch logic-controlled tape function controls on deck with LEDs and on hand-held remote control unit; three-digit tape counter with reset and memory stop/replay; external record/play/repeat timer provision; includes wireless infrared remote control unit. Wow and flutter 0.04% wrms; frequency response +2/−3 dB at 0 VU 25-9000 Hz ($CrO_2$), to 12,500 Hz (metal), at −20 VU, +2/−3 dB 25-14,000 Hz (LH), to 17,000 Hz ($CrO_2$), to 18,000 Hz (metal); S/N 68 dB with FeCr tape, Dolby on; input sensitivity/impedance 0.25 mV/200-10,000 ohms (mic), 75 mV/50,000 ohms (line); output level/impedance 0.41 V/50,000 ohms (line), 2 mW/8 ohms (headphone); 4¾" H × 17¾" W × 12¹⁵⁄₁₆" D ..... $890

### AD-R500U Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter, frequency-generator servo capstan and dc reel motors, and Sendust record/playback and double-gap ferrite erase heads. Features quick auto reverse (turnaround time 0.4 sec) for one-time record/playback of one side, single playback or record of both sides, and continuous uninterrupted playback with LED mode indicators; solenoid IC logic tape function controls; automatic LH/$CrO_2$ tape switching; separate metal tape button; backlit VU meters with three-step peak-reading LEDs; oil-damped cassette eject; optional remote control unit available. Controls for record level, balance, mic and headphone inputs, metal tape, Dolby, and reverse mode selector switches concealed behind front panel. Wow and flutter 0.05% wrms; frequency response +2/−3 dB, −20 VU recording 30-15,000 Hz (LH), to 16,000 Hz ($CrO_2$), to 17,000 Hz (metal); S/N 65 dB with Dolby, metal; input sensitivity/impedance 0.3 mV/200-10,000 ohms (mic), 50 mV/50k ohms (line), 0.1 mV/5.6k ohms (DIN); 4.75" H × 17.75" W × 10.75" D ..... $450

### SD-L50U Mini Cassette Deck

Front-loading metal-compatible mini stereo cassette deck with Dolby noise-reduction system, dc servo capstan and dc reel motors, and ultra hard permalloy record/playback and double-gap ferrite erase heads. Wow and flutter 0.04% wrms; frequency response +2/−3 dB, −20 VU 30-13,000 Hz (LH), to 15,000 Hz ($CrO_2$), to 16,000 Hz (metal); S/N 64 dB with Dolby, FeCr; input sensitivity/impedance 50 mV/50k ohms (line), 0.3 mV/200-10,000 ohms (mic); 4¼" H × 9⅞" W × 10⁷⁄₁₆" D ..... $350

### AD-L450U Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter, dc servo capstan and dc reel motors, and sendust/laminated permalloy DX record/playback and double-gap ferrite erase heads. Features bias and equalization slide selector for LH, $CrO_2$, and metal tapes; three-step peak-reading LED display; separate left/right record level controls; electronic auto stop; timer standby; rec/mute edit control; digital tape counter; soft damped eject; IC logic tape function controls; optional remote control unit available. Wow and flutter 0.04% wrms; frequency response +2/−3 dB, −20 VU 30-13,000 Hz (LH), to 15,000 Hz ($CrO_2$), to 16,000 Hz (metal); S/N 65 dB with Dolby, metal; input sensitivity/impedance 0.3 mV/200-10,000 ohms (mic), 50 mV/50k ohms (line), 0.1 mV/5.6k ohms (DIN); 4.75" H × 16.5625" W × 11.75" D ..... $290

### AD-L300U Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servomotor, ultra hard permalloy record/playback and double-gap ferrite erase heads. Features nine-program Quick Music Sensor (locates beginning of desired selection in fast forward or rewind) with red LED digital indicators displaying numerical selection; 12-segment LED bar graph display with three bands in green (−20 to −2 dB), orange (0 to +4 dB), and red (+6 to +10 dB); bias and equalization selector for LH, $CrO_2$, and metal tapes with bias fine adjust; separate left/right record input controls; digital tape counter; rec/mute; cue and review. Wow and flutter 0.06% wrms; frequency response +2/−3 dB, −20 VU 30-12,000 Hz (LH), to 14,000 Hz ($CrO_2$ and metal); S/N 62 dB with Dolby, FeCr; input sensitivity/impedance 0.3 mV/200-10,000 ohms (mic), 5 mV/50k ohms (line), 0.1 mV/2.7k ohms (DIN); 5¹⁵⁄₁₆" H × 16⁹⁄₁₆" W × 11½" D .. $240

### AD-M250U Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc servomotor, and ultra-hard permalloy head. Features separate bias and equalization for LH, FeCr, and $CrO_2$ tapes; LH fine bias adjust; dual VU meters with +3 and +7 dB peak-reading LEDs; record level control with line/mic input selector; output level control; full auto stop; cue and review; piano-key tape function controls. Wow and flutter 0.06% wrms; frequency response ±3 dB at −20 VU 30-12,500 Hz (LH), to 14,000 Hz ($CrO_2$ and FeCr); S/N 62 dB with FeCr tape, Dolby on; input sensitivity/impedance 0.3 mV/3000 ohms (mic), 75 mV/50,000 ohms (line); output level/impedance 0.41 V/50,000 ohms (line), 0.8 mW/8 ohms (phones); 5⅞" H × 16½" W × 10⅜" D. $260

**AD-M100U.** Similar to AD-M250U without peak-reading LEDs, LH bias fine adjust, and output level control; has auto $CrO_2$ tape selector and separate left/right record level controls with line/mic input selector; wow and flutter 0.07% wrms; S/N 60 dB with $CrO_2$ tape, Dolby on ..... $195

## AKAI

### GXC-570DII Cassette Deck

Vertical-style front-loading stereo cassette deck with dual-process Dolby noise-reduction system, separate crystal-ferrite and glass GX recording, playback, and erase heads, FG dc servo capstan motor and two dc reel motors, and closed-loop double-capstan drive system. Features Sensi-Touch logic circuit function controls with individually colored function indication lamps; detented left/right mic and line recording level controls; tape/source monitor switch; output level control; three-digit tape counter with continuous playback and memory rewind; pitch control for playback (±6%); four-position bias and equalization for low noise, low noise/high output, $CrO_2$, and FeCr tapes; phone level adjustment during playback/monitor; 400-Hz calibration tone switch; left/right recording calibration adjustment; multiplex filter; limiter switch; switchable VU/peak-reading meters with LEDs; Dolby LED; auto door opener; left/right mic and headphone jacks; remote control provision for optional RC-17 or RC-18 remote control unit; fast forward/rewind time 50 sec (C-60). Wow and flutter 0.06% wrms, 0.17% (DIN 45500); frequency response ±3 dB 35-15,000 Hz (LN), to 16,000 Hz (LH), to 17,000 Hz ($CrO_2$), to 19,000 Hz (FeCr); dist. at 1000 Hz, 0 VU 1.0% (LN and LH tapes), 1.5% ($CrO_2$ and FeCr); S/N without Dolby 51 dB (LN and LH), 52 dB ($CrO_2$ and FeCr); 10" H × 17.3" W × 8.9" D ..... $900

**RC-18.** Remote control for GXC-570DII ..... $58

**RC-70.** Full-function wireless remote control for GXC-570DII; operates with all Akai solenoid machines ..... $150

### GXC-750D Cassette Deck

Front-loading stereo cassette deck with dual-Dolby noise reduction system, GX record and playback heads plus erase head, and closed-loop double-capstan drive with three motors. Features ADR system; memory rewind; mic/line mixing; switchable peak level/VU meters; multiplex filter; bias and equalization for LN, LH, $CrO_2$, and FeCr tapes; remote control jack for optional RC-17, RC-18, or RC-70 remote control units; pause with lock; full-logic solenoid function controls. Wow and flutter 0.06% wrms; frequency response 35-18,000 Hz ±3 dB with FeCr tape; dist. 1.0% at LH position; S/N 56 dB weighted ($CrO_2$) without Dolby; 6.2" H × 17.3" W × 12.5" D ..... $725

### GX-F90 Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual-Dolby circuitry, GX record/playback and high-current erase heads, and direct-drive dc servomotor and dc motor for tape handling. Features IPLS (Instant Program Location System); two-color LED bar-graph peak/VU meters; three-digit tape counter with reset, auto repeat, and memory rewind; record/play timer start; mic/line mixing; tape/source monitor switch; output level control;

# 1 CASSETTE TAPE MACHINES

calibration tone oscillator; four-position tape selector with lighted tape selector indicator; illuminated feathertouch logic solenoid tape function controls. Wow and flutter 0.03% wrms; frequency response 25-21,000 Hz ±3 dB with metal tape; dist. 0.6% at 1000 Hz, 0 VU with metal tape; S/N 62 dB without Dolby, improved 10 dB above 5000 Hz using metal tape with Dolby; 4.1" H × 17.3" W × 14.6" D ..... $595

**GX-F80.** Similar to GX-F90 without IPLS and calibration tone oscillator; electronically-controlled dc servo capstan and dc tape handling motors; wow and flutter 0.035% wrms; 5.3" H × 17.3" W × 13.4" D ..... $495

### GXC-735D Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, crystal ferrite and glass GX recording/playback and two erase heads, and electronically-controlled dc capstan and dc reel motors. Features illuminated feather-touch logic function controls; three-position auto reverse (allows one-way record/playback, two-way record/playback, or continuous playback/two-way recording); three-digit tape counter with memory search and LED; dual VU meters with LED +3/+7 dB peak level indicators; line/mic mixing; output level control; four-position bias and equalization for low noise, low noise/high output, $CrO_2$, and FeCr tapes; rec mute; timer start; LED Dolby; damped tape eject; two mic jacks; headphone jack; fast forward/rewind time 60 sec (C-60). Wow and flutter 0.045% wrms; frequency response ±3 dB 35-14,000 Hz (LH and LN), to 15,000 Hz ($CrO_2$), to 16,000 Hz (FeCr); dist. 1.0% (LN and LH), 1.5% ($CrO_2$ and FeCr); S/N without Dolby 55 dB (LN and LH), 56 dB ($CrO_2$ and FeCr); input sensitivity/impedance 0.25 mV/5k ohms (mic), 70 mV/100k ohms (line), 0.25 mV/2.2k ohms (DIN); output 410 mV (line and DIN), 100 mV into 8 ohms (headphone); 5.9" H × 17.3" W × 11.4" D ..... $500

### GX-M50 Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual-Dolby circuitry and GX record/playback and high-current erase heads. Features IPLS (Instant Program Location System); mic/line mixing; tape/source monitoring; output level control; two-color fluorescent bar graph peak/VU meters; four-position illuminated tape selector for LN, LH, $CrO_2$, and metal tapes; bias fine adjust; master recording level control for fade-in/fade-out; FM copy; three-digit tape counter with reset and memory rewind; piano-key tape function controls. Wow and flutter 0.04% wrms; frequency response 25-21,000 Hz ±3 dB with metal tape; dist. 0.6% at 1000 Hz, 0 VU with metal tape; S/N 62 dB without Dolby, improved by 10 dB above 5000 Hz using metal tape with Dolby; 6.2" H × 17.3" W × 10.9" D ..... $375

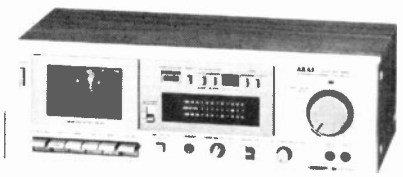
**GX-M30.** Similar to GX-M50 without tape/source monitor switch and master recording level control for fade-in/fade-out; frequency response 30-19,000 Hz ±3 dB with metal tape; S/N 61 dB without Dolby ..... $300

### CS-732D Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, permalloy record/playback and two erase heads, and electronically-controlled dc motor. Features three-position auto reverse (allows continuous repeat or two-way recording); tape direction switch; four-position bias and equalization for low noise, low noise/high output, $CrO_2$, and FeCr tapes; recording level control; one-touch mic/line input selector; output level control; three-digit tape counter with reset; damped tape eject; two VU meters; LED record, +7 dB peak level, and Dolby indicators; piano-key function controls; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response ±3 dB 35-13,000 Hz (LN and LH), to 14,000 Hz ($CrO_2$), to 15,000 Hz (FeCr); dist. 1.3% (LN and LH), 1.5% ($CrO_2$ and FeCr); S/N without Dolby 54 dB (LN and LH), 56 dB ($CrO_2$ and FeCr); input sensitivity/impedance 0.25 mV/5k ohms (mic), 70 mV/100k ohms (line), 2.0 mV/10k ohms (DIN); output level 410 mV (line and DIN), 100 mV into 8 ohms (headphone); 6.3" H × 17.3" W × 11.4" D ..... $350

### GX-M10 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and super



GX record/play and high-current erase heads. Features instant program search system (IPSS) with nine LED program selection digital readout; tape selector for LN, LH, $CrO_2$, and metal tapes; dual fluorescent bar graph peak/VU meter display; timer record/playback capability with external timer; rec mute; auto stop; three-digit tape counter with memory rewind; recording level and output level controls. Wow and flutter 0.04% wrms; frequency response 30-19,000 Hz ±3 dB with metal; dist. 0.6% at 1000 Hz, 0 VU; S/N 71 dB (Dolby on, metal); brushed aluminum front panel and woodgrain vinyl cabinet; 5.6" H × 17.3" W × 9.8" D ..... $300

### CS-M02 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and Sendust record/playback and dual-gap high-current erase heads. Features tape selector for normal, $CrO_2$, and metal tapes; two-level fluorescent bar graph VU/peak-reading display; timer record/playback capability with external timer; rec mute; auto play; record and output level controls; three-digit counter with reset. Wow and flutter 0.045% wrms; frequency response 30-18,000 Hz ±3 dB with metal; dist. 0.7% at 1000 Hz, 0 VU; S/N with Dolby 70 dB (metal); brushed aluminum front panel and gray vinyl cabinet; 5.6" H × 17.3" W × 9.8" D. ..... $230

**CS-M01.** Similar to CS-M02 less metal compatibility, rec mute, and output level control; has vertical VU meters instead of display and normal/FeCr/$CrO_2$ tape selector; wow and flutter 0.05% wrms; frequency response 30-17,000 Hz ±3 dB with FeCr; S/N with Dolby 67 dB (FeCr) ..... $180

## BANG & OLUFSEN

### Beocord 8000 Cassette Recorder

Dual-microcomputer-controlled metal-compatible top-loading cassette recorder with Dolby noise-re-

duction system and single Sendust combination head containing Sendust alloy poles and bedding. Features electronic time measurement of tape travel in all operating modes, shown on illuminated digital display—precise measurement accomplished by microcomputer calibration of inserted cassette tape based on varying tape lengths, types, and thicknesses of magnetic coating (calibration data erased upon ejection); electronically-controlled automatic search locates any time-indexed selection through pushbutton operation—user can also instruct recorder to hold tape until otherwise specified and when to turn record or playback function on or off; automatic memory returns tape to beginning of last recorded segment; automatic four-second pause effected from stop button; electronically-controlled dual eight-LED peak program meters monitoring signal strength; built-in electronic timer shows correct time when TIME SET is pressed; automatic demagnetization of tape head; fast forward/rewind time 70 sec (C-60). Wow and flutter ±0.1%; frequency response 30-16,000 Hz ±2.5 dB (chrome); S/N with Dolby 68 dB (metal), 65 dB (chrome), 63 dB (ferro); input sensitivity/impedance 1 mV/10k ohms (radio), 120 mV/1.2M ohms (aux.), 0.1 mV/2.2k ohms (mic); output level/impedance 800 mV/2k ohms (receiver), 9 V/56 ohms (headphones); 5 1/8" H × 20 7/8" W × 11 7/8" D.. ..... $995

### Beocord 1900 Cassette Recorder

Top-loading cassette recorder with Dolby noise-reduction system and single Sendust combination head. Features memory, Dolby, and bias touch controls; sliding input-signal level control; two illuminated peak-reading VU meters; mic input; channel balance control; above-surface-mount tape function keys; three-digit counter with memory; fast forward/rewind time 90 sec. Wow and flutter ±0.15% (DIN); frequency response 30-15,000 Hz (chrome, DIN); S/N 64 dB with Dolby (chrome); input sensitivity/impedance 2 mV/22k ohms (DIN), 0.175 mV/2.2k ohms (mic); output level/sensitivity 700 mV/22k ohms (DIN); 3 1/8" H × 15 3/4" W × 9 7/8" D. $550

## BENJAMIN ELECTROPRODUCTS

### RAC 10 Auto Cassette Changer

Automatic cassette changer plays up to 10 cassettes in succession without interruption; output impedance 25 ohms; output 350 mV; changeover time 10 sec; has track 1, track 2, auto, and single play indicator lights; 495 mm × 252 mm × 210 mm ..... $795

## B·I·C

### T-4M Cassette Deck

Front-loading microprocessor-controlled metal-compatible two-speed (1 7/8 and 3 3/4 ips) three-head

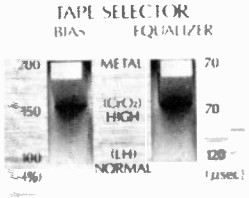
stereo cassette deck with four Dolby circuits for encode/decode and FM copy, tachometer feedback dc servo capstan and dc spooling motors in dual-capstan transport, and wide-gap record, narrow-gap playback, and erase heads. Features LED peak-reading (−36 to +9 dB) bar graph display; three-digit electronic tape counter readout with microprocessor-controlled counter reset, memory inhibit, memory 1, memory 2, auto rewind, and auto play buttons; solenoid tape function controls with pause, record, and play LEDs; separate mic and line record and headphone and output level controls; tape/source monitor; bias calibration; separate three-position bias and equalization for hi, normal, and metal tapes; adjustable Dolby calibration; multiplex filter; pitch control (±5%); record safety/mute switch; fast forward/rewind time 50 sec (C-60). Wow and flutter 0.05% wrms (1 7/8 ips) and 0.035% wrms (3 3/4 ips); frequency response 20-21,000 Hz (1 7/8 ips), to 23,000 Hz (3 3/4 ips); THD 1.3% at 1 7/8 ips, 1.0% at 3 3/4 ips; S/N with Dolby at 1 7/8 ips 65 dB (70 μsec tape), at 3 3/4 ips with Dolby 68 dB (70-μsec tape), all "A" weighted, ref. 3.0% THD; erasure 75 dB; input impedance 50k ohms (line),

# There are many reasons for owning the new Sansui SC-3300.

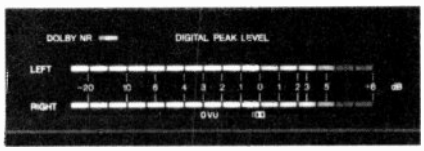

# Metal is just one.

Metal particle tape could be the most exciting thing that's happened to tape recording in years. But to get the full benefits of metal, you need a special cassette deck — like the new Sansui metal-compatible SC-3300.

The great thing about the SC-3300, though, is that even if you're not sure about metal or are wary of the software expense, this deck still makes a great deal of sense. Here's why:




SOUND QUALITY IS SUPERB. The SC-3300 is designed to get the most out of any tape, including the newest pure metal formulations. We're using a special alloy record/play head that's particularly immune to saturation from the high bias currents needed for metal recording; and it's much more wear-resistant than even the strongest conventional heads.




The erase head, too, is special — a double-gap ferrite design that produces a 70dB erasure factor for beautiful low-noise recordings. Our new Roller Back holdback tension mechanism further improves sound quality by suppressing frequency-modulated distortion and reducing wow and flutter to a mere 0.04%.

OPERATION IS EFFORTLESS. The feather-touch controls of the SC-3300 are monitored by an LSIC logic chip tied to high precision solenoids. So you get the freedom you need to concentrate on the music you're making or taping. It's so foolproof that no matter how fast you push the buttons, the tape will never jam or stretch.

The unusually versatile tape selector system provides separate switches for bias and equalization, with numerical indications of the optimum levels for normal, chrome and metal tapes.

And our 16-segment/channel LED peak-level indicators make it easy to set just the right levels for maximum signal and minimum noise. They're calibrated in dB and indicate red if a signal is too strong.

ALL THE EXTRAS, TOO. For added convenience, you can connect the SC-3300 to a timer, and the logic circuits will start recording or playing any time you want. Sansui's exclusive Tape Lead-In feature automatically skips over the unusable leader and beginning portion of each tape. And of course there's Dolby™ noise reduction, memory rewind, variable output and a computer-assisted pause control.

The brushed aluminum face and simulated rosewood cabinet of the SC-3300 perfectly complement our new Double-Digital receivers. We also have a complete line of matte-black finish metal-compatible models that come equipped with rack-mounting handles.

So, whether you're a strong believer in metal or just looking for a new cassette deck, visit your authorized Sansui dealer to see the best.

Dolby™ is a registered trademark of Dolby Labs Inc.

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

Sansui

CIRCLE NO. 15 ON READER SERVICE CARD

# 1 CASSETTE TAPE MACHINES

600 ohms (mic); output level/impedance 2 V rms/3k ohms (line), 0.7 V rms/150 ohms (headphones); 6⁷/₁₆" H × 17⁵/₁₆" W × 10¹/₈" D..... $750

### T-3M Cassette Deck

Front-loading metal-compatible two-speed (1⅞ and 3¾ ips) stereo cassette deck with four Dolby circuits for encode/decode and Dolby FM, tachometer feedback dc servomotor in dual-capstan transport, and separate wide-gap record, narrow-gap playback, and erase heads. Features −36 to +9 dB LED peak-reading bar graph display with chameleon LED record/THD overload indicators; three-digit tape counter with memory and reset; bias and equalization selectors for high, normal, and metal tapes; multiplex filter; record ready with LED; tape/source, record calibration, and mic/line buttons; separate output and headphone level controls; piano-key tape function controls; fast forward/rewind time 50 sec (C-60). Wow and flutter 0.05% wrms (1⅞ ips), 0.035% wrms (3¾ ips); frequency response ±3 dB with 70-μsec tape 20-21,000 Hz (1⅞ ips), to 23,000 Hz (3¾ ips); THD at 0 VU with 70-μsec tape 1.3% (1⅞ ips) and 1.0% (3¾ ips); S/N ("A" weighted, 3.0% THD, 70-μsec tape) with Dolby 65 dB (1⅞ ips), 68 dB (3¾ ips); line input 200 mV; mic input impedance 8-600 ohms; output level/impedance 2.0 V rms/10k ohms (line), 0.7 V rms/100 ohms (headphones); 6⁷/₁₆" H × 17¹⁵/₁₆" W × 10¹/₈" D ..... $500

**T-2M.** Similar to T-3M except has single Dolby noise-reduction circuitry, single-capstan transport, and two heads; no tape/source monitor and record calibration buttons; wow and flutter 0.06% wrms (1⅞ ips) and 0.04% wrms (3¾ ips); frequency response 20-19,000 Hz (1⅞ ips), to 21,000 Hz (3¾ ips); THD 1.5% (1⅞ ips), 1.2% (3¾ ips); S/N with Dolby 62 dB (1⅞ ips), 66 dB (3¾ ips); 6" H × 16¾" W × 9¼" D..... $350

### T-05M Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, defeatable multiplex filter, broadband circuitry, and metal-compatible record/playback head. Features fluorescent peak-reading bar graph display; bias and equalization switches for normal, hi, and metal tapes; three-digit tape counter with reset; separate left and right record level controls; piano-key tape function controls. Frequency response 20-18,000 Hz ±3 dB (70 μsec tape)..... $210

## CALIBRE

### 440 Cassette Deck

Front-loading stereo cassette deck with dual-Dolby circuitry. Features left/right digital LED bar-graph VU display from −20 to +8 dB; separate bias and equalization switches for FeCr, normal, and special tapes; three-digit tape counter with reset and memory; left/right balance control; record master level control; mic/line source input selectors; piano-key tape function controls; LED azimuth adjust. Wow and flutter 0.06% wrms; frequency response 30-15,500 Hz ±3 dB (FeCr); S/N 61.5 dB with Dolby; 4.8" H × 18.16" W × 12.6" D..... $295

## CONCEPT

### ELC Cassette Deck

Front-loading stereo cassette deck with dual Dolby circuitry, dc electronic servo capstan and dc hi-torque hub motors, and sintered Alloy Linear Phase record/playback and ferrite erase heads. Features electronic logic solenoid-assisted tape function controls with LEDs; memory stop, auto play, auto repeat, and timer record and play with optional external timer controls; bias and equalization for Fe, FeCr, and special tapes; separate mic and line input level controls; output level control; two dB-calibrated recording level meters with LED peak-reading indicator; three-digit tape counter with reset; fast-forward/rewind time 75 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 30-16,000 Hz ($CrO_2$, FeCr, and special), to 14,500 Hz (Fe and normal); THD 1.0% at +3 dB, 0.3% typically; S/N 62 dB with Dolby; input sensitivity/impedance 60 mV/47k ohms (line), 0.27 mV/600 ohms (mic); output level/impedance 1.0 V at +3 dB/47 ohms (line), 100 mV/8 ohms (headphone); 5¹/₂" H × 19¹/₈" W × 11³/₈" D..... $525

## DENON

### DR-250 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc servo capstan and dc reel motors, and Sendust record/playback and double-gap ferrite erase heads. Features continuously variable bias adjust; three-position tape selector for LH, Fe-Cr, and cobalt tapes; muted recording/pause button; timer recording/playback provision; automatic repeat; auto rewind and memory stop; logic-controlled tape function buttons with LEDs; three-digit tape counter with reset; two VU meters with vertical three-color five-LED peak level indication array; fast-forward/rewind time 70 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 35-15,000 Hz (cobalt), to 14,000 Hz (LH); S/N 62 dB at 3.0% THD, Dolby on (cobalt); channel separation 35 dB at 1000 Hz; crosstalk −65 dB at 1000 Hz; input level/impedance −68 dB/10k ohms (mic), −21 dB/50k ohms (line); 8-ohm headphone load impedance at 0.7 mW; 147 mm H × 434 mm W × 267 mm D..... $430

### DR-230 Cassette Deck

Front-loading metal-compatible stereo cassette deck with IC Dolby noise-reduction system, dc servo

capstan and dc reel motors, and Sendust-laminated record/playback and double-gap ferrite erase heads. Features tape selector for LH, FeCr, $CrO_2$, and metal tapes with bias fine adjust; dual-color LED peak-reading bar graph display (−25 to +6 dB); IC logic tape function controls with LEDs and direct mode change; rec mute; input level control; one-touch eject; timer record/play with external timer; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.04% wrms (JIS); frequency response 30-16,500 Hz (metal), to 16,000 Hz ($CrO_2$ and FeCr), to 15,000 Hz (LH); S/N 64 dB with Dolby; input sensitivity/impedance 0.4 mV/50k ohms unbalanced (mic), 70 mV/50k ohms unbalanced (line); 112 mm H × 434 mm W × 300 mm D ..... $375

## DUAL

### C839 RC Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, two-motor

dual-capstan twin-belt closed-loop drive system, and Sendust record/playback head and erase head in direct load and lock system with automatic head protection. Features computerized logic solenoid tape function controls; electronic fade/edit; auto reverse; 8% variable pitch control; equalized LED peak-level bar-graph indicators; switchable limiter; switchable multiplex filter; timer provision for optional external timer; memory stop and play; separate line/DIN and mic input selectors; line/mic mixing; headphone level control; six-position bias and equalization selector for Fe, Fe I, Cr, Cr II, FeCr, and metal tapes; auto tape-slack prewind; provision for optional remote control; fast forward/rewind time 65 sec (C-60). Wow and flutter 0.03% wrms; frequency response ±3 dB 20-18,000 Hz (Fe), to 19,000 Hz ($CrO_2$ and FeCr), to 20,000 Hz (metal); HD 0.4%; S/N with Dolby 67 dB (Fe and $CrO_2$), 69 dB (FeCr), 70 dB (metal); 5³/₄" H × 17³/₁₆" W × 13³/₈" D ..... $850

**RC152/RE120.** Wireless remote transmitter/receiver control for C839 RC; has playback speed, fast wind/rewind, pause, and master off controls .... $80/$40

**C830.** Similar to C839 without computerized logic solenoid tape function controls, auto reverse, playback, and record, auto tape-slack prewind, and timer and remote control provision with optional timer and remote control unit; has PLL dc servomotor with i-f generator, true monitor capability, twin-belt drive system, and logic-controlled intermode switching; wow and flutter 0.035% wrms; frequency response ±3 dB 20-17,000 Hz with Fe tape and to 18,000 Hz with $CrO_2$..... $500

### C820 Cassette Deck

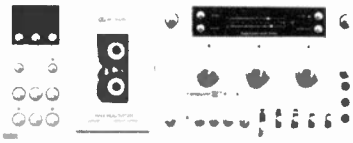
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, high-torque dc servomotor with i-f generator, twin-belt drive system, direct load and lock system, and Sendust record/playback head. Features equalized LED peak-level indicators; two-way memory stop; switchable multiplex filter; switchable limiter; logic-controlled intermode switching; six-position bias and equalization; separate line and mic input level controls; auto shutoff; fast forward/rewind time 65 sec (C-60). Wow and flutter 0.04% wrms; frequency response 20-16,000 Hz (Fe), to 17,000 Hz ($CrO_2$), to 18,000 Hz (FeCr), to 19,000 Hz (metal); HD 0.5%; S/N with Dolby 64 dB (Fe and $CrO_2$), 67 dB (FeCr and metal); 5³/₄" H × 17³/₁₆" W × 13³/₈" D .... $420

**C812.** Similar to C820 without two-way memory stop and switchable limiter; has four-way bias/equalization, equalized peak-reading meters, and M+X-Ferrite record/playback head; frequency response ±3 dB 20-16,500 Hz ($CrO_2$) and to 18,000 Hz (metal); S/N with Dolby 63 dB (Fe and $CrO_2$), 66 dB (FeCr and metal)..... $300

## EUMIG USA

### FL-1000 Cassette Deck

Front-loading microprocessor-controlled metal-compatible stereo cassette deck with Dolby noise-

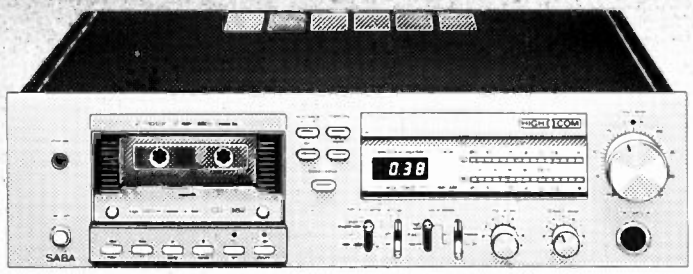


reduction system, three separate heads, and opto-electronic servo capstan motor. Unit can interface with any 8-bit home computer system, and up to 16 units can be interconnected through one computer and individually controlled simultaneously or sequentially to play or record any section of any tape. Features logic-controlled solenoid tape function controls; 14-segment/channel fluorescent level display with switchable VU, peak-reading, and peak-hold functions; separate 400- and 16,000-Hz oscillators; bias controls for metal, high bias, and normal bias tapes; master fader for mic/line and line/line mixing; variable output control; LED digital counter display with microprocessor-controlled indexing; speed accuracy 15,000 times/sec. Wow and flutter 0.035% wrms; frequency response 20-20,000 Hz ±3 dB (metal and $CrO_2$), 30-18,000 Hz ±3 dB

# SABA...Quality through tradition

INTRODUCES

## The only complete HIGH COM cassette tape deck for America.



| | without HIGH COM | with HIGH COM | with DOLBY-B |
|---|---|---|---|
| unweighted signal to noise ratio | 49 dB | 65 dB | 51 dB |
| weighted background noise (A-weighted) | 58 dB | 74 dB | 65 dB |
| signal to noise ratio (CCIR 468) | 50 dB | 66 dB | 58 dB |

Reproduction and playback are effective over the complete frequency range. Noise suppression (power ratio) is spec'd at *approximately 20 dB.* (That's to say, the noise power is reduced to 1% of the original value.) Here's the advantage: Noise suppression is 13 times more effective than Dolby.

**ULTRA HI-FIDELITY DIST.** 1001 E. TOUHY AVE., SUITE 112, DES PLAINES, IL 60018 312/827-9818

CIRCLE NO. 21 ON READER SERVICE CARD

---

**Revised and updated!**

Stereo Review's **SRT14-A**

# STEREO TEST RECORD

THE EDITORS AND TECHNICAL STAFF OF STEREO REVIEW PRESENT THE MOST COMPREHENSIVE, ACCURATE AND EASY-TO-USE TEST RECORD EVER DEVELOPED. SRT14-A HAS BEEN REVISED AND UPDATED FROM THE ORIGINAL SRT14 VERSION USING MORE SOPHISTICATED TEST SIGNALS TO MAKE THE JOB OF SETTING UP AND EVALUATING YOUR SYSTEM EVEN EASIER.


**This latest version contains everything you need to get the fullest, most realistic reproduction from your stereo equipment. Whether you've spent thousands on your stereo system or have a more modest setup, the SRT14-A is an indispensable tool for helping you realize the full potential of your equipment. Best of all, you don't have to be an electronics engineer to use it. You can actually perform a complete stereo system checkup by ear alone.**

**A test lab in a record jacket**

Employing the most advanced recording, mastering, and pressing techniques, the Stereo Review SRT14-A is produced to strict laboratory standards. Engraved in its grooves are a series of precisely recorded test tones, frequency sweeps, and pink noise signals that enable you to accurately analyze and check your stereo system for:

- Frequency response.
- Stereo separation.
- Cartridge tracking ability.
- Channel balance.
- Hum and noise, including turntable rumble.
- Wow and flutter.
- Optimum speaker placement.
- Cartridge Tracking Force & Anti-skating.
- Musical Instrument Tuning Standards, and more . . . much more.

**Step-by-step instructions**

Included with SRT14-A is a detailed instruction manual, complete with charts, tables, and diagrams. This takes you step by step through the testing process. It explains the significance of each test. It tells you what to listen for. It clearly describes any aberrations in system response. And it details corrective procedures.

**For professionals too**

The usefulness of the SRT14-A is not confined to the nontechnical listener. Included on the record are a series of tests that call for the use of sophisticated measuring instruments, such as oscilloscopes, chart recorders, and distortion analyzers. These tests permit the advanced audiophile and professional to make precise measurements of transient response, recorded signal velocity, anti-skating compensation, IM distortion, and a host of other performance characteristics.

**SRT14-A record contents**

- CARTRIDGE TRACKING, HIGH FREQUENCY
- FREQUENCY RESPONSE, 20 kHz to 25 Hz
- SEPARATION, LEFT-TO-RIGHT
- SEPARATION, RIGHT-TO-LEFT
- CARTRIDGE TRACKING, LOW FREQUENCY
- CHANNEL BALANCE
- CARTRIDGE AND SPEAKER PHASING
- LOW-FREQUENCY NOISE
- TURNTABLE FLUTTER
- FREQUENCY-RESPONSE SWEEP, 500 TO 20,000 Hz, LEFT CHANNEL
- FREQUENCY-RESPONSE SWEEP, 500 Hz TO 20,000 Hz, RIGHT CHANNEL
- TONE BURST
- INTERMODULATION DISTORTION
- ANTI-SKATING ADJUSTMENT
- 1000-Hz REFERENCE TONES
- FLUTTER AND SPEED ACCURACY
- STEREO SPREAD
- STANDARD "A"
- CHROMATIC OCTAVE
- GUITAR TUNING TONES

**The final step**

Start getting the most out of your stereo system. Make the SRT14-A your next record purchase. Just complete the coupon and mail it along with your remittance . . . today!

---

Test Record, Dept. 30013, P.O. Box 278, Pratt Station, Brooklyn, NY 11205

Please send _____ SRT14-A Stereo Test Records @ $8.95 each ($10.95 outside U.S.A.).

☐ Enclosed is $_____.

☐ CHARGE: ☐ VISA ☐ Master Charge – Interbank # _____

☐ American Express ☐ Diners Club

Account # _____ Exp. Date _____

Signature _____

Print Name _____

Address _____

City _____ State _____ Zip _____

*Residents of CA, CO, DC, FL, IL, MI, MO, NY STATE and VT add applicable sales tax.

# 1 CASSETTE TAPE MACHINES

(ferric); S/N 72 dB (metal), 68 dB ($CrO_2$), and 66 dB (ferric); rack-mountable ..... $1550

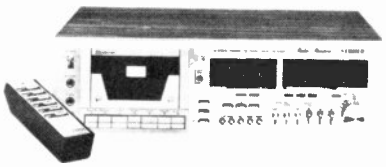
### CCD Metropolitan Cassette Deck

Top-loading stereo cassette deck with Dolby noise-reduction system, opto-electronic servo-controlled capstan motor, dc-controlled mixing circuits, and three heads. Features C/MOS logic tape function controls with LEDs; LED display record-level indicators; built-in tone generator; three-digit tape counter with reset and memory rewind; full-function remote control; automatic or manual record level setting; separate headphone volume control. Wow and flutter 0.05% wrms; frequency response 20-20,000 Hz ±3 dB (FeCr and $CrO_2$), 30-16,000 Hz (ferric); S/N with Dolby 72 dB (FeCr), 68 dB ($CrO_2$), and 66 dB (ferric); 5.4" H × 17.1" W × 11.8" D ..... $1300

## FISHER

### CR5150 Cassette Deck

Front-loading solenoid-operated cassette deck with dual Dolby noise-reduction system, dc servo and dc



governor motors with capstan drive, and three ferrite heads. Features full-function wireless remote control, electronic digital tape counter display with built-in timer, two illuminated VU meters, tape selector switch for normal, $CrO_2$, and FeCr tapes, and defeatable FM subcarrier filter. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-15,000 Hz (normal), 30-18,000 Hz ($CrO_2$); THD 1.4%; S/N 55 dB (Dolby off), 64 dB (Dolby on); channel separation 40 dB; signal crosstalk −70 dB; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mike), 100 mV/100,000 ohms (aux., FM Dolby); output 1 V/5000 ohms at 0 VU (line); walnut-grain vinyl veneer finish; 5⅛" H × 17⅓" W × 11⅞" D ..... $700

**CR5125.** Similar to CR5150 without electronic digital tape counter/timer display; has dual capstan drive and wireless remote control editing; black finish; 4¾" H × 17⅓" W × 12¼" D ..... $500

### CR4029 Cassette Deck

Front-loading two-speed (1⅞ and 3¾ ips) metal-compatible cassette deck with dual Dolby noise-reduction system, dc servo motor, capstan drive, and three VHT/Sendust heads. Features four position bias and equalization selectors for metal particle, normal, FeCr, and $CrO_2$ tapes with bias fine adjust; tape/source monitor switch; two illuminated VU meters; LED tape, source, Dolby, and record indicators; piano-key function buttons; and mic/line input selector. Wow and flutter 0.06% wrms (1⅞ ips), 0.05% wrms (3¾ ips); frequency response ±3 dB at 1⅞: 30-14,000 Hz (normal), to 16,000 Hz ($CrO_2$ and FeCr), to 18,000 Hz (metal), ±3 dB at 3¾: 30-20,000 Hz (normal), 30-22,000 Hz ($CrO_2$ and FeCr), 30-25,000 Hz (metal); THD 1.5% at 0 VU (1⅞), 1.2% at 0 VU (3¾); S/N 52 dB (Dolby off), 62 dB (Dolby on); channel separation 45 dB; signal crosstalk −70 dB; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mike), 100 mV/100,000 ohms (line); output 1 V/5000 ohms (line); walnut-grain vinyl veneer finish; 4¾" H × 17⅓" W × 12¼" D ..... $500

### CR4031 Cassette Deck

Front-loading two-speed metal-compatible cassette deck with Dolby noise-reduction system, dc governor motor, capstan drive, and two Sendust/ferrite heads. Features Auto Search Function (automatically locates the next gap in tape selection) with search cue button, two illuminated VU meters, metal and standard tape bias and equalization, tape selector switch for normal, $CrO_2$, FeCr, and metal tapes, and piano-key function buttons. Wow and flutter 0.07% wrms (1⅞), 0.06% wrms (3¾); frequency response ±3 dB at 1⅞: 30-14,000 Hz (normal), to 15,000 Hz ($CrO_2$ and FeCr), to 16,000 Hz (metal), at 3¾: 30-20,000 Hz (normal), to 22,000 Hz ($CrO_2$ and FeCr), to 23,000 Hz (metal); THD 1.8% (1⅞), 1.6% (3¾); S/N 52 dB (Dolby off), 62 dB (Dolby on); channel separation 42 dB; signal crosstalk −70 dB; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mike), 100 mV/100,000 ohms (line); output 1 V/5000 ohms (line); walnut-grain vinyl veneer finish; mounting hardware included; 4¾" H × 17⅓" W × 12¼" D..... $350

**CR4028.** Same as CR4031 without mounting hardware..... $350

**CR4027.** Similar to CR4031 without metal tape capability; has two super permalloy/ferrite heads; wow and flutter 0.08% wrms (1⅞), 0.07% wrms (3¾); THD 2% at 0 VU (1⅞), 1.8% at 0 VU (3¾); channel separation 40 dB ..... $300

### CR4016M Cassette Deck

Front-loading two-speed metal-compatible cassette deck with Dolby noise-reduction system, dc servo motor, capstan drive, and two super permalloy/ferrite heads. Features electronic tape speed change, metal/$CrO_2$/normal bias and high/low equalization switches, two illuminated VU meters, tape selector switch. Wow and flutter 0.1% wrms (1⅞), 0.09% wrms (3¾); frequency response ±3 dB at 1⅞: 40-13,000 Hz (normal), to 14,000 Hz ($CrO_2$), ±3 dB at 3¾: 40-18,000 Hz (normal), to 19,000 Hz ($CrO_2$); S/N 50 dB (Dolby off), 60 dB (Dolby on); THD 2.2% (1⅞), 1.9% (3¾); channel separation 40 dB; signal crosstalk −70 dB; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mike), 100 mV/100,000 ohms (line); walnut-grain vinyl veneer finish; 5⅛" H × 17⅓" W × 9½" D ..... $250

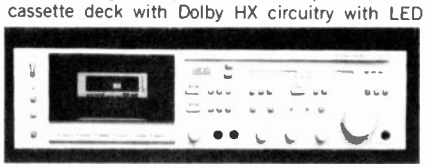
### ER8155/8150 Cassette/8-Track Decks

See Section 8, 8-Track Tape Machines, under Fisher..... $370/$330

## HARMAN/KARDON

### hk400xm Cassette Deck

Front-loading linear-phase metal-compatible stereo cassette deck with Dolby HX circuitry with LED



headroom safety indicators, two motors, and three heads. Features separate bias and equalization buttons for LN, FeCr, $CrO_2$, and metal tapes with bias fine trim and bias and Dolby tone generators; dual 12-LED peak-reading bar graph display with slow/normal meter ballistics switch; solenoid transport controls with electronic automatic program search and LEDs; rec mute; digital tape counter readout with memory and reset; auto rewind and replay; separate line and mic level controls; output level control; fader control; tape/source monitoring; rec/play timer with external timer. Wow and flutter 0.03% wrms (NAB); frequency response 15-20,000 Hz ±3 dB with FeCr and $CrO_2$ low-noise tapes; S/N 68 dB with Dolby, A weighted; mic impedance 600-50,000 ohms ..... $649

### hk300xm Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby HX circuitry with LED headroom safety indicators, two motors, and two heads. Features tone generators for bias and Dolby calibration; solenoid transport controls with electronic automatic program search. Wow and flutter 0.03% wrms (NAB); frequency response 15-20,000 Hz ±3 dB with FeCr and $CrO_2$ low-noise tape; S/N 67 dB with Dolby, A weighted; mic impedance 600-50,000 ohms ..... $449

### hk200xm Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby HX circuitry and two heads. Features auto program search; three-digit tape counter with memory replay; bias and equalization selectors with bias fine trim; slow/normal meter ballistics switch; output level control. Wow and flutter 0.04% wrms (NAB); frequency response 15-19,000 Hz ±3 dB with FeCr and $CrO_2$ low noise tape; S/N 65 dB with Dolby, A weighted; mic impedance 600-50,000 ohms ..... $349

### hk100m Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with switchable multiplex filter and two heads. Features LED peak-reading meters; bias and equalization selectors with bias fine trim; output level control. Wow and flutter 0.05% wrms (NAB); frequency response 15-19,000 Hz ±3 dB with low-noise $CrO_2$; S/N 63 dB with Dolby, A weighted; mic impedance 600-50,000 ohms ..... $269

### High Technology Separates

### hk705 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby HX and Dolby B circuitry, dc servomotor, and Sendust Alloy heads. Features push-button tape selectors for low noise, FeCr, $CrO_2$, and metal tapes; subsonic filter; dual vertical 12-LED peak-level meter display; record and output level controls; three-digit tape counter with memory and reset; rec mute; LED tape end warning indicator; fast forward/rewind time 75 sec (C-60). Wow and flutter 0.04% wrms (NAB); frequency response ±3 dB from 20-19,000 Hz (metal), to 18,000 Hz ($CrO_2$ and FeCr), to 17,000 Hz (LN); S/N 68 dB with Dolby, metal tape; 2.9" H × 15.2" W × 12.6" D .... ..... $449

## HITACHI

### D-5500M Cassette Deck

Front-loading microcomputer-controlled metal-compatible stereo cassette deck with dual-Dolby noise-reduction system, Unitorque direct-drive capstan and dc servo reel motors, dual-capstan transport, and closed-gap ferrite record/playback and erase heads. Features microcomputerized automatic bias and equalization calibration with push-button test, four memory, tape formulation ($CrO_2$, normal, FeCr, and metal), and manual controls with bias and equalization level meters and LED display chart for system; infrared wireless remote control with tape function controls and LEDs (operates within 32-ft radius or can be inserted in front panel when not in use); two VU meters with three LED peak indicators at +7, +3, and 0 dB; auto rewind play/stop; rec mute; separate line and mic/DIN record level controls; output level control; tape/source monitor switch; three-digit tape counter with reset; air-damped cassette eject; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.028% wrms; frequency response ±3 dB in manual position using Hitachi tape 30-18,000 Hz (normal and FeCr), to 19,000 Hz ($CrO_2$ and metal), in test position of Automatic Tape Response System using other tapes 30-18,000 Hz (normal and FeCr), to 20,000 Hz ($CrO_2$ and metal); dist. 1.0% at 0 VU, 1000 Hz; S/N (A weighted, metal tape, 3.0% THD) 69 dB with Dolby, 60 dB without Dolby; input sensitivity/impedance 60 mV/100k ohms (line), 0.35 mV/300-5000 ohms (mic); output level 550 mV; 7⅜" H × 17⅛" W × 12⅝" D..... $1000

**D-3300M.** Similar to D-5500M except has memory storage capability for one tape bias/EQ calibration; dual fluorescent peak level bar graph meters with 0-dB peak hold button, and LED battery, 1000-Hz test, and 7000- and 15,000-Hz frequency indicators in automatic tape response system; no bias and EQ level meters and manual control; infrared remote control optional; has IC logic function controls; wow and flutter 0.023% wrms; $CrO_2$ and

metal tape frequency response 30-20,000 Hz ±3 dB; input sensitivity/impedance 85 mV/100k ohms (line), 0.5 mV/300-5000 ohms (mic); 6.5" H × 17" W × 10" D..... $700

### D-7500 Cassette Deck

Front-loading stereo cassette deck with dual-Dolby noise-reduction system, dc servomotor, and Hall element record/playback and erase heads. Features IC logic tape function controls; three-position bias and equalization for normal, $CrO_2$, and FeCr tapes; tape/source monitor selector with LED display; built-in Dolby noise-reduction calibration control system; rec mute; switchable VU/peak meters; three-digit tape counter with memory and reset; line and mic/DIN record level controls; output level control. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-15,000 Hz (normal and FeCr), to 18,000 Hz ($CrO_2$); S/N (IHF) 68 dB (A weighted, Dolby on); input sensitivity/impedance 60 mV/100k ohms (line), 0.3 mV/3.3k ohms (DIN), 0.3 mV/300 ohms-5k ohms (mic); dist. 1.5%; fast-forward/rewind time 120 sec (C-60); 7 1/8" H × 17 1/8" W × 10" D..... $600

### D-980M Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual-Dolby noise-reduction system and built-in Dolby Calibration Control System for specific tape fine tuning, Unitorque direct-drive capstan and dc servo reel motors, closed-gap ferrite record/playback and erase heads, and dual capstan, closed-loop transport. Features separate bias and equalization switches for normal, $CrO_2$, FeCr, and metal tapes with bias adjust; graphic operations mode indicator; TTL IC logic tape function controls; edit button; auto rewind play/stop; tape/source monitor; separate line and mic/DIN record level controls; output level control; dual VU meters with 0, +3, and +7 LED peak indicators; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.03% wrms; frequency response ±3 dB 30-17,000 Hz (normal and FeCr), to 18,000 Hz ($CrO_2$), to 19,000 Hz (metal); dist. 1.2% at 0 VU, 1000 Hz; S/N (A weighted, metal tape, 3.0% THD) 68 dB with Dolby; input sensitivity/impedance 80 mV/70k ohms (line), 0.35 mV/300-5000 ohms (mic); output level 550 mV; 6 1/2" H × 17" W × 10" D.... $500

### D-90S Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual-Dolby noise-reduction system, elec-

tronically-controlled dc servo and dc reel motors, and close-gap ferrite record/play and erase heads. Features IC logic tape function controls; tape selector for normal, FeCr, $CrO_2$, and metal tapes with bias adjustment; dual VU meters with separate left/right record calibration controls and five LED peak indicators; auto rewind stop/play; tape/source monitor switch; record level control with line/mic switch; output level control; record/play timer selector; three-digit tape counter with reset. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-17,000 Hz (normal and FeCr), to 18,000 Hz ($CrO_2$), to 19,000 Hz (metal); dist. 1.2% at 1000 Hz, 0 VU; S/N (A weighted, 3.0% THD) 68 dB with Dolby; input sensitivity/impedance 60 mV/50k ohms (line), 0.3 mV/300-5000 ohms (mic); output 500 mV; 4 3/8" H × 17 1/8" W × 10 1/2" D..... $450

### D-75S Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc capstan and dc reel motors, and Sendust record/playback and double-gap ferrite erase heads. Features fluorescent bar graph VU/peak-reading meter display; four-position tape selector for normal, FeCr, $CrO_2$, and metal tapes; record level control with line/mic input selector; output level control; feather-touch logic tape function controls; auto rewind and auto play switch; rec mute; three-digit tape counter with reset; fast forward and rewind time 90 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB 30-15,000 Hz (normal and FeCr), to 16,000 Hz ($CrO_2$), to 17,000 Hz (metal); dist. 1.2% at 0 VU, 1000 Hz; S/N (A weighted, 3.0% THD) 66 dB with Dolby; input sensitivity/impedance 60 mV/47,000 ohms (line), 0.38 mV/300-5000 ohms (mic); output level 500 mV; 4 3/8" H × 17 1/8" W × 10 1/2" D..... ..... $350

**D-45S.** Similar to D-75S but has SL permalloy record/playback and erase heads, "Power-Assisted" piano-key tape function controls, and auto stop; no output level control; wow and flutter 0.05% wrms; metal tape frequency response 30-15,000 Hz ±3 dB; S/N 75 dB with Dolby ..... $250

### D-33S Cassette Deck

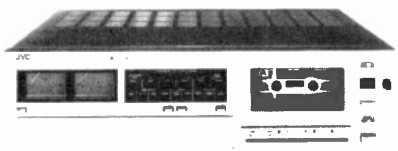
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features tape selector for normal, $CrO_2$, and metal tapes; left/right record level control with line/mic input selector; two VU meters with +3-dB peak LED indicator; rec mute; power-assisted tape function controls ..... $200

**D-22S.** Similar to D-33S minus metal-compatibility, peak-reading LED, and rec mute; has full auto stop and piano-key tape function controls..... $160

## JVC

### KD-A8 Cassette Deck

Front-loading computerized metal-compatible stereo cassette deck with Super ANRS (automatic



noise reduction system), X-cut SA (Sen-Alloy) record/playback and two-gap SA erase heads, and FG dc servo capstan and dc reel motors in ID (independent drive) tape transport. Features computer-controlled B.E.S.T. (bias, equalization, and sensitivity of tape) Tuning System which automatically detects SF/normal, FeCr, SA/$CrO_2$, or metal tape, super ANRS/ANRS, non record, S&L (search and lock), or record mute modes, bias adjustment, high frequency equalization (flat response at 10,000 Hz ±1.0 dB accuracy), ±0.5 dB tape sensitivity adjustment, and error detection and correction with LED peak indicators at −10, −5, 0, +3, and +6 dB; solenoid controlled tape function controls; timer standby with music wake-up; three-digit tape counter with memory stop and play; real-time pause; provision for optional remote control; two-stepped gear/oil-damped cassette lid; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.035% wrms; frequency response at 20 VU ±1 dB with computer 40-12,500 Hz (metal, SA/chrome, and normal), at ±3 dB 25-17,000 Hz (metal and SA/chrome), to 16,000 Hz (normal), at 0 VU 25-12,000 Hz ±3 dB (metal), to 8000 Hz (SA/chrome); THD 1.2% at 0 VU, 1000 Hz (metal); S/N 58 dB without ANRS, improved 5 dB at 1000 Hz and 10 dB above 5000 Hz with ANRS; crosstalk −65 dB at 1000 Hz; channel separation 35 dB at 1000 Hz; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mic), 80 mV/70k ohms (line); output level/impedance 0-300 mV/3-8k ohms (line), 0-0.5 mW/8-1k ohms (headphone); 4 7/8" H × 17 11/16" W × 15 3/8" D..... $750

**KD-A77.** Similar to KD-A8 without computerized B.E.S.T. tuning system: has recording equalizer switch and combination three-head record/playback and two-gap SA erase heads; wow and flutter 0.04% wrms; frequency response at 20 VU ±3 dB 25-18,000 Hz (metal and SA/chrome); 4 3/4" H × 17 3/4" W × 15" D..... $570

**KD-A7.** Similar to KD-A77 without multi-LED peak level indicators and three-head monitor switch; has fluorescent 12-level spectro peak indicators set at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, X-cut SA record/playback and two-gap SA erase heads, and recording equalizer circuit; frequency response at 20 VU with metal and SA/chrome tapes 25-17,000 Hz ±3 dB; 12 7/8" D..... $500

### KD-A66 Cassette Deck

Front-loading computer-controlled metal-compatible stereo cassette deck with super ANRS noise-reduction system, electronic governor dc capstan and dc reel motors, and X-cut Sen-Alloy record/play and two-gap Sen-Alloy erase heads. Features microprocessor-IC B.E.S.T. tuning system (all tapes are automatically adjusted for correct bias and equalization, fine bias in eight steps, fine equalization in eight steps/ch, sensitivity matching in eight steps, and error detection and correction) with front-panel LED display; dual VU meters with five-LED peak indicators; tape selector for normal, $CrO_2$, FeCr, and metal tapes; record and output level controls; IC logic tape function controls; rec mute; timer standby; three-digit tape counter with memory stop/play and auto rewind/play; optional remote control available; fast-forward/rewind time 85 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB at −20 VU 30-16,000 Hz (metal and chrome), to 15,000 Hz (normal); S/N 60 dB without ANRS, metal; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mic), 80 mV/100k ohms (line), 0.1 mV/k ohms (DIN); 4.75" H × 17.75" W × 12.25" D ..... $500

**KD-A55.** Similar to KD-A66 minus computer B.E.S.T. tuning system; has fast forward/rewind music scan system and mic/line input selector; 4 3/4" H × 16 9/16" W × 11 11/16" D..... $350

**KD-A33.** Similar to KD-A55 minus five-LED peak indicators, output level control, music scan, and memory play/stop and auto rewind/play ..... $186

### KD-A5 Cassette Deck

Front-loading metal-compatible stereo cassette deck with super ANRS, electronic governor dc motor in two-motor transport system, and SA record/playback and two-gap SA erase heads. Features solenoid-controlled tape function controls; record mute; two VU meters with five-LED peak level indicators; record/play timer standby; tape select switch for high bias, FeCr, SF/normal, SA/$CrO_2$, and metal tapes; three-digit tape counter with reset; remote control provision; two-stepped gear/oil-damped cassette lid; fast-forward/rewind time 85 sec (C-60). Wow and flutter 0.04% wrms; frequency response at 20 VU, ±3 dB 30-16,000 Hz (metal and SA/chrome), to 15,000 Hz (normal), at 0 VU ±3 dB 30-12,500 Hz (metal), to 8000 Hz (SA/chrome); THD 1.0% at 0 VU, 1000 Hz (metal); S/N 60 dB with metal, improved 5 dB at 1000 Hz and 10 dB above 5000 Hz with ANRS; crosstalk −65 dB at 1000 Hz; channel separation 35 dB at 1000 Hz; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mic), 78 mV/100k ohms (line); output level/

## NOTICE TO READERS

**Prices of items described are suggested prices only and are subject to change without notice. Actual selling prices are determined by the dealer.**

# 1 CASSETTE TAPE MACHINES

impedance 0-300 mV/3-6k ohms (line), 0-0.3 mW/8-1k ohms (headphones); 4¾" H × 16⁹/₁₆" W × 11⅞" D ..... $360

**KD-A3.** Similar to KD-A5 except has piano-key tape function controls; no provision for remote control; fast forward/rewind 80 sec (C-60); wow and flutter 0.055% wrms; DIN input sensitivity/impedance 0.1 mV/1k or 10k ohms switchable; DIN output level/impedance 0-300 mV/5k ohms; 5⅞" H × 16⁹/₁₆" W × 10⁵/₁₆" D ..... $300

### KD-2 Portable Cassette Deck

Top-loading portable stereo cassette deck with super ANRS, electronic governor coreless dc motor, and SA record/playback and two-gap ferrite erase heads. Features three-way power source (ac, 6 V dc, or four "D" batteries); left/right master recording/volume control; three-position input switch; two round VU meters; separate headphone amp with level control; piano-key tape function controls; dual-ball cassette hold system; fast-forward/rewind time 90 sec (C-60). Wow and flutter 0.09% wrms; frequency response ±3 dB 30-16,000 Hz (SA/chrome), to 15,000 Hz (normal); THD 1.2% at 0 VU, 1000 Hz; S/N 57 dB, improved 5 dB at 1000 Hz and 10 dB above 5000 Hz with ANRS; weighs 8.8 lbs with batteries; 3¾" H × 10⅞" W × 11⅜" D ..... $350

### KD-10 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, FG dc servomotor, and Cronios record/playback and two-gap ferrite erase heads. Features three-position bias and equalization selectors; two VU meters with five-LED peak indicators; left and right record level controls with auto mic/line input selection; auto tape-end stop; tape-amount scale; three-digit tape counter. Wow and flutter 0.06% wrms; frequency response 40-15,000 Hz ±3 dB with chrome; S/N 66 dB with Dolby; 5⅞" H × 16⁹/₁₆" W × 10⅞" D..... $210

**KD-A2.** Similar to KD-10 without five LED peak indicators; has direct-access cassette well and single record level control; wow and flutter 0.08% wrms; S/N 67 dB with Dolby; 5⅞" H × 15⅜" W × 10⅜" D ..... $180

### KD-A22 Cassette Deck

Front-loading metal-compatible stereo cassette deck with super ANRS noise-reduction system, electronic governor dc motor, and Metaperm record/playback and two-gap ferrite erase heads. Features tape selector for normal, FeCr, $CrO_2$, and metal tapes; multiple music scan system in forward or reverse (can skip selections to next or preceding ones repeatedly by pushing pause and scan buttons the number of times user wants selections skipped); dual VU meters with five-LED peak indicators; record level control; rec mute; rewind/auto play; cue and review; three-digit tape counter with reset; timer standby; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB at −20 VU 40-15,000 Hz (metal and chrome), to 14,000 Hz (normal); S/N 60 dB without ANRS, metal tape; input sensitivity/impedance 0.2 mV/600-10,000 ohms (mic), 80 mV/100k ohms (line), 0.1 mV/k ohms (DIN); 5¼" H × 16⁹/₁₆" W × 10⅜" D..... $200

**KD-A11.** Similar to KD-A22 minus LED peak indicators, super ANRS, music scan, rec mute, and cue and review; has Dolby noise-reduction system. $170

## KENWOOD

### KX-2060 Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual Dolby noise-reduction system, electronically-controlled dc motor in two-belt drive system, and ferrite combination wide-gap record/narrow-gap play and ferrite erase heads. Features separate bias and equalization selectors for normal,

$CrO_2$, and metal tapes optimized by record calibration and bias fine adjust controls with 400-Hz and 10-kHz tone oscillators and LEDs and LED tuning scale (indicates correct record calibration); dual fluorescent peak level meters; separate line and mic input level controls; output level control; tape/source monitor switch; electronic pushbutton tape function controls with LED indicators; three-digit tape counter with memory; timer standby with external timer; one headphone and two mic jacks; fast-winding time 80 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB 25-17,500 Hz (normal), to 18,000 Hz ($CrO_2$ and metal); S/N with Dolby 66 dB (normal), 69 dB ($CrO_2$), 70 dB (metal); HD 1.0% at 1000 Hz, 0 VU with metal; input sensitivity/impedance 77.5 mV/50k ohms (line), 1.4 mV/10k ohms (DIN), 0.19 mV/56k ohms (mic); supplied with stereo connection cords and head cleaning set; 6" H × 17⁵/₁₆" W × 14⅞" D ..... $649

### KX-1060 Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual Dolby noise-reduction system, electronically-controlled dc motor, and ferrite combination record/playback and ferrite erase heads. Features bias and equalization selectors for normal, chrome, and metal tapes with separate left/right bias adjust controls and built-in 400-Hz and 10-kHz tone oscillators with LEDs; tape/source monitor switch; input control with mic/line/DIN att mic selector; output level control; three-digit tape counter with memory and reset; two lit VU meters with peak-reading LED; full auto shut-off; lever tape function controls with LEDs; timer standby with external timer; fast-winding time 85 sec (C-60). Wow and flutter 0.045% wrms; frequency response ±3 dB 30-17,000 Hz (normal), to 18,000 Hz (chrome and metal); S/N with Dolby 63 dB (normal), 65 dB (chrome and metal); input sensitivity/impedance 77.5 mV/50k ohms (line), 0.75 mV/4k ohms (DIN), 0.19 mV/18k ohms (mic); 6" H × 17⁵/₁₆" W × 14⅞" D..... $450

### KX-800 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and ferrite combination record/play and ferrite erase heads in three-head configuration. Features tape selector for normal, $CrO_2$, FeCr, and metal tapes with bias fine adjust; dual VU meters with 0, +3, +6 LED peak indicators; record level control with mic/line/DIN att mic input selector; output level control; rec mute with LED; soft-touch tape transport controls; full auto shutoff; timer standby; three-digit tape counter with reset; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 35-14,000 Hz (normal), to 16,000 Hz ($CrO_2$, FeCr, and metal); S/N with Dolby 62 dB (normal), 64 dB ($CrO_2$, FeCr, and metal); input sensitivity/impedance 77.5 mV/50k ohms (line), 1.1 mV/4k ohms (DIN), 0.19 mV/15k ohms (mic); 5¼" H × 17⁵/₁₆" W × 14" D..... $369

### KX-600 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and Sendust Guard record/play and ferrite erase heads. Features tape selector buttons for normal, FeCr, $CrO_2$, and metal with bias fine adjust; dual VU meters with 0, +3, +6 dB peak indicator display; rec mute; record level control; timer standby; three-digit tape counter with reset; full auto shutoff; soft-touch tape transport controls; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 40-14,000 Hz (normal), to 15,000 Hz ($CrO_2$, FeCr, and metal); S/N with Dolby 62 dB (normal), 64 dB ($CrO_2$, FeCr, and metal); input sensitivity/impedance 77.5 mV/50k ohms (line), 0.1 mV/k ohms (DIN), 0.2 mV/10k ohms (mic); 5¼" H × 17⁵/₁₆" W × 11¼" D..... $269

### KX-500 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and Sendust Guard record/playback and ferrite erase heads. Features separate tape selectors for normal, FeCr, $CrO_2$, and metal tapes with bias fine adjust; record mute switch; dual fluorescent bar-graph VU/peak-reading meters; record level control; touch-key tape function controls; timer standby with external timer; three-digit tape counter; fast-winding time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 40-14,000 Hz (normal), to 15,000 Hz ($CrO_2$, FeCr, and metal); S/N with Dolby 62 dB (normal), 64 dB ($CrO_2$, FeCr, and metal); HD 1.3% at 1000 Hz, 0 VU with metal; input sensitivity/impedance 77.5 mV/50k ohms (line), 0.19 mV/10k ohms (mic); 5½" H × 15¾" W × 11⅛" D..... ..... $239

### KX-400 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and hard permalloy record/play and ferrite erase heads. Features bias and equalization selectors for normal and chrome tapes; dual VU meters; left/right record level control; rec mute; full auto shutoff; timer standby; three-digit tape counter with reset; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 40-13,000 Hz (normal), to 15,000 Hz (chrome); S/N with Dolby 60 dB (normal), 62 dB (chrome); input sensitivity/impedance 77.5 mV/50k ohms (line), 0.1 mV/k ohms (DIN), 0.2 mV/10k ohms (mic); 5½" H × 15¾" W × 11⅛" D..... $189

## LUX

### Luxman Laboratory Reference Series

### 5K50 Cassette Deck

Front-loading metal-compatible stereo cassette deck with realtime processed dc record/playback amp circuitry, quartz-locked direct-drive dual capstan motor and two coreless reel motors, ferrite record and erase and Sendust playback heads, and Dolby noise-reduction system. Features four-digit, seven-segment LED electronic tape counter display (also reads record/playback time in min and sec) with memory and reset; fluorescent green 24-dot/ch plasma level meter with upper 12 dots for peak hold; variable bias with "Bridge Recording by Bias Current and Signal Current"; azimuth adjustment with two lamps; search cue/review; IC logic-controlled operations; equalization for normal, $CrO_2$, and EX (metal) tapes; tape/source monitor switch; separate mic/line record level controls; rec mute; headphone jack; two mic jacks; 400 and 6000 Hz oscillator; provision for optional remote control. Wow and flutter 0.03% wrms; S/N with Dolby 66 dB ($CrO_2$), 65 dB (LH); frequency response 30-18,000 Hz ($CrO_2$), to 16,000 Hz (LH), both ±3 dB; dist. 1.2% with LH tape at 1000 Hz, 0 dB; separation 35 dB at 1000 Hz, 0 dB; crosstalk −60 dB at 1000 Hz, 0 dB; input sensitivity 100 mV (line), 0.25 mV (mic), 2 mV/1k ohms (DIN); output level 580 mV; headphone output 1 mW into 8 ohms; 5³/₁₆" H × 17¹³/₃₂" W × 14¼" D..... $1995

### K15 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby-HX noise-reduction system, two dc servomotors, three sendust heads, and two dc direct-coupled amplifiers for recording and playback. Features fluoroscan peak-reading meters with peak hold and metal tape indication; three-position bias and equalization for LH, $CrO_2$, and metal tapes; LED digital tape counter display with memory rewind and auto play and rewind; logic solenoid tape function controls; rec mute; mic/line mixing; tape/source

monitor switch; output level control. Wow and flutter 0.04% wrms; frequency response 30-20,000 Hz with metal; S/N 69 dB with metal, Dolby on; rosewood vinyl cabinet..... $899

### K12 Cassette Deck

Front-loading metal-compatible stereo cassette deck with realtime processed dc recording/playback amps, FG servo capstan and electronic governor reel motors, Sendust record/playback and ferrite erase heads, and Dolby noise-reduction system. Features four-digit, seven-segment LED digital tape counter/timer; fluorescent green plasma level meter with peak hold function; IC logic-controlled operations controls; record mute; mic mixing; memory rewind; separate line/mic recording level controls; bias/equalization selector for normal, $CrO_2$, and EX (metal) tapes; provision for optional remote control; headphone jack. Wow and flutter 0.04% wrms; S/N with Dolby 69 dB (metal), 65 dB ($CrO_2$), 63 dB (LH); frequency response ±3 dB from 30-20,000 Hz (metal), to 18,000 Hz ($CrO_2$), and to 16,000 Hz (LH); dist. 1.2% with LH tape at 1000 Hz, 0 dB; input sensitivity/impedance 100 mV/50k ohms (line), 0.25 mV/50k ohms (mic), 30 mV/1k ohms (DIN); output level/impedance 580 mV/220 ohms (line in), 1 mW into 8 ohms (headphone); 4³¹/₃₂" H × 17¹/₄" W × 14⁹/₁₆" D..... $745

### K8 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servomotor, and two sendust heads. Features solenoid tape function controls; three-position bias and equalization for LH, $CrO_2$, and metal tapes with bias fine adjust; dc record amp; fluoroscan meters; LED digital tape counter display with memory rewind and auto rewind/replay switch; rec mute; output level control. Wow and flutter 0.055% wrms; frequency response 30-17,000 Hz (metal); S/N 65 dB with metal tape, Dolby on; 5⁷/₁₆" H × 18¹/₄" W × 11¹/₂" D ..... $499

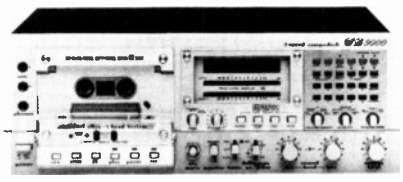
**K5A.** Similar to K8 without auto rewind/replay and LED digital counter display; wow and flutter 0.06% wrms; frequency response 30-20,000 Hz with metal; 5²⁹/₃₂" H × 17¹/₄" W × 10³/₈" D..... $399

**K1.** Similar to K5A minus fluoroscan peak-reading meters, memory rewind, and rec mute; has dual VU meters; wow and flutter 0.07% wrms; frequency response 30-17,000 Hz (metal); S/N 63 dB (metal) ..... $299

## MARANTZ

### SD 9000 Cassette Compudeck

Two-speed (1⅞ and 3¾ ips) microprocessor-controlled metal-compatible front-loading stereo cassette deck with dual Dolby circuitry, Sendust alloy three-head system, and two servo-controlled motors. Compudeck microprocessor programming and selection circuitry features random access memory and sequential access memory playback programming keyboard of up to 19 music selections; keyboard tape counter start/stop and memory call with counter memory mode selector; timer on/off with clock functions; timer/counter/clock selector switch; program start/skip/pause with program mode selector. Additional features include four-digit LED counter/timer/program indicator display; LED peak level bar graph display; pushbutton normal, special/$CrO_2$, FeCr, and metal tape selectors with bias fine adjust (±15%); speed selector; separate mic and line record level controls; tape/source monitor switch; output level control; rec mute; electronic feather-touch tape function controls with LED play, pause, and record indicators; built-in record/playback timer; sensor total system shutoff; front-panel access for head adjustment. Wow and flutter 0.03% wrms (3¾ ips), 0.05% wrms (1⅞ ips); frequency response ±3 dB at high speed 25-23,000 Hz (metal), to 22,000 Hz (FeCr and $CrO_2$), to 20,000 Hz (normal), at standard speed ±3 dB 25-20,000 Hz (metal), to 18,000 Hz (FeCr), to 17,000 Hz ($CrO_2$), to 16,000 Hz (normal); S/N with Dolby over 5000 Hz 72 dB (high speed), 69 dB (standard speed); 5³/₄" H × 16⁹/₁₆" W × 11⁵/₁₆" D ..... $800



**SD 8000.** Similar to SD 9000 without tape/source monitor switch; has single-Dolby circuitry ..... $700

### SD 6000 Cassette Deck

Two-speed (1⅞ and 3¾ ips) metal-compatible front-loading cassette deck with Dolby noise-reduction system, Sendust alloy record/playback and erase heads, and two servo-controlled motors. Features LED bar graph peak-level meters; three-digit tape counter with reset and memory rewind/replay; pushbutton tape selector for normal, special/$CrO_2$, FeCr, and metal tapes with bias fine adjust (±15%); speed selector switch; record/playback timer; rec mute; separate mic and line record level controls; output level control; auto slack tape take-up; electronic feather-touch tape function controls with LED play, pause, and record indicators; total system sensor shut-off. Wow and flutter 0.03% wrms (3¾ ips), 0.05% wrms (1⅞ ips); frequency response ±3 dB at 3¾ ips 30-22,000 Hz (metal), to 21,000 Hz (FeCr and $CrO_2$), to 18,000 Hz (normal), at 1⅞ ips 30-19,000 Hz (metal), to 17,000 Hz (FeCr and $CrO_2$), to 15,000 Hz (normal); S/N with Dolby over 5000 Hz 71 dB (3¾ ips), 68 dB (1⅞ ips); 5³/₄" H × 16⁹/₁₆" W × 11⁵/₁₆" D .... $550

**SD 4000.** Similar to SD 6000 without memory rewind/replay, bias fine adjust, auto slack take-up, output level control, and record/playback timer; has CompuSkip automatic sequential program selection in rewind or fast forward, dual-Dolby circuitry, tape/source monitor switch, cue and review, piano-key tape function controls, and LED record indicator; wow and flutter 0.04% wrms (3¾ ips), 0.06% (1⅞ ips); FeCr and $CrO_2$ tape frequency response at 3¾ ips 30-20,000 Hz ±3 dB; S/N with Dolby over 5000 Hz 70 dB (3¾ ips), 67 dB (1⅞ ips); 5³/₄" H × 16⁹/₁₆" W × 9⁹/₁₆" D..... $450

### SD 3020 Cassette Deck

Two-speed (1⅞ and 3¾ ips) metal-compatible front-loading stereo cassette deck with Dolby noise-reduction system and two superhard permalloy heads; has two peak-level LEDs. Wow and flutter 0.07% wrms (1⅞), 0.05% wrms (3¾); overall frequency response 30-16,000 Hz ±3 dB (1⅞), 30-19,000 Hz ±3 dB (3¾); S/N with Dolby 64 dB (1⅞), 67 dB (3¾); stereo separation 40 dB at 1000 Hz; fast forward/rewind time 100 sec; 5³/₄" H × 16⁹/₁₆" W × 9⁹/₁₆" D..... $315

**SD 1020.** Similar to SD 3020; wow and flutter 0.08% wrms (1⅞), 0.06% (3¾); S/N with Dolby 63 dB (1⅞), 64 dB (3¾) ..... $245

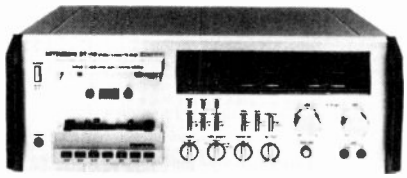
### SD 800 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system and super hard record/playback permalloy head. Features separate bias and equalization for normal, special/$CrO_2$, and FeCr tapes; separate left and right record level controls; two VU meters; three-digit tape counter with reset; total system shut-off. Wow and flutter 0.08% wrms; frequency response ±3 dB 35-15,000 Hz (FeCr), to 14,000 Hz ($CrO_2$), to 13,000 Hz (normal); S/N 63 dB with Dolby over 5000 Hz; 5³/₄" H × 16⁹/₁₆" W × 9⁹/₁₆" D ..... $200

## MITSUBISHI

### DT-40 Cassette Deck

Front-loading dual-speed (1⅞ and 3¾ ips) metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter, dual-speed PLL-controlled dc servo capstan and dc reel motors, and Sendust combination four-micron record/triple-laminated-core one-micron playback head and ferrite/Sendust erase heads. Features bias and equalization selector for normal, FeCr, special, and metal tapes with bias fine adjust; dual peak-reading meters with peak hold; fluorescent digital tape counter display with read out/in memory, repeat, and reset;



separate line and mic level controls; tape/source monitor switch; output level control; automatic spacing-pause system (ASPS) button for equal spacing between selections; record/play timer with external audio timer; feathertouch logic microswitch controls; LED tape speed, Dolby, and metal tape indicators; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.05% wrms (1⅞ ips), 0.04% wrms (3¾ ips); frequency response ±3 dB at 1⅞ ips: 40-15,000 Hz (normal), to 17,000 Hz (special), to 18,000 Hz (FeCr), to 20,000 Hz (metal), ±3 dB at 3¾ ips: 40-20,000 Hz (normal), to 22,000 Hz (special and FeCr), to 23,000 Hz (metal); S/N 68 dB with Dolby, metal tape; input sensitivity/impedance 0.3 mV/2.2k ohms (mic), 100 mV/47k ohms (line); 6.75" H × 16.75" W × 14.875" D..... ..... $650

### M-T01 Cassette Deck

Compact direct front-loading stereo cassette deck with Dolby noise-reduction system, closed-loop dual-capstan drive dc servomotor, and sendust recording/playback head. Features solenoid-operated microswitch controls; automatic spacing-pause button; twin peak-reading VU meters; three-position bias and equalization for normal, special, and FeCr tapes; multiplex filter; timer control with external timer unit; memory-stop and memory-play; microphone and line input level controls; output level control; headphone jack; two mic jacks with left channel doubling as mono mic jack; three-digit tape counter; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.05% wrms; S/N (weighted at +3 dB) 56 dB without Dolby, 64 dB with Dolby; frequency response 40-13,000 Hz (normal), to 15,000 Hz (special and FeCr), all ±3 dB; erasure ratio 70 dB at 1000 Hz; crosstalk 35 dB between channels, 65 dB between tracks; harmonic dist. 1.0% at 400 Hz; input sensitivity 0.3 mV (mic), 100 mV (line); bias frequency 85 kHz; 5¹/₂" H × 10⁵/₈" W × 9⁵/₈" D..... $560

## NAD (USA)

### 6100M Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servo capstan motor, and Sendust record/play and ferrite erase heads. Features dual-LED peak level bar graph display; bias and equalization for normal, FeCr, $CrO_2$, and metal tapes; record and playback level controls; feathertouch solenoid tape transport controls; three-digit tape counter with memory rewind; fast-winding time 70 sec (C-60). Wow and flutter 0.045% wrms; frequency response ±3 dB 35-16,000 Hz (normal), to 17,000 Hz ($CrO_2$ and FeCr), to 18,000 Hz (metal); S/N 64 dB with Dolby, metal tape (A weighted); input sensitivity/impedance 0.5 mV/10k ohms (mic), 35 mV/50k ohms (line), 6 mV/25k ohms (DIN); 9.8" H × 17.7" W × 6" D..... $499

### 6040 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby HX and B noise-reduction system, dc servo capstan motor, and Sendust record/play and ferrite erase heads. Features illuminated peak-reading VU meters; bias and equalization pushbuttons for normal, FeCr, $CrO_2$, and metal tapes; record level control; three-digit tape counter with memory rewind; fast-winding time 110 sec (C-60). Wow and flutter 0.07% wrms; frequency response 20-18,000 Hz ±3 dB ($CrO_2$, FeCr, and metal); S/N 64.5 dB with Dolby, metal tape (CCIR weighted);

# 1 CASSETTE TAPE MACHINES

input sensitivity/impedance 0.2 mV/2k ohms (mic), 60 mV/50k ohms (line), 3 mV/15k ohms (DIN)..... $299

## NAKAMICHI

### 680ZX Cassette Deck

Front-loading two-speed (1⅞ and 15/16 ips) metal-compatible stereo cassette deck with double Dolby

noise-reduction system, PLL dc servo main, dc azimuth alignment, dc reel, and dc cam motors, crystalloy record/playback and E-8L direct-flux erase heads in discrete three-head configuration, and Automatic Azimuth Alignment. Features double NF dc record and phase-corrected double NF playback amplifiers; RAM program search system with LED program indicator; three-position tape selector for EX, SX, and ZX tape with equalization switch; fluorescent VU/peak-reading meter display with meter calibration/peak hold/VU meter switch; manual two-speed cueing; master and record level controls; tape/source monitor switch; output level control; playback pitch control; three-digit tape counter with memory reset; timer record/play with external timer; solenoidless tape function controls. Frequency response ±3 dB at 1⅞ ips 10-22,000 Hz, at 15/16 ips 10-15,000 Hz; THD with metal tape 0.8% at 1⅞ ips, 1.5% at 15/16 ips; S/N with Dolby at 400 Hz, 3.0% THD 66 dB at 1⅞ ips, 60 dB at 15/16 ips; EIA 19-in rack mount; 5⅝" H × 19" W × 13⅜" D..... $1550

**670ZX.** Similar to 680ZX except one-speed cassette deck; has 47-dB peak-reading meters; no switchable meter calibration/peak hold/VU control.. $1150

**660ZX.** Similar to 670ZX minus tape/source monitoring; has single Dolby noise-reduction ..... $995

**RM-200.** Wired remote control duplicates control systems of 660ZX, 670ZX, and 680ZX; includes record, two-speed cueing, and RAM function; 15-ft cable..... $45

### 680 Cassette Deck

Front-loading two-speed (1⅞ and 15/16 ips) metal-compatible stereo cassette deck with Dolby noise-reduction system, PLL dc servo main, dc reel, and dc cam motors, and Crystalloy record/playback and E-8L direct-flux erase heads in discrete three-head configuration. Features double NF dc record and phase-corrected double NF playback amplifiers; RAM program search system with LED program indicator; manual high-speed cueing; fluorescent VU/peak-reading meter display with meter calibration/peak hold/VU meter switch; three-position tape selector for EX, SX, and ZX (metal) tapes with separate EQ switch; tape/source monitor switch; timer start; playback pitch control; three-digit tape counter with memory reset; solenoidless tape function controls. Wow and flutter 0.04% wrms (1⅞ ips), 0.08% wrms (15/16 ips); frequency response ±3 dB, at 1⅞ ips 10-22,000 Hz, at 15/16 ips 10-15,000 Hz; THD with metal tape 0.8% at 1⅞ ips, 1.5% at 15/16 ips; S/N with Dolby at 400 Hz, 3% THD 66 dB at 1⅞ ips, 60 dB at 15/16 ips; 4⅞" H × 19" W × 12¾" D... $1350

**RM-200.** Wired remote control duplicates control system of 680; includes record, two-speed cueing, and RAM function; 15-ft cable ..... $45

### 700II Cassette Deck

Stereo record/play deck with double Dolby noise-reduction system, dc servomotor, and permalloy playback and record head azimuth alignment beacon in three-head design. Features IC logic tape transport controls; separate bias and equalization switches for EX and SX tape; LED record calibration indicators; 50-dB peak-reading meters; line and mic input level controls; blend mic control; tape/source monitor switch; output level control; playback pitch control; three-digit tape counter with memory start; auto shutoff. Wow and flutter 0.05% wrms; frequency response 35-20,000 Hz ±3 dB; S/N 65 dB at 400 Hz, 3.0% THD (with Dolby and SX tape); THD 1.5% at 400 Hz, 0 dB; inputs 0.2 mV at 10,000 ohms (mic), 50 mV at 50,000 ohms (line); outputs 1 V max. (line variable), 40 mV/ch max. into 8 ohms (headphones); 10 11/16" H × 20½" W × 5⅞" D..... $1140

### 582 Discrete Cassette Deck

Metalloy-compatible discrete record/play cassette deck with Dolby noise-reduction system, "Second-Generation" Direct-Flux erase head, Crystalloy record SuperHead, and Crystalloy playback SuperHead with discrete configuration for independently-adjustable record and play azimuths, and PLL dc servomotor and two dc motors in closed-loop, double-capstan system. Features three-position tape selector for EX, SX, and ZX tapes; equalization selector; defeatable multiplex filter; tape-start memory and timer self-start in record/play; built-in 400-Hz (0 dB) and 15-kHz (−20 dB) test oscillators; three-position record calibration and bias adjust controls; source/tape monitoring; 47-dB peak-reading meters; double-negative-feedback record and play amplifiers; MOS logic-controlled anti-spill and tape-end shutoff; high-output 8-ohm headphone amplifier. Frequency response 20-20,000 Hz ±3 dB; wow and flutter 0.05% wrms max., 0.1% weighted peak; S/N 66 dB at 400 Hz, 3.0% THD, A-weighted (with ZX metalloy tape and Dolby); THD 0.8% at 400 Hz, 0 dB (with ZX tape); erasure 60 dB with ZX tape; input 50k ohms at 50 mV; output 2.2k ohms at 1 V; headphone output 45 mW; 5⅛" H × 19 11/16" W × 13 25/32" D..... $890

**581.** Same as 582 without source/tape monitoring. ..... $770

**RM-200.** Wired remote control duplicates control systems of 582 and 581; includes record, two-speed cueing, and RAM function; 15-ft cable... $45

### 482 Cassette Deck

Front-loading metal-compatible stereo cassette deck with double Dolby noise-reduction system, three-motor drive including motor-driven cam system, and Crystalloy record/playback and dual-gap Direct-Flux erase heads in discrete three-head design. Features tape buttons for EX, SX, and ZX tape with equalization switch; 47-dB peak-reading meters; sliding left/right record level controls; tape/source monitor switch; three-digit tape counter with reset and memory start; auto shutoff. Wow and flutter 0.06% wrms; frequency response 20-20,000 Hz; S/N 63 dB at 400 Hz, 3.0% THD, A weighted (ZX tapes, with Dolby); THD 0.9% at 400 Hz, 0 dB with ZX tape; input 30k ohms at 50 mV; output 2.2k ohms at 1 V; headphone output 10 mV. 5 1/16" H × 17 23/32" W × 11⅜" D..... $775

**481.** Similar to 482 minus tape/source monitoring; has single Dolby noise-reduction system ..... $655

**480.** Similar to 481 except has Sendust record/playback and Direct-Flux erase heads in two-head design and is driven by PLL dc servomotor and two dc motors in closed-loop double-capstan system; S/N 62 dB; THD 1.0%; output 2.2k ohms at 600 mV; available in matte black or silver finish.... $495

**RM-100.** Wired remote control duplicates all tape function controls on 480, 481, and 482; 15-ft cable..... $45

### 580M Cassette Deck

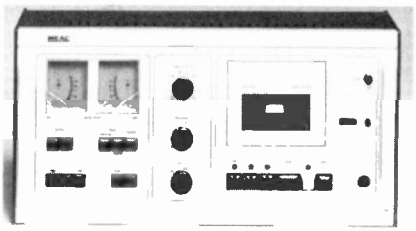
Metal-compatible stereo cassette deck with Dolby noise-reduction system, PLL dc servomotor and two dc motors in closed-loop double capstan, and Sendust record/playback and Direct-Flux erase heads in two-head configuration. Features double negative-feedback record and play amplifiers; separate bias and equalization for EX, SX, and ZX tapes; 47-dB peak-reading meters; built-in 400-Hz test oscillators for record calibration controls; manual two-speed cueing; tape-start memory; timer record/play; C-MOS logic-controlled anti-spill and tape-end shutoff; high-output headphone amplifier (8 ohms). Wow and flutter 0.05% wrms; frequency response 20-20,000 Hz ±3 dB; S/N 64 dB at 400 Hz, 3.0% THD, A weighted (ZX tape with Dolby); THD 1.0% at 400 Hz, 0 dB; input 50k ohms at 50 mV; output 3.9k ohms at 1 V; headphone output 45 mV; 5¼" H × 19 11/16" W × 13 25/32" D..... $690

**RM-200.** Wired remote control duplicates control system of 580M; includes record, two-speed cueing, and RAM function; 15-ft cable..... $45

## NEAL-FERROGRAPH (USA)

### 312 Cassette Recorder

Front/top-loading metal-compatible stereo cassette recorder with Dolby HX and B noise-reduction sys-



tems, three motors, and Sen-alloy heads; vertical or horizontal operation. Features tape selector switch for normal, ferric oxide, $CrO_2$, and metal tapes; dual peak-reading meters with bias and 500-Hz tone calibration switches; logic-controlled solenoid transport controls with LEDs; stop sensor; record level control with separate mic, DIN, and line pushbutton selectors; mono switch (enables recording on both tracks from mono input and gives mono output at headphone socket); balance control; output level control; provision for optional full-function remote control; fast forward/rewind time 50 sec (C-60). Wow and flutter 0.09% wrms (DIN); frequency response ±1/−3 dB 35-14,000 Hz (normal), to 15,000 Hz (FeCr, $CrO_2$, and metal); S/N with Dolby HX and B on 66 dB (normal and special); input sensitivity/impedance 300 μV/2k ohms (mic), 80 mV/200k ohms (high-level line), 3 mV/10k ohms (low-level line); brushed silver anodized aluminum, black suede, or two-tone brown finishes; 8.9" H × 17.5" W × 6.1" D..... $1195

## NIKKO

### ND-790 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features bias and equalization selector for normal, FeCr, $CrO_2$, and metal tapes with fine bias and equalization adjust; dual-LED vertical VU/peak-reading meter display with switchable VU/peak hold button; three-digit tape counter with memory rewind; rec mute; input level control with mic/DIN/line input selector; output level control; cue and review; fast forward/rewind time 75/90 sec (C-90). Wow and flutter 0.06% wrms (JIS); frequency response +3/−6 dB 30-14,000 Hz (normal), to 16,000 Hz (Fe-Cr), to 20,000 Hz (metal); S/N 56 dB at 1000 Hz without Dolby; max. input −26 dB +4 dB (line), −72 dB +4 dB (mic); 19-in rack mountable; matte black anodized aluminum finish ..... $330

## ONKYO

### TA-2080 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and two-channel Dolby recording calibrations, PLL dc servo drive and dc reel motors in two-capstan drive system, and Sendust alloy record and playback and laminated core erase heads. Features automatic "Accu-Bias" control with built-in 400- and 10,000-Hz oscillators (compatible with all tape formulations); separate bias and equalization for metal, high, and normal tapes; electronic logic-controlled feathertouch tape function controls; VU meters with

left/right 10-step LED peak indicators; fade out control; mic mixing; three-digit tape counter with reset and memory rewind; built-in timer function operable with optional audio timer; multiplex filter; auto stop; record mute; lighted auto Accu, Dolby, record, play, and pause indicators; line and mic input level controls; left/right channel mic jacks with auto stereo/mono switchover; phone jack (8-200 ohm headphones); soft eject; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.045% wrms; frequency response 20-16,000 Hz (normal), to 18,000 Hz (high), to 20,000 Hz (metal); S/N 62 dB with metal tape, Dolby out; input level/impedance 0.3 mV/5k ohms (mic), 50 mV/100k ohms (line); output level 775 mV at 0 VU (line out); 6⁵/₁₆" H × 17¹/₄" W × 14³/₈" D..... $800

### TA-2040 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, frequency generator dc servomotor, and Sendust alloy record/playback and ferrite erase heads. Features "Accu-Bias" adjust with separate selectors for metal, high, and normal tape; fluorescent VU level meters; electronic pushbutton tape function controls; auto stop; input selector; three-digit tape counter with reset. Wow and flutter 0.055% wrms; frequency response 20-19,000 Hz (metal); S/N 60 dB without Dolby; 4³/₄" H × 16⁷/₁₆" W × 13" D ..... $370

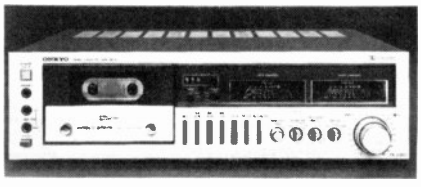
**RC-5.** Remote control unit for TA-2040..... $50

### TA-630DS Cassette Deck

Front-loading stereo cassette deck with dual-Dolby circuitry, PLL dc servomotor in two-belt drive transport, and hyperbolic S&S Sendust head. Features "Accu-Bias" with built-in 400- and 10,000-Hz oscillators with Accu bias adjust; three-position bias and equalization for $CrO_2$, FeCr, and normal tapes; three-digit tape counter with reset and memory rewind; piano-key tape function controls; dual VU meters with two peak indicators; auto stop; timer start/pause provision; rec mute; Dolby FM/line/mic-DIN input selector; input and output level controls; high/low impedance headphone jack. Wow and flutter 0.055% wrms; frequency response 20-15,000 Hz (normal), to 18,000 Hz (FeCr and $CrO_2$); S/N 68 dB with Dolby (FeCr above 5000 Hz); input level/impedance 0.3 mV/50k ohms (mic), 50 mV/50k ohms (line), 0.1 mV/5k ohms (DIN); output level/load impedance 0.775 V/50k ohms (line and DIN); headphone impedance 8-200 ohms; 6¹/₄" H × 16¹/₂" W × 12" D..... $350

### TA-2050 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multi-



plex filter, direct-drive servo capstan and dc reel motors, and hyperbolic-designed hard permalloy record/playback and laminated-core ferrite erase heads. Features tape selector for metal, high, and normal tape with "ACCUBIAS" adjust for fine tuning; dual peak-reading meters; fade-out/in control for gradual erasure at beginning or end of tape; rec mute; input selector; three-digit tape counter with memory play/stop and reset; timer play/record with external audio timer; IC-logic electronic soft-touch tape function controls; optional RC-5 remote control unit available; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.045% wrms; frequency response ±3 dB 30-16,000 Hz (normal), to 17,000 Hz (high position), to 18,000 Hz (metal); S/N 60 dB with metal tape, Dolby out; input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/50k ohms (line); 4.75" H × 16.5" W × 10.63" D. $300

### TA-2010 Cassette Deck

Front-loading stereo cassette deck with dual-Dolby circuitry, dc servomotor, and hard permalloy Widex record/playback and ferrite erase heads. Features "Accu-Bias" adjust; three-position bias and equalization for high, FeCr, and normal tapes; piano-key tape function controls; three-digit tape counter with reset; input level control; two VU meters with ±3 dB Dolby level indication; auto stop; pause control; two mic jacks; high-impedance phone jack; fast forward/rewind 90 sec (C-60). Wow and flutter 0.08% wrms; frequency response 20-14,000 Hz (normal), to 16,000 Hz (FeCr and $CrO_2$); S/N 54 dB with FeCr tape, Dolby out; input level/impedance 0.3 mV/5k ohms (mic), 50 mV/50k ohms (line); output level/load impedance 480 mV/50k ohms (line); headphone load impedance 8-200 ohms; 5¹⁵/₁₆" H × 16⁷/₁₆" W × 10¹/₂" D..... $260

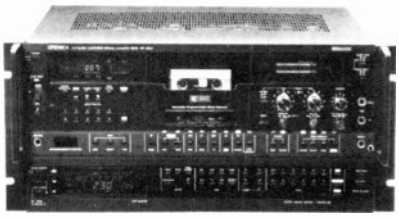
### TA-2020 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter, high-torque dc servomotor, and hard permalloy record/playback and double-gap laminated-core ferrite erase heads. Features tape selector buttons for normal, high, and metal tapes with "ACCUBIAS" adjust for fine tuning; separate left/right input level controls; dual illuminated VU meters; three-digit tape counter with reset; timer start/pause button with external audio timer; LED record and Dolby indicators; full auto stop; piano-key tape function controls; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response ±3 dB 30-14,000 Hz (normal), to 15,000 Hz (high and metal); S/N 60 dB with metal, Dolby out; input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/50k ohms (line); 4.75" H × 16.5" W × 10.625" D ..... $225

## OPTONICA

### RT-6905 Cassette Deck

Front-loading fully-programmable metal-compatible stereo cassette deck section on upper faceplate and



computer-controlled audio timer section on lower faceplate incorporated into single unit. Cassette deck with dual Dolby noise-reduction system and FM multiplex filter, quartz-locked PLL servo capstan and two-speed FG servo reel motors, and four heads including dual Sendust alloy record/play head and sensing head for APMS and APSS; features Automatic Program Music Selector (APMS), which programs for automatic play up to 15 selections on cassette in any order--APMS highlights include auto repeat control (repeats auto play instructions up to five times), two direct memories (M1 button memorizes tape counter number when depressed and M2 memorizes desired auto stop point), two counter memory buttons (set desired auto start and stop tape counter numbers for tape section replay), auto cue button for delayed programming, skip/check button (skips to start and plays next selection during playback/repeat of program or checks song numbers and order of program in stop mode), deck programming tone (indicates computer is on), auto space key (inserts four-second blank segment anywhere on tape and switches to pause after four seconds have elapsed), and digital LCD with APMS instructions conveyed on front panel. Additional cassette deck features include Automatic Program Search System (APSS) which skips to start of next selection or beginning of previous selection; tape selector for normal, FeCr, $CrO_2$, and metal tapes with sensitivity and bias recording fine adjust and record calibration controls for each tape type; two-color Opto™ peak level display with peak hold and auto reset (holds peak level for three seconds and then automatically resets); source/tape monitor buttons; separate mic and line input controls with limiter; output level control; microcomputer-controlled tape tension adjuster; tape function buttons with LEDs and function indicators, along with recording and APSS, duplicated on infrared remote control (included). Audio timer section: enables user to program up to 42 different instructions; features 12/24-hr LCD quartz clock/programmable instructions, built-in alarm, time signal tone and memory power protection. Wow and flutter 0.038% wrms; frequency response 20-22,000 Hz (metal); S/N 70 dB with Dolby over 5000 Hz; ebony cabinet with gold-trimmed controls ..... $1600

### RT-6502 Cassette Deck

Front-loading microprocessor-controlled metal-compatible stereo cassette deck with Dolby noise-reduction system, frequency-generated servomotor, and superhard permalloy head. Features Auto Program Locate Device (APLD) with five memory functions (locates beginning of selection, automatically plays any segment of tape in forward or reverse, auto on/off, repeatedly plays certain segment of tape, and has rewind and tape counter memory); quartz digital clock and LCD display; LCD electronic tape and elapsed time displays; Opto peak level display with peak hold function; record and Dolby LED indicators; separate mic and line input level controls; four-position bias and equalization for normal, $CrO_2$, FeCr, and metal particle tapes; full auto stop; illuminated tape compartment. Wow and flutter 0.045% wrms; frequency response 20-17,000 Hz (normal), to 18,000 Hz ($CrO_2$), to 20,000 Hz (metal); S/N 68 dB with Dolby..... $460

**RT-6506.** RT-6502 with ebony finish..... $460

### RT-6501 Cassette Deck

Front-loading microprocessor-controlled cassette deck with Dolby noise-reduction system, frequency generator servomotor, and permalloy head. Features Automatic Program Locate Device (APLD) with five separate memory functions (can be directed to find start and automatically play any segment of tape by going either forward or in reverse; can be programmed to turn itself on and off, and repeatedly play a certain segment of a tape; has rewind and tape counter memory); quartz digital clock and complete LCD display; LCD electronic tape and elapsed time displays; two VU meters; LED peak level, record and Dolby indicators; individual input level controls for mic and line; separate bias and equalization settings; Hall effect IC full automatic stop; illuminated tape compartment; teardrop-shaped control knobs. Wow and flutter 0.058% wrms; frequency response 30-16,000 Hz ±3 dB (FeCr); S/N 64 dB ..... $420

**RT-6505.** RT-6501 with ebony finish..... $420

### RT-6202 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features nine-position Auto Program Locate Device (APLD) that locates any selection in forward or reverse; logic solenoid-controlled transport; Opto peak level display with peak hold; mic/line mixing; output volume control; four-position bias and equalization for normal, $CrO_2$, FeCr, and metal particle tapes; timer/start mechanism. Wow and flutter 0.04% wrms; frequency response 25-15,000 Hz (normal), to 17,000 Hz ($CrO_2$), to 18,000 Hz (metal); S/N 67 dB with Dolby. ..... $390

**RT-6206.** RT-6202 with ebony finish..... $390

### RT-6201 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, two electronic governor dc motors for capstan and reel drives, and Sendust alloy record/playback head. Features Auto Program Search System (APSS); solenoid-controlled transport; multiplex filter; two VU meters with three peak LEDs; output volume control. Wow and flutter 0.05% wrms; frequency response 30-14,000 Hz (normal), to 16,000 Hz ($CrO_2$), to 17,000 Hz (FeCr), all ±3 dB; S/N 67 dB with Dolby ..... $370

**RT-6205.** RT-6201 with ebony finish..... $370

### RT-6101 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features nine-position Auto Program Locate Device (APLD) that scans and stops at desired selection; four-posi-

# 1 CASSETTE TAPE MACHINES

tion bias and equalization for normal, $CrO_2$, FeCr, and metal particle tapes; Opto peak level display with peak hold; electronic auto stop; output volume control; mic/line mixing. Wow and flutter 0.055% wrms; frequency response 25-15,000 Hz (normal), to 16,000 Hz ($CrO_2$), to 18,000 Hz (metal); S/N 67 dB with Dolby..... $290

**RT-6105.** RT-6101 with ebony finish..... $290

### RT-6002 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features Auto Program Search System (APSS); bias and equalization for normal, $CrO_2$, FeCr, and metal tapes; electronic auto stop; output volume control; Opto peak level display. Wow and flutter 0.06% wrms; frequency response 30-17,000 Hz (metal) .. ..... $230

**RT-6006.** RT-6002 with ebony finish..... $230

## PANASONIC

### RN-006A Microcassette Recorder

Two-hr two-speed microcassette recorder with electronic governor motor and capstan drive. Features built-in condenser mic; full auto-stop; LED record/battery indicators; edit function; tape speed selector; one-touch record/cue/review controls; locking pause control; five-hr rechargeable system; comes with ac adaptor, five-hr recharging pack, telephone pick up, two blank cassettes, earphones, carrying case and strap; champagne gold finish; 5 1/2" H × 2 7/8" W × 5/8" D ..... $260

## PEARLCORDER by OLYMPUS

### D130 Microcassette Recorder/Player

Two-hour two-speed modular pocket microcassette recorder/player with capstan drive, coreless motor (can drive 8-ohm 10-in woofer), and ferrite recording head. LED display functions as tape counter, quartz clock, quartz timer and quartz stop watch; side-mounted deactivator switch for quartz system. Includes built-in electret condenser microphone; 45 mm dynamic speaker; auto shut-off; LED record/battery check indicator; front-panel function selector, reset and start/stop buttons, and tape speed switch; side-mounted cassette eject button, record, play and stop pushbutton controls; top-mounted four-way switch features review, rewind, cue and fast forward functions; earplug/monitor, mic, remote control, and power jacks. Tape speeds: 2.4 cm/sec and 1.2 cm/sec; ac bias; max. output 150 mW at 2.4 cm/sec and 75 mW at 1.2 cm/sec; frequency response 300-7000 Hz (2.4 cm/sec) and 300-7000 Hz (1.2 cm/sec); 3 V dc; complete set includes three MC-60 microcassettes, cassette head cleaner, earphone, ac adaptor, carrying case, wrist strap, two 1.5-V AA Penlight batteries, two silver oxide batteries; optional detachable AM and FM radio and other accessories available; 5 1/2" H × 2 5/8" W × 15/16" D ..... $350

## JC PENNEY

### MCS 3563 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system; permalloy record/play and ferrite erase heads; dc motor; FM multiplex filter; memory reset; bias control for normal, FeCr and $CrO_2$ tapes; mic/line source selectors; timer standby; record mute; tape run, peak, record, memory, and Dolby LEDs; low, mid and high tone controls; power on/off; tape counter with reset; all playback/record function modes; record level meters and controls; left/right mic jacks; headphone jack; wow and flutter 0.07% wrms; frequency response 20-12,500 Hz ± 3 dB (normal tape), 20-15,000 Hz ±3 dB ($CrO_2$ and FeCr tapes); S/N 64 dB ($CrO_2$ with Dolby), 63 dB (normal tape with Dolby); THD 1.4%... $270

### MCS 3570 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system. Features LED ten-program memory preset; bias and equalization for normal, FeCr, and $CrO_2$ tapes; mic/mute/line input selector; record and output level controls; two VU meters with LED peak indicator; three-digit tape counter with reset; auto shut-off. Wow and flutter 0.09% wrms; frequency response 30-14,000 Hz ($CrO_2$ and normal); S/N with Dolby 64 dB ($CrO_2$), 63 dB (normal); wood grain vinyl cabinet with brushed aluminum faceplate; 5 7/16" H × 15 3/4" W × 10 7/16" D..... $250

### MCS 3552 Cassette Deck

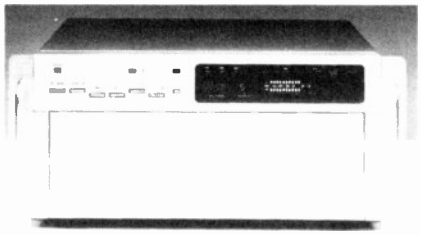
Front-loading stereo cassette deck with Dolby noise-reduction system. Features separate bias and equalization for normal, FeCr, and special/$CrO_2$ tapes; separate left and right record level controls; dual VU meters; three-digit tape counter with reset; auto shut-off. Wow and flutter 0.14% wrms; frequency response 40-12,500 Hz −3 dB; S/N with Dolby 56 dB ($CrO_2$) and 54 dB (normal and FeCr); 6 1/4" H × 16 9/16" W × 10 7/16" D..... $180

**MCS 3536.** Similar to MCS 3552 minus FeCr tape selection; wow and flutter 0.15% wrms; response 40-15,000 Hz −3 dB ($CrO_2$), to 14,000 Hz (ferric oxide); 5 7/8" H × 14 1/2" W × 10 1/4" D..... $150

## PHASE LINEAR

### 7000 Series Two Cassette Deck

Hidden-loaded (behind front panel) microprocessor-controlled metal-compatible stereo cassette deck



with dual Dolby noise-reduction system, quartz PLL direct-drive capstan and coreless dc reel motors, and uni-crystal ferrite record/playback and separate erase heads. Features MicroScan system that automatically adjusts and optimizes bias, level, and equalization with all tape types including metal; nine memory locations with LED digital readout for storage of bias/level/equalization settings for playback accuracy; dual LED VU bar graph display with peak/peak hold/average and dimmer selectors; tape selector for standard, FeCr, $CrO_2$, and metal tapes with bias fine adjust; four-digit tape counter with LED digital readout; mic/line input controls; output level control; pitch control; record/playback timer capability with external timer. Wow and flutter 0.03% wrms; frequency response +3 dB 25-16,000 Hz (standard), to 18,000 Hz (FeCr and $CrO_2$), to 19,000 Hz (metal); S/N 70 dB with Dolby; THD 1.0%; input sensitivity/impedance 0.3 mV/10k ohms (mic), 60 mV/100k ohms (line); fast winding time 75 sec (C-60). All controls, except tape transport and LED readout and VU meter displays, behind front panel; 12 1/2" H × 20 3/4" W × 19 1/4" D ..... $1350

## PHILIPS

### N5781 Cassette Deck

Front-loading microcomputer-controlled metal-compatible stereo cassette deck with calibrated Dolby noise-reduction system, two motors, and three ferrite heads. Features four-position tape selector for ferro, FeCr, chrome and metal tapes with separate left/right bias fine adjust, 400- and 10,000-Hz test oscillators, and separate left/right Dolby calibration controls; LED digital tape counter display with memory 1 and 2, memory clear, memory execute, auto rewind, and auto play selector buttons; fluorescent peak-reading bar graph display with peak hold; master record level control with separate mic and line controls; output level control; tape/source monitoring; ±5% pitch control; solenoid tape function controls; rec mute; timer record/play with external audio timer; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.045% wrms; overall frequency response 20-20,000 Hz; S/N 72.5 dB with metal tape, Dolby on; silver front panel; 6" H × 17.7" W × 10.25" D..... $525

**N5788.** Rack-mount version of N5781 with black

anodized front panel; 19" W..... $550

### N5631 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc motor, and two ferrite heads. Features switchable peak/VU fluorescent bar graph meter display; bias and equalization slide selectors for ferro, $CrO_2$, and metal tapes with bias fine adjust; on/off limiter; separate mic and line record level controls; output level control; electronic pushbutton tape function controls including rec mute; timer provision; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; overall frequency response 30-18,000 Hz; S/N 70.5 dB with Dolby, metal tape; silver front panel; 6" H × 16.5" W × 10.25" D..... $370

**N5391.** Similar to N5631 minus peak/VU switch, bias fine adjust, limiter, and electronic pushbutton transport controls; has record level control with mic/rec mute input selector, line output level control, and piano-key tape function controls..... $270

### N5371 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc motor, and two ferrite heads. Features bias and equalization selectors for ferro, FeCr, and chromium tapes; dual VU meters with +3-dB LED peak indicator; record level control with mic/rec mute input selector; line output control; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.08% wrms; overall frequency response 30-17,000 Hz; S/N 70.5 dB with Dolby, ferrochrome; 6" H × 16.5" W × 10.25" D..... $230

**N5171.** Similar to N5371 minus rec mute, input selector, line output level control, and LED peak indicator; has two-position bias and equalization for chromium and ferro tapes and separate left/right record level controls; overall frequency response 30-16,000 Hz; S/N 66.5 dB with Dolby, chromium tape..... $180

## PIONEER

### CT-F1250 Cassette Deck

Microprocessor-controlled front-loading metal-compatible stereo cassette deck with Dolby noise-reduc-

tion system, closed-loop dual-capstan transport with quartz-locked direct-drive capstan motor and dc fast-winding motor, and "Single-Crystal Ferrite Solid" record/playback and Alfex erase heads. Features four memory functions; monitoring-while-recording capability; two 24-segment Fluroscan average/peak/peak-hold meters; automatic bias and equalization controls; multiplex filter; mic/line mix-

ing and recording; auto stop; quartz-locked pitch control; fast forward/rewind time 65 sec (C-60). Wow and flutter 0.03% wrms; frequency response 20-16,000 Hz ±3 dB (standard), to 17,500 Hz with $CrO_2$ and FeCr tapes, to 18,500 Hz (metal); S/N 69 dB with Dolby (chrome); two mic, two line, and DIN inputs; two line, DIN, and headphone outputs; 7 3/8" H × 16 9/16" W × 14 9/16" D ..... $695

### CT-F950 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically controlled dc servomotor with built-in generator for capstan drive in closed-loop dual-capstan transport, and crystalline ferrite record/playback and Alfex erase heads in three-head configuration. Features digital readout tape counter; memory/repeat functions; electronic microprocessor for record/play level display (20 segments in each channel, covering a range from −20 dB to 7 dB, can also show VU's and peak level); electronic tape transport with soft-touch controls; bias adjust facility; automatic chrome tape selection; add-on recording; timer start; fast-winding time 85 sec (C-60). Wow and flutter 0.04% wrms; frequency response 25-15,000 Hz ±3 dB (standard LH tape), 25-17,000 Hz ±3 dB (chromium dioxide and FeCr tapes), 25-18,000 Hz ±3 dB (metal); S/N 59 dB (Dolby off), 69 dB (Dolby on); HD 1.3% at 0 dB; mike input sensitivity/impedance 0.3 mV-100 mV/30k ohms; 7 3/8" H × 16 9/16" W × 14 1/2" D..... $595

### CT-F850 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc servomotor with built-in generator for capstan drive and dc high-torque fast-winding motor in closed-loop dual-capstan transport, and Sendust record and playback and Alfex erase heads. Features Fluroscan level indicators with average and peak functions. Wow and flutter 0.04% wrms; frequency response 20-17,000 Hz (standard LH tape), to 18,000 Hz ($CrO_2$ and FeCr tapes), to 19,000 Hz (metal tape); S/N with Dolby 69 dB; HD 1.2%; mic input sensitivity/impedance 0.3 mV-100 mV/10k ohms; 5 7/8" H × 16 9/16" W × 14 13/16" D ..... $495

### CT-F750 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, high-torque dc servomotor, and stationary four-track record/playback and two ferrite erase heads. Features auto reverse; line/mic-DIN input selector; soft-touch buttons; vertical-hold tape mounting; LED Dolby; bias and equalization for standard, FeCr, $CrO_2$, and metal tapes; illuminated cassette compartment; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response 20-15,000 Hz (standard), to 17,000 Hz (FeCr and $CrO_2$), to 18,000 Hz (metal), all ±3 dB; S/N 69 dB with Dolby; HD 1.2% at 0 dB; mic input sensitivity/impedance 0.3 mV-100 mV/10k ohms; 5 7/8" H × 16 9/16" W × 13 1/4" D..... $395

### CT-F650 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc servomotor, and hard permalloy record/playback and ferrite erase heads. Features automatic music selection that locates gaps between musical selections; vertical cassette holding mechanism; LED Dolby; tape selector switch; tape compartment illumination; complete complement of inputs and outputs; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.05% wrms; frequency response 20-15,000 Hz (standard), to 17,000 Hz (chrome and ferrichrome), to 18,000 Hz (metal); S/N 69 dB with Dolby; HD 1.2%; 5 7/8" H × 16 9/16" W × 13 1/4" D..... $295

### CT-F500 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc servomotor, and hard permalloy recording/playback and ferrite erase heads. Features flywheel capstan drive; automatic shut-off in all modes; soft-damping cassette holder; three-mode tape bias/equalization switching; left/right mic jacks; two large VU meters; three-digit tape counter; record and Dolby on indicators; fast-winding time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response 40-13,000 Hz ±3 dB (STD tape), 40-15,000 Hz ±3 dB ($CrO_2$ and FeCr tape); S/N 54 dB (Dolby off), 64 dB (Dolby on); HD 1.5%; mike input sensitivity/impedance 0.3 mV-110 mV/10k ohms; 5 1/2" H × 14 15/16" W × 10 1/4" D. ..... $195

## REALISTIC

### SCT-3100 Cassette Deck

Front-loading metal-compatible stereo cassette deck with double Dolby noise-reduction system, FG servo capstan and dc reel motors, and ferrite-core titanium-surface record/play and double-gap ferrite erase heads in three-head configuration. Features adjustable fine bias with built-in twin-tone test oscillators; left/right record calibration controls; solenoid-controlled logic tape function controls; auto rewind/play; dual VU meters with +3 and +6 peak-reading LEDs; timer switch with external timer. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-19,000 Hz (ferric), to 20,000 Hz ($CrO_2$), to 21,000 Hz (metal); S/N 67 dB with metal tape, Dolby on (3.0% THD, CCIR weighted); THD 0.9% ..... $580

### SCT-31 Cassette Deck

Front-loading metal-compatible stereo cassette deck with double Dolby noise-reduction system, electronically-governed dc capstan servomotor, and ferrite-core titanium-surface record/playback and double-gap ferrite erase heads in three-head configuration. Features 16-segment LED bar graph display with switchable peak hold; variable bias; auto stop; power-assist tape function controls; record control with memory ring. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-19,000 Hz (ferric), to 20,000 Hz ($CrO_2$), to 21,000 Hz (metal); S/N 66 dB with metal tape, Dolby on (3.0% THD, CCIR weighted)..... $420

### SCT-21 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy record/playback and ferrite erase heads. Features variable bias adjust; 14-segment fluorescent bar graph display with switchable peak hold; auto stop; record level control with memory ring; output level control. Wow and flutter 0.06% wrms; frequency response ±3 dB 30-15,000 Hz (ferric), to 18,000 Hz ($CrO_2$), to 20,000 Hz (metal); S/N 66 dB with metal tape, Dolby on (3.0% THD, CCIR weighted)..... $300

### SCT-22 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy record/play and ferrite erase heads. Features tape selector for ferric, $CrO_2$, and metal tapes; 12-segment fluorescent peak-level bar graph display; auto stop; separate record level controls with memory ring; output level control. Wow and flutter 0.07% wrms; frequency response ±3 dB 30-13,000 Hz (ferric), to 14,000 Hz ($CrO_2$), to 15,000 Hz (metal); S/N 65 dB with metal tape, Dolby on (3.0% THD, CCIR weighted) ..... $200

### SCT-24 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with switchable multiplex filter. Features dual LED peak metering; auto stop; tape selector buttons for ferric, $CrO_2$, and metal tapes; digital tape counter. Wow and flutter 0.15% wrms; frequency response ±3 dB 30-12,000 Hz (ferric and $CrO_2$), to 14,000 Hz (metal); S/N 64 dB with metal tape, Dolby on (3.0% THD, CCIR weighted) ..... $150

## REFERENCE by QUADRAFLEX

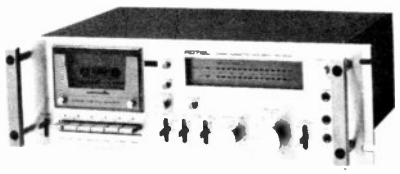
### 412D Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and two heads. Features dual VU meters with peak-reading LED; metal, special, and normal tape selector buttons; separate left/right input selectors; three-digit tape counter with reset; piano-key tape function controls include one for door. Wow and flutter 0.06% wrms; frequency response 30-18,000 Hz ±3 dB (metal); S/N 62 dB with Dolby; 6 1/4" H × 15 3/4" W × 10" D..... $250

## ROTEL

### RD-2200M Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronic



governor dc motor, and Sendust recording/playback and ferrite erase heads. Features bias and equalization controls for normal, $CrO_2$, and metal tapes with adjustable bias control; input selector for line, mic, and record mute; multiplex filter; 13-element LED bar chart peak level indicator; three-digit tape counter; pushbutton controls for reset and memory rewind; operation controls for eject, record, rewind/review, play, fast forward/cue, and pause; headphone amplifier with control; headphone and two mic jacks. Wow and flutter 0.05%; frequency response 30-17,000 Hz ±3 dB (normal) and 30-19,000 Hz ±3 dB ($CrO_2$ and FeCr tapes); S/N 64 dB with $CrO_2$, Dolby in; rack mountable; 5 7/8" H × 19" W × 10 7/32" D..... $450

### RD-1000M Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG servo capstan and dc servo reel motors, and hard permalloy record/playback and ferrite erase heads. Features feathertouch solenoid tape function controls with LEDs; auto stop, auto repeat, and auto rewind; three-digit tape counter with memory rewind/play; two VU meters with LED peak indicator; normal, $CrO_2$, and metal tape selectors; record/play timer buttons with external timer unit; direct-function change without going through stop; fast-winding time 90 sec (C-60). Wow and flutter 0.045% wrms; 3 27/32" H × 16 15/32" W × 11 13/16" D..... $440

### RD-2000 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, electronic governor dc motor, and Sendust recording/playback head. Features three-position bias and equalization with adjustable bias control; five LED peak indicators; two VU meters; input selector for line and mic/DIN; multiplex filter; headphone and two mic jacks; damped ejection; tape counter. Wow and flutter 0.05%; frequency response 30-14,000 Hz ±3 dB (normal), 30-15,000 Hz ±3 dB ($CrO_2$), 30-16,000 Hz (FeCr); S/N 63 dB with Dolby; rack mountable; 5 5/8" H × 19" W × 10 5/8" D..... $370

### RD-500 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronic governor dc motor, and High B permalloy record/playback and ferrite core erase heads. Features four-position tape selection for normal, chrome, ferric, and metal tapes with bias adjust and LED indicators for each tape; twin VU meters with peak LED; full auto shutoff; three-digit tape counter; headphone and mic jacks; fast-winding time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 30-14,000 Hz (normal), to 15,000 Hz (chrome), to 16,000 Hz (FeCr), to 17,000 Hz (metal); dist. 0.6% with metal at 400 Hz; S/N 64 dB with Dolby, chrome tape; input sensitivity/impedance 0.3 mV/10k ohms (mic), 25 mV/47k ohms (line); 2 23/32" H × 16 15/16" W × 10 9/16" D.$320

### RD-18F Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, electronic governor dc motor, and

# 1 CASSETTE TAPE MACHINES

hard permalloy record/playback and ferrite core erase heads. Features bias and equalization for normal, FeCr, and $CrO_2$ tapes with bias fine adjust; auto stop; dual VU meters with peak LED; record level control; piano-key tape function controls. Wow and flutter 0.08% wrms; frequency response ±3 dB 30-13,000 Hz (normal), to 15,000 Hz ($CrO_2$ and FeCr); S/N 63 dB with $CrO_2$, Dolby in; 5²⁵/₃₂" H × 16¹⁵/₁₆" W × 10²³/₃₂" D..... $250

## SAE

### SAE Two Line

### C4 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and FG servo motor. Features logic solenoid tape function controls; three-position bias and equalization for normal, FeCr, and high output (includes metal) tapes with variable bias; auto stop; LED peak level bar graph display; mic, line, and record mute switch; tape counter with reset; timer switch; optional remote control. Wow and flutter 0.06%; frequency response 30-18,000 Hz ±2.5 dB..... $500

**Remote One.** Remote control unit for C4 and C3D.... ..... $45

### C3D Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, FG servomotor, and two heads.

Features solenoid logic tape function controls; auto stop; memory rewind; bias and equalization for low noise, FeCr, and $CrO_2$ tapes; two lighted VU meters; mic/line input selector; rec mute; record level and record balance controls; timer switch for optional external ac timer; provision for optional remote control. Wow and flutter 0.06%; frequency response 30-18,000 Hz ±3 dB; S/N 64 dB with Dolby; 5.3" H × 17.4" W × 14" D..... $400

## SANSUI

### SC-5330 Cassette Deck

"Direct-O-Matic" front-loading metal-compatible stereo cassette deck with dual-Dolby circuitry, FG

servo capstan and reel motors with holdback tension mechanism, special record/playback and ferrite erase heads, and dc amplifier circuitry. Features three-position bias and equalization selectors for metal, $CrO_2$, and normal tapes; two VU meters with five-LED peak-reading indicators; memory rewind, replay, and repeat buttons; rec mute; mic/line mixing with switchable limiter; output level control; logic-controlled feather-touch tape function controls include tape lead-in; LED record, play, and pause indicators; three-digit tape counter with reset; provision for optional external play/record timer. Wow and flutter 0.038% wrms; frequency response ±3 dB 20-20,000 Hz (metal), to 17,000 Hz ($CrO_2$); S/N 69 dB with Dolby; black matte finish with detachable rack-mounting handles; 7⁷/₁₆" H × 19" W (handles on) × 12" D ..... $520

### SC-3300 Cassette Deck

"Direct-O-Matic" front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG servo capstan and reel motors with holdback tension mechanism, and special record/playback and ferrite erase heads. Features separate bias and equalization for metal, $CrO_2$, and normal tapes; 16-segment LED peak-reading indicators; memory rewind; auto replay and repeat functions; record mute; logic-controlled feather-touch tape function controls include tape lead-in; LED record, pause, and play indicators; mic/line mixing; provision for external record/play timer. Wow and flutter 0.04%; frequency response 20-16,000 Hz ±3 dB (metal and $CrO_2$); S/N 69 dB with Dolby; simulated rosewood-grain finish; 6⁵/₁₆" H × 16¹⁵/₁₆" W × 12" D..... ..... $420

**SC-3330.** Same as SC-3300 except has black matte finish with detachable rack-mounting handles; 6⁵/₁₆" H × 19" W (handles on) × 12" D... $420

### SC-1300 Cassette Deck

"Direct-O-Matic" front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc drive motor and constant-tension holdback mechanism, and special record/playback and ferrite erase heads. Features 16-segment LED peak-reading indicators; three-position bias and equalization for metal, $CrO_2$, and normal tapes; record mute; tape lead-in; separate input/output level controls; provision for external timer activation. Wow and flutter 0.05%; frequency response 20-16,000 Hz ±3 dB (metal and $CrO_2$); S/N 69 dB with Dolby; simulated rosewood finish; 6⁵/₁₆" H × 16¹⁵/₁₆" W × 12⅝" D ..... $320

**SC-1330.** Same as SC-1300 except has black matte finish with detachable rack-mounting handles; 6⁵/₁₆" H × 19" W (with handles) × 12⅝" D .... ..... $320

### D-100 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with new IC circuitry, high-torque dc motor, and Hi-B permalloy record/playback head. Features bias and equalization selection for normal, chrome, and metal tapes with dc equalizer amp circuitry; VU meters with tricolor five-LED bar graph peak-reading display; auto stop; recording level control; soft-eject system. Wow and flutter 0.055%; frequency response ±3 dB 20-17,000 Hz (metal), to 16,000 Hz (chrome), to 15,000 Hz (normal)..... $250

### D-90 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc servomotor, and super hard permalloy record/playback and ferrite erase heads. Features separate bias and equalization for normal, FeCr, and $CrO_2$ tapes; dual VU meters; record level control; piano-key tape function controls; provision for external timer with auto shut-off. Wow and flutter 0.055%; frequency response ±3 dB 35-15,000 Hz ($CrO_2$), to 14,000 Hz (normal); S/N 65 dB with Dolby; metal cabinet; 5³/₄" H × 16¹⁵/₁₆" W × 9½" D..... $200

## SANYO

### RD5035 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, Sendust Alloy record/playback head and ferrite erase head, and dc high torque motor. Features equalization and bias switches for metal, $CrO_2$, FeCr, and normal tapes with LEDs; two input level controls for both channels; multiplex filter; dual VU meters; digital tape counter with reset; auto stop; air damped cassette door; headphone jack; two mic jacks with left doubling as mono mic. Wow and flutter 0.08%; frequency response 30-19,000 Hz ..... $200

### RD5350 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, PLL dc servomotor with 34 stator and 34 rotor poles, and permalloy recording head. Features LED peak indicators; separate calibrated input and output level controls; two lighted VU meters; record mute; standby timer; full automatic stop; locking pause; separate bias and equalization switching ($CrO_2$ and normal); separate left and right microphone jacks; headphone jack; digital tape counter; Dolby on/off switch; line-in, mic/DIN input button. Frequency response up to 17,000 Hz with $CrO_2$ and FeCr tape; S/N 64 dB (Dolby on); simulated walnut covered metal cabinet..... $180

### RD5030 Cassette Deck

Front-loading stereo record/playback deck with Dolby noise-reduction system; tape select switch for normal, $CrO_2$, and FeCr tape; pause control; calibrated level controls; separate bias/equalization switching; full automatic stop; left and right mike inputs; frequency 30-16,000 Hz; wow and flutter 0.08%; S/N 62 dB (Dolby on) ..... $170

### RD5008 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, high torque dc motor, and two heads. Features auto stop; $CrO_2$ and normal tape selector; dual five-LED VU bar graph indicators; input level controls; piano-key tape function controls. Wow and flutter 0.1% wrms; frequency response 30-14,000 Hz ±3 dB ($CrO_2$); S/N 60 dB ($CrO_2$ with Dolby); 5" H × 14" W × 8" D..... $150

### PLUS Series

### RD5372 Cassette Deck

Front-loading microprocessor-controlled metal-compatible stereo cassette deck with dual-Dolby

noise-reduction system, dc servo capstan and dc governor reel motors, and separate but integrated Sendust Alloy record and play heads and ferrite erase head; solenoid transport control. Features digital tape counter readout display with reset and memory rewind; auto rewind and repeat; PLL speed control; timer standby for record/playback with provision for external timer/programmer; tape/source monitor switch; defeatable FM multiplex filter; defeatable peak limiter; normal, FeCr, $CrO_2$, and metal tape selection; lighted front-panel function and tape selection indicators; LED record, pause, and play indicators; two VU meters with peak LEDs; removable damped door. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-19,000 Hz (metal), to 18,000 Hz ($CrO_2$ and FeCr), to 15,000 Hz (normal); S/N with Dolby 70 dB (metal), 69 dB (FeCr), 67 dB ($CrO_2$), and 66 dB (normal); THD 0.8% (metal), 1.5% ($CrO_2$); input sensitivity/impedance 0.26 mV/600 ohms (mic), 100 mV/100 ohms (line); line output level/load impedance 1 V/7k ohms; channel separation 42 dB; crosstalk −70 dB; 6¼" H × 17⅜" W × 12⅝" D ..... $500

**RD5370.** Similar to RD5372 without digital tape counter readout display, LED record, play, and pause indicators, auto rewind and repeat, and PLL-synthesized speed control; $CrO_2$ and FeCr frequency response 30-17,000 Hz, normal 30-13,000 Hz; THD 1.7% (metal), 2.0% ($CrO_2$) ..... $470

### D65 Cassette Deck

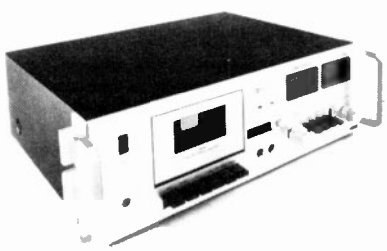
Front-loading metal-compatible auto-reverse cassette deck with Dolby noise-reduction system, Sendust Alloy record/playback and ferrite erase heads, and dc servo capstan and dc governor reel motors. Features separate bias and equalization for metal, $CrO_2$, FeCr, and normal tapes; defeatable FM multiplex filter; auto stop; edit record mute control; digital tape counter with reset; timer standby function with provision for optional external timer/programmer; output level control; two lighted VU meters; feather-touch solenoid transport controls and mode

selectors; lighted tape direction arrows; damped door; headphone jack; two mic jacks with left jack doubling as mono mic jack. Wow and flutter 0.04% wrms; frequency response ±3 dB 20-18,000 Hz (metal), to 16,000 Hz ($CrO_2$ and FeCr), to 13,000 Hz (normal); S/N with Dolby 70 dB (metal), 69 dB (FeCr), 67 dB ($CrO_2$), and 66 dB (normal); THD 0.8% (metal), 1.5% ($CrO_2$); input sensitivity/impedance 0.3 mV/400-10,000 ohms (mic), 50 mV/50k ohms (line); line output level/load 0.53 V/7k ohms; channel separation 42 dB; crosstalk −70 dB; 5¼" H × 16½" W × 10⅜" D ..... $470

**D62 Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, Sendust Alloy record/playback and ferrite erase heads, and dc servomotor. Features automatic music select system (automatically locates gap between musical selections on cassette) with flashing tape direction arrows; two-color fluorescent peak-hold level bar graph displays with high-speed peak/standard VU selection switch; bias and equalization for metal, $CrO_2$, FeCr, and normal tapes; mic/line mixing; output level control; defeatable FM multiplex filter; auto stop; piano-key transport controls include record mute; digital tape counter with memory rewind; timer standby with provision for external tuner and programmable timer; removable damped door; black metal finish. Wow and flutter 0.04%; frequency response ±3 dB 20-20,000 Hz (metal), to 17,000 Hz ($CrO_2$ and FeCr), to 13,000 Hz (normal); S/N with Dolby 70 dB (metal), 67 dB ($CrO_2$), 69 dB (FeCr), and 66 dB (normal); THD 0.8% (metal), 1.5% ($CrO_2$); input sensitivity/impedance 0.3 mV/400-10,000 ohms (mic), 50 mV/50k ohms (line); output level/load 530 mV/7k ohms (line), 50 mV/8 ohms (phone); channel separation 42 dB; crosstalk −70 dB; 5¼" H × 17⅝" W × 11⅜" D ..... $380
**D60.** D62 with silver faceplate..... $370
**D55.** Similar to D60 without automatic music select system..... $330
**D45.** Similar to D55 without dual-mode bar graph display and memory rewind; has one-color peak-hold bar graph display; wow and flutter 0.05% wrms; frequency response ±3 dB 30-19,000 Hz (metal), to 17,000 Hz ($CrO_2$ and FeCr), to 13,000 Hz (normal); S/N with Dolby 67 dB (metal), 66 dB (FeCr), 64 dB ($CrO_2$), 63 dB (normal); headphone output/load 32 mV/8 ohms; channel separation 38 dB; 5⅜" H × 16½" W × 11½" D ..... $300

## H.H. SCOTT

**671DM Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc motor,



and super hard permalloy "B" record/playback head. Features bias and equalization selectors for normal, FeCr, $CrO_2$, and metal tapes; dual VU meters with LED peak indicator; record level control; mic/line input selector; output level control; three-digit tape counter with memory rewind and reset; full auto shutoff; LED Dolby and record indicators; fast forward/rewind time 90 sec. Wow and flutter 0.04% wrms; frequency response 25-15,000 Hz (normal), to 17,000 Hz (FeCr), to 18,000 Hz ($CrO_2$ and metal); S/N 66 dB with Dolby (A weighted); input sensitivity/impedance 60 mV/47k ohms (line), 5 mV/5k ohms (mic); optional 19-in rack-mount handles available; 5.25" H × 17" W × 11.75" D..... $250

**610D Cassette Deck**
Front-loading stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and super hard permalloy record/play head. Features bias and equalization selector for normal, FeCr, and $CrO_2$ tape; dual VU meters; record level control; mic/line input selector; three-digit tape counter with reset; LED record and Dolby indicators; full auto stop; fast forward/rewind time 90 sec. Wow and flutter 0.05% wrms; frequency response 25-15,000 Hz (normal), to 16,000 Hz (FeCr and $CrO_2$); S/N 64 dB with Dolby (A weighted); input sensitivity/impedance 60 mV/47k ohms (line), 5 mV/5k ohms (mic); optional 19-in rack-mount handles available; 5.25" H × 17" W × 11.75" D..$200

## SHARP

**RT-4488 Cassette Deck**
Front-loading microprocessor-controlled metal-compatible stereo cassette deck with Dolby noise-

reduction system, frequency-generator servomotor, and superhard permalloy head. Features 10-selection auto program locate device (APLD) with five separate memory functions (locates beginning of selection, automatically plays any segment of tape in forward or reverse modes, automatic on/off, repeatedly plays certain segment of tape, and has rewind and tape counter memory), LCD quartz digital clock and program selection display, and LCD electronic tape and elapsed time displays; Opto peak level display with peak hold function; LED record and Dolby indicators; separate mic and line input level controls; output level control; four-position bias and equalization for normal, $CrO_2$, Fe-Cr, and metal particle tapes; auto stop; illuminated tape compartment. Wow and flutter 0.048% wrms; frequency response 20-16,000 Hz (normal), to 17,000 Hz ($CrO_2$), to 18,000 Hz (FeCr), to 20,000 Hz (metal); S/N 68 dB with Dolby..... $450

**RT-3388A Cassette Deck**
Microprocessor-controlled front-loading stereo cassette deck with Dolby noise-reduction system, servo-controlled dc motor, and hard permalloy record/playback head and ferrite erase head. Features Automatic Program Locate Device (APLD) with five forms of memory (can be programmed to find the start and automatically play any segment of cassette tape by going either forward or in reverse, can turn itself on and off, has both rewind and tape counter memory, and can be programmed to repeatedly play a certain segment of tape), Quartz digital clock, and complete LCD display; LCD electronic tape and elapsed time displays; two VU meters; LED peak level, record and Dolby indicators; individual input level controls for mic and line; separate bias and equalization settings; Hall effect IC full auto stop; illuminated tape compartment. Wow and flutter 0.55% wrms; frequency response 30-16,000 Hz (FeCr tape); S/N 64 dB (Dolby on) ..... $410

**RT-2266 Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and solenoid-controlled transport operations. Features nine-position auto program locate device (APLD) (locates any selection in forward or reverse) with display panel; Sharpscan peak level display with peak hold; mic/line mixing; output volume control; four-position bias and equalization for normal, $CrO_2$, FeCr, and metal particle tapes; timer/start mechanism; auto spacing; auto stop. Wow and flutter 0.045% wrms; frequency response 25-15,000 Hz (normal), to 16,000 Hz ($CrO_2$), to 18,000 Hz (FeCr), to 19,000 Hz (metal); S/N 67dB with Dolby ..... $380

**RT-2251 Cassette Deck**
Front-loading stereo cassette deck with Dolby noise-reduction system, two dc motors, and permalloy record/playback head. Features Automatic Program Search System that scans in forward and reverse modes and stops at desired selection; soft-touch solenoid tape function controls; LED control display; three-digit tape counter with reset; two VU meters with LED peak indicator; high/low bias and equalization buttons; mic/line input selector; left and right record level controls; output level control. Wow and flutter 0.055% wrms; frequency response 25-17,000 Hz (FeCr); S/N 66 dB with Dolby . $360

**RT-1199 Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features nine-position auto program locate device (scans tape in forward or reverse and stops at desired selection); four-position bias and equalization for normal, $CrO_2$, FeCr, and metal particle tapes; Sharpscan peak level display with peak hold function; electronic auto stop; output volume control; mic/line mixing. Wow and flutter 0.058% wrms; frequency response 30-15,000 Hz (normal), to 16,000 Hz ($CrO_2$ and FeCr), to 18,000 Hz (metal); S/N 67 dB with Dolby..... $280

**RD110AC Micro Cassette Recorder**
Three-cubic-centimeter micro cassette recorder features capstan drive system, two-speed control system, built-in electret condenser mic, auto stop, electronic pause, three-digit tape counter, cue/review, LED record/battery indicator, earphone monitoring, and two-way power supply; accepts two AA batteries; includes ac adaptor ..... $250

**RT-1178 Cassette Deck**
Front-loading stereo cassette deck with Dolby noise-reduction system. Features three-position bias and equalization for normal, $CrO_2$, and FeCr tapes; electronic auto stop; separate left/right record level controls; output volume control; Sharpscan peak level display; auto program search system in forward or reverse. Wow and flutter 0.065% wrms; frequency response 30-15,000 Hz (normal), to 16,000 Hz ($CrO_2$ and FeCr); S/N 67 dB with Dolby..... $230

**RT-30 Cassette Deck**
Front-loacing metal-compatible stereo cassette deck with Dolby noise-reduction system and electronic-controlled dc motor. Features auto program search system in fast forward or rewind; Sharpscan peak-level display; bias and equalization for normal, $CrO_2$, FeCr, and metal tapes; separate left/right record level controls with mic/line input selector; damped eject; electronic auto stop; LED Dolby and record indicators. Wow and flutter 0.075% wrms; frequency response 30-14,000 Hz (normal), to 15,000 Hz ($CrO_2$ and FeCr), to 17,000 Hz (metal); S/N 66 dB with Dolby..... $200

**RT-20 Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features computer-controlled multi display showing Sharpscan peak level meters, time, AM/PM, electronic tape counter, and time counter; bias and equalization for normal, $CrO_2$, and metal tapes; pushbutton tape time remaining counter for C-90, C-60, and C-46 tapes with 3-min warning; timer alarm; 50/60-Hz ac frequency selector; mic/line input selector; auto stop. Wow and flutter 0.08% wrms; frequency response 30-14,000 Hz (normal), to 17,000 Hz (metal); S/N 62 dB with Dolby..... $180

**RT-10 Cassette Deck**
Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and electronic-controlled dc motor. Features LED peak level display; tape selector for normal, $CrO_2$, and metal

For more product information, write directly to the manufacturer. See address list on page 4.

# 1 CASSETTE TAPE MACHINES

tapes; separate left/right record level controls; soft-eject cassette holder; auto stop. Wow and flutter 0.09% wrms; frequency response 30-14,000 Hz (normal), to 16,000 Hz (metal); S/N 62 dB with Dolby; silver finish..... $130
**RT-10BK.** RT-10 with ebony finish..... $130

## SONY

### TC-K77R Cassette Deck

Front-loading metal-compatible stereo cassette deck with IC Dolby noise-reduction system, BSL

servo capstan and dc reel motors, and infrared-sensor rotating three-head system with sendust-ferrite record/play and two-gap ferrite-and-ferrite erase heads for auto reverse play/record at end of tape; includes full-function remote control unit. Features tape selector for normal, $CrO_2$, FeCr, and metal tapes with two-position bias adjust for normal tape; auto reverse system (tape can play both sides once or reverse continually up to five times); auto stop; dual LED peak-reading bar graph display (−40 to +8 dB) with auto/manual peak hold reset buttons; record level control with line/mic input selector; line out/headphones level control; microprocessor-controlled tape transport controls with indicators; auto-space rec mute; three-digit tape counter with memory; punch-in recording; timer record/play with external timer; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 30-17,000 Hz (metal and FeCr), to 16,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 59 dB with FeCr tape, Dolby off (IHF A weighted); 6⅛" H × 17" W × 12¾" D..... $600

### TC-K81 Cassette Deck

Front-loading metal-compatible stereo cassette deck with IC Dolby noise-reduction system, BSL servo capstan and dc reel motors, and separate sendust-ferrite record and play and four-gap ferrite-and-ferrite erase heads. Features separate bias and equalization slide controls for normal, FeCr, $CrO_2$, and metal tapes with bias and separate left/right record calibration (8000/400 Hz tones) controls for all tape types; dual 16-segment LED peak-reading bar graph display with auto/manual peak hold reset buttons and bias/rec level calibration switch; auto play after fast forward/rewind or memory rewind; IC logic tape function controls; auto-space rec mute; record level control with mic/line input selector; line/out phones level control; tape/source monitor switch; three-digit tape counter with memory rewind; timer record/play with external timer; provision for optional remote control; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB 30-18,000 Hz (FeCr and metal), to 17,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 60 dB with FeCr, Dolby off (IHF A weighted); 5⅛" H × 17" W × 11⅜" D..... $530
**RM-50.** Remote control for TC-K81..... $50

### TC-K65 Cassette Deck

Front-loading metal-compatible stereo cassette deck with IC Dolby noise-reduction system, BSL servo capstan and dc reel motors, and sendust-ferrite record/play and four-gap ferrite-and-ferrite erase heads. Features Random Music Sensor with memory (programs up to 16 selections, including repeats, in any order), LED digital program display, auto fast forward/rewind scan, and auto play; separate bias and equalization slide selectors for normal, FeCr, $CrO_2$, and metal tapes; dual LED peak-reading bar graph display (−40 to +8 dB) with auto/manual peak hold reset; microprocessor-controlled tape transport controls; auto-space rec mute; punch-in recording; record level control with separate mic/line level controls; three-digit tape counter with memory rewind; auto replay after memory or manual rewind; timer rec/play with external timer; optional remote control provision; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB 30-17,000 Hz (FeCr and metal), to 16,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 59 dB with FeCr, Dolby off (IHF A weighted); 5⅛" H × 17" W × 11⅜" D..... $500

### TC-K71 Cassette Deck

Front-loading metal-compatible stereo cassette deck with IC Dolby noise-reduction system, BSL servo capstan and high-torque reel motors, and separate sendust-ferrite record and play and four-gap ferrite-and-ferrite erase heads. Features tape selector for normal, $CrO_2$, FeCr, and metal tapes with variable fine bias for normal tape; 16-segment LED peak-reading bar graph display with auto/manual peak hold reset buttons; IC logic solenoid tape transport controls; auto-space rec mute; auto play after manual/memory rewind; record level control; line out/phones control; tape/source monitor switch; three-digit tape counter with memory rewind; timer rec/play; optional remote control provision; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.04% wrms; frequency response ±3 dB 30-18,000 Hz (metal and FeCr), to 17,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 60 dB with FeCr, Dolby off (IHF A weighted); 5⅛" H × 17" W × 11⅜" D..... $430
**TC-K61.** Similar to TC-K71 minus tape/source monitoring; has line/mic input selection; frequency response ±3 dB 30-17,000 Hz (metal and FeCr), to 16,000 Hz ($CrO_2$), to 14,000 Hz (normal); S/N 59 dB under same conditions..... $320

### TC-K44 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc FG servomotor, and sendust-ferrite record/play and four-gap ferrite erase heads. Features pushbutton selectors for normal, $CrO_2$, FeCr, and metal tapes; LED peak-reading/VU meter display; record level control with mic rec/play and line input selector; headphones level control; rec mute; punch-in recording; LED Dolby and record indicators; three-digit tape counter with reset; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response ±3 dB 30-15,000 Hz (FeCr and metal), to 14,000 Hz ($CrO_2$); S/N 58 dB with FeCr, Dolby off (IHF A weighted); 4⅛" H × 17" W × 11⅜" D..... $230
**TC-K22.** Similar to TC-K44 minus rec mute, headphone volume control, LED peak-reading display, and LED Dolby; has super high-density permalloy rec/play head, dual VU meters, and switch selections for tape, Dolby, and line/mic input..... $190

### Limited-Edition Audio Lab Series

### TC-K88B Cassette Deck

Power-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, three-motor quartz-locked direct-drive transport, and separate sendust-and-ferrite record and play and four-gap ferrite-and-ferrite erase heads. Features tape selector for metal, $CrO_2$, FeCr, and normal tapes with variable bias control for all tapes; auto music sensor system; LCD peak-reading meter display with auto/manual peak hold reset buttons; auto stop and auto play; auto-space record mute; feathertouch transport controls; punch-in recording; tape-remaining scale; optional remote control provision; dc head/playback amplifier; fast forward/rewind time 60 sec (C-60). Wow and flutter 0.03% wrms; frequency response ±3 dB 30-17,000 Hz (metal and FeCr), to 16,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 60 dB with FeCr, Dolby off (IHF A weighted); 3⅛" H × 18⅞" W × 15¼" D..... $1200

### Portable

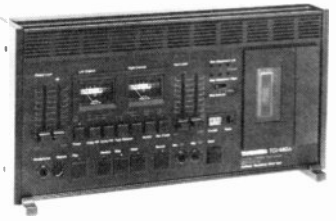
### TC-D5M Portable Cassette Deck

Lightweight metal-compatible stereo cassette deck with Dolby noise-reduction system, coreless motor with FG servo control and dc-to-dc converter power supply, and sendust-ferrite record/playback head. Features dual VU meters with LED peak indicator; switchable limiter; monitor level control; low-impedance mic input; line inputs and outputs; stereo headphone jack with level control; operates on two "D" batteries for up to four hours; 3 lbs, 12 oz; 1⅞" H × 9⅜" W × 6⅝" D..... $700

## TANDBERG

### TCD 440A Cassette Deck

Metal-compatible stereo cassette deck with dual Dolby noise-reduction system, separate record, playback, and Tandberg erase heads (80 dB erasure



at 1000 Hz and 60 dB erasure at 100 Hz), and three motors in dual capstan transport system. Features "DYNEQ™" record equalization circuitry designed to automatically adjust record pre-emphasis of deck to maximize potential treble response while simultaneously minimizing treble distortion; "Actilinear" recording system; dual peak-reading meters with second scale reflecting metal-particle signal levels; 10-kHz test oscillator; bias adjust controls for ferric, $CrO_2$, and metal tapes with set of left/right LEDs; separate slider input and output level controls; source/tape monitor button; record preset; three-digit tape counter with reset; PROM logic-controlled tape function controls with LEDs; LED Dolbys, tape I and II/metal, source/tape, rec preset on/off, and power on/off indicators; optional PCM infrared wireless remote control available. Frequency response 30-20,000 Hz ±3 dB; S/N 70 dB ("A" weighted); anodized matte black finish. $1600

### TCD 340A Cassette Deck

Front-loading stereo cassette deck with four Dolby-B processors, three motors, and separate adjustable azimuth recording and playback heads and dual-gap erase head. Features Actilinear recording system; solenoidless operation; electronic logic tape function controls; equalized peak-reading/VU meters; variable input/output controls; mode indicator lights; tape selector switch; multiplex filter; front-panel electronic editing; pneumatically-damped cassette door; digital tape counter. Wow and flutter 0.12% wrms, 0.08% (JIS); frequency response 30-20,000 Hz; S/N 65 dB (IEC A); horizontal or vertical operation; rack mountable..... $1200

### TCD 420A Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual-Dolby noise-reduction system, three motors in dual capstan transport system, and diamond-cut multicore Senalloy record/playback and Tandberg erase (80 dB erasure at 1000 Hz, 60 dB at 100 Hz) heads. Features Dyneq, dynamic equalization amplifier circuitry; Actilinear recording system; tape and bias selectors for tape I (ferric), II (chrome), and metal with left- and right-channel bias adjust selectors for each tape; separate left and right input and output level vertical slide levers; equalized peak-reading/VU meters; three-digit tape counter with reset; headphone and two mic jacks. Wow and flutter 0.13% wrms; frequency response 30-18,000 Hz ±3 dB; THD 3.0% (metal), 2.0% (ferric and chrome); S/N with metal tape 68 dB (IEC

A); input sensitivity/impedance 8 mV/47k ohms (radio), 40 mV/220k ohms (left/right inputs), mic input sensitivity 0.15-20 mV (mic input matched to dynamic microphone); 4" H × 18 3/16" W × 8 7/8" D... ..... $850

### TCD 320 Cassette Deck

Horizontal- or vertical-operating stereo cassette deck with Dolby B noise-reduction system and synchronous record/replay, fast forward, and back wind motors in dual capstan closed-loop transport system. Features self-adjusting input amplifier; equalized peak-reading/VU meters; defeatable multiplex filter; headphone output and playback volume controls. Wow and flutter 0.13% wrms (record/playback), 0.09% (JIS); frequency response 30-18,000 Hz; S/N 65 dB min..... $650

### TCR-222 Cassette Deck

Top-loading cassette deck for mono recording and playback; has three-motor system, one synchronous hysteresis motor for recording and playback and two servo dc motors for fast winding, and dual-capstan closed-loop drive system. Features peak-reading meter; tape counter; output and input level controls; bass and treble controls; large built-in speaker and amplifier with output power of 12 W continuous. Wow and flutter (DIN) 0.2%; frequency response 40-14,000 Hz (DIN); S/N (DIN) 58 dB; max. dist. 3% at 0 dB; mic input suitable for dynamic microphone with impedance less than 700 ohms; mic input sensitivity 0.1 mV to 17 mV at 200 ohms..... $650

## TAPE-ATHON

### 750 Dual Cassette Play System

Solid-state unit combines two TR 100 standard Philips-type transports and "round robin sequencer" for program intermix; 16-hr mono cassette playback with dc motor and 1/4-track heads; up to seven TR-100 units can be added for 112 programming hours; each transport can be controlled separately to play at 1 7/8 or 15/16 ips; transport A plays one selection of music, switches to transport B for one music selection, and goes back to A again; auto reverse; front-panel controls are eject and reverse pushbutton/transport. Wow and flutter 0.35% at 1 7/8 ips; frequency response 50-6000 Hz ±2 dB at 1 7/8 ips; rugged steel cabinet; 1.75" H × 15" W × 11.625" D..... $720

## TEAC

### C-1 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system and three-motor and three-head dual-capstan transport system with PLL dc servo capstan and two dc coreless reel motors. Features LSI logic tape function operation controls; pitch control to vary tape speed up to ±4%; double-action input controls; two peak program VU meters; three-position bias and equalization switch; optional interchangeable bias/equalization card, CX-8; three-position monitor switch; switchable Dolby/dbx noise reduction system with optional dbx II Interface; input selector switch for mic/mic-with-attenuation/line; memory function for auto-stop/repeat; timer control switch; provision for optional remote control unit. Wow and flutter 0.04% (NAB weighted); frequency response 31.5-18,000 Hz ±3 dB ($CrO_2$), 31.5-16,000 Hz ±3 dB (Hi-Fi); S/N 60 dB, improved 5 dB at 1 kHz and 10 dB over 5 kHz with Dolby; fast-winding time 100 sec (C-60); two mic inputs −72 dB (0.25 mV), 600-ohm impedance; two line inputs 60 mV, 50,000-ohm impedance; available in champagne or brown; 6 1/2" H × 19" W × 13 7/8" D..... $1350

**C-2.** Similar to C-1 except has two motors and accepts metal-particle tape; wow and flutter 0.05%; frequency response 20-20,000 Hz (metal or chrome); S/N 68 dB with Dolby, 90 dB with dbx (optional)..... $1000

**C-3.** Similar to C-2 without provision for optional dbx II Interface and plug-in bias/equalization modules; S/N 58 dB, improved 5 dB at 1000 Hz, 10 dB over 5000 Hz with Dolby..... $600

### CX-650R Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system. Features solenoid-operated bi-directional record/play; feather-touch micro-switched logic tape function controls; separate three-position bias and equalization; programmable auto reverse/continuous play; programmable timer function; record mute; tape counter with memory rewind; provision for optional remote control unit..... $700

### C-3X Cassette Deck

Front-loading two-speed (1 7/8 and 3 3/4 ips) three-head metal-compatible stereo cassette deck with

Dolby B (10-dB S/N improvement over 5000 Hz) and Dolby HX (7-dB at 12,000 Hz and 15 dB at 15,000 Hz S/N improvement) noise-reduction system plus capability for optional dbx II interface. Features bias and equalization slide selectors for normal, $CrO_2$, and metal tapes with separate left/right bias fine adjust and left/right record calibration controls with adjust/preset switch; separate left/right record level controls with mic/line/optional test oscillator input selector; output level control; source/tape monitor switch; IC logic tape function controls with indicators; rec mute; three-digit tape counter with memory play and memory stop; timer play/record with external timer; dual peak-level meters; optional remote control available ..... $650

### A-770 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, separate dc servo capstan and dc reel motors, and three heads. Features microcomputer-controlled LED digital program display with 19-position program memory capacity, memory timer, auto rewind, auto repeat play, and auto search in fast forward and rewind; bias and equalization selectors for normal, $CrO_2$, and metal tapes; IC logic tape function controls including rec mute; record level control with mic/line input selector; output level control; tape/source monitoring; dual peak level meters; timer rec/play with external timer; optional remote control available. Wow and flutter 0.05% (NAB weighted); frequency response 30-19,000 Hz with metal tape ..... $600

**A-660.** Similar to A-770 minus programmable memory system and tape/source monitoring; has three-digit tape counter with memory play/stop and two heads..... $360

### A-550RX Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system and dbx circuitry, dc servomotor, and high-density ferrite erase and record/playback heads. Features feather-touch microprocessor-controlled tape function controls; rec/mute control; programmable record/play timer; three-position bias and equalization; separate left and right record level controls; output level control; mic/line switching; three-digit tape counter with memory rewind. Wow and flutter 0.06% wrms; frequency response 30-16,000 Hz (chrome); S/N 56 dB, 66 dB with Dolby over 10,000 Hz, 90 dB with dbx; 147 mm H × 440 mm W × 345 mm D ..... $550

### CX-400 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and three heads. Features bias and equalization selectors for normal, $CrO_2$, and metal tapes; fluorescent bar graph meter display with peak hold, auto/manual reset, and dimmer controls; three-digit tape counter with memory stop; record level control with mic/line input selector; output level control; tape/source monitor switch; rec mute. Wow and flutter 0.06% (NAB weighted); frequency response 30-20,000 Hz with metal tape..... $320

**CX-310.** Similar to CX-400 minus bar graph metering with meter controls, rec mute, memory stop, tape/source monitor switch, and output level control; has hard permalloy record/play head and dual VU meters; frequency response 30-19,000 Hz with metal ... ..... $200

### M-124 Syncaset Cassette Deck

Front-loading Simul-Sync stereo cassette deck with Dolby noise-reduction system, FG dc servomotor, and record/playback and erase heads. Features Simul-Sync (for monitoring on one track while simultaneously recording on another through the same head) with cross-feed switch for slight blending of left and right channels; mic blend level control with left/blend and right mic jacks; independent bias and equalization selectors for normal and $CrO_2$ tapes; separate left and right record level controls; mic/DIN and line input selector; three-digit tape counter with memory rewind; two VU meters; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.07% (NAB weighted); frequency response 30-16,000 Hz ($CrO_2$); S/N 55 dB, improved 5 dB at 1000 Hz and 10 dB at 5000 Hz with Dolby; input sensitivity/impedance 60 mV/50k ohms (line), 0.25 mV/600 ohms (mic); 6 1/4" H × 16 1/8" W × 11 1/2" D ..... $450

## TECHNICS

### RS-M68 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, FG dc servomotor, and four-track Sendust Extra (SX) record/playback and double-gap ferrite erase heads. Features full auto reverse record/playback with three-position mode switch (continuous play until stopped manually, auto stop at end of reverse record or play cycle, and auto reverse that disengages after end of side); two-color fluorescent bar graph peak meters with adjustable meter light switch; forward and rewind cue/review; three-digit tape counter with memory auto play, rewind auto play, and memory stop; separate three-position bias and equalization for $CrO_2$, FeCr, and normal tapes; input level control with line and mic/DIN input selector; output level control; timer standby switch; fast forward/rewind time 86 sec (C-60). Wow and flutter 0.06% wrms; frequency response 20-17,000 Hz ($CrO_2$ and FeCr); S/N 67 dB with Dolby; input sensitivity/impedance 0.25 mV/36k ohms (mic), 60 mV/47k ohms (line); 6.5" H × 17.75" W × 13.875" D ..... $500

### RS-M56 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, FG dc servomotor, and hot pressed ferrite record/playback and double-gap ferrite erase heads. Features Micro-Computer Music Selector that quickly searches and stops at user-specified song (20-selection capacity in any order) with LED digital display showing Present Status (selection being played), Music Select (next selection programmed to be played), and Music Address (stored instructions of number of selection being played and next selection that will be played) as well as indicating elapsed time between recorded selections through rec mute; two-color fluorescent bar graph peak meters; separate three-position bias and equalization for normal, FeCr, and $CrO_2$ tapes with bias fine adjust; rec mute; cue and review with quick review; separate line and mic input level controls; output level control; three-digit tape counter with memory rewind and memory auto play; timer standby. Wow and flutter 0.045% wrms; frequency response 30-17,000 Hz ($CrO_2$ and FeCr); S/N 67 dB with Dolby; input sensitivity/impedance 0.25 mV/10k ohms (mic), 60 mV/22k ohms (line); 5.875" H × 16.875" W × 10.5" D ..... $500

### RS-M51 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and high-saturation flux density MX record/play head and sendust/ferrite erase heads. Features automatic recording level system with autorec sensor and readout display (searching red LED checks peak levels during seven-second period and green LED indicates level is set and recording can begin) plus manual and up/

down level fine adjust; automatic tape selectors for normal, FeCr, $CrO_2$, and metal tapes; two-color 18-segment fluorescent peak-reading display with auto-reset 2-sec peak hold memory circuit; pause/rec mute control; rewind auto play; auto stop; auto mic/line switchover. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-16,000 Hz (metal, $CrO_2$, and FeCr), to 15,000 Hz (normal); S/N 67 dB with Dolby ..... $400

### RS-M63 Cassette Deck

Front-loading metal-compatible stereo cassette deck with dual Dolby circuitry, hot pressed ferrite combination wide-gap record/narrow-gap playback heads in single housing and double-gap sendust/ferrite erase head, and high-torque dc motor. Features three-head five-LED function display; two-color fluorescent bar graph peak meters with adjustable meter light control; four-position bias and equalization selector for normal, FeCr, $CrO_2$, and metal tapes with bias adjust control; separate line and mic input level controls; tape/source monitor switch; output level control; three-digit tape counter with memory auto play, memory rewind, and rewind auto play; cue and review with quick review; timer standby; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response 20-20,000 Hz (metal), to 18,000 Hz ($CrO_2$ and FeCr); S/N 67 dB with Dolby; 5.625" H × 16.875" W × 10.625" D ..... $380

### RS-M45 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, planar-opposed direct-drive dc servo capstan and dc reel motors, and SX (Sendust Extra) record/playback and double-gap sendust/ferrite erase heads. Features four-position bias and equalization selector for normal, FeCr, $CrO_2$, and metal tapes; two-color 18-segment fluorescent peak-reading bar graph display with auto-reset 2-sec peak-hold memory circuit; input level control with line/mic input selector; output level control; rec mute; timer record/playback with external timer; electronic auto stop; IC logic tape function controls with direct mode switching; optional remote control available with all transport modes; three-digit tape counter with reset; fast forward/rewind time 85 sec (C-60). Wow and flutter 0.035% wrms; frequency response ±3 dB 30-17,000 Hz (metal), to 16,000 Hz ($CrO_2$ and FeCr), to 15,000 Hz (normal); S/N 68 dB with Dolby; input sensitivity/impedance 0.25 mV/100k ohms (mic), 60 mV/47k ohms (line); 3⅞" H × 16⅞" W × 13⅝" D ..... $330

### RS-M24 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, high-torque dc motor, and MX record/playback and double-gap sendust/ferrite erase heads. Features tape selector buttons for normal, FeCr, $CrO_2$, and metal tapes; two-color 18-segment fluorescent peak-level bar graph display with auto-reset 2-sec peak-hold memory circuit; rewind auto play; auto stop; input level control with line/mic selector; output level control; one-touch record button; cue and review; rec mute; record/play timer with external timer; optional remote control available with pause and rec mute functions; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 30-16,000 Hz (metal, $CrO_2$ and FeCr), to 14,000 Hz (normal); S/N 67 dB with Dolby; input sensitivity/impedance 0.25 mV/46k ohms (mic), 60 mV/40k ohms (line); 4¾" H × 16⅞" W × 11⅛" D ..... $250

**RS-M14.** Similar to RS-M24 minus output level control and jack for optional remote control unit; has four-position rotary switch for tapes and double-gap ferrite erase head; mic input sensitivity/impedance 0.25 mV/25k ohms; 9¹¹⁄₁₆" D ..... $200

### RS-M8 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and MX record/play head. Features tape selector for normal, $CrO_2$ and metal tapes; 12-segment fluorescent meters; separate left/right input level controls with line/mic selector; auto stop; three-digit tape counter with reset. Wow and flutter 0.07% wrms; frequency response 20-17,000 Hz (metal), to 16,000 Hz ($CrO_2$), to 15,000 Hz (normal); S/N 66 dB with Dolby; 5⅝" H × 16⅛" W × 8⅛" D ..... $170

**RS-M6.** Similar to RS-M8 without metal compatibility; has three-position tape selector for normal, FeCr, and $CrO_2$ tapes and dual VU meters in place of bar graph display; wow and flutter 0.08% wrms; frequency response 30-15,000 Hz ($CrO_2$ and FeCr), to 14,000 Hz (normal) ..... $140

## Professional Series

### RS-M95 Cassette Deck

Front-loading quartz-locked metal-compatible stereo cassette deck with Dolby noise-reduction system, quartz-locked direct-drive motor, and hot-pressed ferrite record/playback and erase heads in three-head system. Features dual-color fluorescent VU/instant peak/peak hold bar graph display; four-position bias and equalization for normal, FeCr, $CrO_2$, and metal tapes with bias fine adjust; microprocessor tape counter with memory play/rewind/stop; optional RP-9690-P or RP-070 remote control unit available; black metal cabinet ..... $1300

### RS-9900US Cassette Deck

Incorporates closed-loop, double-capstan, three-motor drive, separate amplifier unit, and Dolby noise-reduction system. Features memory play/rewind; pitch control; remaining tape time meter; calibration controls for Dolby play and record, bias, equalization; tape/source monitoring; mike attenuator; tape selection switch; 400- and 8000 Hz test oscillators; MPX filter. Amp unit: S/N 67 dB with Dolby; 55-dB dynamic range (mike amp recording capacity). Tape transport: wow and flutter 0.04% wrms; frequency response 25-18,000 Hz ±3 dB (normal tape), to 20,000 Hz with $CrO_2$ tape; fast-winding time 70 sec (C-60); two HPF record/play and ferrite erase heads; transport: 7⅜" H × 19" W × 14¾" D; amp: 6⅞" H × 19" W × 14¾" D. $1000

### RS-M85II Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system; vertical hold, flat component style; quartz-locked-planar-opposed dc brushless, coreless, slotless direct drive capstan motor with servo-controlled circuit; separate coreless reel motor; full IC logic control; laminated Sendust head; low noise equalizer and high linearity amplifier; MPX filter. Features fluorescent electronic bar graph peak meters with dim/bright and VU/peak meter switch; four-position tape selector with fine bias adjustment; electronic full auto-stop; record muting; mic/line mixing; output level control; three-digit tape counter with memory rewind; timer record with external timer; left and right channel microphone jacks; stereo headphone jack; electronic muting circuit. Wow and flutter 0.035% wrms; speed deviation 0.3%; fast-winding time 80 sec (C-60); frequency response 30-16,000 Hz ±3 dB ($CrO_2$ and FeCr tape), 30-14,000 Hz ±3 dB (normal tape); S/N 59 dB (Dolby off), 69 dB (above 5kHz, Dolby on); mic input sensitivity 0.25 mV; mic impedance 400-10,000 ohms; 3⅞" H × 19" W × 15⅞" D ..... $700

## Micro Series

### RS-M02 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG servo direct-drive dc capstan and dc coreless reel motors, and SX record/playback and double-gap sendust/ferrite erase heads. Features two-color fluorescent peak-reading bar graph display; tape selector buttons for normal, FeCr, $CrO_2$, and metal tapes; IC logic tape function controls; rec/rec mute button with LED; input level control with rear-panel mic/line switch and front-panel LED mic indicator; timer record/play with external timer; three-digit tape counter with reset; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.035% wrms; frequency response ±3 dB 30-17,000 Hz (metal), to 16,000 Hz ($CrO_2$ and FeCr), to 14,000 Hz (normal); S/N 68 dB with Dolby; input sensitivity/impedance 0.25 mV/400-10,000 ohms (mic), 60 mV/47k ohms (line); 3⅞" H × 11¾" W × 9" D ..... $500

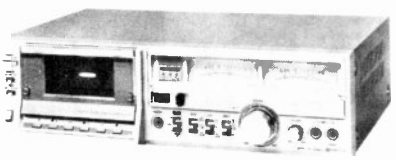
### RS-M04 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and MX record/playback head. Features auto tape selector buttons for normal, $CrO_2$, FeCr, and metal tapes; two-color 18-segment fluorescent bar graph display with auto-reset peak hold memory circuit; music selector system; rewind auto play; auto stop; input and output level controls; rec mute; timer standby; three-digit tape counter with reset. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-16,000 Hz (metal, $CrO_2$, and FeCr), to 14,000 Hz (normal); S/N 67 dB with Dolby; 12.2 cm H × 29.7 cm W × 23.2 cm D ..... $300

# TOSHIBA

### PC-X60AD Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multi-



plex filter, dc servo capstan and dc reel motors, high-linearity dc amplification, and Aurex-Sendust record/play and Aurex-Ferrite erase heads. Features bias and equalization selectors for normal, $CrO_2$, and metal tape with LED tape indicators; −40 to +10-dB peak level meters; IC logic-controlled feathertouch tape function controls with LEDs; record level control with mic/line/rec mute input selector; output level control; three-digit tape counter with reset and memory stop/play; rec/play timer with external audio timer; fast forward/rewind time 70 sec (C-60). Wow and flutter 0.035% wrms; frequency response at ±3 dB 20-17,000 Hz (normal), to 18,000 Hz (chrome), to 20,000 Hz (metal); S/N 70 dB (metal with Dolby); THD 0.6% (metal); input sensitivity/impedance 0.25 mV/600 ohms (mic), 70 mV/50k ohms (line); metallic silver diecast aluminum front panel; 4¾" H × 16⁹⁄₁₆" W × 11" D ..... $400

### PC-X33 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter. Features IC logic feathertouch tape function controls; four-position tape selector; LED bar graph peak meter display; separate left/right record level controls; auto repeat with memory rewind; rec mute; optional remote control available. Wow and flutter 0.045% wrms; frequency response 25-18,000 Hz ±3 dB with metal; S/N 60 dB (metal, Dolby off); 4⅓" H × 16⁹⁄₁₆" W × 11" D ..... $330

### PC-X22 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter and super hard All-Permalloy head. Features four-position tape selector; VU meters; separate left/right level controls; rec mute. Wow and flutter 0.05% wrms; frequency response 25-18,000 Hz ±3 dB with metal; S/N 60 dB (metal, Dolby off); 4⅓" H × 16⁹⁄₁₆" W × 11" D. ..... $250

### PC-X12 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex filter, dc servomotor, and super hard Aurex-Permalloy record/play and four-gap Aurex-Ferrite

erase heads. Features bias and equalization selectors for normal, $CrO_2$, and metal tapes; recording and output level controls; line/mic input selector; oil-damped soft eject; cue and review; dual lighted VU meters; one-touch recording; timer standby with external audio timer; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response at ±3 dB 30-15,000 Hz (normal), to 16,000 Hz (chrome), to 18,000 Hz (metal); S/N 69 dB with Dolby; THD 0.8% (metal, 400 Hz, 0 dB); input level/impedance 0.25 mV/600 ohms (mic), 70 mV/50k ohms (line); silver finish; 5⁹/₁₆" H × 16⁹/₁₆" W × 10¹¹/₁₆" D..... $199

**PC-X12B.** PC-X12 in matte black..... $210

### PC-X10M Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servomotor, and permalloy record/play and ferrite erase heads. Features bias and equalization selectors; separate left/right record level controls; dual lighted VU meters; LED record and noise-reduction indicators; cue and review; timer record/play with external audio timer; full auto stop; fast forward/rewind time 80 sec (C-60). Wow and flutter 0.05% wrms; frequency response ±3 dB 25-15,000 Hz (normal), to 16,000 Hz (chrome), to 18,000 Hz (metal); S/N 69 dB (metal with Dolby); input level/impedance 0.25 V/600 ohms (mic), 100 mV/50k ohms (line); 5¹¹/₁₆" H × 16⁹/₁₆" W × 8¹/₄" D..... $170

## UHER by WALTER ODEMER

### CR-240 Portable Cassette Deck

Compact front-loading portable cassette deck with Dolby noise-reduction system, collectorless, low-wear motor with electronic control, two contrarotating flywheels, and built-in loudspeaker for mono monitoring. Features automatic start after fast-forward or rewind; automatic end-of-tape shut-off; switchable alc; remote control accessory; clock timer operation; separate or tandem (mechanical coupling) record level controls; twin peak-reading level meters for record and playback with meter illumination and three LED function indicators; battery check with quick-action switch; built-in condenser microphone; linear stereo power amplifier; stereo headphone jack socket; joy stick control for selection of three tape transport functions. Wow and flutter 0.2% (DIN); frequency response 30-16,000 Hz; S/N 58 dB (Dolby off, FeCr), 66 dB (Dolby on, $CrO_2$ and FeCr), 65 dB (Dolby on, $Fe_2O_3$); crosstalk at 1 kHz, −70 dB (reverse track), −45 dB (stereo); mic input 0.2 mV at 500 ohms source impedance; power: ac mains, dry cells, rechargeable, or car battery; 9¹/₄" × 2¹/₃" × 7¹/₄" ..... $1489

**CR-240AV.** Audio-visual version of CR-240.. $1576

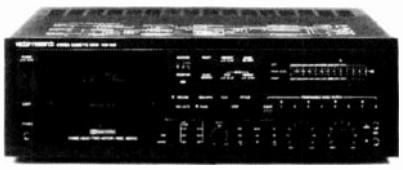
### CG-332 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system and hard permalloy tape head. Features separate left and right channel level controls, plus combined master control; adjustable headphone power stage; three-position tape type selector switch (Fe, $CrO_2$, FeCr); three-digit memory tape counter; tape run indicator; automatic end-of-tape shut-off; twin moving-coil VU level meters; LED peak indicator. Wow and flutter 0.13%; frequency response 40-14,000 Hz (Fe), 40-17,000 Hz ($CrO_2$ tape), 40-18,000 Hz (FeCr tape); S/N 56 dB (Dolby off), 62 dB (Dolby on); crosstalk 60 dB (reverse track), 25 dB (stereo); mic input sensitivity 0.2 mV/500 ohms; separate sockets for headphones, left and right microphones, DIN input/output, line output, line input; 3.9" H × 15" W × 10.1" D ..... $533

## VECTOR RESEARCH

### VCX-600 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system containing four Dolby processors, fg servo dc capstan and servo reel motors, and separate Sendust record, Sendust playback, and ferrite erase heads. Features computerized programmable music search (eight program buttons with LEDs represent eight selections on tape side, of which one or several chosen pieces are sought out and played); programmable search that



automatically seeks next selection; separate bias and equalization for Fe, Co, and metal tapes with bias adjust; dual LED peak level bar graph meters; separate auto play and rewind buttons; memory stop; IC logic tape function controls with LEDs; rec mute; cue and review; input and output level controls; tape/source monitor switch; three-digit tape counter with reset; optional remote control capability; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response ±3 dB 30-16,000 Hz (normal), to 18,000 Hz (Co/$CrO_2$), to 20,000 Hz (metal); S/N (A weighted, 3.0% THD) 65 dB with Dolby; input sensitivity/impedance 60 mV/50,000 ohms (line), 0.25 mV/600 ohms (mic); output level/impedance 580 mV/1000 ohms (line), headphones 8 ohms; 5³/₈" H × 17³/₈" W × 14³/₄" D..... $750

**VCX-500.** Similar to VCX-600 less eight-selection programmable music search, auto play and rewind, and tape/source monitor switch; has combination Sendust record/playback and ferrite erase heads; line output level/impedance 500 mV/1000 ohms... ..... $575

**VCX-300.** Similar to VCX-500 without rec mute; has electrically-governed dc motor and piano-key tape function controls; no option for remote control unit; wow and flutter 0.09% wrms; frequency response ±3 dB 30-15,000 Hz (normal), to 17,000 Hz (Co/$CrO_2$), to 19,000 Hz (metal)..... $400

**VRC-2.** Wired remote control for VCX-500/600 . $75

## YAMAHA

### TC-1000 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, PLL servomotor and mechanical governor reel motor, "Pure Plasma Processed" Sendust-Alloy record/playback head and ferrite erase head, and dual FET differential ICL low-noise amplifier. Features mic attenuator switch; auto stop; memory rewind; tape select/bias fine adjust switch for $CrO_2$, LH, and FeCr tapes; timer recording; headphone amp; mic/line mixing; dual line output (fixed and variable); FM multiplex filter; twin peak-reading meters; LED Dolby and record indicators; electronically-controlled operating switches; three-digit tape counter with reset; headphone and two mic jacks; fast forward/rewind time 70 sec (C-60). Wow and flutter 0.05% wrms (JIS); frequency response 30-16,000 Hz (LH), 30-18,000 Hz ($CrO_2$), both ±3 dB; THD at 1000 Hz 1.0% (LH), 1.6% ($CrO_2$); S/N 60 dB without Dolby (JIS weighted), 69 dB at 5000 Hz with Dolby; channel separation 30 dB at 1000 Hz; input sensitivity/impedance 0.25 mV/600 ohms (mic), 50 mV/50k ohms (line); output level 340 mV max. (line), 1 mW into 8 ohms (headphone); 6¹¹/₁₆" H × 18¹/₈" W × 12⁷/₈" D.. $650

### K-950 Cassette Deck

Direct-front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG

dc servo capstan and high-torque dc reel motors, Pure Plasma Process Sendust record/play and double-gap ferrite erase heads, and low-noise equalizer amp circuitry. Front-panel features are −30 to +3 dB peak-level bar-graph display; LED LH, $CrO_2$, metal, and Dolby indicators on display panel; IC logic tape function controls, including rec mute with LED and auto rec/pause; sliding record and output level controls. Hidden controls behind front panel include bias and equalization selector for LH, $CrO_2$, and metal tapes with bias adjust; Dolby NR with multiplex filter switch; subsonic filter switch; record balance control; line/mic input selector; tape/source monitor switch; sharp/soft focus switch (controls quality of sound images during tape playback); memory rewind; timer record/play with external timer; two mic jacks. Wow and flutter 0.028% wrms (JIS); frequency response ±3 dB 30-17,000 Hz (LH), to 19,000 Hz ($CrO_2$), to 22,000 Hz (metal); S/N 60 dB with $CrO_2$, Dolby off (JIS weighted); input sensitivity/impedance 0.3 mV/5k ohms (mic), 60 mV/50k ohms (line); fast forward/rewind time 75 sec (C-60); 5.5" H × 17.5" W × 12" D..... $550

### K-850 Cassette Deck

Direct-front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronic governor dc servomotor, Pure Sendust record/playback and double-gap ferrite erase heads, and dc EQ amp circuitry. Features auto repeat, auto rewind, auto recording standby, timer record (with external timer), and manual (defeats all auto functions) positions on auto function selector; LH, $CrO_2$, and metal tape selection with auto switching between LH and $CrO_2$ tapes; sharp/soft focus switch for improved sound image; dual −40 to +5 dB peak-level meters; IC logic tape function controls, including auto rec/pause and rec mute; auto shut-off; record and output level controls; "Roller-Coupled Cassette Holder" grip with hinged cover when no tape is loaded; fast forward/rewind time 75 sec (C-60). Wow and flutter 0.04% wrms (JIS); frequency response ±3 dB 30-16,000 Hz (LH), to 18,000 Hz ($CrO_2$), to 19,000 Hz (metal); S/N 60 dB with $CrO_2$, Dolby off; input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/100k ohms (line); 5³/₁₆" H × 17³/₄" W × 12³/₄" D ..... $360

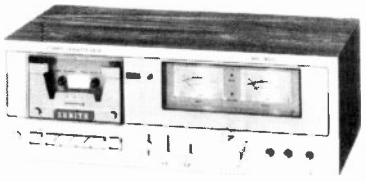
### K-350 Cassette Deck

Direct-front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servomotor, and Sendust record/play and double-gap ferrite erase heads. Features tape selector buttons for LH, $CrO_2$, and metal tapes; auto shutoff; directly switchable transport functions; separate left/right record level controls; dual VU meters; direct tape-loading with flip-up mechanism cover; three-digit tape counter with reset; fast forward/rewind time 90 sec (C-60). Wow and flutter 0.06% wrms; frequency response ±3 dB 40-14,000 Hz (LH), to 15,000 Hz ($CrO_2$), to 18,000 Hz (metal); S/N 57 dB with $CrO_2$, Dolby off; input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/80k ohms (line); 5³/₃₂" H × 17¹/₈" W × 10¹/₂" D .... $240

## ZENITH

### MC9070 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc mo-



tor, and recording/playback and erase heads. Features two VU meters with LED peak indicators; bias and equalization for normal, FeCr, and $CrO_2$ tapes; left/right record level control; piano-key tape function controls; three-digit tape counter. Wow and flutter 0.08% wrms (JIS); frequency response ±3 dB 40-13,000 Hz (normal), to 14,000 Hz ($CrO_2$), to 15,000 Hz (FeCr); HD 1.5%; S/N 66.5 dB with Dolby, $CrO_2$; 5.98" H × 16.77" W × 9.33" D . $250

# 2 OPEN-REEL TAPE MACHINES

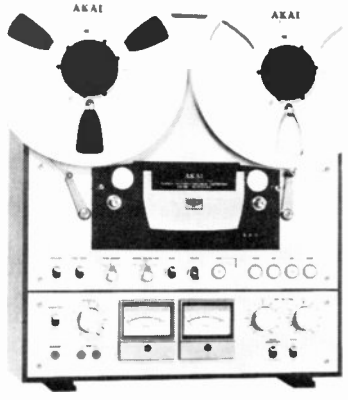
## AKAI

### PRO-1000 Stereo Tape Deck

Three-speed (15, 7½, and 3¾ ips), ½-track record/play and ¼-track play two-channel stereo system; will handle up to 10½-in reels; double-capstan closed-loop drive system; one ac servomotor for capstan drive and two six-pole eddy current motors for reel drive; three GX heads and one full-track erase head. Features illuminated VU meters with changeover switch for reading peak/VU and bias; built-in mixing of four different inputs with panpots; input selector switch with 30 dB microphone attenuator; full mic/line mixing capability; tape/source monitoring; remote control and timer operation (with optional RC-17 or RC-18); feather-touch full logic solenoid control system; NAB playback standards; recording input level control; independent left and right output volume controls. Wow and flutter 0.025% wrms (15 ips), 0.04% wrms (7½ ips), 0.08% wrms (3¾ ips); frequency response 50-20,000 Hz ±1 dB (15 ips), 40-24,000 Hz ±3 dB (7½ ips), 60-12,000 Hz ±3 dB (3¾ ips); THD 1%, 1 kHz, 0 VU; S/N 60 dB; fast-forward and rewind time within 120 sec (1800-ft tape); 16¼" H × 18" W × 8" D ..... $1995

### GX-650D Stereo Tape Deck

Three-speed (15, 7½, and 3¾ ips), ¼-track two-channel stereo/mono system; will handle up to




10½-in reels; closed-loop double capstan mechanism; three motors with ac servo-controlled capstan drive; glass and crystal ferrite heads. Features line/mike mixing; sound-on-sound recording facilities; dual-monitoring system; remote control (with optional RC-17 accessory); automatic stop; pause lever switch; cue switch; individual line-output volume control; tape selector switch (low noise/wide range); four-digit tape index counter; two VU meters; two mike input jacks; stereo headphone jack; RCA-type line input and output jacks; record and pause indicator lamps. Wow and flutter 0.04% rms (15 ips), 0.055% rms (7½ ips), 0.07% rms (3¾ ips); frequency response 30-30,000 Hz ±3 dB at 15 ips, 30-26,000 Hz ±3 dB at 7½ ips (both with LN-150 tape); dist. 0.4% at 15 and 7½ ips (1000 Hz, 0 VU). 20.6" H × 17.4" W × 10" D ..... $1295

### GX-635DB Stereo Tape Deck

Two-speed (7½ and 3¾ ips), ¼-track, two-channel record/playback stereo deck with dual-process Dolby noise-reduction system, ac servo direct-drive capstan and two reel motors, and two GX record, two GX playback, and two erase heads; handles up to 10½-in reels. Features automatic reverse in record/playback; ±6% pitch control; full logic solenoid function controls; mic/line mixing; output level control; record mute; real time counter; remote control jack. Wow and flutter 0.03% wrms at 7½ ips; frequency response 30-27,000 Hz ±3 dB with WR tape; dist. 0.5% at 7½ ips (1000 Hz, 0 VU); S/N 62 dB DIN without Dolby, improved 10 dB above 5000 Hz with Dolby; 19" H × 17.4" W × 10.1" D .. ..... $1095

**GX-635D.** Similar to GX-635DB without Dolby noise-reduction system ..... $995

### GX-267D Stereo Tape Deck

Two-speed (7½ and 3¾ ips), ¼-track, two-channel stereo deck with two GX playback, two GX record, and two erase heads and center pole generator ac servo capstan and two eddy current reel motors; handles up to 7-in reels; direct capstan drive system. Features two brake drums each fitted with Mylar brake belt for supply and take-up reels; three-position record/playback auto reverse for one-way record/playback, one-cycle record/playback, or one-cycle record and continuous playback; feather-touch solenoid operations controls with direct function control; record mute with 1-sec timing indicator; timer start switch with wake-up music function; line/mic input mixing controls; instant pause control; dual VU meters; low noise/wide range tape selector switch; dual monitoring; left/right record mode selector switches; output level control; one-way damped tension arm. Wow and flutter 0.04% wrms (7½ ips), 0.06% wrms (3¾ ips); frequency response ±3 dB 30-25,000 Hz (7½ ips), to 19,000 Hz (3¾ ips), both with Akai LN-150-7 tape; dist. 0.5% at 1000 Hz, 0 VU; S/N 60 dB (JIS); input sensitivity/impedance 0.25 mV/2.4k ohms (mic), 70 mV/100k ohms (line); output level 0.775 V (line), 100 mV into 8 ohms (headphone); 18.5" H × 17.3" W × 9.8" D ..... $850

### GX-620 Stereo Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track two-channel stereo/mono tape deck with ac servo direct-drive capstan and two eddy current reel motors and GX record, GX playback, and erase heads; 10½-in reel capacity. Features illuminated logic solenoid tape function controls with standby indicators; mic/line mixing; tape/source monitor switch; output level control; low noise/wide range tape selector; stereo/mono record selector; rec mute; see-through head cover for editing; provision for record/playback timer; two VU meters. Wow and flutter 0.03% rms at 7½ ips; response 30-26,000 Hz ±3 dB at 7½ ips; dist. 0.5% at 1000 Hz, 0 VU (7½ ips), S/N 62 dB DIN; 17.6" H × 17.4" H × 9.5" D ..... $725

### GX-255 Stereo Tape Deck

Two-speed (7½ and 3¾ ips), ¼-track two-channel stereo/mono tape deck with ac servo direct drive capstan and two eddy-current reel motors and three GX heads in four-head function; 7-in reel capacity. Features auto/manual reverse playback; tape/source monitor switch; mic/line mixing; output level control; low noise/wide range tape selector; illuminated logic solenoid tape function controls with standby indicators; see-through head cover for editing; stereo/mono record; two VU meters. Wow and flutter 0.04% rms (7½ ips); frequency response 30-24,000 Hz ±3 dB at 7½ ips; dist. 0.5% at 1000 Hz, 0 VU (7½ ips); S/N 61 dB DIN; 16.5" H × 17.3" W × 9.5" D ..... $650

### GX-4000DB Stereo Tape Deck

Two-speed (7½ and 3¾ ips), ¼-track, two-channel stereo system with Dolby noise-reduction system, GX recording and playback heads and erase head, and four-pole induction motor; handles up to 7-in reels. Features tape/source monitor and low noise/wide range selector switches; auto stop; mic/DIN/line mixing; output control; pause control; four-digit index counter with reset; LED record indicator. Wow and flutter 0.08% wrms; frequency response ±3 dB 30-24,000 Hz (7½ ips), to 16,000 Hz (3¾ ips); dist. 1.0% at 1000 Hz, 0 VU; S/N 60 dB without Dolby; input sensitivity 0.25 mV (mic), 70 mV (line), 2 mV into 10k ohms (DIN); output level 580 mV (line), 100 mV into 8 ohms (headphone), 0.3 V (DIN); 12.4" H × 17.3" W × 9.1" D ..... $500

**GX-4000D.** Same as GX-4000DB without Dolby noise-reduction system ..... $400

### 1722II Stereo Tape Deck

Two-speed (7½ and 3¾ ips), ¼-track, two-channel stereo tape system with record/playback and erase heads and two-speed induction motor; handles up to 7-in reels. Features low noise/wide range tape selector switch; three-way speaker switch for mute/recording monitor, normal, and PA; auto shut-off; rear-panel speaker switch convertible to PA system; pause control; built-in phono equalizer amp directly records from magnetic phono cartridge; built-in 5 × 7-in speakers with speaker jacks; line and DIN in and out connections; two VU meters. Wow and flutter 0.14% rms (7½ ips), 0.18% rms (3¾ ips); frequency response ±3 dB at 7½ ips 30-21,000 Hz (wide-range tape), to 18,000 Hz (low-noise), at 3¾ ips 40-15,000 Hz (wide range), to 13,000 Hz (low-noise); dist. 2.0% at 1000 Hz, 0 VU; S/N 50 dB; output 10 W total music power, 6 W continuous; crosstalk 60 dB (mono), 45 dB (stereo); input sensitivity/impedance 0.5 mV/100k ohms (mic), 150 mV/330k ohms (line); output level 1.23 V (line), 100 mV into 8 ohms (headphone), 5 W into 8 ohms (speaker); 14.1" H × 14" W × 9.8" D ..... $475

### *4-Channel*

### GX-270D-SS 4-Channel Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track, four and two channel record/play deck with ac servo direct-drive capstan motor plus two eddy current motors for fast-forward and rewind and four GX heads in three-head function; 7-in reel capacity. Features full logic solenoid function controls; automatic stereo reverse playback; tape/source monitoring; "Quadra-Sync" recording; pitch control for record/playback (±5%);

line output control; mic/line mixing; low noise/wide range tape selector; auto stop; four VU meters. Wow and flutter 0.07% rms (7½ ips); S/N 54 dB (measured via tape with peak recording level of +6 dB); frequency response 30-21,000 Hz ±3 dB (7½ ips); distortion 1% (1000 Hz, 0 VU); 18.3" H × 17.3" W × 7.5" D..... $1075

## NEAL-FERROGRAPH (USA)

### SP7 Tape Recorder

Three-speed (choice of 15, 7½, and 3¾ high, 7½, 3¾ and 1⅞ medium, or 3¾, 1⅞, and 15/16 low ips) tape recorder with three motors, 250-μin record, 80-μin replay, and erase heads; choice of mono full-track or half-track or stereo half-track or quarter-track heads; max. reel capacity 10½ in. Features illuminated VU meters logic-controlled transport functions; 0.1-sec fast start/correct speed operation; damped tension arms; remote control facility. Other options include balanced line in/line out, power amp/speaker, rack mounting, Cannon XLR connectors, stainless-steel retainers, and Dolby noise-reduction in stereo only. Wow and flutter (peak, DIN weighted) at high speed 0.08% (15), 0.1% (7½), 0.17% (3¾), at medium speed 0.08% (7½), 0.15% (3¾), 0.2% (1⅞), at low speed 0.15% (3¾), 0.2% (1⅞), 0.4% (15/16); frequency response 30-20,000 Hz +2 dB (15), 30-17,000 Hz +2 dB (7½), 40-14,000 Hz ±3 dB (3¾), 50-7000 Hz ±3 dB (1⅞), 60-3000 Hz ±3 dB (15/16); S/N 60 dB (½ track, Dolby out), 58 dB (¼ track, Dolby out); 16⅞" H × 18¾" W × 10" D.

**SP7 A1.** Mono line in/line out ..... $1463
**SP7 A3.** Mono line in/line out with mic amp . $1646
**SP7 A2.** Stereo line in/line out..... $1829
**SP7 A4.** Stereo line in/line out with mic amplifier... ..... $1966
Balanced lines (per channel)..... $274
Power amp and speaker (per channel) ..... $183
Cannon XLR sockets (per channel)..... $46
Rack-mounting brackets ..... $156
Dolby B noise-reduction system; for stereo only ..... ..... $411

## OTARI

### MX-5050-B Stereo Tape Recorder

Two-channel ½-track (¼-track reproduce) three-speed (internally switchable pairs of 15 and 7½ ips or 7½ and 3¾ ips) compact professional tape recorder with variable three-speed (±7%) dc servo capstan and two induction torque reel motors and four plug-in rugged Permalloy head stacks (½ track erase, record and reproduce and ¼-track reproduce); handles 10½-in EIA or NAB reels and 5- or 7-in plastic reels; ¼-in tape. Features dual VU meters with +9-dB peak-reading LEDs; adjustable bias; record equalization for high and low speeds for each channel; two-speed operation button in speed pairs; four-digit tape counter with reset and selection locater memory that recues machine to zero setting; cue control; edit control; selective reproduce; TTL-IC logic noise-free punch-in/punch-out record; motion-sensing play mode directly from fast forward or rewind; fixed output level control; two line/mic input level controls; LED flashing record; built-in 1000-Hz test oscillator; rewind time 90 sec for 2500-ft reel. Wow and flutter (NAB weighted) 0.05% (15 ips), 0.06% (7½ ips), 0.10% (3¾ ips); frequency response +2 dB 30-22,000 Hz (15 ips at 0 VU), 25-20,000 Hz (7½ ips at −10 VU), 30-12,000 Hz (3¾ ips at −10 VU); dist. 1.0% at 1000 Hz, 250 nWb/m; S/N (weighted) 65 dB (15 and 7½ ips), 64 dB (3¾ ips); crosstalk 55 dB at 1000 Hz on adjacent tracks; line inputs 15 dBm, 50k ohms unbalanced and 600 ohms balanced; mic input −70 dBm, 50k ohms unbalanced; line output 4 dBm/−10 dBm (fixed level, switch selectable), max. output +28 dBm, headroom +24 dBm before clipping, load impedance 600 ohms balanced, output impedance 50 ohms balanced; headphone jack −24 dBm, 8-ohm impedance; standard 3-pin XLR connector. Includes 10½-in NAB reel, precision hold down knob, and NAB reel shims; vinyl wooden cabinet; vertical or horizontal operating position; 21⅞" H × 21½" W × 8⅛" D..... $2050

### 4/8 Channel

### Mark II Four-Channel Recorder

Incorporates features of MX-5050 plus separately packaged transport and electronics, dc capstan

servo with pitch control, plug-in electronics, complete accessibility to electronics adjustments, and interface jack for adding dbx or Dolby noise-reduction system; tape speeds 15 and 7½ ips; three four-track heads in line stacks for erase, record, reproduce; wow and flutter 0.05% at 15 ips, 0.06% at 7½ ips; frequency response 50-20,000 Hz +2 dB, 35-25,000 Hz +3 dB (15 ips at 0 VU), 50-18,000 Hz +2 dB, 40-20,000 Hz +3 dB (7½ ips at −10 dB); 600-ohm balanced output; 10½ in NAB reels; ½-in tape, 0.075-in track width; 25¼" × 19" standard rack mount..... $3595
**Two-Channel.** Same as Mark II but uses ¼-in tape; will handle 5- and 7-in plastic reels or 10½-in EIA or NAB; 21¼" × 19" standard rack mount... $2445

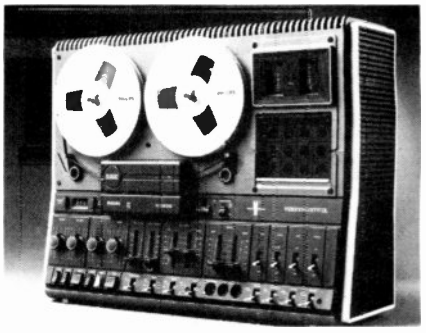
### MX-5050-QXHD Four-Channel Recorder

Four-channel, two-speed (15 and 7½ ips), ¼-track, ¼-in tape recorder/reproducer with dc capstan servo system and two induction torque reel motors; reel size 5, 7, and 10½ inch EIA or NAB; four head stacks, erase (tracks 1 and 3), erase (tracks 2 and 4), record (four track), and reproduce (four track); rewind time less than 90 sec (2500-ft reel). Wow and flutter 0.05% at 15 ips, 0.06% at 7½ ips; connectors: line in/out standard three-pin XLR, mike standard ¼-in phone jack; inputs: 15 dBm unbalanced 50k ohms, 600 ohms balanced with optional transformer, mike 70 dBm unbalanced nominal 50k ohms; outputs: variable or fixed level, headroom 19 dBm before clipping; headphone jack −24 dBm nominal, 8 ohms unbalanced; NAB standard equalization; S/N 63 dB weighted at 15 ips, 62 dB weighted at 7½ ips; frequency response 50-20,000 Hz +2 dB, 35-25,000 Hz +3 dB (both at 15 ips), 50-18,000 Hz +2 dB, 40-20,000 Hz +3 dB (both at 7½ ips); distortion 1% at 1000 Hz at 185 nWb/m; vertical or horizontal operation; vinyl-covered wood case; rack mounting kit and floor console optional; transport 16 11/16" H × 18⅛" W × 9½" D; electronics 11 3/16" H × 18⅛" W × 9½" D... ..... $2845
**MX-5050-8D.** Similar to MX-5050-QXHD except eight-channel ½-in recorder/reproducer ..... $4895

## PHILIPS

### N4506 Tape Recorder

Three-speed (7½, 3¾, and 1⅞ ips) switchable ¼ or ½-track preamplified tape recorder with three direct-drive dc motors and three heads; accepts reels up to 7 in. Features dynamic noise limiter in playback mode; A-B monitor switch; two peak-reading meters; solenoid transport controls with direct switchable tape direction; input selection and level adjustment of phono, tuner, aux., and line; adjustable outputs; sound-on-sound and sound-with-sound; post-fading; four-digit counter with memory stop; auto stop; LED overload indicators; cueing. Frequency response 35-11,500 Hz (1⅞ ips), to 20,000 Hz (3¾ ips), to 26,000 Hz (7½ ips); S/N



(without DNL) 60 dB (7½ and 3¾ ips), 58 dB (1⅞ ips); wow and flutter 0.05% (7½ ips), 0.07% (3¾ ips), 0.2% (1⅞ ips); fast-winding time 180 sec (1800 ft); channel separation 30 dB; track separation 60 dB 17" H × 21¾" W × 8¼" D..... ..$630

### N4504 Tape Recorder

Three-speed (7½, 3¾, and 1⅞ ips) ¼-track tape recorder with three direct-drive dc motors and three heads; max. reel capacity 7 in. Features two peak-reading meters; solenoid transport controls with direct switchable tape direction; A-B monitor switch; dynamic noise limiter. Frequency response 35-11,500 Hz (1⅞ ips), to 20,000 Hz (3¾ ips), to 26,000 Hz (7½ ips); S/N (without DNL) 60 dB (7½ and 3¾ ips), 58 dB (1⅞ ips); wow and flutter (wrms) 0.05% (7½ ips), 0.07% (3¾ ips), 0.2% (1⅞ ips); fast-winding time 180 sec (1800 ft); channel separation 25 dB; track separation 60 dB; full complement of inputs/outputs; 16¾" H × 16⅜" W × 7¼" D..... $480

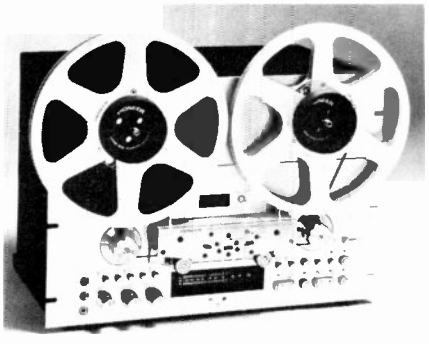
## PIONEER

### RT-2022 Stereo Tape Deck

Two-speed (7½ and 15 ips), ½-track, three-motor, three-head stereo deck; will handle up to 10½-in reels; 4/8 pole hysteresis synchronous motor and two six-pole inner-rotor induction motors for reel drive. Features solenoid-operated direct-change function buttons; separate transport and amplifier units; plug-in head assembly; scrape filter; continuously variable tape bias, two-step tape equalizer and tape selector with time-constant switch mechanism for use with all types of tape; wide-dynamic-range playback amplifier; independent recording amplifier for line and mike input/output; "synchromonitor" mechanism for sound-on-sound and sound-with-sound. Wow and flutter 0.04% wrms at 15 ips, 0.08% wrms at 7½ ips; S/N 55 dB; THD 0.8% max. at 15 ips, 1.0% max. at 7½ ips; response 30-28,000 Hz +3 dB at 15 ips, 40-20,000 Hz +3 dB at 7½ ips; full complement of inputs and outputs; 21¾" H × 18⅛" W × 10 13/16" D.... $1590

### RT-909 Stereo Tape Deck

Two-speed (3¾ and 7½ ips), ¼-track, three-motor, four-head stereo tape deck; FG dc servo dual-cap-



stan motor and two six-pole inner rotor reel motors; accepts both 10½- and 7-in reels. Features two-step bias and equalization selector with variable

# 2 OPEN-REEL TAPE MACHINES

bias; Fluroscan level indicators with peak and average functions; four-digit electronic counter; reel and speed selector; pitch control; repeat switch; timer start with external timer; auto reverse; tape/monitor switch; separate mic/line and left/right input level controls; output level control. Wow and flutter 0.04% at 7½ ips, 0.08% at 3¾ ips; frequency response 20-28,000 Hz ±3 dB (7½ ips), 20-18,000 Hz ±3 dB (3¾ ips); S/N 60 dB (7½ ips), 55 dB (3¾ ips); 13⅜" H × 18⅞" W × 12½" D ..... $895

**RT-901.** Similar to RT-909 except has three heads. ..... $795

### RT-707 Stereo Tape Deck

Auto-reverse playback stereo reel to reel tape deck; two speed (3¾ and 7½ ips); speed accuracy ±0.5%; three-motor, four-head, ¼-track, two-channel design; handles 7-in reels; FG servo ac direct drive motor for capstan drive and two six-pole inner-rotor induction motors for reel drive. Features solenoid operated, direct switchable function buttons and preset function buttons for timer record and play; auto and manual reverse play; auto repeat play; independent L/R recording mode selectors; two bias and two equalization tape selection; full complement of inputs/outputs. Wow and flutter 0.05% wrms (7½ ips), 0.08% wrms (3¾ ips); S/N 58 dB; dist. 1% max. (7½ ips); fast rewind 100 sec (7-in reel); frequency response 30-24,000 Hz ±3 dB (7½ ips), 30-16,000 Hz ±3 dB (3¾ ips); crosstalk −50 dB; channel separation 50 dB; pitch control ±6% (playback only); 9¹⁄₁₆" H × 18²⁹⁄₃₂" W × 14¹³⁄₃₂" D ..... $695

### RT-701 Stereo Tape Deck

Two speed (3¾ and 7½ ips) design; speed accuracy ±0.5%; three-motor, three-head design; FG servo ac direct drive motor for capstan drive and two six-pole inner-rotor induction motors for reel drive; handles 7-in reels. Features solenoid-operated direct switchable function buttons and preset function buttons for timer record and play; permalloy heads; line/mike mixing; two bias and two equalization tape selectors; full complement of inputs/outputs; fast rewind 100 sec. Wow and flutter 0.05% wrms (7½ ips), 0.08% wrms (3¾ ips); S/N 58 dB; dist. 1% (7½ ips); frequency response 30-24,000 Hz +3 dB (7½ ips), 30-16,000 Hz ±3 dB (3¾ ips); crosstalk −50 dB; channel separation 50 dB; pitch control ±6% (playback only); 9¹⁄₁₆" H × 18²⁹⁄₃₂" W × 14¹³⁄₃₂" D ..... $595

### *4-Channel*

### RT-2044 4-Channel Tape Deck

Same as RT-2022 stereo deck except with two TAU-11 amplifier units; 37¹⁵⁄₁₆" H × 18⅛" W × 10³⁄₁₆" D ..... $2010

## REALISTIC

### TR-3000 Stereo Open-Reel Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track two-channel stereo tape recorder with three motors and three heads including hard permalloy record/play head; will accept up to 7-in reels. Features full logic solenoid tape function controls; dual 3-in VU meters; record mute and pause controls; twin idler arms; scrape flutter filter; separate high/low bias and equalization selectors; separate mic/line level controls with mixing capability; digital tape counter; low-impedance ¼-in mike inputs; ¼-in headphone jack. Wow and flutter 0.06% wrms (7½ ips); frequency response ±3 dB 30-28,000 Hz (7½ ips), 30-20,000 Hz (3¾ ips); S/N 66 dB (7½ ips), 63 dB (3¾ ips) at 3.0% THD; THD 0.9% at 0 VU..... ..... $500

## STUDER/REVOX

### B67 Stereo Tape Recorder

Three-speed (choice of 3¾, 7½, and 15 ips or 7½, 15, and 30 ips) two-channel tape recorder with two servo-controlled ac capstan motors; designed for professional use. Electronics console features record and playback level controls, record switch with LED, input/sync/reproduce selector switch with LEDs, VU level meters for each channel with peak-reading LEDs, and safe/ready switch preventing accidental recording and erasure; equalization internally switchable to CCIR- or NAB-standard curves; logic-controlled LSI-circuit transport functions; editing through integral splicing block and momentary rewind button; electronic digital counter reads hours, minutes, and seconds (accuracy 0.5%); rear-panel connector for external oscillator. Wow and flutter 0.06% at 15 ips (weighted peak); frequency response 30-18,000 Hz ±2 dB (15 ips); S/N 62 dB in stereo (NAB, unweighted); HD below 1.0% at 1000 Hz (NAB); die-cast chassis; 19.5" H × 19" W × 10.5" D .....from $3910

### A700 Stereo Tape Recorder

Three-speed (choice of 15, 7½, and 3¾ ips, ¹⁵⁄₁₆, 1⅞, and 3¾ ips, or 1⅞, 3¾, 7½ ips) stereo tape recorder with plug-in head assembly (¼- or ½-track available), three heads (fourth head optional), and frequency and phase servo capstan motor and two servo reel motors. Features microprocessor-controlled digital logic function controls; quartz-crystal speed control; logic-controlled tape tension; electronic tape-motion sensor; digital tape counter readout in min and sec; auto stop logic; electronic pause control; instant repeat play control; continuous record or play function; solid-state switching of audio circuits; built-in four-input mixer; switched selection of 12 input sources including four balanced hi/lo mike inputs; built-in magnetic phono preamp; master record level slide fader; stereo echo; five stereo outputs; zero-level line outputs and level and tone-controlled outputs; VU meter with overmodulation indicators; input or off-tape metering; variable speed (±7 halftones) with optional remote control available, variable speed (2.5 to 21.5 ips) with external oscillator. Wow and flutter (DIN 45507/IEEE 193-1971) 0.06% (15 ips), 0.08% (7½ ips), 0.10% (3¾ ips); frequency response +2/−3 dB 30-22,000 Hz (15 ips), to 20,000 Hz (7½ ips), to 16,000 Hz (3¾ ips); S/N on ¼-track 63 dB (15 and 7½ ips), 60 dB (3¾ ips); on ½-track machines 67 dB (15 and 7½ ips), 64 dB (3¾ ips); 18.2" H × 19" W × 6.9" D..... $2999

### A77 Mk IV Tape Deck

Two-speed (3¾ and 7½ ips or 7½ and 15 ips), ½- or ¼-track stereo tape recorder with servo-controlled capstan and two reel motors and three heads; reel capacity 10½ in. Features dual VU meters with LED peak level indicators; auto shut off; relay/solenoid operations controls; off-tape or input monitoring; two record level controls; provision for remote control; optional plug-in 8-W power amp boards; metal cage for rack or custom mounting, and suitcase version with built-in speakers available. Wow and flutter (DIN 45507/IEEE 193-1971) 0.06% (15 ips), 0.08% (7½ ips), 0.1% (3¾ ips); frequency response +2/−3 dB 30-22,000 Hz (15 ips), to 20,000 Hz (7½ ips), to 16,000 Hz (3¾ ips); S/N on ¼-track 62 dB (7½), 59 dB (3¾), on ½-track 66 dB (15 and 7½ ips), 63 dB (3¾ ips); 16³⁄₁₆" H × 14³⁄₁₆" W × 7⅛" D . $1399

**A77 Mk IV Professional.** Same as A77 Mk IV but only in 7½ and 15 ips speed; balanced and floating inputs and outputs; no input selector and level controls accessible from outside of machine; inputs and outputs via Cannon connectors..... $1950

### B77 Stereo Tape Recorder

Two-speed (choice of 3¾ and 7½ ips, 7½ and 15 ips, ¹⁵⁄₁₆ and 1⅞ ips, or 1⅞ and 3¾ ips) stereo tape recorder with three motors; reel capacity 10½ in. Features integrated drive logic computer-type push-point function keys; built-in tape cutter close to headblock; dual VU meters with peak level indicators; separate left/right record and input level controls; tape monitor switch; provision for remote control of all functions and electric timer operation; connectors for remote control of tape transport functions, remote control of variable tape speed,

and slide projector or crossfade unit. Wow and flutter (DIN 45507/IEEE 193-1971) 0.6% (15 ips), 0.08% (7½ ips), 0.1% (3¾ ips); frequency response +2/−3 dB 30-22,000 Hz (15 ips), to 20,000 Hz (7½ ips), to 16,000 Hz (3¾ ips); S/N on ¼-track 63 dB (15 ips and 7½ ips), 60 dB (3¾ ips), on ½-track 67 dB (15 and 7½ ips), 64 dB (3¾ ips); mic input level/impedance 0.15 mV/2.2k ohms (lo position, 50- to 600-ohm mics), 2.8 mV/110k ohms (hi, 20k-ohm mics); 16.3" H × 17.8" W × 8.14" D ..... $1499

**B77 Self Sync.** Same as B77; available in 3¾ and 7½ ips or 7½ and 15 ips speeds with playback possibility from record head... ..... $1599

**B77 Dolby B.** Same as B77 except 3¾ and 7½ ips speed only with Dolby B noise-reduction system; separate compressors and expanders for each channel; S/N on ½-track 67 dB (3¾ ips), 72 dB (7½ ips)..... $1799

**B77 Autostart.** Same as B77 except with VOX control ..... $1749

**B77 Slide Sync.** Same as B77 except with additional head for slide projector control ..... $1599

## TANDBERG

### TD 20A "Baron" Open-Reel Deck

Features Actilinear recording system; active transconductance circuit for lower intermodulation;

built-in Sel Sync; four-motor solenoidless operation; phase linearity network; pushbutton operation with LED indicators, including "Free" position for easy tape editing and threading; stand-by position with LED when one or both record buttons are engaged; electronically-governed speed; optional infrared (wireless) remote control or conventional cord remote control; four line inputs and master control for fading in/out; two-step front panel switch for mic attenuation (25 dB); very wide scale, peak-reading VU meters; front panel accessible bias adjustment; available in three versions:

7½ and 3¾ ips; ¼-track..... ..... $1500
15 and 7½ ips; ¼-track..... $1650
15 and 7½ ips; ½-track..... $1750
Carrying case with/without wheels .....$300/$245
Wireless remote control ..... $150

### Series 15 Open-Reel Recorder

Three-speed (7½, 3¾, 1⅞ ips) mono record/play open-reel recorder; wow and flutter 0.1% at 7½ ips; frequency response 40-18,000 Hz ±2 dB at 7½ ips; S + N/N 55 dB at max. record level; 5 W/channel continuous, both channels driven; preamp output 0.75 V; low-Z mic; high- and low-level inputs; 6¾" H × 13⅜" W × 11⅞" D.

**1521F.** ¼-track or ½-track; includes foot control ... $750

**1521.** 1521F without foot control ... $650

## TAPE-ATHON

### 702 Tape Players

Auto reverse ½-track tape playback machines with 8-pole, 3-wire reversible prelubricated ball-bearing motor. Available in mono or stereo modes with choice of tape speeds (1⅞, 2, 3¾, or 7½ ips) and choice of 7 or 10½-in reel sizes; continuous program playing time from 4-16 hours depending on speed and reel size. Wow and flutter rms unweighted 0.15% (7½), 0.2% (3¾), 0.25% (2), 0.3% (1⅞); frequency response ±2 dB 50-5000 Hz at 1⅞, to 6000 Hz at 2, to 7500 Hz at 3¾, to 15,000 Hz at 7½ ips; S/N 50 dB at 3¾ ips, unweighted; 14" H × 16.75" W × 10" D.

**702-7-P/RP.** Portable or rack-mount mono model with 7-in reel; 8-hr playing time at 1⅞ and 2 ips, 4 hrs at 3¾ ips ... $670

**702-7-P/RP-ST.** Portable/rack-mount stereo version of 702-7-P/RP ... $870

**702-10-P/RP.** Portable/rack-mount mono model with 10½-in reel; playing time 16 hrs at 1⅞ and 2 ips and 8 hrs at 3¾ ips ... $720

**702-10-P/RP-ST.** Stereo version of 702-10-P/RP ... $920

## TASCAM by TEAC

### 80-8 Recorder/Reproducer

½-in, 8-tracks; will take up to 10½-in reels NAB hub only; 15 ips and 7½ ips tape speed; function

select panel; full IC logic tape transport; memory stop function; digital counter; integrated dbx noise reduction; line input −10 dB (0.3 V), impedance greater than 20,000 ohms, unbalanced; line output −10 dB (0.3 V), load impedance greater than 10,000 ohms, unbalanced; record level 0 VU referenced to 3 dB above; wow and flutter 0.04% rms (NAB, weighted), 0.06% peak (ANSI, weighted); fast-winding time 120 sec with 240-ft tape; frequency response 40-18,000 Hz +3 dB; S/N 65 dB weighted, 60 dB unweighted; dist. 1.0% at 400 Hz, 0 VU; overall THD 3.0% at 10 dB above 0 VU; crosstalk greater than 45 dB at 400 Hz; 21" H × 17¼" W × 12" D ... $3990

### 35-2 Recorder/Reproducer

Switchable two-track stereo/four-track stereo playback two-speed (15 and 7½ ips ±0.5%) open-reel recorder/reproducer with dc servo-controlled capstan and two eddy current induction reel motors and high-density Permaflux erase, record, playback, and 4-track playback heads; 10½-in reel capacity; separate transport and electronics design. Transport features touch-button logic tape function controls with motion-sensing direct mode changes; pitch control; punch-in recording facility; cueing and edit; four-digit tape counter. Electronics features optional dbx encode/decode; six-step bias selector and variable record EQ control; source/calibration/output monitor switch; separate left and right input and output level controls; two VU meters with LED peak indicators. Wow and flutter (NAB weighted) 0.03% at 15 ips, 0.06% at 7½ ips; frequency response 40-22,000 Hz ±3 dB (15 ips), to 18,000 Hz (7½ ips); HD 0.6%; S/N 100 dB with dbx, 65 dB without dbx at 3.0% THD; stereo channel separation 50 dB at 1000 Hz; line input sensitivity/impedance 60 mV/50,000 ohms; line output level/load impedance 0.45 V/10,000 ohms; headphone output/impedance −21 dB/8 ohms; fast forward/rewind time 160 sec for 1800 ft; 16½" H × 18 13/16" W × 10½" D (transport); 6 15/16" H × 18 13/16" W × 9 5/16" D (electronics) ... $1900

**DX-2.** Plug-in dbx noise-reduction cards for 35-2 ... $225

### 40-4 Recorder/Reproducer

Four-track, ¼-in recorder/reproducer; will take up to 10½-in reels NAB hub only; 15 and 7½ ips tape speeds; includes function select panel; full IC logic tape transport; memory stop function; digital counter; integrated dbx noise-reduction system; line input −10 dB (0.3 V) impedance greater than 20,000 ohms, unbalanced; line output −10 dB (0.3 V) load impedance greater than 10,000 ohms, unbalanced; wow and flutter 0.04% wrms NAB at 15 ips; fast-winding time 120 sec for 2500-ft tape; frequency response 40-20,000 Hz ±3 dB (15 ips), 40-15,000 Hz ±3 dB (7½ ips); S/N 63 dB weighted, 58 dB unweighted at 15 ips, 65 dB weighted, 60 dB unweighted at 7½ ips; overall dist. 1% at 400 Hz, 0 VU at 9 dB; crosstalk greater than 50 dB at 400 Hz; 21" H × 17¼" W × 12" D. $1700

## TEAC

### A-6600 Stereo Tape Deck

Two speed (7½ and 3¾ ips), ¼-track, two-channel deck; will handle reels up to 10½-in; four heads (erase, record, play, reverse playback). Features auto-reverse and counter repeat; two capstans, one for each direction; tape guide rollers; cueing facility for both forward and reverse tracks; record mode indicator lights; auto spacer for inserting blank spaces between selections; separate left and right level controls; master gain controls for mic and line inputs; hi and low bias and equalization settings; three-position monitor switch; peak LEDs flash at 10 VU (7½ ips) and 8 VU (3¾ ips); remote control with optional RC-80 ... $1575

### A-6100 Mark II Stereo Tape Deck

Two speed (15 and 7½ ips), ½-track, two-channel deck; will handle reels up to 10½-in; four heads (erase, record, play, ¼-track playback). Features two peak-reading LED level indicators; timer control; servo-controlled supply reel; manual cue lever which defeats tape lifters during last modes for fast search, cueing, and editing; flip-up hinged head cover; memory stop function. ... $1400

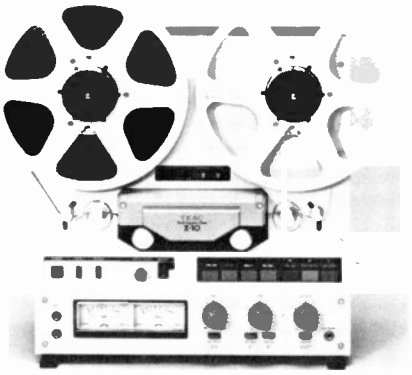
### A-3300SX-2T Tape Deck

Two-speed (15, 7½ ips), ½-track, two-channel stereo or mono deck; one dual-speed hysteresis synchronous capstan motor; two eddy-current induction reel motors; three heads; will handle 7-in and 10½-in reels. Wow and flutter 0.04% (15 ips), 0.06% (7½ ips) NAB weighted; S/N 60 dB; frequency response 30-26,000 Hz +3 dB at 15 ips, 30-24,000 Hz ±3 dB at 7½ ips; THD 1% at 1 kHz. Features independent left/right channel source/tape selectors; VU-type level meters; manual cue lever; separate bias and equalization selectors; 17 5/16" H × 17 5/16" W × 8 5/16" D ... $1050

### Audio Specialist Series

### X-10 Stereo Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track two-channel tape recorder with three dc motors in closed-loop dual-capstan drive system and erase, record, and playback heads; 10½-in reel capacity. Features



pitch control; cue lever; pushbutton tape function controls with rec mute; separate mic and line input level controls; output level control; source/tape monitor switch; separate two-position recording bias and equalization buttons; four-digit tape counter with memory and timer; two VU meters. Wow and flutter (NAB weighted) 0.03% (7½ ips), 0.04% (3¾ ips); frequency response 30-28,000 Hz (7½ ips), to 20,000 Hz (3¾ ips); S/N 63 dB; 17 13/16" H × 17" W × 10 5/16" D ... $1000

**X-10R.** Same as X-10 except bi-directional record/playback with six heads (two each erase, record, and playback) ... $1150

### X-7 Stereo Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track two-channel tape deck with three dc motors in closed-loop dual-capstan drive and erase, record, and playback heads; 7-in reel capacity. Features pitch control; separate mic and line input level controls; tape/

# 2 OPEN-REEL TAPE MACHINES

source monitor switch; output level control; two-position bias and equalization; two VU meters; pushbutton tape function controls including rec mute; timer standby; four-digit tape counter; provision for optional remote control unit. Wow and flutter (NAB weighted) 0.03% (7½ ips), 0.04% (3¾ ips); frequency response 30-28,000 Hz (7½ ips), to 20,000 Hz (3¾ ips); S/N 63 dB; 14⅝" H × 17" W × 10⅜" D ..... $700

**X-7R.** Same as X-7 except has bi-directional record/playback and auto repeat ..... $800

### X-3 Stereo Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track two-channel tape recorder with dc servo capstan and two induction reel motors and three-head configuration; 7-in reel capacity. Features separate mic and line input controls; output level control; two-position bias and equalization selectors; rec mute; tape/source monitor switch; dual VU meters; four-digit tape counter; fast-acting spring-loaded reel holders; detachable head housing; 13" H × 16" W ..... $550

### *4-Channel*

### A-3440 4-Channel Tape Deck

Two-speed (15 and 7½ ips) ¼-track four-channel Simul-Sync tape deck with erase, record/sync and playback heads and three motors; 10½-in reel capacity. Features four function select buttons with LEDs and source/sync/play output select buttons with tape/source monitoring and standby functions; headphone monitor switch with four-track pushbuttons; independent level control; four separate input and output level controls per channel with mic attenuation/mic/line input selectors; four VU meters; pitch control; four-digit tape counter; micro-switch tape function controls with LED pause and record; manual cueing; four unbalanced high- or low-impedance microphone input jacks; provision for optional dbx interface noise-reduction unit and optional RC-70 remote control. Wow and flutter (NAB weighted) 0.04% (15 ips), 0.06% (7½ ips); frequency response ±3 dB 40-22,000 Hz at 0 VU (15 ips), to 20,000 Hz at −10 VU (7½ ips); S/N 65 dB with 3.0% THD, weighted; input sensitivity/impedance 60 mV/50,000 ohms (line), 0.25 mV/600 ohms (mic); 117 V ac, 60 Hz; 20½" H × 17½" W × 9¼" D ..... $1600

### A-2340SX Tape Deck

Two-speed (7½ and 3¾ ips) ¼-track four-channel Simul-Sync tape recorder with erase, record, and playback heads and three motors; 7-in reel capacity. Features four Sync function select buttons with tape/source output select switches; four mic/line input level controls and output level controls for each channel; four VU meters; micro-controlled tape function controls; four-digit tape counter; four mic jacks and two phone jacks; provision for optional RC-120 remote control unit. Wow and flutter (NAB weighted) 0.08% (7½ ips), 0.10% (3¾ ips); frequency response ±3 dB 40-18,000 Hz (7½ ips), to 10,000 Hz (3¾ ips); S/N 62 dB with 3.0% THD, weighted; input sensitivity/impedance 0.1 V/100k ohms (line), 0.25 mV/600 ohms (mic); 17⅝" H × 13¾" W × 8¾" D ..... $1175

## TECHNICS

### RS-1520US Open-Reel Deck

Compact professional tape deck; ½-track, two-channel recording/playback and ¼-track, two channel playback; four head system; three speeds (15, 7½, 3¾ ips); quartz control phase-locked dc brushless servo direct-drive capstan motor; reel tables; two-tape tension controlled dc brushless direct drive motors; isolated loop direct-drive transport system. Features full IC logic tape transport functions; direct switching from mode-to-mode without tape strain; separate left and right bias and equali-

zation controls; left and right VU meters; built-in stroboscope. Wow and flutter 0.018% wrms (15 ips), 0.3% wrms (7½ ips); fast-winding time 150 sec with 2500-ft tape; frequency response 30-30,000 Hz ±3 dB (15 ips), 30-25,000 Hz ±3 dB (7½ ips); S/N 60 dB; 0.8% dist., 50 dB channel separation; mic input sensitivity 0.25 mV (−72 dB); microphone impedance 200-10,000 ohms; 17½" H × 18" W × 10⅛" D ..... $2000

**RS-1506US.** Similar to RS-1520US except ¼-track, two-channel recording/playback and ½-track, two-channel playback ..... $1500

**RS-1700US.** Similar to RS-1506US except auto-reverse in both recording and playback modes; ¼-track, two-channel; six-head system ..... $2000

### RS-1500US Open-Reel Deck

Three-speed (15, 7½, and 3¾ ips) ½-track two-channel record, playback, and erase and ¼-track two-channel playback stereo tape recorder with quartz-controlled PLL dc brushless servo direct-drive capstan motor with double pinch rollers and two tape-tension-controlled dc brushless direct-drive reel motors and four heads for recording, ½- and ¼-track playback, and erasure; max. reel capacity 10½ in. Features IC logic-plus-transistor tape transport controls with LED indicators and mode-to-mode switching with automatic pause between modes; three-position bias and equalization switches; dual two-scale VU meters with normal-range (+3 dB) and high-range (+6 dB) meter scale selector; separate mic and line level input controls with mixing; 0/20-dB mic attenuator; output level control; left and right tape/source monitor switches; left/right rec mode switches; four-digit tape counter showing elapsed time in min and sec; timer start with external audio timer; edit dial; fast forward/rewind cueing; ±6% pitch control; fast forward/rewind time 150 sec (2500-ft, 1.5-mil tape). Wow and flutter 0.018% wrms (15 ips), 0.03% wrms (7½ ips); frequency response ±3 dB 30-30,000 Hz (15 ips), 20-25,000 Hz (7½ ips), 20-15,000 Hz (3¾ ips); S/N (NAB weighted) 60 dB (15 and 7½ ips), 58 dB (3¾ ips); THD at 400 Hz, 0 VU 0.8%; channel separation 50 dB; input sensitivity/impedance 0.25 mV/4.7k ohms (mic, unbalanced), 60 mV/150k ohms (line, phono jack); rosewood veneer side panels; 17½" H × 19⅜" W × 10⅛" D .... $1500

## TELEX

### Telex/Magnecord 1400 Series

Three-speed (either 15, 7½, 3¾ ips or 7½, 3¾, 1⅞ ips) open-reel tape recorder; reel sizes 5, 7, or 8¼ in EIA; available with a variety of head configurations allowing single-, two-, or four-track mono or stereo operation; brushless dc servo ball-bearing drive system. Wow and flutter 0.35% at 3¾ ips, 0.24% at 7½ ips, 0.17% at 15 ips (all DIN weighted), 0.25% at 3¾ ips, 0.17% at 7½ ips, 0.12% at 15 ips (all rms unweighted); S/N 60 dB (NAB weighted); frequency response 30-10,000 Hz ±3 dB (3¾ ips), 30-18,000 Hz ±3 dB (7½ ips), 35-22,000 Hz ±3 dB (15 ips, two-track); crosstalk ratio 50 dB at 1 kHz (two-track head); fast-winding time 80 sec (1200 ft, 7-in reel, 1.5 mil tape). Inputs: 150-ohm microphone, balanced bridge, unbalanced bridge, mixing bridge, and aux. bridge; outputs: 150/600 ohm balanced, +4 dBm, aux. A and B unbalanced. Features VU meters for each channel; separate mike and line input gain controls plus master gain control; catenary head block design and hyperbolic contour heads ensure intimate tape/head contact; 110/130-V ac, 50/60 Hz, 180 W ..... from $2350

## UHER by WALTER ODEMER

### SG-631 Logic Open-Reel Deck

Three-speed (7½, 3¾, 1⅞ ips) two- or four-track stereo record/play deck; Omega looping system eliminates pinch roller, drive couplings, springs, and function wheels; four-motor drive system includes two dc hub motors, an electronically regulated capstan drive, and a servomotor to form the Omega loop. Wow and flutter 0.05%; frequency response 20-25,000 Hz (7½ ips), to 16,000 Hz (3¾ ips), to 12,500 Hz (1⅞ ips); S/N 65 dB (two-track at 7½ ips). Features built-in strobe disc; speed control; peak-reading meter; built-in "Dia-Pilot" for recording signal impulses and automatic slide-projector control; switchable peak-level limiter; separate stereo headphone power with volume, bass, and treble controls; A/B monitoring; remote-control facilities; 10½-in reel, max. ..... $2357

### SG 561 Royal Open-Reel Deck

Four speed (7½, 3¾, 1⅞, 15/16 ips) two- or four-track mono/stereo record/play deck with interchangeable two- or four-track tape head mount with Recovac longlife heads and built-in stereo amplifier with mixing facility; 7-in reel capacity. Features "Synchro-Play" sound-with-sound, "Multi-Play" sound-on-sound, reverb effect, and echo; "Dia-Pilot" for record/playback of cueing signals for auto slide projectors, will also synchronize sound and picture in 8- and 16-mm film-making; separate mic/radio and phono input controls; mic in/out switch; dual peak-reading meters; tape/source monitor switch; separate and continuous tandem tone control; four-digit tape counter with zero reset; tape tension comparator; electronic end-of-tape shut-off. Wow and flutter (DIN 45507) 0.05% (7½ ips), 0.1% (3¾ ips), 0.2% (1⅞ ips); frequency response 20-20,000 Hz (7½ ips), to 15,000 Hz (3¾ ips), to 9000 Hz (1⅞ ips); S/N (weighted, DIN 45500) on two-track 67 dB (7½ ips), 66 dB (3¾ ips), 65 dB (1⅞ ips), on four-track 65 dB (7½ ips), 64 dB (3¾ ips), 61 dB (1⅞ ips); crosstalk −60 dB (mono), −45 dB (stereo); 13.9" H × 18" W × 7.5" D ..... $1785

### 4200 Report Monitor Recorder

Four-speed (7½, 3¾, 1⅞, 15/16 ips) two-track stereo record/play recorder with Recovac tape head. Features three-digit counter; direct tape monitoring with earphones or speaker; electronic start and stop with remote switch, manual, or foot-switch operation; 5-in. max. reel size; ac, single-cell, car, or rechargeable battery operation. Wow and flutter 0.15% (7½), 0.2% (3¾), 0.25% (1⅞); S/N 62 dB (rms A curve); frequency response (DIN 45500) 20-25,000 Hz (7½), 20-16,000 Hz (3¾), 25-13,000 Hz (1⅞), 25-5000 Hz (15/16); input 0.12-40 mV at 200 ohms (mic), 2.4-700 mV (radio), 0.045-20 V at 2 megohms (phono) .. $1361

**4400.** Four-track version of 4200 ..... $1361

**4000.** Two-track mono version of 4200; has three heads ..... $1190

### SG-521 Four-Speed Recorder

Four-speed (7½, 3¾, 1⅞, and 15/16 ips) recorder; interchangeable head assemblies for two- or four-track operation; remote capability for start/stop; can be sound-activated; end-of-tape stop; on/off automatic level control switch; bass and treble controls; four-digit index counter. Frequency response 30-20,000 Hz; wow and flutter 0.02% wrms (both at 7½ ips); 6 W/ch continuous into 8 ohms (30-20,000 Hz) at 1% THD; S/N 65 dB (two-track at 7½ ips); can be operated vertically or horizontally ..... $1162

# 3 8-TRACK TAPE MACHINES

## AKAI

**CR-83D 8-Track Deck**
Recorder/player features illuminated elapsed-time record indicator, locking pause, fast-forward, inde-

pendent dual-record level controls, combination record/play and erase head, auto stop, and continuous playback selector switch; dc motor; illuminated record interlock; automatic ac on when cartridge is inserted; wow and flutter 0.15% rms; S/N 48 dB; frequency response 60-14,000 Hz ±3 dB (low-noise tape); dist. 2% at 3¾ ips; 4.3" H × 16.5" W × 9.6" D ..... $225

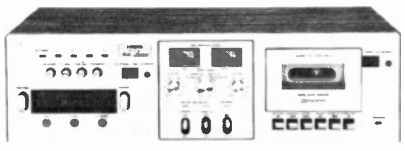
## CHELCO

**TP-520 Portable 8-Track Player**
Portable 8-track player with AM-FM slide-rule radio. Features four LED channel indicators; built-in afc on FM; automatic/manual program selectors; ac line cord/battery/optional car adapter operation; earphone and car adapter jacks; automatic ac/dc switching; includes carrying strap ..... $45

**TR-900 Portable 8-Track Player**
AM/FM portable 8-track tape player; automatic and manual program changer; ac/dc (car and boat) operation; program selector; program indicator; sing along feature; rod antenna ..... $40

## FISHER

**ER8150 8-Track/Cassette Deck**
8-track and cassette deck with Dolby noise-reduction system. Wow and flutter 0.15% wrms (8-track),

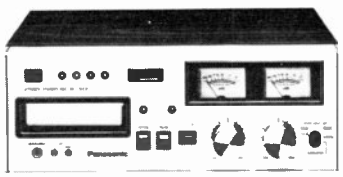


0.09% wrms (cassette); frequency response 40-12,000 Hz at ±3 dB; S/N 52 dB (8-track, Dolby on), 56 dB (cassette, Dolby on) ..... $330
**ER8155.** Similar to ER8150 except has cassette with wireless remote control editing ..... $370

**ER8115 8-Track Deck**
Features 8-track record/play deck with dc governor motor; features dual VU meters; left/right record level controls; four-program LED indicators; locking pause control; LED tape record and tape stop indicators. Wow and flutter 0.15% wrms; frequency response 35-11,000 Hz ±3 dB; HD 1.5% at 1000 Hz; S/N 44 dB; input sensitivity/impedance 0.2 mV/600 ohms (mic), 100 mV/100k ohms (line); fast-wind time 4.5 min (45 min), 8.9 min (90 min); 5" H × 12⅝" W × 10¼" D ..... $170

## PANASONIC

**RS-808 8-Track Deck**
Front-loading 8-track record/play deck with slide-in cartridge mechanism; features auto-stop in record/playback modes with LED indicators; auto/manual



program selector with LED indicators; locking pause and fast forward switches; left and right channel level controls; two level meters; tape time counter; jacks for mic and headphones; two built-in connection cords. Wow and flutter 0.15% wrms; S/N 45 dB; frequency response 50-12,000 Hz; simulated wood cabinet; 5⅜" H × 14¼" W × 9⅞" D ..... $140

## REALISTIC

**TR-803 8-Track Deck**
Record/play deck with Dolby noise-reduction system. Features digital timer; dual VU meters; pushbutton control of continuous play, program repeat, auto-stop, eject, program change, fast-forward, and pause; adjustable output level control. Frequency response 50-13,000 Hz ±3 dB; wow and flutter 0.14%; front-panel mike input for live recording; walnut wood cabinet; 4¾" × 16½" × 10" ..... $200

**TR-883 8-Track Deck**
Record/play deck with permalloy record/play head. Features digital timer; dual VU meters; record level controls with memory ring; pushbutton fast forward, pause, and record interlock; program select button; auto stop button; stereo headphone jack; left and right microphone jacks; program indicators. Frequency response 50-13,000 Hz; wow and flutter 0.15%; walnut-finish wood cabinet; 4⅜" × 14" × 8¾" ..... $140

## REFERENCE by QUADRAFLEX

**708D 8-Track Deck**
Front-loading 8-track tape machine features endless play, track repeat, single-track stop, end-of-cartridge stop, and fast forward and pause controls; microphone and line level inputs. Wow and flutter 0.17% wrms; frequency response 40-12,000 Hz ±2.5 dB; S/N 50 dB ..... $220

## SANYO

**RD8020A 8-Track Deck**
8-track record/play deck; frequency response 30-12,000 Hz; S/N 42 dB; wow and flutter 0.3%;

features automatic stop at program-start point; two calibrated VU meters; latching fast-forward control; latching pause control; restart button; lighted channel indicators; inputs for right/left mike and aux.; 5" H × 12½" W × 10" D ..... $120

## TELEX

**TMS-1000 Music Machine**
Automatic stereo 8-track cartridge changer switches and selects 12 tape cartridges for uninterrupted music; two pushbutton sequences permit playing of each cartridge completely or intermixing programs from different cartridges; automatic gain control; load and reject pushbuttons; power on/off and stereo/mono switches; frequency response 60-10,000 Hz; S/N 38 dB; HD less than 2% at 10 W/channel; flutter 0.3% weighted, DIN; 8-ohm speaker terminals; includes power amplifier and smoked dust-cover; 10" H × 16⅜" W × 18⅛" D ..... $695
**TMS-1001.** With pre-amplifier only ..... $595

# 4 VIDEO CASSETTE RECORDERS

## AKAI

### VT-300N Nighthawk Portable VCR

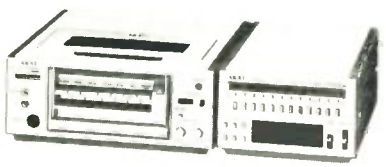
Portable ½-in, 30-min black-and-white video cassette recorder designed for low-light applications; modular design with optional detachable three-in black-and-white monitor; includes Nighthawk video camera with C-mount 8:1 zoom lens, detachable 1.5-in VF-300E electronic viewfinder, and built-in omnidirectional electret microphone. Recorder has twin rotating glass and crystal ferrite heads in frequency modulation system; uses USA Standard TV signal; features quick start, piano key function controls, battery meter, and three-digit tape counter with reset; resolution 270 lines; S/N 40 dB (video), 45 dB (audio); input 1 V p-p into 75 ohms (video), −65 dB into 600 ohms (audio); audio frequency response 80-10,000 Hz; accepts Akai VK30 cassette; ac or two 6-V battery operation; 5" H × 9.75" W × 11.5" D. Video camera features 500-line horizontal resolution at 15,750 Hz; vertical frequency 60 Hz; video output 1 V p-p composite; 8" H × 2.6" W × 6.5" D ..... $2395

### VT-350 Portable VCR

Portable black-and-white video cassette recorder with vertical-interval editing, variable speed frame control, and still frame; ½-in cassette format; 30-min recording time; twin rotating head, frequency modulation recording system; audio dubbing; includes black and white video camera with "C" lens mount, VF-300E electronic viewfinder, and 8:1 (11.5 to 90 mm) zoom lens; battery or ac power; recorder dimensions 5" H × 9.75" W × 11.5" D; camera dimensions 3.6" H × 4.3" W × 7.8" D ..... $2195

### ActiVideo VCR/Tuner-Timer

Portable VHS two-hour color video cassette recorder with detachable color TV tuner adaptor/timer. Video



recorder: has rotary slant azimuth two-head scan system and NTSC color video signal system; features double-speed playback; still and single-frame advance/variable speed playback (still through four times normal speed control); front-panel remote pause control jack; three-digit tape counter with memory; sound dubbing; LED flashing dew warning, battery warning, and tape motion indicators; video horizontal resolution 240 lines; input 0.5-2 V, 75 ohms unbalanced (video), −65 dB, 600 ohms (mic); output 1 V, 75 ohms unbalanced (video), −20 dB, 1000 ohms (audio); S/N 45 dB (video), 40 dB (audio); audio frequency response 50-10,000 Hz. Tuner/timer: features built-in programmable 24-hr LED digital clock/timer display that can be preset for up to seven days with auto on-off function; 12-channel (UHF/VHF) electronic tuning; auto battery recharging; auto shut-off; auto external/internal battery switch; three-hour battery charge time. System operates on ac house current or rechargeable nickel-cadmium batteries; includes antenna switch box, r-f converter, earphone, remote pause control, T-30 video cassette, channel display card for tuner, antenna cable, UHF antenna, 75/300 ohm antenna converters and 300/75 ohm antenna converters; 13.3 lbs (VCR), 10.4 lbs (tuner); 4.8" H × 11.5" W × 11.9" D ..... $1495

## GENERAL ELECTRIC

### IVCR0010W Video Cassette Recorder

VHS four-hour computer-programmable color video cassette recorder. Features electronic memory bank

with five program select buttons with LED indicators, auto start, stop, and channel change, repeat program button, and four sequence indicator lights; built-in digital clock/timer display with memory recall (displays pre-programmed schedule of shows); 12-channel pushbutton electronic tuning for any combination of VHF/UHF channels; three-digit tape counter with memory and program search; remote pause control for use within 16 ft; audio dubbing; pause control; long/standard play tape speed selector; tracking control; includes 75-ohm coaxial cable, two 300-ohm UHF twin leads, 300/75 ohm transformer, 75/300 ohm transformer, and terminal block; high impact plastic construction with woodgrain finish; 6¼" H × 18 13/16" W × 14 1/16" D. $1300

### IVCR0005W Video Cassette Recorder

VHS four-hour color video cassette recorder. Features built-in 24-hr digital clock/timer display with preselected auto start/stop; long/standard play recording selector; built-in VHF/UHF tuner; tape counter with memory switch and program search; remote pause control for use within 20 ft; tracking control; audio dubbing; dew indicator lamp; 6 7/16" H × 19⅛" W × 15½" D ..... $995

## JVC

### Vidstar HR-6700U VCR

Programmable six-hour two-speed VHS color video cassette recorder with rotary slant azimuth two-head helical scan system and separate SP and EP video heads. Features microcomputer-controlled programmable timer (allows unattended recording of six programs at specific time and day for any recording time length from 5-395 minutes) with LED digital clock/timer/program/recording length display, auto shutoff at end of program, and memory storage of three programs; auto SP/EP playback switching; freeze frame, slow motion, speed or normal playback; four-digit tape counter with cue/counter auto search; 12-channel VHF/UHF electronic tuner with digital indicators; edit start control; audio dubbing; record select (when recording from camera or other video source); damped cassette eject. Horizontal resolution 240 lines; input 0.5-2.0 V p-p/75 ohms unbalanced (video), −67 dBs/10k ohms unbalanced (mic), −20 dBs/50k ohms unbalanced (line); S/N 45 dB (video), 40 dB (audio); audio frequency response 50-10,000 Hz. Supplied with remote control unit with 16-ft cord, videocassette, dustcover, channel number film, antenna cable, two matching transformers, and power cord; 5 13/16" H × 18½" W × 13¾" D ..... $1350

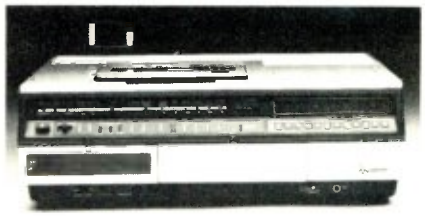
### Vidstar HP-4000AU Portable VC Player

Portable VHS two-hour color video cassette player with rotary slant azimuth two-head helical scanning system and NTSC color signal system. Playback-only machine features lightweight construction; still playback key that freezes scene for up to four min; built-in r-f converter for channel 3 or 4; piano-key tape function controls; three-digit tape counter with search button and reset; LED power and dew indicators; tracking control; remote control jack; ac power pack compartment; includes ac power pack, earphone, r-f converter, two antenna cables, F connector, and antenna selector. Video: output 1.0 V p-p, 75 ohms unbalanced; horizontal resolution 240 lines (color); S/N 45 dB (Rhode & Schwarz). Audio: output −6 dBs, 1k ohms unbalanced (line), 0 dBs, 1k ohms unbalanced (earphone); frequency response 70-10,000 Hz; S/N 40 dB; 17.8 lbs with ac power pack; 5 7/16" H × 13⅜" W × 14 3/16" D ... $925

## MITSUBISHI

### HS-300U Video Cassette Recorder

Programmable six-hour two-speed VHS color video cassette recorder with five computer-controlled di-



rect-drive motors. Features programmable timer (records up to six programs over one-week period) with LED digital 24-hr clock/timer readout; freeze frame and single frame advance in EP mode (6-hr tape); slow motion in EP mode with ⅓- and 1/10-speed selector buttons; picture search in forward or reverse (EP mode); electronic touch tuning; electronic tape function controls; audio dubbing; three-digit tape counter with memory; auto rewind; TV/VTR switch; camera/TV input; optional 15-function wireless remote control available. Video horizontal

resolution 240 lines (SP), 220 lines (EP); input 0.5-2.0 V p-p/75 ohms unbalanced (video), −20 dB/50k ohms unbalanced (line) −65 dB/10k ohms unbalanced (mic); audio frequency response −10 dB 50-10,000 Hz (SP), to 7000 Hz (EP); S/N 45 dB (video), 40 dB (audio); includes 75-ohm VHF output cable, 300-ohm UHF connector cable, and dustcover; 6¼" H × 19⅜" W × 13½" D..... $1350
Remote control unit for HS-300U..... $100

## PANASONIC

### Omnivision VI Series

### PV-3200 Portable VCR

Portable six-hour programmable VHS color video cassette recorder for switchable SLP (six-hour), LP (four-hour), and SP (two-hour) recording; compatible with color or black-and-white and other 2/4 and 2/4/6-hr VHS systems; incorporates solid-state integrated circuitry, direct-drive video head cylinder (ddc) and dc motors, hot pressed ferrite heads, and azimuth recording system. Features still frame with frame advance switch on SLP mode; built-in digital clock with time on and time limiter; digital memory counter with auto search and shut-off after rewind; audio dubbing; built-in electronic UHF/VHF tuner/timer (enables recording of one station while viewing another); soft touch tape function pushbutton controls; tracking control; pause mode with remote pause control; dew detector; ac, dc, or car battery operation; auto recharging system and overcharge protection; records TV programs off air or home movies with optional TV camera; one-hr operation using LCR-1812 battery with optional color camera; includes rechargeable battery pack; lightweight annealed aluminum diecast chassis..... $1295

**PV-3100.** Similar to PV-3200 except electronic UHF/VHF tuner and built-in digital clock optional; supplied with ac adaptor..... $1150

### PV-1650 Video Cassette Recorder

Two/four/six-hour programmable VHS color video cassette recorder with solid-state integrated circuitry, ddc motor, hot pressed ferrite heads, and azimuth recording system; compatible with color or b & w TV sets and other 2/4 or 2/4/6-hr VHS systems. Features VTR tuner remote channel selector; fast/slow/still frame with frame advance in standard- or super-long-play modes; built-in programmable clock/timer/tuner for unattended recording of four different programs; dim-bright switch for clock/timer readout; built-in UHF/VHF tuner; audio dubbing; tracking control; pause mode with remote pause control; digital memory counter with auto search and shut-off; dew detector; records TV programs off air and home movies with optional TV camera; lightweight annealed aluminum diecast chassis and simulated woodgrain finish; includes hard plastic dustcover..... $1395

**PV-1600.** Similar to PV-1650 minus VTR tuner remote channel selector; has electronic index signal (locates beginning of recorded programs in fast forward) and unswitched ac outlet..... $1295

### PV-1200 Video Cassette Recorder

Two/four/six-hour programmable VHS color video cassette recorder with solid-state integrated circuitry, ddc motor, hot pressed ferrite heads, and azimuth recording system; compatible with color or b&w TV and other 2/4 and 2/4/6-hr VHS systems. Features auto tape threading; built-in digital clock with time on and time limiter; audio dubbing; built-in UHF/VHF tuner; tracking control; pause mode with remote pause control; digital memory counter with auto search and shut off; dew detector; records TV programs off air or home movies with optional TV camera; unswitched ac outlet; lightweight annealed aluminum diecast chassis and woodgrain finish..... $1095

### Video Cameras

**PK-600.** Color camera with ⅔-in single vidicon tune, 6:1, f1.8 auto zoom lens, and 1.5-in Crt electronic viewfinder/monitor; has removable boom electret condenser microphone and remote trigger switch to start and stop VTR recording; 6.4 lbs..... $1000

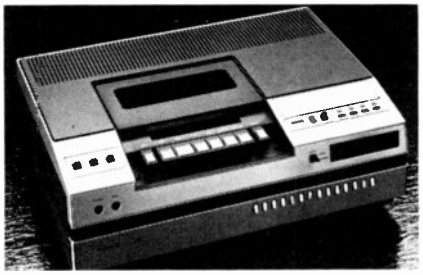
**PK-400.** Color camera with ⅔-in single vidicon tube, "C" mount 25-mm, f1.8 lens, and optical viewfinder with field of view frame for standard lens; has built-in electret condenser microphone and remote start/stop trigger switch; 4.4 lbs..... $700

**WV-550A.** Black-and-white camera with ⅔-in vidicon, 4:1, f1.8 zoom lens, and through-the-lens viewfinder..... $400

## PHILCO/GTE

### V1500 Video Cassette Recorder

Programmable six-hour VHS color video cassette recorder with dual hot-press-ferrite video head system



and direct-drive motor. Features microprocessor-controlled programmer (presets recording of up to four different programs on four different channels over seven-day period) with digital clock/timer display; built-in VHF/UHF tuner with 14-button electronic channel selectors with lighted channel numbers; electronic program cue/review; two-speed tape selector switch; dew and tracking controls; audio overdub; three-digit tape counter with memory; automatic fine tuning; switchable r-f modulator for playback on channel 3 or 4; supplied with remote pause/edit control unit with 20-ft cable. Audio frequency response 100-8000 Hz −10 dB (SP), to 6000 Hz (LP); S/N 42 dB (b&w), 40 dB (audio); 7" H × 19" W × 14.75" D..... $1350

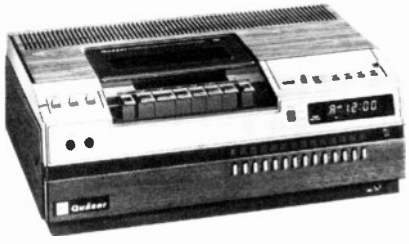
### V1300 Video Cassette Recorder

Programmable six-hour VHS color video cassette recorder. Features built-in VHF/UHF tuners with program selection; built-in electronic digital clock/timer display; three-digit tape counter with memory; editing capability with remote pause control; audio dubbing. S/N 43 dBs (video), 40 dBs (audio); video horizontal resolution 240 lines; audio frequency response 50-10,000 Hz; supplied with remote control unit, power cord, videocassette, and antenna cables; 6⅞" H × 19⅛" W × 15½" D..... $1100

## QUASAR

### VH5155RW Video Cassette Recorder

Six-hour three-speed programmable VHS color video cassette recorder with four rotary hot press ferrite video, station audio control, and full-track and audio-dubbing erase heads. Features four-program recording capability over one-week period with LED clock/timer record or playback/program readout display; electronic 14-button VHF/UHF varactor tuning with digital readout; three-digit tape counter with memory; tuner/camera and TV/VTR switches; audio overdub; cue and review. Video horizontal resolution 270 lines (b&w), 230 lines (color); input 1.0 V p-p/75 ohms unbalanced (video), −20 dB/100k ohms unbalanced (line), −70 dB/600 ohms unbalanced (mic); audio frequency response −10 dB 100-8000 Hz (SP), to 6000 Hz (LP), to 5000 Hz (SLP); S/N 42 dB (b&w), 40 dB (audio). Includes VC-T60 1-2-3-hr videocassette, remote control for pause, channel change, still, variable, slow, and still frame advance, 5-ft 75-ohm output cable, 5-ft 300-ohm UHF connector cable, 75/300 ohm VHF matching transformer, and 300/75 ohm VHF antenna adaptor; 7" H × 19" W × 14.75" D.... $1395



### VH5200RQ Portable VCR

Portable four-hour VHS color video cassette recorder with two rotary hot press ferrite video heads, one stationary audio control head, and full track and audio dubbing erase heads; azimuth helical scan system. Features three-way power supply (built-in sealed rechargeable battery, 12 V dc, or ac home current); audio dub; logic-controlled tape function controls; three-digit tape counter with memory; standard/long play speed switch; battery check meter. Video: horizontal resolution 280 lines (b&w), 240 lines (color); input 1.0 V p-p, 75 ohms unbalanced; S/N 42 dB (b&w). Audio: input −20 dB, 100k ohms unbalanced (line), −70 dB, 600 ohms unbalanced (mic); frequency response 100-8000 Hz −10 dB (standard play), 100-6000 Hz −10 dB (long play); S/N 40 dB. Includes 1-2-3 hr videocassette, battery pack, car battery cord, shoulder strap, earphone, 5-ft 75-ohm VHF output cable, and 300/75 ohms VHF antenna adaptor; 19 lbs w/battery; 5½" H × 12½" W × 12½" D..... $1150

**VA515RQ.** Electronic varactor tuner for VH5200RQ; 14-position electronic tuning system for 14 UHF/VHF channels; remote TV channel changing; permits ac home operation and off-the-air recording; also recharges built-in battery on ac power..... $425

**VA505RQ.** Power supply for VH5200RQ; recharges batteries and enables standard ac house current operation..... $130

### VH5020RW Video Cassette Recorder

Six-hour VHS color video cassette recorder with two rotary hot press ferrite video heads, one audio control stationary head, and full-track and audio dubbing erase heads. Features built-in electronic digital clock/timer; 14 UHF/VHF station selection buttons; audio dub; pause control; three-digit tape counter with memory; cue/review; tuner/camera and TV/VTR input select switches. Video: horizontal resolution 270 lines (b&w), 230 lines (color); input 1.0 V p-p, 75 ohms unbalanced; S/N 42 dB (b&w, Rhode & Schwarz); output 1.0 V p-p, 75 ohms unbalanced. Audio: input −20 dB, 100k ohms unbalanced (line), −70 dB, 600 ohms unbalanced (mic); output −6 dB, 600 ohms unbalanced (line); frequency response 100-8000 Hz (standard play), 100-6000 Hz (long play), 100-5000 Hz (SLP), all −10 dB; S/N 40 dB. Includes 1-2-3 hr videocassette, remote pause control with 20-ft cable, 5-ft 75-ohm VHF output cable, 5-ft 300-ohm UHF connector cable, 75/300 ohms VHF matching transformer, and 300/75 ohms VHF antenna adaptor; 6⅞" H × 19⅛" W × 15½" D..... $1100

**VH5150RW.** Same as VH5020RW except has built-in electronic digital clock/timer display that can program up to four programs over seven-day period; has remote channel change/pause control with 20-ft cable; 7" H × 19" W × 14¾" D..... $1325

### VH5300SE Portable VCR

Portable six-hour three-speed VHS color video cassette recorder with two rotary hot press ferrite video, stationary audio control, and full-track and audio-dubbing erase heads. Features special effects (playback in slow motion, freeze frame, and frame advance in 6-hr mode), three-digit tape counter with memory, tuner/camera switch, audio overdub, built-in rechargeable 80-min battery, and scene transition stabilizer; car cord for 12-V dc operation or ac power supply optional. Horizontal resolution 280 lines (b&w), 240 lines (color). Supplied with VC-T60 1-2-3 hr videocassette, battery pack, shoulder strap, earphone, 5-ft 75-ohm VHF output cable, 75/300 ohm VHF matching transformer, mic attenuator, mic plug matching adaptor, battery connector cord, and remote pause control; 12 lbs with battery; 4.5" H × 11.5" W × 9.75" D..... $1000

**VA512SE.** 14-pushbutton varactor tuner for VH5300SE; has LED digital electronic clock/timer

# 4 VIDEO CASSETTE RECORDERS

display and auto fine tuning ..... $250

**VA520SE.** Programmable 14-pushbutton varactor tuner for VH5300SE; programs up to 8 programs over two-week period; has LED digital electronic clock/timer display and auto fine tuning ..... $350

### Color Cameras

**VK705RQ.** Video camera with F1.8-22 25-mm C-mount lens, optical viewfinder, and built-in microphone ..... $660

**VK715RQ.** Video camera with F1.8 6:1 zoom lens, through-the-lens viewfinder, and built-in microphone ..... $850

**VK720RQ.** Video camera with F1.8 6:1 zoom lens, electronic viewfinder, and boom microphone . $960

## RCA

### VEP150 SelectaVision Portable VCR

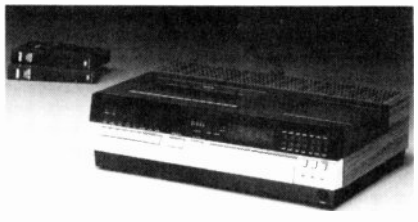
Six-hour three-speed portable VHS color video cassette recorder with direct-drive capstan and headwheel motors; powered by built-in rechargeable battery (1.5-hrs recording time), cigarette lighter socket (with optional dc power cord), or on ac house current (with TEP1400 tuner/timer or PDP500 ac adaptor/charger). Features soft-touch transport controls; audio dubbing; three-digit tape counter with memory; LED battery indicators for full charge, adequate charge, and 5-min recording time remaining; power saver circuit (automatically switches recorder to standby after 5-min pause); air-damped cassette insert/eject; tracking control. Output 1.0 V p-p, ±0.2 V; input 1.0 V p-p ±0.5 V; r-f output level 1.5-3 mV. Supplied with remote start/stop/pause control with 19-ft 8-in cord, earphone, 3-hr videocassette, and removable handle; 15 lbs; 4⅝" H × 10¼" W × 11⅜" D ..... $1075

**TEP1400.** Microprocessor-controlled tuner/timer module for VEP150; programmed to record up to five different programs on different channels over one-week period. Features LED digital timer/clock display; electronic touchbutton tuning for channels 2-83; built-in ac power adaptor and battery charger; output 1.0 V p-p ±0.5 V; 4⅝" H × 10⅜" W × 12½" D ..... $350

**PDP500.** Ac adaptor/charger for VEP150; recharges built-in battery off regular ac house current, plays back videocassettes on ac current, or can be used for in-home camera recording; 4½" H × 4¾" W × 11" D ..... $149

### VET450 SelectaVision VCR

Programmable six-hour three-speed VHS color video cassette recorder with direct-drive capstan and



headwheel motors and two-head helical scan system. Features microprocessor-controlled electronic programmer (programs up to eight different programs on eight different channels over two-week period) with LED digital timer/clock readout; picture search (9× normal speed) in fast forward or rewind (LP or SLP modes ); electronic touchbutton tuning of VHF/UHF channels 14-82; auto tape rewind in all modes except timer; four-digit tape counter with memory; tracking control; soft-touch electronic tape transport controls; audio dubbing; .auto TV/VCR switch; dew moisture control. Includes remote channel change/pause/picture search control with 20-ft cord and three-hour videocassette; 5¼" H × 18⅜" W × 14" D ..... approx. $1150

**VET250.** Similar to VET450 except has built-in 24-hr electronic clock/timer with auto stop .... $995

### CC006 Color Video Camera

Lightweight color VHS video camera with fl.8 6:1 power zoom lens, electronic viewfinder, and boom microphone (telescopes out to 7.75 in); has on-camera record/pause control; includes 9-ft 10-in cable and compact power supply with 500-W ac outlet for VCR hookup ..... $949

## SANYO

### 9100A Betacord Video Cassette Recorder

Color video cassette recorder with Beta cassette format for one hour, two hour, or three hour recording/playback; one-touch pushbutton operation; built-in digital clock/timer; memory digital tape counter; instant editing with pause control; built-in all-channel tuner; lighted channel indicators; automatic fine tuning; camera and microphone inputs; video inputs/outputs; automatic shut-off with sleep switch; rotary two-head helical scan recording system; 7.7" H × 19.5" W × 14.6" D ..... $795

## SEARS

### 5306 Video Cassette Recorder

4½-hr Beta color video cassette recorder. Features LED digital clock/timer readout; remote control with freeze-frame; BetaScan in fast forward and rewind; auto speed selection; auto rewind; feathertouch tape function controls; walnut woodgrain vinyl-on-metal front and side panels ..... $985

### 5305 Video Cassette Recorder

Three-hour Beta color video cassette recorder features LED digital clock/timer readout, remote control, and auto end-of-tape shutoff; walnut woodgrain vinyl-on-metal front and side panels ..... $735

## SHARP

### VC-6800 Video Cassette Recorder

Six-hour programmable two-speed (1.31 and 0.43 ips) VHS color video cassette recorder with three dc

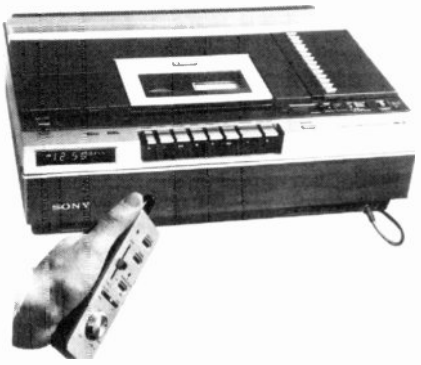
motors for servo capstan, head drum, and tape loading drive. Features microcomputer-controlled automatic and unattended program system (records up to seven separate programs on seven different channels over one week or automatically records program at same time for seven consecutive days) with programmable keyboard and channel selector, program/clock/timer/AM-PM/tape counter LCD display readout, memory recall, and backup batteries to prevent loss of memory during power interruption; auto program locate device in fast forward or rewind; electronic four-digit tape counter with memory; tape remaining LED indicators in LP/SP rec/play; two-way pause with included remote control unit with 20-ft cord; touchbutton VHF/UHF electronic tuning with auto fine tuning; auto TV/VTR switch; audio dubbing; dew warning LED. Horizontal resolution 240 lines (SP mode); output 1.0 V p-p/75 ohms unbalanced (video); input 0.5-2.0 V p-p/75 ohms unbalanced (video), −20 dBm/100k ohms unbalanced (line, audio), −70 dBm/600 ohms unbalanced (mic); audio frequency response 70 ±4 dB to 10,000 +2/−5 dB Hz in SP mode; 6⅜" H × 19⅛" W × 15⅞" D ..... $1295

**ALWAYS....**
**check the *TAPE RECORDING & BUYING GUIDE* first before you shop for your new equipment.**

## SONY

### SL-5800 Video Cassette Recorder

Five-hour programmable Betamax color video cassette recorder with double-azimuth video head. Fea-



tures built-in programmable timer (preset recording of four programs over two-week period) with LED digital clock/timer readout; variable BetaScan (searches in forward or reverse from 5-20 times normal speed with remote commander control unit); 3× normal speed fast play; stop −⅓ normal speed variable slow motion; freeze-frame and frame-by-frame viewing; auto tab marker (automatically marks electronic signal on beginning of each recorded program on tape) with memory; 14 pushbutton VHF/UHF tuning; logic-controlled transport controls; audio dubbing; VTR/TV switch; B-I play, B-II record/play, and B-III 5-hr record operations mode; includes remote commander control with BetaScan, fast play, variable slow motion, freeze-frame, frame-by-frame viewing, and cue/review in fast forward and rewind ..... approx. $1400

**AG-300 BetaStack.** Programmable videocassette autochanger providing up to 20 hrs of record/playback time of four different programs on different channels over two-week period, each on separate cassettes .. ..... approx. $100

### SL-5600 Video Cassette Recorder

Programmable Betamax color video cassette recorder features built-in programmer (preset recording of five hours of programs automatically over two-week period or recording of four different programs on different stations at various times) with LED digital timer/clock display and memory back-up system (automatically advances clock and keeps programming instructions for 10 minutes during power outage); BetaScan (searches in fast forward or reverse up to 13× normal speed); tab-marker electronic indexing (automatically marks electronic signal on beginning of each recorded program on tape); microprocessor direct mode-to-mode tape transport controls; 14-pushbutton UHF/VHF express tuning; 3× fast play; freeze frame; Beta-I play operation; includes remote control with BetaScan search, 3× fast play, and pause/freeze frame with 15-ft cord ... ..... $1350

### SL-3000 Portable VCR

Portable one-hour Betamax color video cassette recorder with rotary two-head helical scanning system and EIA-standard NTSC color video signal system. Features one-button recording; audio dubbing; cue function; pause control; logic-controlled tape functions; dew sensor; battery indicator; three-way power supply (ac, dc, or battery operation); four-digit tape counter; tape speed control system. Video: S/N 45 dB; input 1.0 V p-p, 75 ohms unbalanced; output 1.0 V p-p, 75 ohms; resolution 240 lines. Audio: S/N 40 dB; frequency response 50-7000 Hz. Includes −26-dB earphone, antenna switch and 2-m cable, and shoulder strap; 8.5 kg with tape and battery; 127 mm H × 296 mm W × 345 mm D ..... $1300

**TT-3000.** Tuner-timer for SL-3000; features built-in electronic digital timer for seven-day programmable recording capability with access to 14 VHF/UHF channels, three-hr recording capacity, express tuning, and auto shut-off and fine tuning; 16 lbs, 9 oz ..... $500

**HVC-1000.** MF Trinicon color video camera for SL-3000; has ⅔-in Trinicon pick-up tube; built-in F1.8 14-42 mm zoom lens, built-in microphone, single reflex optical viewfinder, remote start/stop recorder control functions, and remote control pause; 300-line resolution; S/N 45 dB; video output 1.0 V p-p; 22 kg ..... $1400

### SL-5400 Video Cassette Recorder

Five-hour Betamax color video cassette recorder with direct-drive dc head and servo capstan motors in rotary two-head helical scan system and NTSC-color video signal. Features BetaScan system for instant forward/reverse search and scan; built-in three-day timer/multi-event programmer; fourteen-position pushbutton tuning; auto program selector; 3× normal speed fast play; still-frame capability; BetaScan Commander remote control with freeze-frame capability up to 15 ft away; audio dubbing; five recording length settings; air-damped cassette lid; remote camera connector; four-digit tape counter. Video: horizontal resolution 280 lines (monochrome), 240 lines (color); S/N 45 dB (monochrome). Audio: S/N 40 dB; frequency response 50-8000 Hz (Beta II), 100-7000 Hz (Beta III). Includes cassette tape, channel indicators, antenna connectors, 75-ohm coaxial cable, and 300-ohm twin-lead cable; 33 lbs; 6½" H × 19¾" W × 15" D ..... $1250

### Betamax SL-8600 VCR

Color video cassette recorder with Beta cassette format for three-hour recording. Features LED clock timer; record/pause indicator; remote pause with 20-ft cord; tape counter with memory; VHF and UHF channel selectors with numeral read-out; rotary two-head helical scan recording system; optional black-and-white sound camera available; 7¹¹⁄₁₆" H × 18⅜" W × 16⅛" D ..... $1150

### VP-2011 Video Cassette Player

U-Matic ¾-in one-hour video cassette player with microprocessor-controlled Auto Search Control random access unit with automatic program/segment locate and play function, pause control, and LED digital position/selected position readout display. Features auto stop, rewind, and restart; still adjust control; 8-pin VTR connector; BNC video out and playback on conventional TV receiver with optional r-f adaptor ..... $2000

**VO-2610.** U-Matic video cassette player/recorder with input review, skew control, and still adjust ..... $2150

**VP-2010.** U-Matic player with still control ... $1775

**Trident VP-2030.** U-Matic player/recorder can record on three major world TV systems, NTSC, PAL, and SECAM, when used with PVM-1850PS Trinitron monitors ..... $2350

**PVM-1850PS.** Trinitron monitor ..... $1430

## SYLVANIA/GTE

### VC4500 Video Cassette Recorder

Portable two-piece six-hour three-speed VHS color video cassette recorder with separate record and

playback sections. Record section features microprocessor-controlled tape function buttons with LEDs (changes modes without going through stop), auto dubbing, manual pause with separate remote pause control unit, three-digit tape counter with memory, speed selector, and battery check indicator. Playback section features built-in VHF/UHF tuner with 14 electronic pushbutton channel selectors with LED channel indicators and built-in electronic timer with LED digital display. Supplied with remote control unit, adjustable carrying strap, battery pack, and T-60 1-2 hr video cassette. Record deck 5⅝" H × 12¹¹⁄₁₆" W × 14⅜" D; tuner 5⅝" H × 7⅝" W × 14⅛" D ..... $1500

### VC3000 Video Cassette Recorder

Programmable six-hour three-speed VHS color video cassette recorder that records four programs on four different channels over seven-day period. Features built-in UHF/VHF tuner with 14-button electronic channel selectors with channel indicators; built-in electronic timer with LED digital display; electronic program indexing signal; auto dubbing; manual pause with separate remote control pause unit; remote control channel change; three-digit tape counter with memory; supplied with remote control unit, 1-2 hr videocassette, 5-ft 75-ohm VHF output cable and 5-ft 300-ohm UHF connector cable, and 75/300 ohm VHF matching transformer and 300/75 ohm VHF antenna adaptor; 7" H × 19" W × 14.75" D ..... $1350

### VC2700 Video Cassette Recorder

Six-hour VHS color video cassette recorder. Features built-in UHF/VHF tuner with electronic channel selector; built-in electronic timer with LED digital display; manual pause with separate remote control; audio dubbing; includes T-60 1-2 hr video cassette; 6⅞" H × 19¼" W × 15⅜" D ..... $1100

### SC2112 Color Camera

Color video camera with 6X power zoom lens, electronic viewfinder, action microphone with mic battery and extension cable, and wrist strap; 6.4 lbs; 13.25" H × 3.5" W × 13.75" D ..... $1095

## TOSHIBA

### V-5425 Video Cassette Recorder

Five-hour two-speed programmable Beta-format color video cassette recorder. Features Comput-R-

Tune™ programmable 12-station electronic tuning system that presets up to three programs over seven-day period; programmable quartz-locked LCD digital timer with time adjust/time/program switch for preselected recording times by day, time, and for up to a week in advance; freeze frame, fast forward, and reverse with scanning and monitoring facilities; four-digit tape counter with fast forward/rewind auto find and counter memory rewind; visual cue/review picture search in fast forward/rewind LP mode; audio dubbing; remote pause; LED power, record, long play, pause/still, and tape function indicators; camera/remote control connectors controlling record/play pause action on stop-action still frames; one-touch recording. Video input and output 1.0 V p-p, 75 ohms unbalanced, sync, negative; horizontal resolution 250 lines (SP), 240 lines (LP); S/N 45 dB (video SP/LP), 40 dB (audio); audio frequency response 50-8000 Hz (SP), to 7000 Hz (LP); 7" H × 18.7" W × 15.2" D ..... $1345

### V-5420 Video Cassette Recorder

Programmable three-hour Beta-format video cassette recorder records up to three different programs within seven-day period. Features built-in electronic digital clock/timer; memory circuits fed with day of program, program channel, program time, and program length; programmable electronic forward/reverse channel selectors (2-13) with LED channel indicators; tape sentinel; piano-key tape function controls with LED indicators; search tape counter with memory reset; LED power, record, standby, and pause indicators; audio dubbing; remote pause control ..... $1295

**IK-1610.** Portable color video camera with 25-mm F/1.8 lens, built-in condenser mike, hand grip and shoulder rest, univicon sensitivity, remote trigger pause, and ac/dc operation ..... $895

**IK-1650.** Same as IK-1610 but also has 18-105 mm F/1.8 zoom lens and electronic viewfinder with built-in record/playback monitor and sound . $1345

### V-5530 Video Cassette Recorder

Portable three-hour Beta-format video cassette recorder. Features audio dubbing; remote pause; cue and review; touch reference controls; optional built-in battery supply; allows one hour fully remote recording ..... $1245

**V-5535.** V-5530 with tuner; does not include ac adaptor ..... $1345

**TU-530.** Timer/tuner for V-5530; LED timer for hands-off recording; includes battery charging function ..... $245

### LVR Video Tape Recorder

Endless-loop-tape fixed-head fixed-reel two-hour color video tape recorder. System features simplified internal mechanics, 25-sec fast-access time to any track for visual review/preview, 300-track digital tape indexing, distortion- and vibration-free tape handling, smaller size and weight, and high-speed tape duplication; uses ½-in 100-m-long graphic-lubricated tape. Additional features include random access and function flexibility; seven-day programmable timer/clock display; red LED track counter display; enter three-digit track number selector; Comput-R-Tune™ programmable 12-station electronic tuning; play and record buttons with LED; up/down for preview, scan, or rewind; repeat with LED indicator (repeats selected 25-sec track, locks, cancelled by play or stop); stop; and eject. Video: EIA NTSC-compatible color in and out signals; S/N 42 dB min.; resolution 230 lines (color); track access time 50 msec/track; audio S/N 45 dB; 11.2" H × 15" W × 5.5" D ..... approx. $600

## ZENITH

### VR9000W Video Director VCR

Betamax-format five-hour color video cassette recorder with rotary two-head helical scan recording system and EIA NTSC color video signal. Features Video Action remote control with speed search and stop; automatic digital timer display with auto shut-off permits user to program over three-day period; electronic 14-pushbutton tuning; audio dubbing; tape counter with reset button; camera jack for use with any Zenith black-and-white or color TV camera. Video input 1.0 V p-p + 1/−0.5 V, 75 ohms unbalanced; output 1.0 V p-p ±10%, 75 ohms; horizontal resolution 250 lines ±20 (monochrome); S/N 45 dB (video), 40 dB (audio); audio frequency response 50-10,000 Hz; simulated American walnut finish cabinet; 6½" H × 19⅛" W × 15" D ... $1125

**VR9700J.** Similar to VR9000W except features 14-day auto recorder LED display, a microprocessor-controlled programmable timer that can turn on, change, turn off, or record four different programs on different channels over 14-day period, with daily or weekly repeats of program recorded for up to five hours on company's L830 cassette; uses 12-hour AM/PM power line synchronized clock; additional features include automatic indexing in fast forward or rewind and triple forward speed search button on video action remote control for rapid viewing of recorded programs; 14-pushbutton tuning is microprocessor-controlled; chestnut vinyl-cushioned cabinet; 6.5" H × 19.5" W × 15.25" D ..... $1300

### Video Cameras

**KC1250.** Color video camera with 6:1 F:2.0 zoom lens, electronic viewfinder, and built-in electret microphone; includes power supply adaptor .... $1395

**KC1000.** Color video camera with 25-mm "C" mount lens, optical pop-up viewfinder, and built-in electret microphone; includes power supply adaptor ..... $995

# 5 CAR STEREO EQUIPMENT

## Ai/RHAPSODY

### RY-703 AM-FM/Cassette Player
In-dash stereo cassette player with AM-stereo FM radio; adjustable shafts; lighted slide-rule dial; slide-in cassette; fast forward and eject buttons; balance and tone controls; pushbutton AM/FM and local/distant controls; LED AM, FM, and stereo indicators; front-end head alignment; antenna trimmer; mounting hardware and universal face trim plates included; optional RY-10 and RY-16 speakers available; 7" × 6¼" × 2⅛"..... $90

### RY-873 AM-FM/8-Track Player
In-dash stereo 8-track player with AM-stereo FM radio; lighted slide-rule dial on tape opening cover; automatic and pushbutton track changer with LED number indicators; pushbutton AM/FM, local/distant, and power on/off controls; balance and tone controls; front-end alignment; antenna trimmer; mounting hardware and universal face trim plates available; optional RY-10 and RY-16 speakers available; 7" × 6¼" × 2⅛"..... $80

## ALPINE

### 7308 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio with digital PLL frequency synthesizer tuner, metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy head, and LED digital frequency/tape counter readout with tape memory and clear buttons; designed to fit most domestic and imported cars; hooks up with company's components through DIN jack. Cassette deck features music sensor system (scans tape for beginning of desired selection); cassette glide electromechanical lock-in insertion of cassette and electronic glide eject (hands tape to listener outside window); FeCr/$CrO_2$/metal tape selector; locking fast forward and rewind; auto eject at end of tape and fast forward; auto replay at end of rewind. Radio features electronic feathertouch five-station AM/FM memory preset with auto scan and seek, scan sense, FM, tuner, and noise-eliminator switches; built-in muting; sliding bass, treble, balance, and four-way fader controls; output 6 W/4 ch continuous; 2" H × 7 1/16" W × 6¼" D..... $700

### 7206 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio and cassette player with Dolby noise-reduction system, hard permalloy tape head, and cassette and electronic glide eject; $CrO_2$/FeCr tape selector; auto replay at end of rewind and auto eject at end of play or fast forward; music sensor in fast forward/rewind; wow and flutter 0.09%; tape frequency response 40-12,000 Hz; tape S/N 65 dB (Dolby on). Radio features five-station preset, four-way fader/balance control; feather-touch controls for mute, loudness contour, and noise eliminator switches; separate bass and treble controls; output 20 W/ch continuous; FM usable sensitivity 1.4 μV; FM S/N 72 dB (Dolby on); FM capture ratio 1.5 dB; dist. 0.8% at 10 W continuous ..... $410
**7205.** Similar to 7206 without $CrO_2$/FeCr switch and music sensor ..... $360
**7204.** Similar to 7205 without four-way fader/balance control..... $310

### 7307 Preamp/Tuner/Cassette Deck
In-dash AM-stereo FM tuner/preamplifier/stereo cassette deck. Cassette deck features Dolby noise-reduction system, $CrO_2$/FeCr selector button, ignition-key off and cassette glide eject, auto replay at end of rewind, auto eject at end of play/fast forward, and music sensor in fast forward and rewind; wow and flutter 0.09%; tape frequency response 40-16,000 Hz; S/N 72 dB (Dolby on). Radio features five-station pushbutton preset, noise eliminator switch, separate bass and treble controls, mute switch, DIN connector, and tone-by-pass switch; FM usable sensitivity 1.4 μV; FM S/N 72 dB (Dolby on); FM capture ratio 1.5 dB..... $380

### 7203 AM-Stereo FM/Cassette Deck
In-dash AM-stereo FM radio/stereo cassette deck. Cassette features Dolby noise-reduction system; hard permalloy tape head; cassette and electronic glide eject; $CrO_2$/FeCr tape selector; auto replay at end of rewind; auto eject at end of play/fast forward; wow and flutter 0.13%; tape frequency response 40-12,000 Hz; S/N 65 dB (Dolby on). Radio features four-way fader/balance control; noise eliminator switch; separate bass and treble controls; mute switch; loudness contour; output 20 W/ch continuous; FM usable sensitivity 1.4 μV; FM S/N 72 dB (Dolby on); FM capture ratio 1.5 dB; dist. 0.8% at 8 W continuous ..... $380
**7213.** Similar to 7203 without permalloy tape head; auto reverse cassette; wow and flutter 0.14%; tape response 40-11,000 Hz ..... $410
**7212.** Similar to 7213 without $CrO_2$/FeCr tape selector and noise eliminator switch ..... $360
**7202.** Similar to 7212 without auto reverse; cassette has auto replay at end of rewind and auto eject at end of play or fast forward; tape response 40-12,000 Hz; wow and flutter 0.13% ..... $330
**7201.** Similar to 7202 without Dolby noise-reduction system and four-way fader/balance ..... $280

### 7123 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio and metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy head. Cassette deck features music sensor system (scans for desired tape selection on tape); cassette glide lock-in insert and electronic glide eject system; FeCr/$CrO_2$/metal tape selector; locking fast forward and rewind; auto eject at end of play and fast forward; auto replay at end of rewind. Radio features five-station memory preset; separate bass and treble controls; muting; auto local/distant switch; built-in afc; balance control; 6 W/ch continuous; preamp/deck capability through DIN jack; 2" H × 7 1/16" W × 5¾" D..... $320

### 7128 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio with PLL digital frequency synthesizer tuner, metal-compatible stereo cassette deck with hard permalloy head, and LED digital clock/station frequency display. Cassette features cassette glide lock-in insert; auto reverse at end of play, fast forward, or rewind; metal/chrome/ferro bias switch; locking fast forward and rewind; wow and flutter 0.1% wrms; frequency response 40-15,000 Hz ±3 dB (all tapes); S/N 50 dB. Radio features five-station AM/FM preset with memory; auto local/distant; built-in afc; manual up/down tuning (200-Hz increments on FM, 10-kHz on AM); adjustable Tone Tenor control (±10 dB at 10,000 Hz); max. output 2.2 W/ch continuous into 4 ohms from 70-20,000 Hz with 0.8% THD; FM usable sensitivity 2.2 μV/75 ohms, selectivity 50 dB, and S/N 55 dB; accepts variety of 3000 Series components through DIN jack connection; 2" H × 7" W × 5.25" D..... $300

### 7327 AM-FM Tuner/Preamp/Cassette
In-dash unit combines AM-stereo FM tuner/preamp and metal-compatible stereo cassette deck with Dolby noise-reduction system and sencore head; designed to fit X-body cars. Cassette deck features automatic music sensor (scans to next selection in fast forward, replays same song in rewind); metal/chrome/ferro bias switch; auto cassette glide lock-in insert mechanism; auto eject at end-of-play and fast forward; key-off eject; locking fast forward and rewind; LED tape indicator; wow and flutter 0.09% wrms; frequency response 40-18,000 Hz +3 dB with metal; S/N 65 dB with Dolby. Tuner features separate bass and treble controls, feathertouch loudness, mute, and AM/FM switches, auto local/distant, built-in afc, and LED stereo indicator; FM usable sensitivity 1.8 μV/75 ohms, selectivity 60 dB, and S/N 72 dB with Dolby; preamp/deck capability through DIN jack; 2" H × 6.25" W × 4.5" D... ..... $280

### 7121 AM-Stereo FM/Cassette Deck
In-dash unit incorporates AM-stereo FM radio and metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy head; can add any of company's 3000 Series components through DIN jack connector. Cassette deck features auto reverse at end-of-play, fast forward, and rewind; bias switch for metal, chrome, and ferro tape; auto cassette glide lock-in insert system; fast forward and rewind; tape direction indicators; key-off eject; wow and flutter 0.1% wrms; frequency response 40-15,000 Hz +3 dB with metal; S/N 65 dB with Dolby. Radio features pushbutton loudness, stereo, mute, and AM/FM; auto local/distant switch; adjustable Tone Tenor (+10 dB at 10,000 Hz); built-in afc; FM usable sensitivity 1.8 μV/75 ohms, selectivity 60 dB, S/N 72 dB with Dolby, stereo separation 35 dB at 1000 Hz, and capture ratio 2 dB; output 2.2 W/ch continuous into 4 ohms from 70-20,000 Hz with 0.08% THD; accepts company's 3000 Series components through DIN jack; 2" H × 7" W × 5.25" D..... $270
**7120.** Similar to 7121 without cassette Dolby noise-reduction system and key-off eject; tape S/N 55 dB..... $210
**7124.** Same as 7120 except designed for all cars,

including X-body models; no built-in afc; 2" H × 6.25" W × 4.5" D..... $200

**7100 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM radio and cassette player with cassette glide, locking fast forward and rewind, and auto stop at end of play or fast forward; radio has five-station preset, local/distant switch, and tone control; wow and flutter 0.09%; tape S/N 55 dB; FM sensitivity 1.6 μV; FM selectivity 70 dB; FM S/N 62 dB; auto afc and power antenna lead.. $200

## AUDIOVOX

**DGC-20 AM-Stereo FM/Cassette Player**
In-dash digitally-synthesized AM-stereo FM push-button radio with memory, stereo cassette player, and built-in LED digital quartz clock/radio frequency display with "display priority" switch for constant frequency or time readout and dimmer. Features include electronically-controlled tuning with green LED digital display; as many as six AM and six FM stations can be preset; auto scan searches and stops at next available station; push-button stereo/mono and local/distant switches; cassette locking fast forward and rewind; tape direction indicators. Wow and flutter 0.35% wrms; frequency response 50-10,000 Hz; max. output 6.5 W/ch with 10% THD; FM stereo separation 25 dB; 2" H × 7⅛" W × 6" D ..... $355

**CAS-600A AM-Stereo FM/Cassette**
In-dash unit combines AM-stereo FM radio, stereo cassette player with Dolby noise-reduction system, and built-in 40-W power amplifier. Features locking fast-forward/rewind, auto/manual cassette eject, bass, treble, mono/stereo, local/distant, four-way balance, and power booster on/off controls and LED tape and stereo FM indicators..... $240

**ID-675/CAS-350 AM-FM/Cassette**
In-dash "Super Power" AM-stereo FM radio, stereo cassette player, and built-in 40-W power amplifier. Cassette features side-load cassette mechanism, auto and manual eject, tape play indicator light, and locking fast forward/rewind control. Radio features pushbutton mono/stereo and local/distant controls, slide-bar band selector, four-way stereo balance control, and separate bass and treble controls. Wow and flutter 0.35% wrms; frequency response 50-10,000 Hz; max. output 20 W/ch; FM stereo separation 25 dB; 12 V dc negative ground; 2" H × 7⅛" W × 5½" D ..... $192

**ID-725 AM-Stereo FM/Cassette Player**
In-dash pushbutton AM-stereo FM radio and stereo cassette player features locking fast forward and pushbutton eject control, dial-in-door, LED tape indicator, and four-way balance control. Radio has pushbutton local/distant and tuning controls and slide-bar band selection. Wow and flutter 0.3% wrms; frequency response 50-10,000 Hz; max. output 6 W/ch; FM stereo separation 20 dB; 12 V dc negative ground; 2¾" H × 7⅛" W × 6" D.. $147

**HI-COMP Line**

**HCM-0010 AM-Stereo FM/Cassette Deck**
In-dash modular biamplified unit combines AM-stereo FM electronic tuner/preamp, stereo cassette

deck with Dolby noise-reduction system and hard permalloy head, and LED digital quartz clock/radio frequency display with LED dimmer; requires external amplifier. Cassette deck features auto reverse, $CrO_2$ tape selector, pushbutton fast forward, rewind, and eject, and LED Dolby and tape direction indicators. Radio features twelve-station pushbutton preset with memory, auto station seek control, electronic motor-driven fader control, sliding four-way stereo balance, bass, and treble controls, FM muting, and pushbutton biamp, loudness, local/distant, and mono/stereo controls; preamp and RCA output jacks..... $650

**HCM-005 AM-Stereo FM/Cassette Deck**
In-dash modular biamplified unit combines AM-stereo FM electronic tuner/preamp, stereo cassette deck with Dolby noise-reduction system and hard permalloy head, and LED digital clock/frequency display; requires external amplifier. Cassette deck features $CrO_2$ tape selector, auto reverse, pushbutton fast forward, rewind, and eject, and LED Dolby and tape direction indicators. Radio features 12-station pushbutton preset with memory, loudness, AM/FM, local/distant, mono/stereo, and separate bass and treble controls, and electronic motor-driven fader; preamp output..... $550

**HCC-1100 AM-Stereo FM/Cassette Deck**
In-dash unit combines AM-stereo FM receiver, stereo cassette deck, and LED digital quartz clock/radio frequency display with dimmer. Cassette deck features sliding fast forward/eject/rewind control; radio features 12-station pushbutton preset with memory, auto station seek control, four-way balance control, pushbutton mono/stereo, local/distant, and AM/FM controls, and preamp output jacks; frequency response 50-12,000 Hz; speaker impedance 8 ohms ..... $450

**HCC-1030 AM-Stereo FM/Cassette Deck**
In-dash AM-stereo FM radio/stereo cassette deck. Deck features Dolby noise-reduction system, auto reverse, $CrO_2$ tape selector, pushbutton eject, and locking fast forward and rewind. Radio features pushbutton tuning, FM Dolby, separate bass and treble controls, four-way balance, local/distant, and mono-stereo switches, and built-in 40 W power booster. Output 13 W/ch continuous with 1.0% THD; frequency response 40-15,000 Hz ..... $420

**HCC-550 AM-Stereo FM/Cassette Deck**
In-dash unit combines AM-stereo FM radio and stereo cassette deck; DIN-spec nosepiece designed for imported cars. Cassette features auto reverse, locking fast forward and rewind, pushbutton eject, and tape program indicators; radio features AM/FM, local/distant, mono/stereo, and extended-range tone controls and low-distortion preamp output jacks; output 6 W/ch continuous max.; frequency response 50-10,000 Hz ..... $210

## AUTOTEK

**CSR-3200 AM-Stereo FM/Cassette Player**
In-dash unit combines AM-stereo FM radio and stereo cassette deck with Dolby noise-reduction system and sendust head. Cassette: features auto reverse at end-of-tape, locking fast forward and rewind, and tape direction indicators; wow and flutter 0.13%; frequency response 28-16,000 Hz ±3 dB; S/N 51.5 dB with Dolby. Radio: features five-station pushbutton preset tuning, separate bass and treble controls, mono/stereo and local/distant switches, and balance control; FM sensitivity 1.7 μV and stereo separation 33.5 dB at 1000 Hz; output 7 W/ch ..... $330

**CSR-2001 AM-Stereo FM/Cassette Player**
In-dash unit combines AM-stereo FM radio and stereo cassette deck; DIN styling for imported cars. Cassette features auto reverse, locking fast forward and rewind, and tape direction indicators; wow and flutter 0.3%; frequency response 60-14,000 Hz −3 dB; S/N 45 dB. Radio features AM/stereo FM, local/distant, and balance controls; FM usable sensitivity 2 μV at 30-dB S/N, dist. 0.5%, S/N 57 dB, and stereo separation 35 dB; adjustable shafts, power antenna lead, and snap brackets included; 45 mm H × 175 mm W × 150 mm D..... $220
**CSR-2000.** Similar to CSR-2001; tape wow and flutter 0.25% and frequency response 40-13,000 Hz −3 dB; FM usable sensitivity 1.5 μV, S/N 54 dB, and stereo separation 32.5 dB; 58 mm H × 180 mm W × 150 mm D..... $190

**CSR-1100 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM radio/stereo cassette player; designed for small imported cars. Cassette has locking fast forward; wow and flutter 0.25%; frequency response 100-8000 Hz −3 dB; S/N 40 dB. Radio features mono/stereo and AM/FM switches and balance and tone controls; FM usable sensitivity 1.5 μV at 30-dB S/N, dist. 1.0%, S/N 40 dB, and stereo separation 20 dB; 40 mm H × 177 mm W × 127 mm D..... $110

## B·I·C

**C-1 Cassette Deck**
Underdash two-speed (1⅞ and 3¾ ips) metal-compatible car stereo cassette deck with Dolby noise-reduction system. Features speed selector with LED; illuminated peak level meter; equalization selector for all tapes with LED; volume, balance, and treble controls; tape eject; loudness selector with LED; tape end indicator; preamp output; 10 W/ch continuous; supplied with quick-disconnect mounting bracket ..... $200

## CLARION

**PE-956B AM-Stereo FM/Cassette Deck**
In-dash unit combines AM-stereo FM radio, stereo cassette deck, and LED digital quartz clock/frequency display; DIN nosepiece for imported cars. Cassette features auto reverse, locking fast forward/rewind, pushbutton eject, and tape direction indicators. Radio features voltage-synthesizer FM electronic tuning, two AM/four FM pushbutton preset with memory, seek tuning, pushbutton loudness, local/distant, and stereo/mono switches, and LED station indicators; 4 W/ch continuous; 1.75" H × 5.75" W × 7" D..... $490

**PE-958A AM-Stereo FM/Cassette Deck**
In-dash unit combines AM-PLL stereo FM tuner, metal-compatible stereo cassette deck, and LED


digital clock/radio frequency display; requires separate power amplifier. Cassette deck: features super permalloy heads, equalization selector for metal and $CrO_2$ tapes, auto reverse, locking fast forward and rewind, and pushbutton eject; wow and flutter 0.13% wrms; frequency response 30-15,000 Hz. Tuner features five-station AM/FM pushbutton electronic tuning with seek and scan tuning, Dolby B circuitry with LED, pushbutton local/distant, and separate bass and treble controls; 2.75" H × 7" W × 5.5" D..... $430
**GA-302E.** Power amplifier for PE-958A; 24 W/ch continuous into 4 ohms from 45-30,000 Hz with 1.0% THD; speaker protection circuitry; 2" H × 6" W × 5.5" D..... $130
**GA-301E.** Power amplifier for PE-958A; 12 W/ch continuous into 4 ohms from 40-20,000 Hz with 1.0% THD; 1" H × 4" W × 5.5" D ..... $55

**PE-751B AM-Stereo FM/Cassette Player**
In-dash unit combines AM-stereo FM radio with stereo cassette player. Features five pushbutton tuning; Dolby noise-reduction; auto reverse; locking fast forward and rewind; separate bass and treble controls; 12 W/ch continuous; front-to-rear fader; left-to-right balance control; FET front end; cassette eject button; stereo indicator light; cassette program change button; Dolby indicator lights; smaller chassis fits most U.S. and foreign cars. Tape wow and flutter 0.13% wrms and frequency response 30-15,000 Hz; 2" H × 7" W × 6.25" D ..... $390

**PE-758B AM-Stereo FM/Cassette Deck**
In-dash unit combines AM-stereo FM radio and

# 5 CAR STEREO EQUIPMENT

stereo cassette deck; DIN nosepiece for imported cars. Cassette features auto reverse, locking fast forward and rewind, pushbutton eject, and tape direction indicators. Radio features five-station pushbutton tuning, IC circuitry, FET front end in tuner section, pushbutton AM/FM and local/distant selectors, LED stereo indicator, and power antenna lead; 4 W/ch continuous; 1.75" H × 6" W × 7" D ... $308

### PE-765A AM-Stereo FM/Cassette Deck

In-dash AM-stereo FM radio/stereo cassette deck; designed for domestic and imported cars. Cassette: features auto reverse, locking fast forward/rewind, and pushbutton eject; wow and flutter 0.13% wrms; frequency response 30-15,000 Hz. Radio: features five-pushbutton AM/FM tuning, pushbutton AM/FM and local/distant switches, program selector, and four-way balance control; output 4 W/ch continuous; 2" H × 5.5" W × 7" D..... $285

### PE-550A AM-Stereo FM/Cassette Deck

In-dash unit combines AM-stereo FM radio and stereo cassette deck. Cassette features auto reverse, locking fast forward/rewind, pushbutton eject, tape direction indicators, and dial-in-door; wow and flutter 0.2% wrms; frequency response 40-15,000 Hz. Radio: features FET front end tuning with Dolby FM circuitry, low-level line output, local/distant and AM/FM selector, auto stereo/mono switching, front-to-rear fader, and LED Dolby and stereo indicators; 4 W/ch continuous; adjustable shafts; 2" H × 6.25" W × 7" D..... $279

### PE-684A Stereo FM/Cassette Player

Underdash unit combines stereo FM radio with stereo cassette player. Features 10 W/ch continuous power amplifier; auto reverse; Dolby on both FM and cassette; locking fast forward and rewind; pushbutton eject; program change switch; punch sound; FM tuner sensitivity switch; Dolby and stereo indicator lights; program indicator lights; separate bass and treble controls; front-to-rear fader; left-to-right balance control; 2/4-ohm speaker impedance selector; FET front end in FM tuner section. Tape wow and flutter 0.12% wrms and frequency response 40-15,00 Hz; 2" H × 7.5" W × 6.5" D..... $254
**PE-838A.** Similar to PE-684A less FM tuner .. $227

### PE-560A AM-Stereo FM/Cassette Deck

In-dash unit combines AM-stereo FM radio and stereo cassette deck. Cassette: features auto reverse, locking fast forward and rewind, pushbutton eject, dial-in-door, and tape direction indicators; wow and flutter 0.2% wrms; frequency response 50-10,000 Hz. Radio: features AM/FM and local/distant switch, FET front end tuner, front-to-rear fader control, auto stereo/mono and left/right balance controls; 4 W/ch continuous; adjustable shafts; 2" H × 7.125" W × 5.5" D..... $216
**PE-559A.** Similar to PE-560A without tape auto reverse and direction indicators and auto stereo/mono switching; has auto eject..... $185

### PE-703A AM-Stereo FM/8-Track

In-dash AM-stereo FM radio and 8-track tape deck. 8-track: features dial-in-door, tape eject, program selector with four program LEDs, and vertical head tracking; wow and flutter 0.3% wrms; frequency response 30-10,000 Hz. Radio: features five-station pushbutton tuning, AM/FM slide bar switch, auto stereo/mono, front antenna adjustment, front-to-rear fader control, and LED stereo indicator; 4 W/ch continuous; adjustable shafts ($5^{13}/_{16}$ to $6^{5}/_{16}$ in); $2^{5}/_{8}$" H × $7^{1}/_{16}$" W × $6^{7}/_{8}$" D..... $195
**PE-623B.** Similar to PE-703A minus pushbutton tuning; has FET front end tuner; tape response 50-10,000 Hz; 2" H × 7.125" W × 4.75" D.. $151

### PE-453A 8-Track Player

Underdash stereo 8-track player features 10-W/ch continuous power amplifier; separate bass and treble controls; left-to-right balance control; program change switch; program repeat switch; punch sound; muting; loudness button. Tape wow and flutter 0.1% and frequency response 40-12,000 Hz; 2" H × 7.5" W × 6.5" D..... $127

## COBRA

### 221GTL AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio and auto reverse stereo cassette player features digital frequency readout

and digital clock display; cassette has pushbutton eject, fast forward and rewind slide controls, and tape direction indicators; radio has pushbutton tuning, local/distant and mono/stereo buttons, and rotary balance, treble, bass, and fader controls; output 12 W/ch; tape frequency response 100-8000 Hz +6 dB; FM sensitivity 1.9 mV..... $330
**222GTL.** Similar to 221GTL except has 8-track player with power-off eject..... $300

### 99GTL AM-FM/Cassette Player

In-dash AM-stereo FM radio and stereo cassette player. Cassette features fast forward/eject button and LED tape running indicator; wow and flutter 0.2% rms; frequency response 60-10,000 Hz +3 dB. Radio features five preset AM/FM pushbutton tuning; manual tuning; FM local/distant control; LED FM stereo indicator; front-to-rear fader control; slide balance control with center detent; power antenna lead; FM usable sensitivity 1.8 μV; FM stereo separation 30 dB; FM S/N 56 dB; max. output 12 W/ch continuous into 4 ohms; adjustable shafts; $2^{35}/_{64}$" H × $7^{5}/_{64}$" W × $6^{19}/_{64}$" D..... $200
**97GTL.** Similar to 99GTL without five memory AM/FM pushbutton tuning; $2^{3}/_{64}$" H × $7^{5}/_{64}$" W × $6^{19}/_{64}$" D..... $150

### 98GTL AM-Stereo FM/8-Track Player

In-dash AM-stereo FM radio and stereo 8-track player. 8-track player features LED program indicators and tape repeat control; wow and flutter 0.2% rms; frequency response 60-10,000 Hz +3 dB. Radio features five preset AM/FM pushbutton tuning; manual tuning; FM local/distant; LED FM stereo indicator; front-to-rear fader control; slide balance control with center detent; power antenna lead; FM usable sensitivity 1.8 μV; FM stereo separation 30 dB; FM S/N 56 dB; max. output 12 W/ch continuous into 4 ohms; adjustable shafts; $2^{35}/_{64}$" H × $7^{5}/_{64}$" W × $6^{19}/_{64}$" D..... $190
**95GTL.** Similar to 98GTL without pushbutton memory tuning; $2^{3}/_{64}$" H × $7^{5}/_{64}$" W × $6^{19}/_{64}$" D..... $145

### 105GTL AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio and auto reverse stereo cassette player. Cassette features pushbutton eject, fast forward/rewind slide control, and tape direction indicators. Radio features pushbutton local/distant, mono/stereo with stereo LED, and AM/FM controls and rotary balance and fader controls; output 12 W/ch. DIN-size chassis fits most imported and domestic cars; $1^{5}/_{8}$" H × $6^{1}/_{4}$" W × $4^{1}/_{2}$" D..... $180

### 93GTL AM-Stereo FM/Cassette Player

Compact in-dash AM-stereo FM radio and auto stop stereo cassette player. Cassette features eject/fast forward button and LED tape running indicator; wow and flutter 0.2% rms; frequency response 60-10,000 Hz +3 dB. Radio features local/distant and FM/AM pushbuttons, LED stereo FM, and rotary tone and left-to-right balance controls; FM usable sensitivity 1.8 μV; FM stereo separation 30 dB; FM S/N 56 dB. DIN-size chassis fits most domestic and imported cars; includes adjustable shafts; $1^{5}/_{8}$" H × $6^{1}/_{4}$" W × $4^{1}/_{2}$" D..... $100
**94GTL.** Similar to 93GTL except has 8-track player. ..... $100

## CONCORD

### HPL-515 Tuner/Amp/Tape Deck

In-dash unit combines digital tuner, 25 W/ch power amplifier with biamplification and preamp, and


front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Cassette deck: features electronic dc servomotor, X-cut Sen-Alloy record/play head, auto eject at tape end/power off, equalization for $CrO_2$ and metal tapes, rec mute in fast forward/rewind, locking fast forward/rewind, variable speed control, and LED tape indicator; wow and flutter 0.08% wrms; frequency response +2 dB 30-15,000 Hz (normal), to 20,000 Hz (metal); S/N 56 dB with Dolby. Tuner: features dual-gate MOS FET front end, green LED digital frequency/quartz clock display, pushbutton FM stereo high blend, FM muting, loudness, and AM/FM selectors, LED AM and FM indicators, and auto local/distant control; FM sensitivity 1.0 μV at 30-dB S/N, S/N 68 dB, image rejection 70 dB, capture ratio 2 dB, and selectivity 70 dB. Amplifier: features biamp level control, 40/80/120-Hz bass and 1k/3.5k/10k-Hz treble equalization at +10 dB, loudness, and two sets of 800 mV at 2200-ohm line output jacks; power amp output 12 W/ch continuous into 4 ohms from 30-20,000 Hz with 0.8% THD; 2" H × $7^{1}/_{8}$" W × $6^{1}/_{2}$" D..... $430
**HPL-510.** Similar to HPL-515 minus LED digital quartz clock/frequency display and local/distant switch; has 5-W/ch continuous output under same conditions; 2" H × 7" W × 6" D..... $400
**HPL-506.** Similar to HPL-510 minus built-in 20-W stereo power amplifier..... $370
**HPL-505.** Similar to HPL-506 minus biamp capability and three-band treble equalizer control; has treble tone control (+10 dB at 10,000 Hz); 2" H × 7" W × $5^{11}/_{32}$" D..... $330

### HPL-120 Tuner/Amp/Tape Deck

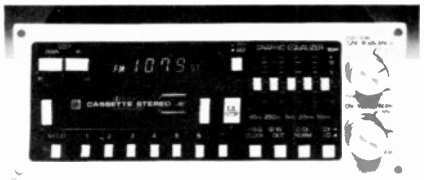
In-dash unit combines digital tuner, 25-W/ch power amp/preamp, and front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and Sen-Alloy record/playback head. Cassette deck: features equalization selector for metal and $CrO_2$ tapes, key-off auto eject, and locking fast forward/eject/rewind; wow and flutter 0.08% wrms; frequency response +2 dB 30-15,000 Hz (normal), to 20,000 Hz (metal); S/N 56 dB with Dolby. Amplifier: 12 W/ch continuous into 4 ohms from 30-20,000 Hz with 0.8% THD; features bass equalization at 40, 80, and 120 Hz, ±10 dB range, separate bass and treble controls, loudness control, left-right balance control, and 400/800 mV at 2200-ohm preamp line outputs. Tuner: features LED digital quartz clock/frequency display pushbutton local/distant, AM/FM, FM muting, and high blend controls; FM sensitivity 1 μV for 30-dB S/N, image rejection 70 dB, capture ratio 2 dB, and selectivity 70 dB; $1^{31}/_{32}$" H × $7^{1}/_{8}$" W × $5^{29}/_{32}$" D. $370
**HPL-115.** Similar to HPL-120 without LED digital frequency/clock readout..... $320
**HPL-110A.** Similar to HPL-115 minus bass equalizer control, loudness, high blend, FM muting, tuner on/off, and auto local/distant; has one preamp line output (400 mV at 2200 ohms); amp output 5 W/ch continuous under same conditons; 2" H × $7^{1}/_{8}$" W × $5^{11}/_{16}$" D..... $260
**HPL-100.** Similar to HPL-110A minus tape metal compatibility, Dolby noise-reduction system, and tape equalization; tape S/N 48 dB; $1^{31}/_{32}$" H × $7^{3}/_{32}$" W × $4^{3}/_{4}$" D..... $200

## FUJITSU TEN

### EP-820 "Dashboard Wizard"

Microprocessor controlled AM-stereo FM radio with preamp and auto reverse cassette player with Dolby noise-reduction system. Unit features built-in five-

band graphic equalizer with center frequencies set at 60, 250, 1000, 3500, and 10,000 Hz, +3 dB;



quartz clock and electronic tuning for constant digital frequency readout and pushbutton digital time display; preset channel selector that memorizes up to seven AM and seven FM stations for instant recall with search up/down and scan function. Cassette features Life Time Metal tape head, equalizer switch for chrome and ferri-chrome tape, and locking fast forward and rewind slide control. Radio features FM noise blanker, FM muting, and four-way fader control. Frequency response 40-14,000 Hz .. ..... $570

### EP-750S1 AM-FM/Cassette Player

In-dash AM-stereo FM radio with electronic digital tuner and stereo cassette player with auto reverse, locking fast forward/rewind slide control and program indicator. Unit features digital frequency and time display; quartz clock; preset pushbutton Memory Write tuning up to five AM and five FM channels with instant recall; auto search and lock into next station; pushbutton local/distant and AM/FM selectors; stereo indicator. Wow and flutter 0.15%; frequency response 40-14,000 Hz ..... $490

### GP-7881 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio and cassette player with Dolby noise-reduction system and auto reverse; features locking fast forward and rewind, five AM or five FM pushbutton tuning, four-way bass fader, and built-in noise blanker; front/rear fader control and balance, bass, treble and volume controls. Wow and flutter 0.15%; frequency response 40-14,000 Hz; output 5 W/ch continuous power, max. output 20 W; tape S/N 48 dB; FM stereo separation 20 dB; FM sensitivity 18 dB ..... $280

**DP-7872.** Similar to GP-7881 without Dolby system; adjustable shafts designed to fit American cars ..... $180

**DP-7871.** Similar to DP-7872 except has DIN specs and fixed shafts to fit foreign cars ..... $180

*All three radio/cassette players can utilize any one of Fujitsu Ten's plug-in preamp, power and control options.*

### DP-644 AM-Stereo FM/Cassette Deck

In-dash unit combines AM-stereo FM radio and metal-compatible stereo cassette deck with LTM head; designed for small cars. Cassette features auto reverse, locking fast forward/rewind, equalization for chrome and metal tapes, cassette eject, and tape direction indicators; wow and flutter 0.2% wrms; frequency response 40-10,000 Hz +3 dB; S/N 52 dB; stereo separation 40 dB. Radio features separate bass and treble controls with DSS bass boost, FM muting, built-in noise blanker, and stereo FM LED; output 16 W/ch into 4 ohms from 30-20,000 Hz at 10.0% THD; FM tuner usable sensitivity 20 dBf, 50-dB quieting 24 dBf, selectivity 64 dB at 400 kHz, stereo separation 35 dB, and frequency response 30-15,000 Hz +3 dB; 1 47/64" W × 7" W × 5 21/64" D ..... $250

### DP-620 AM-Stereo FM/Cassette Deck

In-dash AM-stereo FM radio/stereo cassette deck; designed for small imported and domestic cars. Cassette features locking fast forward and rewind, tape direction indicators, and power-off eject; wow and flutter 0.12% wrms; frequency response 60-8000 Hz +3 dB; S/N 50 dB; stereo separation 35 dB. Radio features stereo/mono, LED stereo FM, and balance and tuning/select controls; output 5 W/ch into 4 ohms from 150-20,000 Hz with 10.0% THD; FM tuner usable sensitivity 20 dBf, 50-dB quieting 24 dBf, selectivity 64 dB at 400 kHz, stereo separation 30 dB, and response 30-15,000 Hz ±3 dB; 1 47/64" H × 7" W × 5 25/64" D ..... $150

### GL-7851 AM-Stereo FM/8-Track Player

In-dash AM-stereo FM radio and 8-track player with dial-in-door; four-way fader, mute, and treble/bass control; local/distant switch; LED stereo and tape indicators; five pushbutton tuning; wow and flutter 0.25%; frequency response 50-12,000 Hz; S/N 30 dB; FM sensitivity 18 dB; adjustable shafts ... $200

**DL-7841.** Similar to GL-7851 without four-way fader, mute and treble/bass control ..... $130

### Component System

**AT-7831.** AM/FM tuner with auto-search tuning; bass and treble tone controls; local/distant and stereo/mono pushbutton switches ..... $266

**AT-372/EX-1.** Stereo FM tuner with auto-search tuning ..... $230

**SP-711S1.** Cassette deck with auto reverse and Dolby noise-reduction system; slide-bar bass and treble tone controls; wow and flutter 0.15%; frequency response 30-14,000 Hz; S/N 50 dB .. $180

**CA-200Q.** Five-band preamp/graphic equalizer features Level Attenuator System switch, remote control for tape program and search tuning, illuminated front panel, fader control, and pushbutton defeat. Center frequencies set at 60, 250, 1000, 3500, and 15,000 Hz, +10 dB; frequency response 20-40,000 Hz; THD 0.1%; S/N 60 dB..... $125

**PA-150F.** Four-channel power amp with 80-W output ..... $110

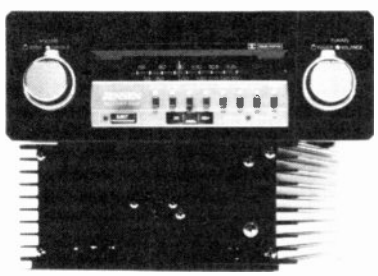
**CA-100.** Control amplifier ..... $86

**RV-130-EX-1.** Electronic stereo graphic timer delay with LED 500, 1500, 3000 msec; fader/volume, reverb, and pushbutton power controls. ..... $160

## JENSEN

### R430 AM-Stereo FM/Cassette Player

In-dash bi-amplified AM-stereo FM receiver/cassette player with Dolby noise-reduction system and



separate power amplifiers. Features cassette door/tuner dial; pushbutton eject; locking fast forward/rewind switch; automatic flashing tape alarm reminds you when ignition is turned off to remove cassette; LED cassette and stereo indicators; individual bass/treble and balance/fader; other controls include pushbutton remote power amplifier, bi-amplification, loudness compensation, muting, AM/FM, local/distant, and tuner. Wow and flutter 0.15%; S/N 73 dB (FM Dolby); frequency response 30-18,000 Hz; THD 0.4% at 52 W; output 30 W/ch continuous; FM sensitivity 1.0 μV; FM alternate channel rejection 75 dB; FM stereo separation 35 dB; capture ratio 1.5 dB; bi-amplifier output 25 W/ch (bass), 5 W/ch (treble); bi-amp crossover 1000 Hz ..... $470

**R420.** Similar to R430 without separate power amplifier and remote power amplification control; THD 1.0% at 16 W; bi-amplifier output 5 W/ch (bass), 5 W/ch (treble); output 10 W/ch continuous..... $370

**R410.** Similar to R420 without bi-amplification; output 5 W/ch continuous; THD 1.0% at 8 W. $300

### R405 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/stereo cassette player designed for imported cars. Cassette features auto reverse and auto replay, cassette door/tuner dial, pushbutton eject, and locking fast forward/rewind; radio features loudness compensation, muting, automatic local/distant, stereo/mono switch, separate bass/treble and balance/fader controls, and four-way fading; LED cassette and stereo indicators; wow

# 5 CAR STEREO EQUIPMENT

and flutter 0.15%; frequency response 30-18,000 Hz; THD 1.0% at 8 W; output 5 W/ch continuous... ..... $280

**R402.** Similar to R405 without cassette auto reverse and auto replay; chassis less than 5 in deep... ..... $240

**R400.** Similar to R402 minus separate bass/treble and balance/fader controls and four-way fader; has loudness-compensated volume control ..... $200

## J.I.L.

### 634E AM-Stereo FM/Cassette Player

In-dash computer-programmed AM-stereo FM radio and cassette player with auto reverse. Cassette features auto eject, locking fast forward/rewind, and LED tape direction indicators. Radio features fluorescent digital time and frequency readout; pushbutton tuning for four AM and four FM channels with scan/pause and seek/lock-in functions; auto FM muting; local/distant button; hour/min adjust; treble/bass tone control; power boost "Power Pumper" switch; FET front end and adjustable shafts; max. output 20 W/ch continuous; 2" H × 7" W × 7" D..... $490

**633.** Similar to 634E without computer programming and digital clock/frequency display; has LED stereo indicator; 2" H × 7¼" W × 6¾" D ..... $325

**632.** Similar to 633 without "power pumper" power booster; has max. output 10 W/ch continuous; 2" H × 7¼" W × 6" D..... $275

**631.** Similar to 632 without auto reverse and eject; has auto stop; max. output 6 W/ch continuous; 2⅛" H × 7¼" W × 5" D ..... $190

### 607 Cassette Player

Underdash stereo cassette player with pushbutton fast forward, rewind, and eject controls; left-to-right balance control; play indicator light; 1¾" H × 5½" W × 6½" D..... $100

### 874E AM-Stereo FM/8-Track Player

In-dash computer-programmed AM-stereo FM radio and 8-track player with dial-in-door. Unit features LED frequency readout and time display; hour/minute adjust; auto FM muting; LED stereo indicator; pushbutton tuning for four AM and four FM channels with scan/pause and seek/lock-in functions; AM/FM selector button; treble/bass tone controls; power boost "Power Pumper" switch; FET front end and adjustable shafts; max. output 20 W/ch continuous; 2" H × 7" W × 7" D..... $415

**873.** Similar to 874E without computer programming; has program indicator lights; 1¹³⁄₁₆" H × 7¼" W × 6" D..... $270

**872.** Similar to 873 without "Power Pumper" power booster; has AM/FM slide bar selector; max. output 6 W/ch continuous ..... $175

### 517 Stereo FM/8-Track Player

Underdash stereo FM radio and 8-track player with channel selector; numerical program indicator; balance, tone, and volume controls; repeat play; radio/tape switch; local switch; 2" H × 6¾" W × 6¾" D.. ..... $145

**515.** Similar to 517 without FM radio; has LED program indicator..... $90

## KENWOOD

### KRC-721 AM-FM Tuner/Cassette Deck

In-dash unit combines AM-FM tuner with FM Dolby and auto noise-reduction circuitry, cassette deck with Dolby, and four-digit PLL quartz clock/radio frequency display; must operate with separate power amplifier. Tuner features ten-channel preset (five AM and FM); bass, treble, balance, and fader controls; auto stereo/mono and local/distant switches; powered antenna connection; low-level preamp output jacks; stereo FM LED; S/N 70 dB; selectivity 65 dB; FM stereo separation 40 dB. Cassette deck features auto bi-directional tape advance (locates gaps between selections); cassette standby for indefinite cue-up and programmed to activate any time radio reception is below acceptable limits; auto reverse; fast forward and rewind; auto eject; cassette door illumination; wow and flutter 0.12% wrms; S/N 52 dB; frequency response 30-16,000 Hz..... $399

**KRC-711.** Same as KRC-721 except incorporates amplifier boosting 5 W/ch to front-mounted speak-

ers and 20 W/ch to rear-deck speakers..... $449

**KRC-511.** Similar to KRC-711 without bi-directional tape advance; amp output 5 W/ch ..... $379

### KRC-311 AM-FM/Cassette Deck

In-dash unit combines AM-FM stereo receiver and cassette deck. Receiver features analog tuning with 10-station preset; balance, tone, and fader controls; LED stereo indicator; auto mono/stereo; amp output 5 W/ch; FM S/N 63 dB; selectivity 70 dB; stereo separation 30 dB. Cassette deck features auto reverse; key-off eject; fast forward and rewind; cassette standby; wow and flutter 0.12% wrms; S/N 52 dB; frequency response 30-16,000 Hz .... $269

### KXC-757 Cassette Deck

Underdash metal-compatible stereo cassette deck with Dolby noise-reduction system and Sendust heads for metal tape playback. Features cassette standby (in operation with KTC-767 tuner); auto reverse; fast forward and rewind with LEDs; separate bass and treble controls; cassette door illumination; auto eject; bi-directional tape advance; 70-μsec equalization (but accommodates chrome and metal tapes); headphone jack. Wow and flutter 0.12% wrms; frequency response 30-16,000 Hz (normal); S/N 60 dB with Dolby; 2⅛" H × 6¹¹⁄₁₆" W × 6½" D. ..... $269

**KTC-767.** Underdash electronic PLL-synthesis AM-FM stereo tuner with digital quartz clock/radio frequency display; 12-station memory preset (six AM and FM); auto noise-reduction circuit with FM signal monitoring capability that automatically switches to next sequence of alternate reception modes; auto broadcast search system (replaces weak AM or FM signal for stronger signal); scan/seek and up/down switches; LED stereo indicator; separate bass and treble controls; output for powered antenna. FM section: S/N 70 dB (mono), 65 dB (stereo); alternate channel selectivity 80 dB; stereo separation 40 dB; 2⅛" H × 6¹¹⁄₁₆" W × 6½" D..... $299

## KRACO

### LED-501 AM-Stereo FM/Cassette Player

In-dash/underdash AM-stereo FM radio/stereo cassette player with LED digital clock/radio frequency display with selector switch and clock hr/min adjustment. Cassette features fast forward/eject and LED tape play indicator. Radio features variable fader and tone controls; sliding stereo balance control; weather band, bass boost, and mute on/off; stereo/mono switch; LED AM, FM, and stereo FM indicators; manual tuning ..... $250

### KID-589 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/automatic reverse cassette player. Cassette features locking fast forward and rewind, manual tape eject, tape program selector switch, LED tape play and tape direction indicators. Radio features stereo balance, tone, and fader controls, FM stereo/mono switch, mute on/off, and LED stereo FM, AM, and FM indicators..... $208

**KID-588.** Similar to KID-589 without mute on/off, fader, and stereo/mono switch; has fast forward/rewind switch and local/distant control; in-dash or underdash installation ..... $160

### KID-587 AM-Stereo FM/Cassette Player

In-dash/underdash AM-stereo FM radio/stereo cassette player. Cassette features fast forward and eject and LED tape run indicator. Radio features five AM and FM pushbuttons; variable tone control; LED FM stereo indicator; local/distant and AM/FM switches; sliding balance and variable fader control ..... $176

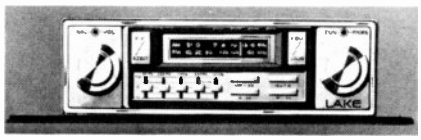
### KGE-801 Radio/Tape Player/EQ/Amp

In-dash/underdash unit combines stereo cassette player, AM-stereo FM radio, weather band, five-band graphic equalizer, and 20-W/ch power amplifier. Equalizer has center-frequency slide controls set at 60, 250, 1000, 3500, and 10,000 Hz and EQ bypass/on switch with LED; cassette player has locking fast forward/eject button, built-in auto stop, and LED tape play/end indicators; radio features pushbutton FM mute, AM/FM with LEDs, and stereo/mono controls, rotary balance/volume and tuning/fader controls, and separate weather band; illuminated AM/FM dial scale also functions as cassette door; includes adjustable shafts ..... $200

## LAKE COMMUNICATIONS

### 5500 AM-Stereo FM/Cassette Player/EQ

In-dash unit combines AM-stereo FM radio, stereo cassette player, and five-band graphic equalizer.



Radio features volume/balance and tuning/fader controls and pushbutton local/distant, mute, and AM/FM controls; cassette player features fast forward/eject; equalizer center frequencies at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut; has EQ/bypass button. Output 20 W continuous; woodgrain/chrome trim; 52 mm H × 178 mm W × 120 mm D ..... $250

**5800.** Same as 5500 except has 8-track player..... ..... $250

### 990 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/cassette player features digital LED clock/radio frequency readout display. Radio includes multipurpose concentric control for volume/balance (pull and turn) and bass/treble (push and turn); stereo balance/tuning control; toggle switches for time/frequency, AM/FM, and stereo/mono modes; LED FM stereo indicator. Cassette features auto eject and fast forward and rewind. Output 6 W/ch; stereo separation 30 dB; 13.8 V dc negative ground; 44 mm H × 178 mm W × 150 mm D..... $230

### FX008 AM-FM/Cassette/8-Track Player

In-dash unit combines AM-stereo FM radio, auto stop stereo cassette player, and 8-track player. Cassette deck has fast forward and eject; radio has local/distant pushbutton, AM/stereo FM selector, and volume/tone and balance/tuning controls; combined 8-track cartridge door/tuning dial function; stereo, cassette, and 8-track mode LEDs; output 5 W/ch; 13.2 V dc negative ground ..... $200

### 1290 AM-Stereo FM/Cassette Player

In-dash unit combines AM-stereo FM radio and stereo cassette player. Cassette player has pushbutton eject/fast forward; radio features five-pushbutton preset tuning, pushbutton local/distant, mute, and AM/FM controls, slide balance control, volume/tone and balance/tuning controls, and LED AM and stereo FM indicators; output 6 W/ch continuous; universal installation kit for car, truck, boat, or plane; 13.2 V dc negative ground; 55 mm H × 180 mm W × 120 mm D..... $190

**8700.** Same as 1290 except has 8-track player..... ..... $190

### 2200 AM-Stereo FM/Cassette Player
In-dash unit combines AM-stereo FM radio and auto reverse stereo cassette player. Cassette player features dual capstan drive, sliding fast forward/rewind with tape direction indicators, and eject button. Radio features pushbutton AM/FM, local/distant, and channel select controls, LED stereo FM, and rotary volume/tone and balance/tuning controls. Output 12 W; FM and tape stereo separation 30 dB; chrome and woodgrain front panel; 13.8 V dc negative ground; 50 mm H × 143 mm W × 182 mm D.. ..... $180

### 870 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio with auto stop stereo cassette player; mini size designed to fit newer cars. Cassette player has fast forward/eject; radio has rotary volume/tone and balance/tuning controls, local/distant, and LED stereo indicator; output 6 W/ch; 13.2 V dc negative ground.... ..... $110

### 8900 AM-Stereo FM/8-Track Player
In-dash AM-stereo FM radio/8-track tape player features digital LED clock/radio frequency readout display. Radio features concentric volume/tone control with program frequency readout function (push); balance/tuning control; lighted mode indicators; front-to-back speaker fader control; AM/FM and local/distant pushbuttons. 8-track features LED tape channel indicators. Output 6 W/ch; stereo separation 30 dB; 13.8 V dc negative ground; 56 mm H × 176 mm W × 120 mm D..... $230

## MARANTZ

### CAR-427 CompuTuner/Cassette Deck
In-dash unit incorporates stereo CompuTuner/preamplifier/auto reverse cassette deck with digital

quartz clock/radio frequency display. Cassette features Dolby noise-reduction system with tape and FM Dolby buttons, Sendust-alloy tape head, tape equalization for special tape (includes metal-particle), memory preset tape eject and power off auto eject, and locking fast forward and rewind. Tuner/preamplifier features front-to-rear preamp fader control; atmospheric interference rejection; quartz-locked synthesized tuning with ten electronic memory preset buttons and electronic station search; center-detented bass, midrange and treble controls; loudness compensation; FM muting; FM impulse-noise blanker. Wow and flutter 0.15% wrms; tape frequency response 40-15,000 Hz at ±3 dB; FM sensitivity 1.0 μV, 75 ohms; stereo separation 30 dB at 1000 Hz; 2⁹/₁₆" H × 7¹/₈" W × 5¹/₈" D; nose piece 2" H × 4¹/₈" W..... $625

### CAR-400 CompuTuner/Cassette Deck
In-dash unit combines stereo CompuTuner, built-in stereo amplifier, and cassette deck with digital quartz clock/radio frequency display. Cassette features Dolby noise-reduction system, auto eject, and locking fast forward and rewind. Radio features quartz-locked synthesized tuning with 12-station electronic memory preset buttons and electronic station search; atmospheric interference rejection; center detented bass and treble controls; fader control; FM muting. Wow and flutter 0.15% wrms; tape frequency response 40-13,000 Hz at ±3 dB; output 2.5 W/ch into 4 ohms from 50-20,000 Hz with 0.9% THD; FM sensitivity 1.8 μV into 75 ohms; stereo separation 30 dB at 1000 Hz; 2⁹/₁₆" H × 7¹/₈" W × 5¹/₈" D; nose piece 2" H × 4¹/₈" W..... $500

### CAR-302 Tuner/Cassette Deck
In-dash unit combines AM-FM stereo tuner and stereo cassette deck. Cassette features Dolby noise-reduction system, super hard permalloy tape head, auto eject, and fast forward and rewind. Radio features five-station preset; atmospheric interference rejection; separate bass and treble controls; volume control; LED FM stereo indicator; front-to-rear speaker fader. Wow and flutter 0.15% wrms; tape response 40-13,000 Hz at ±3 dB; output 2.5 W/ch into 4 ohms from 50-20,000 Hz with 0.9% THD; FM sensitivity 1.8 μV; 2³/₄" H × 7¹/₈" W × 4³/₄" D; nose piece 1³/₄" H × 4¹/₈" W..... $300

### CAR-301 Tuner/Preamp/Cassette Deck
In-dash unit combines AM-FM stereo tuner/preamplifier/cassette deck. Cassette deck features Dolby noise-reduction system, super hard permalloy tape head, auto eject, and fast forward and rewind. Radio features five-station pushbutton preset; atmospheric interference rejection; separate bass and treble controls; loudness compensation volume control; LED FM stereo indicator; preamp front-to-rear speaker fader..... $270

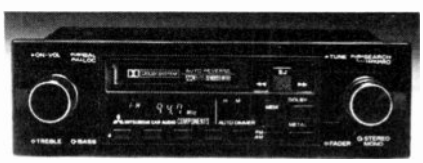
### CAR-330 Amp/Tuner/Cassette Deck
In-dash unit combines power amp, AM-stereo FM tuner, and stereo cassette deck. Cassette deck: wow and flutter 0.15% wrms; frequency response 40-13,000 Hz; S/N 48 dB. Amp output 4 W/ch continuous into 4 ohms at 1000 Hz with 0.9% dist., max. output 16 W. FM tuner section: usable sensitivity 1.8 μV at 75 ohms; 50-dB stereo quieting 50 μV at 75 ohms; capture ratio 2 dB at 65 dBf; selectivity 65 dB ±400 kHz; stereo separation 30 dB at 1000 Hz; frequency response 40-14,000 Hz ±3 dB; S/N 60 dB..... $250

### 410 AM-FM/Cassette Player
In-dash unit combines AM/FM radio and stereo cassette player; AM/FM stereo Computuner with quartz controlled synthesized digital tuning and microprocessor which provides electronic station search plus instant access to 12 user-programmable stations (six AM and six FM); auto-eject cassette player with locking fast forward and rewind; wow and flutter 0.15%; tape frequency range 40-13,000 Hz; output 4 W/ch continuous into 4 ohms with 0.9% THD; FM sensitivity 1.1 μV at 75 ohms (12 dBf); capture ratio 1.5 dB; FET r-f amplifier; PLL for stereo separation; FM muting; local/distant switch; tone control; antenna trimmer; power antenna wire; adjustable control shaft spacing; quartz clock; 1³/₄" H × 7¹/₈" W × 5⁷/₈" D; nose dimensions 1⁵/₈" H × 4¹/₈" W (DIN standard) ..... $390

### 300 AM-FM/Cassette Player
In-dash unit combines five-station presets and auto eject cassette; PLL FM decoder; FM muting; full-time noise blanker; automatic stereo/mono switching; local/distant switch; super-hard permalloy head; volume, tone and balance controls; FM stereo LED indicator; locking fast-forward and rewind; wow and flutter 0.15% wrms; output 4 W/ch continuous into 4 ohms with 0.9% THD; frequency response 40-13,000 Hz; FM sensitivity 1.8 μV into 75 ohms (16.36 dBf); capture ratio 2.0 dB; FM selectivity 60 dB at ±400,000 Hz; negative ground; anodized brushed-aluminum faceplate in gold; chassis 2⁵/₈" H × 7¹/₈" W × 5³/₈" D; nose 1³/₄" × 4¹/₈"..... $220

## MITSUBISHI CAR AUDIO

### CZ-747 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio and auto reverse metal-compatible stereo cassette deck; has



compact dual chassis designed to fit almost any domestic or foreign car. Cassette deck: features Dolby noise-reduction system, sendust head, tape program search in either direction, tape switch for normal, chrome, and ferrichrome tape, fast forward, rewind, and eject buttons, and LED Dolby and metal tape indicators; wow and flutter 0.15% wrms; frequency response 40-15,000 Hz with metal; S/N 57 dB with Dolby; 35-dB stereo separation. Radio: features five-pushbutton AM/FM electronic tuning with memory, auto electronic tuning and manual electronic scanning, LED digital frequency/clock display with auto dimmer, FM Dolby noise-reduction, separate bass and treble, fader, and balance controls; FM S/N 60 dB with Dolby, selectivity 80 dB, frequency response 30-15,000 Hz at 3 dB, stereo separation 35 dB at 1000 Hz, and capture ratio 2 dB; AM S/N 53 dB at 1 μV and selectivity 36 dB. Unit also features ignition noise killer, pinch-off mechanism at tape end and power off, and low-level connectors for separate 8, 20, or 40-W/ch power amplifiers; 2" H × 7¹/₈" W × 4³/₄" D ..... $480

**CZ-692.** Similar to CZ-747 but designed for most domestic cars; less LED digital frequency/clock display with auto dimmer, auto electronic tuning, electronic scan, and electronic memory pushbutton tuning; AM selectivity 40 dB; 4³/₄-in chassis ..... $300

### RX-2 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio and auto reverse stereo cassette deck. Cassette deck: features program selector, locking fast forward/rewind, and auto eject at power off. Radio: features six-pushbutton AM/FM electronic tuning with memory; auto electronic tuning and manual electronic scan; LED digital frequency/clock display; mono/stereo, local/distant, and AM/FM pushbuttons; tone and fader controls; built-in 8-W/ch amp ..... $400

### RX-691 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM radio and auto reverse stereo cassette deck. Cassette deck: features locking fast forward and rewind, eject, program selector, and pinch-off tape mechanism at tape end or power off; wow and flutter 0.15% wrms; S/N 50 dB; frequency response 50-12,000 Hz. Radio: features five-pushbutton AM/FM tuning, FM noise killer, dual-color dial illumination for AM and FM, pushbutton AM/FM and local/distant controls, fader and balance controls, power antenna lead, and built-in 8-W/ch amplifier; FM S/N 50 dB, selectivity 80 dB, frequency response 30-15,000 Hz at 5 dB, stereo separation 35 dB at 1000 Hz, and capture ratio 2 dB; AM S/N 53 dB at 1 μV and selectivity 40 dB; 2.75" H × 7.5" W × 4.75" D ..... ..... $260

**RX-752.** DIN model designed to fit most imported cars; similar to RX-691 minus local/distant and fader controls; FM selectivity 86 dB, frequency response 30-15,000 Hz at 2 dB, and capture ratio 3 dB; AM S/N 54 dB and 44-dB selectivity ..... $240

**RX-723.** Super compact version of RX-691 minus pushbutton tuning, program selector, tape rewind, auto reverse, and noise killer circuitry; cassette deck features auto stop; FM selectivity 70 dB, AM S/N 49 dB at 1 μV and 33-dB selectivity; includes nosepiece and faceplate for horizontal or vertical installation in almost any car currently on market; 1³/₄" H × 6³/₈" W × 4¹/₂" D ..... $150

### RX-79 AM-FM/Cassette Player
In-dash AM-stereo FM radio/stereo cassette player with auto reverse; features locking fast forward and rewind; four-speaker capability; separate bass and treble controls; tuning, balance, and fader controls with five-station pushbutton preset; stereo/mono switch; pushbutton program selector; AM/FM LEDs; 18 W/ch..... $260

**RX-69.** Similar to RX-79; has five-station pushbutton preset, stereo/mono switch, dual-color-mode dial illumination, bass booster switch, and fader and balance controls for four-speaker 8-ohm system; dist. 0.5%; selectivity 35 dB..... $240

**RS-67.** Similar to RX-69 except has 8-track player with one-touch program selector; radio has five AM/FM station preset; wow and flutter 0.2% wrms; S/N 50 dB..... $230

### RX-73 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio/stereo cassette player features pushbutton AM/FM; tuning/fader control with five-station pushbutton preset; locking fast forward and eject; left and right balance controls; local/distant switch; has low-level outputs for 30-W CV-23 amp/equalizer; 4.75-in chassis ..... $180

# 5 CAR STEREO EQUIPMENT

### RX-103 Stereo FM/Cassette Deck
Underdash unit combines stereo FM radio and stereo cassette player. Cassette deck features hard permalloy head, eject, fast forward, and play selector, and auto eject. Radio features built-in 7-W/ch continuous amp, separate bass and treble controls, balance control, and FM ignition noise killer .. $160

### Car Stereo Components
**CV-21.** 20 W/ch power amplifier with balanced transformerless circuit; loudness, separate bass and treble, fader, and balance controls, attenuation switch; dimmer control connection ..... $140
**CJ-20.** AM-stereo FM tuner with noise-killer circuitry, local/distant switch, muting circuit, and illuminated tuning meter ..... $140
**CJ-22.** AM-stereo FM tuner features five-pushbutton AM/FM memory tuning, electronic auto search and manual scan tuning, LED digital frequency/clock display with dimmer, FM noise killer, pushbutton mono/stereo, mute, local/distant, and frequency controls ..... $270
**CX-20.** Cassette deck with auto eject, hard permalloy heads, level controls, and dimmer control connections; wow and flutter 0.15%; S/N 55 dB; frequency response 30-14,000 Hz ..... $100
**CX-21.** Same as CX-20 except has noise-reduction switch, locking fast forward/rewind, program selector switch, and auto reverse ..... $140

## PACE/ALTUS

### CLA-3740 AM-FM/Cassette Player
In-dash AM-stereo FM pushbutton radio with digital readout and clock, and stereo cassette player with auto reverse. Features tape eject, locking fast-forward and rewind, and tape direction indicator. Radio features five preset pushbutton tuning, auto FM muting, hr/min adjustment, local/distant switch, stereo indicator light, and front/rear fader and left/right balance controls. Wow and flutter 0.2%; frequency response 30-12,000 Hz; S/N 45 dB; amp output 15 W/ch continuous; FM THD 1.0% at 1 W; FM sensitivity 4.8 $\mu$V 3 dB; FM S/N 60 dB; FM stereo separation 35 dB at 1000 Hz; 12 V negative ground; 2.77" H × 7.1" W × 6" D..... $300

### RCD-3349 AM-FM/Cassette Player
Combines stereo cassette player with AM-stereo FM radio and LED digital clock; locking fast forward and rewind; automatic tape eject; fader control; balance control; AM/FM mode selector; stereo FM indicator; FM local/distant switch; volume, tone, and tuning controls; digital station readout; hr/min adjustment; automatic clock when tape is inserted; adjustable shafts; auto antenna lead; LED dimmer controlled by car instrument panel dimmer; 4-8 ohm impedance; audio output 10 W continuous; 14.4 V dc; 2¾" H × 7" W × 5" D..... $200

### CXT-9520 AM-FM/Cassette Player
In-dash AM-stereo FM radio and stereo cassette player. Features locking fast forward and rewind, power-off tape eject, four-way balance control, dial-in-door, muting, stereo indicator light, five-pushbutton tuning, mono/stereo switch, and power antenna lead; output 5 W/ch; 2.62" H × 7.13" W × 5.45" D ..... $190

### ARC-3730 AM-FM/Cassette Player
Combines stereo cassette player with AM-stereo FM radio; automatic tape reverse; side-loading cassette; fast-forward and rewind controls; tape eject; tape indicator light; stereo indicator light; AM/FM indicator lights; volume, tone and tuning controls; local/distant switch; adjustable shafts; 4-8 ohm impedance; output power 8 W continuous; 12 V dc negative ground; 2¾" H × 7" W × 5" D..... $170

### CXR-2376 AM-FM/Cassette Player
In-dash AM-stereo FM radio and side-loading stereo cassette player with auto reverse and electronic motor speed control; adjustable shafts and trimplates and DIN standard nosepiece to fit foreign cars. Features locking fast-forward and rewind, LED tape, stereo and AM/FM indicators, and local/distant, eject and AM/FM band selector switches. Wow and flutter 0.25%; frequency response 30-10,000 Hz; S/N 55 dB; amp output 5 W/ch continuous; FM THD 1.5% at 1 W; FM sensitivity 1.5 $\mu$V at 3 dB; FM S/N 60 dB; FM stereo separation 30 dB at 1000 Hz; 12 V negative ground; 1.75" H × 7.01" W × 5.15" D ..... $150

### IDC-3226 AM-FM/Cassette Player
In-dash AM-stereo FM radio and stereo cassette player; adjustable shafts. Features fast-forward control; pushbutton eject; tape and stereo indicator lights; local/distant, AM/FM, radio/tape selector switches; muting, and variable tone, volume, and balance control. Wow and flutter 0.2%; frequency response 30-10,000 Hz; S/N 55 dB; amp output 5 W/ch continuous; FM THD 0.7% at 1 W; FM sensitivity 1.3 $\mu$V 3 dB; FM S/N 60 dB; FM stereo separation 32 dB at 1000 Hz; 12 V negative ground; 1.72" H × 7.07" W × 4.41" D..... $120

### ELR-3742 AM-Stereo FM/8-Track Player
In-dash AM-stereo FM pushbutton radio with digital readout/clock display and stereo 8-track player with LED program indicators. Features five preset pushbutton tuning, auto FM muting, hr/min adjustment, local/distant switch, AM/FM mode control, stereo indicator light, fader and bass/treble balance controls. Wow and flutter 0.25%; frequency response 30-18,000 Hz; S/N 50 dB; amp output 15 W/ch continuous; FM THD 2.0% at 1 W; FM sensitivity 1.9 $\mu$V 3 dB; FM S/N 60 dB; FM stereo separation 35 dB at 1000 Hz; 12 V negative ground; 2.88" H × 7.11" W × 7.91" D..... $300

### PBH-2385 AM-FM/8-Track Player
Combines stereo 8-track player with AM-stereo FM radio. Features locking fast forward; separate bass and treble controls; fader control (four-way speaker balance); left/right balance control; program repeat; tape eject; mono/stereo selector; stereo channel indicator lights; power indicator light; manual channel selector; preset pushbutton tuning; local/distant switch; adjustable shafts; 4-8 ohm impedance; audio output 25 W continuous; 14.4 V dc..... $230

### RED-3335 AM-FM/8-Track Player
In-dash stereo 8-track player with AM-stereo FM radio and LED digital clock. Features fader control; balance control; volume, tone and tuning control; AM/FM mode control; stereo FM indicator light; FM local/distant switch; stereo channel indicator lights; key-off tape eject; digital station readout; hr/min adjustment; clock and radio dial lock; adjustable shafts; auto antenna lead; 4-8 ohm impedance; audio output 10 W continuous; 14.4 V dc..... $200

### NPB-2408 AM-FM/8-Track Player
In-dash unit combines stereo 8-track player with AM-stereo FM radio. Features five quick-set pushbutton tuning; four-way balance control; AM/stereo FM indicator lights; stereo channel indicator lights; FM local/distant switch; automatic tape switching; adjustable shafts; 4-8 ohm impedance; audio output 10 W continuous; 12 V dc negative ground; 2¾" H × 7 1/16" W × 6¼" D..... $150

### Super Separates Line

### CS-052 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM tuner and cassette player with Dolby noise-reduction system. Cassette features auto reverse, loudness contour, tape switch for $CrO_2$, locking fast-forward and rewind, tape eject, and LED tape direction indicator. Radio features mode selector with LED AM/FM stereo indicators, local/distant switch, and FM muting. Wow and flutter 0.15% wrms; S/N 60 dB with Dolby; FM sensitivity 2 $\mu$V for 30-dB quieting; stereo separation 30 dB at 1000 Hz; 1.74" H × 7.1" W × 5.87" D $332
**CS-101.** Preamp/40-W amplifier and five-band graphic equalizer for CS-052 ..... $135

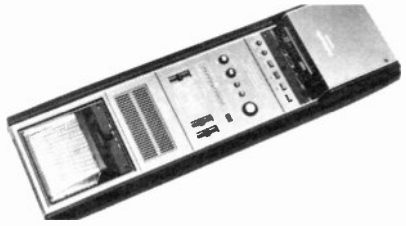
### CS-032 AM-Stereo FM/8-Track Player
In-dash AM-stereo FM tuner and stereo 8-track player with separate preamp/40-W amp/five-band graphic equalizer unit. Features loudness contour, channel selector, LED program indicators, and program repeat switch. Radio features FM muting, LED stereo indicator, local/distant switch and AM/FM mode selector. Wow and flutter ("A" weighted) 1.5%; S/N 50 dB; FM sensitivity 2 $\mu$V for 30 dB S/N; stereo separation 30 dB at 1000 Hz; 1.74" H × 7.10" W × 5.31" D..... $350

### CS-152 Cassette Deck
Underdash cassette deck with Dolby noise-reduction system. Features auto reverse, locking fast forward and rewind, loudness contour, tape eject, tape switch for $CrO_2$, and separate bass, treble and balance controls. Wow and flutter 0.15% wrms; S/N 60 dB with Dolby ..... $212
**CS-112.** Underdash AM-stereo FM tuner with separate preamp/40-W amp/five-band graphic equalizer unit for CS-152; features LED stereo indicator, and FM muting, AM/FM, stereo/mono, and local/distant switches; FM sensitivity 4 $\mu$V at 1 W; stereo separation 30 dB at 1000 Hz..... $320

## PANASONIC

### Cockpit RM-610 Tuner/Cassette Deck
Ceiling-mounted modular control unit incorporates stereo cassette deck, FM stereo tuner, and preamplifier with plug-in power amplifier. Tape deck: has switchable Dolby noise-reduction system; auto reverse; locking fast forward and rewind; auto eject; tape selector for normal and $CrO_2$ tapes; LED tape direction indicator; volume control; wow and flutter 0.2% wrms; frequency response 30-14,000 Hz; S/N 60 dB with Dolby; crosstalk 57 dB; stereo separation 40 dB at 1000 Hz. FM tuner: automatic multipath noise suppressor, r-f amplifier, and double-balanced mixer circuitry; three-pushbutton preset or manual electronic FM tuning; auto FM stereo/mono switch; FM stereo indicator; LED dial frequency indicators; muting switch; local/distant switch; noise blanker; usable sensitivity 16 dBf; S/N 65 dB; image rejection 70 dB; i-f rejection 80 dB; frequency response 30-15,000 Hz. Preamp: separate center-detent bass and treble controls; balance and fader controls; 21 click-stop volume control; loudness switch; ten-LED output power indicators. Plug-in power amplifier: hidden mount (behind dash, under seat, or in trunk); 60 W total output into 4 ohms with 0.5% THD from 20-20,000 Hz; frequency response 20-40,000 Hz −3 dB; S/N 82 dB. Optional speakers and equalizer available with Cockpit system, 1½" × 7¾" × 9 1/16" ..... $1000
**RMS-610.** Rear-deck surface-mount two-way air-suspension speaker system with urethane-edged 4¾-in woofer and 2-in tweeter; max. input 50 W; frequency response 60-20,000 Hz; 4-ohm input impedance; 5 7/16" × 9 13/16" × 7 7/16"..... $210 pr.
**RME-610.** Five-band equalizer with ±12-dB boost or cut ..... $60

### Cockpit RM-310 Receiver/Cassette Deck
Ceiling-mount modular control unit incorporates AM-stereo FM radio, Repeatrack cassette deck,



built-in 20-W power amplifier, and three-band room sound equalizer. Cassette deck: has locking fast forward/rewind, auto replay after rewind, and end-of-tape/ignition-key-off automatic eject; wow and flutter 0.15% wrms. Tuner: features impulse noise quieting circuit switch with LED, local/distant switch, and muting and auto stereo switches with LEDs. Preamp/power amp has left/right LED level

meter tuning display, loudness and hi filter switches and built-in fader control; equalizer has center frequency slide controls at 50, 250, and 10,000 Hz, +6 dB boost or cut. Also features two-beam dome light and universal fitting kit ..... $600

**CQ-8700 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM electronic tuner, digital frequency/clock readout, and cassette player with Dolby noise-reduction system and auto reverse; requires separate power amplifier. Cassette features locking fast forward/rewind, manual eject, and LED tape direction indicator. Tuner features five-memory buttons for five AM and five FM station selections, seek control that stops on strong frequencies, manual frequency scan, quartz-controlled PLL frequency synthesizer, built-in impulse noise quieting circuit, LED frequency and time display on cassette door, LED stereo and flashing signal/strength indicators, and local/distant, Dolby, and bi-amp switches; electric antenna and dimmer leads. Wow and flutter 0.2%; tape frequency response 30-12,500 Hz; S/N 53 dB (Dolby off), 62 dB (Dolby on); FM frequency response 30-15,000 Hz; FM S/N 60 dB; THD 0.2%; adjustable shafts and trimplates ..... $650
**CJ-5000.** 100-W solid-state two-speaker power amplifier for CQ-8700, CQ-7600, and CQ-7400 units; output 50 W/ch with 0.05% THD; frequency response 15-40,000 Hz ±3 dB; S/N 84 dB; preamp and booster inputs ..... $230
**CJ-4000.** 40-W (20 W/ch with 0.08% THD) four-speaker power amp for same models; frequency response 20-40,000 Hz ±3 dB; S/N 82 dB ..... $190
**CJ-3000.** 30-W (15 W/ch with 0.9% THD) four-speaker power amp for the same models; frequency response 30-40,000 Hz ±3 dB; S/N 80 dB... $110

**CQ-8530 Car Compact**
In-dash unit combines electronic tuning, AM/stereo FM radio with auto/manual cassette deck. Features digital clock; six electronic memory buttons for 12 preset stations, and seek/search and memory buttons; digital readout of AM/FM frequencies and tape direction indicator; fader switch, balance control; separate bass and treble controls; illuminated stereo indicator; locking fast-forward/rewind; dimmer and motor antenna connector; max. power output 25 W ..... $450
**CQ-6530.** Similar to CQ-8530 minus digital/electronic functions ..... $250
**CQ-2530.** Similar to CQ-6530 except 8-track. $230

**CQ-7600 AM-Stereo FM/Cassette Player**
In-dash preamplifier/AM-stereo FM tuner, Repeatrack cassette player with Dolby noise-reduction system, and built-in five-band graphic equalizer; requires separate power amp. Features locking fast forward/rewind; eject button; bi-amp, Dolby, and local/distant switches; FM muting; quartz-controlled PLL frequency synthesizer; stereo indicators; built-in INQ circuit; electric antenna and dimmer leads; equalizer center frequencies set at 60, 250, 1000, 3500, 10,000 Hz at +12 dB. Wow and flutter 0.02% wrms; tape frequency response 30-12,500 Hz at ±3 dB; S/N 63 dB (Dolby on); adjustable shafts and trimplates ..... $360
**CQ-7400.** Similar to CQ-7600 except without Dolby noise-reduction, quartz-controlled PLL frequency synthesizer, and bi-amp switch; has equalizer center frequencies set at 80, 250, 1000, 3500, 10,000 Hz at +12 dB ..... $300

**CQ-6600 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM radio and Repeatrack cassette player; has adjustable shafts and trimplates to fit American and imported cars. Features locking fast forward/rewind; auto or manual eject; LED stereo/tape mode indicators; switchable INQ circuit designed to suppress impulse noise on FM band; local/distant/super sensitivity control; tuner, balance, fader and tone controls; pushbutton tuning; max. output 7 W/channel ..... $240
**CQ-4600.** Similar to CQ-6600 except 8-track; has manual and auto program change and LED program indicators ..... $240

**CQ-6800 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM radio and stereo cassette player with Repeatrack; adjustable shafts and trimplates. Features locking fast forward/rewind, auto or manual eject, LED stereo indicator, tone and balance controls, afc on FM, and local/distant switch. Max. output 5 W/channel ..... $150

**CQ-2800 AM-Stereo FM/8-Track**
In-dash AM-stereo FM radio and 8-track player with two-stage preamp and dual channel amplifiers; adjustable shafts and trimplates. Features dial-indoor, digital program indicator, program change button, FM stereo light, local/distant switch, and volume, tone, and left/right balance controls. Max. output 7 W/channel ..... $140

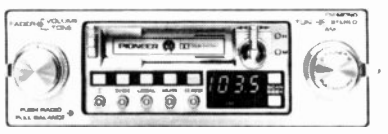
**CX-7200 Component Cassette Player**
Underdash cassette player with auto reverse. Features two stage preamp and dual channel amp; separate volume, left/right tone, and balance controls; one-lever operation for locking fast forward/rewind/eject; manual program selector; LED program indicators; wow and flutter 0.3% wrms; frequency response 40-12,000 Hz at ±3 dB; S/N 50 dB; output 2 W/channel at 400 Hz; THD 5%; impedance 4 ohms. (Components to or in place of CX-7200 all underdash unless otherwise noted.) ..... $140
**CX-5200.** Similar to CX-7200 without auto reverse; has Repeatrack that switches rewind mode to playback at the beginning of tape; frequency response 40-10,000 Hz ±3 dB ..... $100
**CX-1200.** Similar to CX-7200 except 8-track with Panasonic Vertical Head Movement System; wow and flutter 0.13% wrms; S/N 40 dB ..... $80
**CA-9600.** AM-stereo FM tuner ..... $100
**CJ-3600.** Five-band graphic equalizer/30-W amp... ..... $130
**CJ-2600.** Dashboard-mount; 10 W/ch power booster ..... $60

**Supreme Series In-Dash Units**

**CQ-S780 AM-Stereo FM/Cassette Deck**
In-dash pushbutton AM-stereo FM radio/metal-compatible auto-reverse cassette deck with Dolby noise-reduction system and Sendust alloy magnetic head. Cassette deck has metal/$CrO_2$ tape selector with LED, fast forward/rewind buttons with push program and LED indicators, and Dolby LED. Radio: features MOS-FET tuner, four AM/FM pushbutton tuning, separate bass and treble controls, four-way balance control, preamp out, FM optimizer switch, and motor antenna relay control lead. Supplied with universal nosepiece and adjustable shaft to fit most domestic and imported cars ..... $280
**CQ-S740.** Similar to CQ-S780 minus Sendust alloy magnetic tape head and LED metal/$CrO_2$ indicator.. ..... $240
**CQ-S710.** Similar to CQ-S740 minus pushbutton tuning ..... $210
**CQ-S700.** Similar to CQ-S710 except Repeatrack cassette player without Dolby and metal compatibility; unit has impulse noise quieting circuit, LED output level meter display, and pushbutton tuning ..... $200
**CQ-S680.** Similar to CQ-S700 minus LED output level display and separate bass and treble controls; has LED stereo and tape indicators and tone control ..... $180
*The 15-W/ch CJ-3000, 20-W/ch CJ-4000, and 50-W/ch CJ-5000 in-dash amplifiers can be used with all Panasonic car cassette players.*

## PIONEER

**KE-5000 AM-Stereo FM/Cassette Player**
In-dash AM-stereo FM Supertuner and stereo cassette player with dual-Dolby circuitry; electronic



PLL frequency synthesizer tuning; digital readout for station frequency and time with clock button; random access memory allows pre-setting up to five AM and five FM stations through electronic feather-touch buttons; scan/stop and seek buttons for station selection; built-in PNS noise suppression. Cassette features auto replay, locking fast forward and rewind, and $CrO_2$ tape selector. Radio features double diffusion MOS FET front end, muting and stereo/mono switches, AM/FM and local/distant switches, and built-in fader control. Wow and flutter 0.28%; tape frequency response 50-12,000 Hz; S/N 53 dB (Dolby on), 45 dB (Dolby off); output 8 W continuous; FM usable sensitivity 1.1 μV into 75 ohms (12 dBf); FM 50-dB quieting sensitivity 1.4 μV into 75 ohms (14.3 dBf); selectivity 65 dB; capture ratio 3 dB; 3" H × 7⅛" W × 7⅛" D ..... $400
**KE-3000.** Similar to KE-5000 without Dolby noise-reduction system, digital clock, and $CrO_2$ tape selector; 2" H × 7⅛" W × 7⅛" D ..... $340
**KE-2100.** Similar to KE-3000 without PNS noise suppression, electronic PLL synthesizer, and scan tuning; LED electronic pointer display; AM local/distant switch ..... $250

**KPX-9500 AM-Stereo FM/Cassette**
In-dash AM-stereo FM Supertuner and electronically governed stereo cassette player with dual-Dolby noise-reduction circuitry; LED stereo and Dolby indicators. Cassette features auto replay and eject, and locking fast-forward and rewind. Radio features five-station preset pushbutton tuning, stereo/mono switch, loudness control, separate bass and treble controls with center detent, and volume and balance controls. Wow and flutter 0.13% wrms; tape frequency response 30-15,000 Hz ±3 dB; S/N 60 dB (Dolby on); FM usable sensitivity 1.1 μV into 75 ohms (12 dBf) mono; FM 50-dB quieting sensitivity 1.4 μV into 75 ohms (14.3 dBf); selectivity 74 dB; capture ratio 1.7 dB; 3" H × 7⅛" W × 7⅛" D ..... $300

**KPX-9000 AM-Stereo FM/Cassette**
In-dash AM-stereo FM Supertuner and electronically governed stereo cassette player; volume and balance control; auto eject; rewind/fast-forward lever; separate bass and treble controls; loudness contour switch; five-station preset pushbutton tuning; LED stereo and tape play indicators; FM muting; FM stereo/mono switch; tuner capture ratio 1.7 dB; FM usable sensitivity 1.1 μV into 75 ohms (12 dBf) mono. Tape player: fast-winding time 120 sec (C-60); wow and flutter 0.13% wrms; frequency response 30-15,000 Hz ±3 dB; S/N 52 dB; 2" H × 7⅛" W × 7⅛" D; nose 1¾" H × 4⅛" W × 1⅛" D... ..... $270

**KP-707G Cassette Deck**
Underdash cassette deck with Dolby noise-reduction system, electronic governor motor, and ferrite head. Features auto reverse with auto tape slack eliminator; $CrO_2$ tape selector; audio muting switch; feather-touch direction, fast forward, and rewind tape controls; loudness control; tape direction indicators; separate bass, treble, balance, and volume controls with center detent. Wow and flutter 0.13% wrms; tape frequency response 30-15,000 Hz at +3 dB; S/N 60 dB (Dolby on), 52 dB (Dolby off); 2" H × 6" W × 6⅝" D ..... $230

**KP-8500 AM-Stereo FM/Cassette Player**
In-dash Supertuner AM-stereo FM radio and cassette player with Dolby noise reduction system. Features auto eject, and locking fast forward and rewind. Radio features five-station preset pushbutton tuning, stereo/mono and local/distant switches, auto FM muting, and volume, tone and balance controls. Wow and flutter 0.28% wrms; tape frequency response 50-12,000 Hz; 10 W max. continuous output power; FM usable sensitivity 1.1 μV into 75 ohms; 50 dB quieting sensitivity 1.4 μV into 75 ohms; alternate channel selectivity 74 dB; 3" H × 7⅛" W × 7⅛" D; nose dimensions 1¾" H × 4⅛" W × 1⅛" D ..... $200

**KP-500 Stereo FM/Cassette**
Underdash FM stereo Supertuner and cassette player. Features automatic eject; fast forward and rewind; automatic stereo/mono switching; local/distant switch; loudness and muting switches; separate bass and treble controls; 8 W max. continuous

# 5 CAR STEREO EQUIPMENT

output power; FM usable sensitivity 1.1 μV; 50-dB quieting sensitivity 1.4 μV; alternate channel selectivity 74 dB; capture ratio 1.7 dB; wow and flutter 0.3%; frequency response 50-10,000 Hz; brushed aluminum panel; 3" H × 7⅝" W × 7½" D ..... $190

**KP-250.** Similar to KP-500 except separate balance/tone/volume control; 2" H × 6⅛" W × 6¾" D. ..... $145

### KPX-600 Stereo FM/Cassette

Underdash FM stereo Supertuner and stereo cassette player. Features automatic replay and eject; locking fast forward and rewind; tape-play indicator; electronic governor motor; volume, bass, treble, and balance controls; FM muting; loudness contour switch; FM stereo indicator; FM stereo/mono switch. FM tuner: S/N 68 dB; capture ratio 1.7 dB; stereo separation 32 dB (65 dBf, 1 kHz). Tape player: fast-winding time 120 sec (C-60); wow and flutter 0.13% wrms; frequency response 30-15,000 Hz 3 dB; S/N 52 dB; 2⅜" H × 7⅞" W × 6⅞" D ..... $190

### KP-5005 AM-Stereo FM/Cassette

In-dash AM-stereo FM Supertuner and cassette player. Features auto eject and replay, and locking fast forward and rewind; five-station preset tuning; volume/tone/balance controls; muting switch; stereo/mono switch; 10 W max. continuous output power; FM usable sensitivity 1.1 μV at 75 ohms (12 dBf); 50-dB quieting sensitivity 1.4 μV at 75 ohms (14.3 dBf); alternate channel selectivity 74 dB; capture ratio 1.7 dB; FET r-f amplifier; tape frequency range 50-12,000 Hz; wow and flutter 0.28% wrms; 2" H × 7⅛" W × 7⅛" D; nose dimensions 1¾" H × 4⅛" W × 1⅛" D ..... $180

**KP-8000.** Same as KP-5005 except designed to DIN standard for European cars; nose 1⅝" H × 4⅛" W × ¾" D; shaft spacing 5⅛-in ..... $220

### KP-3500 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio and cassette player designed to fit European cars. Unit features built-in PNS noise suppression system, auto eject and replay, locking fast forward and rewind, stereo/mono and local/distant switches, and volume, tone and balance controls. Wow and flutter 0.28% wrms; tape frequency response 50-12,000 Hz; max. output 10 W continuous; FM usable sensitivity 1.1 μV; FM 50-dB quieting sensitivity 1.4 μV; selectivity 50 dB; capture ratio 4 dB; 2" H × 7⅛" W × 6¾" D; nose dimensions 1⅝" H × 4⅛" W × ¾" D ..... $180

### KP-77G Cassette Deck

Underdash cassette deck with electronic governor motor features auto reverse with auto tape slack eliminator, locking fast forward and rewind, $CrO_2$ tape selector, audio muting switch, loudness control, tape direction indicators, and separate bass, treble, balance and volume controls with center detents. Wow and flutter 0.13%; frequency response 30-15,000 Hz at ±3 dB; S/N 52 dB; 2" H × 6" W × 6⅝" D ..... $160

### KP-88G Cassette Player

Underdash stereo cassette player with Dolby noise-reduction system and electronic governor motor. Features automatic replay and eject; loudness contour switch; locking fast forward and rewind; Dolby on/off switch; separate bass and treble controls; balance control; Dolby on and tape play indicators; fast-winding time 120 sec (C-60); wow and flutter 0.13% wrms; frequency response 30-15,000 Hz ±3 dB; S/N 60 dB (Dolby on), 52 dB (Dolby off); 2" H × 6" W × 6⅝" D ..... $160

**KP-66G.** Similar to KP-88G except without Dolby; 2" H × 4⅞" W × 6⅛" D ..... $130

### KP-575 Cassette Player

Underdash cassette player has auto reverse with auto tape slack eliminator, locking fast forward and rewind, tape direction indicators, loudness control, and volume, tone and balance controls. Wow and flutter 0.25% wrms; tape frequency response 50-12,000 Hz; S/N ratio 50 dB; max. output 10 W continuous; 2" H × 6⅛" W × 4¾" D ..... $140

**KP-373.** Similar to KP-575 except without auto reverse; has auto replay and slide volume control; 2" H × 4¾" W × 6⅛" D. ..... $115

### KP-272 Cassette Player

Underdash cassette player with auto eject, fast-forward and rewind, and separate volume, tone, and balance controls. Wow and flutter 0.3% wrms; frequency response 50-10,000 Hz; max. output 8 W continuous; 2" H × 5⅞" W × 6⅛" D ..... $90

### TP-7007 AM-Stereo FM/8-Track Player

In-dash AM-stereo FM radio and 8-track player with auto and manual program change, five-station preset pushbutton tuning, stereo/mono switch, LED FM and stereo indicators, and volume, balance and tone controls. Wow and flutter 0.3% wrms; tape frequency response 50-10,000 Hz; max. output 8 W continuous; 2" H × 7⅛" W × 7½" D ..... $150

**TP-6006.** Similar to TP-7007 without five-station preset tuning; has local/distant switch and LED stereo indicator; 2" H × 7⅛" W × 7½" D ..... $130

## RCA

### 12R812 AM-Stereo FM/Cassette Player

In-dash unit combines AM-stereo FM radio, auto reverse cassette player, and LED digital station frequency/clock display with dimmer and radio/clock switch. Radio features five electronically-tuned touch buttons with memory, electronic scan with hold, local/distant, fader and balance controls, FM mono switch, and LED FM, stereo, and AM indicators; cassette has locking fast forward and rewind with indicators and pushbutton eject; output 5.5 W/ch continuous into 4 ohms with 10.0% THD; 3" H × 7⅛" W × 5¼" D ..... $414

**12R712.** Similar to 12R812 except has 8-track player with tape program selector and program LEDs; 6" D ..... $388

### 12R807 AM-Stereo FM/Cassette Player

In-dash unit combines AM-stereo FM radio and automatic reverse cassette player. Radio features five AM/FM pushbutton tuning, FM mono/stereo switch, LED stereo FM, auto power antenna activator lead, and tone/balance and tuning/fader rotary controls; cassette has locking fast forward and reverse with LED indicators and pushbutton eject; output 4.5 W/ch continuous into 4 ohms with 10.0% THD; 1¾" H × 7" W × 5⅛" D ..... $226

**12R806.** Similar to 12R807 minus pushbutton tuning and power antenna activator lead ..... $180

### 20C505 AM-Stereo FM/Cassette Player

In-dash unit combines AM-stereo FM radio and stereo cassette player. Features AM/FM slidebar switching; five quick-set pushbutton tuning; local/distant switch; automatic frequency control; stereo balance control; fader control; dial light dimmer control lead; automatic power antenna activator lead. 4.5 W/ch into 4 ohms with 10.0% THD; frequency response 30-20,000 Hz; 4-8 ohm impedance; adjustable shafts; 2¹³⁄₁₆" H × 7" W × 6" D ..... $165

### 12R210 AM-Stereo FM/Cassette Player

In-dash unit combines AM-stereo FM radio and stereo cassette player; compact installation for use in small domestic and foreign cars. Features solid state circuitry; built-in afc; automatic tape shut-off; stereo fader and balance controls; FM stereo indicator light; tape indicator light; fast-forward and eject button. 4.5 W/ch into 4 ohms with 10.0% THD; frequency response 30-15,000 Hz; 3-8 ohm impedance; adjustable shafts; 1⅝" H × 6¹¹⁄₁₆" W × 4¾" D ..... $110

### 12R206 Cassette Player

Underdash compact cassette player features fast forward and rewind; automatic and manual tape eject; power on/off indicator; slide controls for volume, balance, and tone. 4.5 W/ch into 4 ohms with 10.0% THD; frequency response 80-18,000 Hz; 3-8 ohm impedance; wow and flutter 0.25%; 2" H × 5¼" W × 6½" D ..... $53

### 12R704 AM-Stereo FM/8-Track Player

In-dash unit combines AM-stereo FM radio and stereo 8-track player. Features radio dial in cartridge door; five quick-set tuning pushbuttons; cartridge eject; local/distant switch; stereo fader and balance controls; dial light dimmer control lead; afc; program indicator lights; FM stereo indicator light. 4.5 W/channel into 4 ohms with 10.0% THD; frequency response 30-20,000 Hz; 3-8 ohm impedance; adjustable shafts; 2¹³⁄₁₆" H × 7" W × 6" D ..... $159

### 12R711 AM-Stereo FM/8-Track Player

In-dash unit combines AM-stereo FM radio and stereo 8-track player. Features radio dial in cartridge door; short chassis only 4¾-in deep; AM/FM slidebar switching; local/distant switch; stereo fader and balance controls; tape program indicator lights. 5.5 W/channel into 4 ohms with 10.0% THD; frequency response 30-10,000 Hz; 3-8 ohm impedance; adjustable shafts; 1¾" H × 6¹¹⁄₁₆" W × 4¹³⁄₁₆" D ..... $110

### 12R903 8-Track Player

Underdash stereo 8-track player features non-glare numbered program indicator lights; pushbutton program selection; sliding volume, balance, and tone controls; automatic on/off switch; front-loading with dust cover. Output 4.5 W/ch into 4 ohms with 10.0% THD; frequency range 80-8000 Hz; 3-8 ohm impedance; wow and flutter 0.3% rms; 2" H × 5½" W × 6¾" D ..... $50

## REALISTIC

### 12-1889 AM-Stereo FM/Cassette Player

In/underdash unit combines AM-stereo FM radio, stereo cassette player, and LED digital radio frequency/clock display with LED dimmer switch. Cassette features key-off eject and locking fast forward and rewind; radio has stereo/mono switch; includes speaker and speaker cables; 7 W/ch, 12 V dc negative ground ..... $180

### 12-1886 AM-Stereo FM/Cassette Player

In/underdash AM-stereo FM radio/cassette player features auto eject with electronic manual eject, adjustable shafts, locking fast-forward/rewind, stereo/mono switch, separate controls for bass, treble, and loudness, and LED tape on and stereo FM indicators; includes speaker cables; 12 W/channel; 12 V dc negative ground ..... $180

**12-1887.** Same as 12-1886 except has 8-track player ..... $180

### 12-1891 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio with cassette player. Cassette features full auto stop and locking fast forward and rewind; radio features five AM/FM pushbutton tuning and tone control; includes speaker cables; 4 W/ch, 12 V dc negative ground ..... $130

### 12-1892 Stereo Cassette Player

In-dash stereo cassette player designed for X body and import cars; has locking fast forward and auto stop in play mode; includes speaker cables; 4 W/ch, 12-V dc negative ground ..... $100

### 12-1884 AM-Stereo FM/Cassette Player

In/underdash AM-stereo FM radio and cassette player features adjustable shafts, locking fast for-

ward/rewind, auto stop, LED end-of-tape indicator, and separate controls for bass, treble, and loudness; includes speaker cables; 4 W/ch, 12 V dc negative ground ..... $100
**12-1885.** Same as 12-1884 except has 8-track player ..... $100

### 12-1809 Cassette Player
Underdash cassette player with key-off auto eject, fast forward/rewind controls, slide volume and balance controls, pushbutton eject, auto stop at end of tape, and separate bass and treble and loudness controls; includes speaker wires; output 12 W/ch ..... $100

### 12-1805 Cassette Tape Player
Underdash stereo cassette tape player features auto-search music system (locates next selection on tape), locking fast forward and rewind, pushbutton eject, and auto stop at tape end; includes speaker cables; 4 W/ch, 12 V dc negative ground ..... $70

### 12-1803 Cassette Tape Player
Underdash miniature stereo cassette tape player with locking fast forward and end-of-tape auto stop with LED; includes speaker cables; 4 W/ch, 12 V dc negative ground ..... $60

### 12-1801 8-Track Player
Underdash 8-track player with slide volume, tone, and balance controls, and program indicators; includes speaker wires; 4 W/ch, 12 V dc negative ground ..... $45

## SANYO

### FT2200 AM-Stereo FM/Cassette Deck
In-dash unit combines AM-stereo FM tuner/preamp and metal-compatible cassette deck with Dolby noise-reduction system and built-in digital quartz clock; designed for small foreign and American subcompact cars; separate power amplifier required. Cassette features Sendust Alloy record/playback head, bias head switch for normal, $CrO_2$, FeCr and metal tapes, and automatic/manual reverse, locking fast forward and rewind; wow and flutter 0.07% wrms; frequency response 40-19,000 Hz; S/N 62 dB. Electronic-varactor tuner features ten-station touchbutton memory tuning, LED frequency and time display, and manual FM stereo/mono and local/distant switches; frequency response 30-15,000 Hz at +3 dB; stereo separation 32 dB at 1000 Hz. Preamplifier features output jacks, bass and treble controls, loudness switch, rotary on/off/master volume control and balance control; frequency response 30-25,000 Hz at +3 dB; 2" H × 6¼" W × 5" D ..... $320
**FT1498.** Similar to FT2200 except biamplified with 14 W/ch woofer and 2.7 W/ch tweeter amps at 5% THD; 33 W continuous output power; 4-8 ohm impedance; wow and flutter 0.08% wrms; FM frequency response 60-14,000 Hz at +3 dB; 3" H × 7" W × 6" D ..... $300
**FT1490-2.** Similar to FT1498 without digital frequency/time display ..... $200

### FT1670 AM-Stereo FM/Cassette Player
In-dash unit combines AM-FM stereo radio, cassette player, digital clock, and elapsed timer; has auto eject transport; biamp with 12 W/ch woofer amps and 2 W/ch tweeter amps; LED display for elapsed time and station frequency; auto up/down for electric antennas; separate woofer and tweeter controls; remote scanning with hold button; locking fast-forward/rewind. Receiver: 28 W continuous output power; FM usable sensitivity 1.0 μV into 75 ohms; frequency response 30-16,000 Hz; selectivity 55 dB; capture ratio 1.5 dB; stereo separation 30 dB; speaker impedance 4 or 8 ohms; operating voltage 12 V dc neg. ground, 13.8 V dc nominal. Cassette: wow and flutter 0.2% wrms; S/N 45 dB. 3" H × 7" W × 6" D ..... $200
**FT690.** Similar to FT1670 without elapsed timer and biamp with woofer/tweeter amps; 8 W continuous; response 50-12,000 Hz ..... $200
**FT1495.** Similar to FT1670 without digital clock; features Dolby noise-reduction system and Dolby-encoded FM broadcasting; full auto reverse with auto repeat; five-station preset pushbutton tuning; wow and flutter 0.08% wrms; 33 W continuous output power; S/N with Dolby 62 dB ..... $220
**FT1490A.** Similar to FT1495 without five-station preset pushbutton tuning; has local/distant control; 28 W continuous output power; FM stereo separation 30 dB ..... $200

### FT645 AM-Stereo FM/Cassette Player
In-dash unit combines AM-stereo FM radio and stereo cassette player with built-in digital quartz clock. Cassette features automatic reverse and program repeat, self-draw tape compartment and locking fast forward and rewind; wow and flutter 0.08% wrms; frequency response 50-12,000 Hz; S/N 50 dB; output 9 W continuous. Radio features LED FM stereo indicator, automatic IC FM stereo/mono switching, automatic up/down control for electric antennas, and pushbutton AM/FM selector; FM stereo separation 28 dB; 2" H × 7" W × 6" D . $180

### FT412 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio and stereo cassette player designed for foreign and American sub-compact cars. Features automatic eject and tape replay; locking fast forward and rewind; memory tuning for up to five AM and five FM stations; local/distant and FM muting switch; separate balance and tone controls; lighted stereo and tape indicators; wow and flutter 0.2% wrms; frequency response 50-10,000 Hz; S/N 45 dB; 4 W/ch continuous output power at 5% THD; selectivity 55 dB; FM stereo separation 30 dB; 12 V dc negative ground; pigtail for automatic electric antennas; 1¾" H × 6¼" W × 5" D ... $160

### FT482 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio and auto reverse stereo cassette player features automatic music select system which locates gap between musical selection on cassette; local/distant and FM muting switch; locking fast forward and rewind; separate volume, balance, bass, and treble controls. Wow and flutter 0.09% wrms; frequency response 50-12,000 Hz; S/N 55 dB; max. output 7.5 W/ch continuous; 2" H × 7" W × 5" D ..... $160

### FT417 AM-Stereo FM/Cassette Player
In-dash pushbutton AM-FM stereo radio with cassette player; features ceramic r-f filters; PLL multiplex decoder; EZ install system; separate bass and treble controls; local/DX switch; auto stop; locking fast forward and rewind. Receiver: 8 W continuous output power; FM usable sensitivity 1.5 μV into 75 ohms; frequency response 50-10,000 Hz; selectivity 55 dB; capture ratio 1.5 dB; FM stereo separation 30 dB; speaker impedance 4 or 8 ohms. Cassette: wow and flutter 0.2% wrms; S/N 45 dB. Operating voltage 12 V dc neg. ground, 13.8 V dc nominal; 2" H × 7" W × 6" D ..... $130
**FT415.** Similar to FT417 without pushbutton preset stations; local/DX switch; has full-function recording mode; locking fast-forward, pause, and rewind; can record from radio with hand-held remote microphone; 7 W/ch continuous output power; FM sensitivity 11.2 dBf (2.0 μV); selectivity 60 dB; capture ratio 1.2 dB; FM stereo separation 80 dB; 2" H × 7" W × 5⅛" D ..... $150

### FT1400 Biamp/Cassette Player
Underdash unit combines biamp and auto reverse cassette player with slide in/out bracket; biamp with 14 W/ch woofer and 2.7 W/ch tweeter amps at 5% THD; separate woofer and tweeter controls; loudness switch; locking fast-forward and rewind. Amp: 33 W continuous total output power; speaker impedance 4 or 8 ohms. Cassette: wow and flutter 0.08% wrms; S/N 46 dB. Operating voltage 12 V dc neg. ground, 13.8 V dc nominal; 2½" H × 7" W ..... $120

### FT1877 AM-FM Stereo Biamp/8-Track
In-dash AM-FM biamplified stereo receiver and 8-track player with Dolby noise-reduction system and five pushbutton preset stations; biamp with 14 W/ch woofer amp and 2.7 W/ch tweeter amp; separate woofer and tweeter controls; locking fast-forward; dual gate MOS FET front end; PLL multiplex decoder; automatic up/down for electric antennas. Receiver: 33 W continuous total output power; FM usable sensitivity 2.0 μV into 75 ohms; frequency response 30-16,000 Hz; selectivity 55 dB; capture ratio 1.5 dB; FM stereo separation 30 dB; speaker impedance 4 or 8 ohms. Cassette: wow and flutter 0.15% wrms; S/N 55 dB with Dolby. Operating voltage 12 V dc neg. ground, 13.8 V dc nominal; 3" H × 7" W × 6" D ..... $150
**FT1004.** Similar to FT1877 but underdash unit without Dolby noise-reduction system and locking fast-forward; has rotary balance and tone controls; FM radio; FM sensitivity 1.5 μV into 75 ohms; S/N 46 dB; 2¼" H × 6¾" W × 6⅞" D ..... $80
**FT874.** Similar to FT1004 but in-dash unit with AM-FM radio and five-station preset pushbutton tuning; no biamp with woofer and tweeter controls or 8-track player; 8 W continuous output power; frequency response 50-10,000 Hz; capture ratio 1.5 dB; 3" H × 7" W × 6" D ..... $100

## SHARP

### RG-3550 AM-Stereo FM/Cassette Player
In-dash unit combines AM-stereo FM radio and stereo cassette player; designed for domestic cars. Cassette features auto program search system in fast forward or rewind, LED tape end indicator, auto end-of-tape shutoff and locking fast forward and rewind. Radio features illuminated slide-rule tuning dial, AM/FM/stereo FM band switch, balance control, variable tone control, solid-state stereo amplifier, PLL FM stereo circuitry, agc and afc, and LED stereo indicator ..... $220

### RG-3400 AM-Stereo FM/Cassette Player
In-dash unit combines AM-stereo FM radio and stereo cassette player; designed for domestic cars. Cassette features auto reverse and locking fast forward and rewind; radio features illuminated slide-rule tuning dial, AM/FM/stereo FM selector, balance and variable tone controls, solid-state stereo amplifier, PLL FM stereo circuitry, afc and agc, and LED stereo indicator ..... $190

### RG-3200 AM-Stereo FM/Cassette Player
In-dash unit combines AM-stereo FM radio and stereo cassette player; designed for domestic cars. Cassette features auto eject and locking fast forward and rewind; radio features illuminated slide-rule tuning dial, band selector switch, balance and variable tone controls, PLL/FM stereo circuitry, afc and agc, and LED stereo indicator ..... $170

## SPARKOMATIC

### SR-3400 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio/stereo cassette player with digital clock. Features auto stop; pushbutton eject; electronic loudness, muting, high filter, and AM/FM controls; local/distant control; elapsed timer and reset controls; locking fast forward and rewind; bass, treble, balance, and fader controls; LED stereo indicator. Wow and flutter 0.3% rms; S/N 40 dB; channel separation 45 dB; audio output 40 W continuous at 1.0% THD; frequency response 20-20,000 Hz; 1¾" H × 7" W × 5½" D ..... $270
**SR-2400.** Same as SR-3400 except has 8-track player with program selector and LEDs instead of cassette; no fast forward and rewind; wow and flutter 0.25% rms; 5⅛" D ..... $270
**SR-3300.** Similar to SR-3400 except auto-reverse cassette player with tape direction control and LED indicator; no digital clock with elapsed time and reset controls ..... $250
**SR-3100.** Similar to SR-3300 minus auto reverse with tape direction control and LED ..... $220
**SR-2100.** Same as SR-3100 except has 8-track player with program selector and indicator lights instead of cassette; wow and flutter 0.25% rms; 5⅛" D ..... $220

### SR-340 AM-Stereo FM/Cassette Player
In-dash AM-stereo FM radio/stereo cassette player with digital clock. Features elapsed timer and reset controls; electronic loudness, muting, high filter, and AM/FM controls; local/distant control; auto-

# 5 CAR STEREO EQUIPMENT

matic end-of-tape and pushbutton eject; locking fast-forward and rewind; bass, treble, balance, and fader controls; LED stereo indicator. Wow and flutter 0.3% rms; S/N 40 dB; channel separation 45 dB; audio output 10 W at 1.0% THD; frequency response 40-15,000 Hz; 1¾" H × 7" W × 5½" D.. ..... $240

**SR-240.** Same as SR-340 except has 8-track player with program selector and LED indicators instead of cassette; wow and flutter 0.25% rms; 5⅛" D. $240

**SR-330.** Similar to SR-340 except auto reverse player with tape direction control and indicator; no digital clock..... $220

**SR-310.** Similar to SR-330 without auto reverse .... ..... $190

**SR-210.** Same as SR-310 except has 8-track player with program selector and indicator lights instead of cassette; wow and flutter 0.25% rms; 5⅛" D. $190

### SR-303 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/stereo cassette player. Cassette player features continuous play auto reverse, auto key-off and pushbutton eject, and locking fast forward and rewind buttons with LEDs; wow and flutter 0.3% rms; S/N 38 dB. Radio: features pushbutton local/distant, program, and AM/FM controls, balance and fader controls for four-way speaker adjustment, and rotary volume, tone, and tuning controls; audio output 8 W at 1.0% THD; frequency response 60-12,000 Hz; FM sensitivity 7 μV for 30-dB S/N; 1¾" H × 7" W × 4¹¹⁄₁₆" D.. $160

### SR-302 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/stereo cassette player. Cassette has fast forward and eject switch; wow and flutter 0.3% rms; S/N 38 dB. Radio features five AM/FM programmable pushbutton tuning, separate balance and fader controls for four-way speaker adjustment, local/distant switch, and LED multiplex, AM, and FM indicators; output 8 W at 1.0% THD; response 60-12,000 Hz; FM sensitivity 7 μV for 30-dB S/N; 2⅛" H × 7¹⁄₁₆" W × 4⅞" D..... $160

**SR-202.** Same as SR-302 except has 8-track player instead of cassette..... $160

### SR-301 AM-Stereo FM/Cassette Player

In-dash AM-stereo FM radio/stereo cassette player with AM/FM, muting, local/distant, and mono/stereo switches; auto shutoff; pushbutton eject and fast forward and rewind; separate balance and fader controls; tone control. Wow and flutter 0.3% rms; S/N 38 dB; channel separation 42 dB; audio output 8 W at 1.0% THD; frequency response 60-12,000 Hz; 1¾" H × 6¹¹⁄₁₆" W × 4¹³⁄₁₆" D..... $120

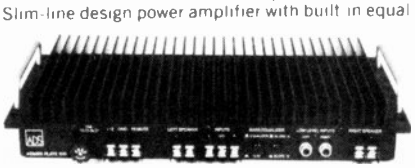
**SR-201.** Same as SR-301 except has 8-track player with program selector and LEDs instead of cassette. ..... $120

# 5 CAR STEREO ACCESSORIES

## ADS

### Power Plate 100 Power Amp

Slim-line design power amplifier with built in equal



izers, subsonic filter, and remote turn-on. Output 50 W/ch continuous power into 4 ohms from 20-20,000 Hz with 0.8% THD; S/N 90 dB; frequency response 30-20,000 Hz ±0.5 dB; 13.5 V dc negative ground; flat black satin finish; optional bolt-on handles extend height to 2¹⁄₄ in; 1¹⁵⁄₁₆" H × 12¼" W × 6¼" D. ..... $300

## ALPINE

### 3005 Amplifier

20 W car stereo amplifier with eight electronic rhythms and separate mic and line inputs; LED output indicators; input sensitivity control; rhythm and tempo controls; rhythm function switch; digital time delay (60-130 msec) fader; separate bass and treble controls (±10 dB at 100-1000 Hz); mic and PA on off switches; separate mic and line controls; frequency response 20-20,000 Hz ..... $350

### 3002 Amplifier

50 W main amplifier with pulse regulated power supply; input sensitivity control; auto remote power on switch; two inputs for preamp out and speaker out; frequency response 10-60,000 Hz with 0.2% THD ..... $250

### 3008 Power Amplifier

30 W/ch continuous, both channels driven into 4 ohms from 30-30,000 Hz with 0.2% THD; frequency response 20-20,000 Hz ±3 dB; features pulse-regulated power supply, auto remote power on, preamp/speaker out inputs, input sensitivity control, and LED power on. . $150

### 3006 Power Amplifier

8 W/ch continuous, both channels driven into 4 ohms from 40-20,000 Hz with 0.8% THD $60

### 3000 Graphic Equalizer

Four-channel five-band graphic equalizer with center frequencies set at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB; unit features bi-amp in out switch, tuner auxiliary switch, clipping indicators; accepts digital time delay (Model 3001) with digital time delay on off switch, digital time delay max. min. control (0-1000 msec), and digital time delay gain control, and input sensitivity control; slide control detent midrange; 20 W/ch output power; frequency response 20-20,000 Hz $200

**3003.** Similar to 3000 except with preamplifier; no clipping indicators ... . $150

**3004.** Similar to 3003 without digital time delay compatibility; has two-channels, front to rear fader, power on off switch, and clipping indicators $120

### 3011 Preamp/Equalizer

Compact preamp five-band equalizer with ±12 dB range; frequency response 20 20,000 Hz; 1¹⁄₁₆" H × 5⅞" W × 3⅛" D . $150

## AUDIOVOX

### AMP-550 Graphic Equalizer/Power Amp

Unit combines five-band stereo graphic equalizer and 50-W power amplifier. Equalizer center frequency slide controls at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut; amp output 25 W ch continuous into 4 ohms; frequency response 60-10,000 Hz; has front to rear fader control and EQ bypass . . . . . $59

### AMP-500B "Sound Exploder"

Underdash 40-W stereo power amplifier with push button on off switch and LED power on indicator; output 20 W ch continuous into 8 ohms; frequency response 50-15,000 Hz; accepts 4 or 8 ohm speakers; brushed chrome nosepiece $27

### HI COMP Line

### HCB-860 Stereo Power Amplifier

65 W/ch continuous into 4 ohms from 15-20,000 Hz with 0.3% THD; frequency response 15-50,000 Hz; features dual 4-8 ohm output impedance connectors, remote on/off power switch, and selectable high/low-level inputs..... $200

**HCB-830.** Same as HCB-860 except four-channel power amp with 30 W/ch output . . . . . $200

### HCB-820 Stereo Power Amplifier

18 W/ch into 4 ohms from 20-20,000 Hz with 1.0% THD; frequency response 15-30,000 Hz; features selectable high/low-level input connectors, dual 4-8 ohm output impedance, remote on off power switch, and direct connection wiring . $100

### HCE-750 Graphic Equalizer

Five-band semi parametric graphic equalizer with frequency slide controls at 60, 250, 1000, 3500, and 12,000 Hz, ±12 dB boost or cut. Features parametric frequency deviation controls for each band, front-to-rear fader control, biamp capability, and selectable high- and low-level inputs; frequency response 20-20,000 Hz; THD 0.07% . $150

### HCE-707 Graphic Equalizer

Seven-band graphic equalizer with frequency slide controls at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, ±12 dB boost or cut; has fader control, EQ bypass, and LED power level indicators for 60 W output . . . . . $120

### HCE-720 Preamp

Preamplifier with biamp capability; features separate bass and treble slide controls, front to rear fader, selectable high- and low-level inputs, and back-lit control panel; frequency response 20-20,000 Hz; THD 0.07% . . . . $66

### HCE-700 Fader Control

Heavy-duty fader control provides four way balance for high-power amplifiers; accepts 60 W ch; special heat dissipation design and direct connection input output cables . . . . $40

## AUTOTEK

### EQL-200 Graphic Equalizer/Booster

Unit combines five-band graphic equalizer and 20-W/ch stereo amplifier. Equalizer features center frequency slide controls at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut. Power amp features LED peak level indicator display ch, front-to-rear fader, and output protection circuitry; frequency response 20 20,000 Hz ±3 dB; output impedance 4 8 ohms; 51 mm H × 140 mm W × 177 mm D. . . . . $110

## CLARION

### 300-EQB2 Booster/Equalizer

Unit combines 70-W power booster and five-band graphic equalizer. Equalizer center frequency slide controls at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut; has EQ defeat switch. Booster: 35 W ch continuous; impedance 4-8 ohms; features six-LED output level display for each channel, front-to-rear fader, and solid-state circuitry; frequency response 40-30,000 Hz; 1⁷⁄₁₆" H × 7" W × 6½" D . . . . . $200

**100-EQB3.** Similar to 300 EQB2 minus LED output level display indicators; 15 W ch at 1.0% THD and 30 15,000 Hz frequency response; 1⁷⁄₁₆" H × 5½" W × 6½" D . . . . . $125

## COBRA

### GEA40-5 Graphic Equalizer/Amplifier

Five-band graphic equalizer/amplifier; center frequencies set at 60, 250, 1000, 4000, and 12,000 Hz with ±12 dB boost or cut; amplifier has "Bridge Transformerless Circuitry"; output 20 W ch continuous; frequency response 30-20,000 Hz; front to rear fader control; power on bypass control with LED; can drive four 6-ohm speakers . . . . . $90

**GEA60-7.** Similar to GEA40-5 except seven band equalizer with center frequencies set at 60, 150, 400, 1000, 2500, 6000, and 12,000 Hz; output 30 W/ch continuous; LED power level indicators/ch; frequency response 20-20,000 Hz..... .. $160

## CONCORD

### HPA-70 Car-ponent™ Stereo Power Amp
70 W ch continuous, both channels driven into 4 ohms from 20-20,000 Hz with 0.5% THD; frequency response 10-70,000 Hz ± 3 dB at 50 W continuous; IM dist. 0.025% at 50 W continuous; S/N 90 dB; slew rate 5 V/μsec; damping factor 300 into 4 ohm loads; input sensitivity 0.25 W continuous (low level), 2 V rms (high level); input impedance 10,000 ohms (low level), 47 ohms (high level). Features dynamic compliance circuitry (serves as automatic equalizer) with on/off switch; single-ended Darlington IC output circuitry; 4/8 ohm speaker impedance selector switch; switching power supply; high and low level inputs; remote on/off; electronic overload, thermal overload, and speaker protection circuits; 3.5" H × 9" W × 8" D . . . . . $330

### HPA-45 Car-ponent™ Stereo Power Amp
20 W ch continuous, both channels driven into 4 ohms from 20-20,000 Hz with 0.06% THD; frequency response 15-20,000 Hz ± 3 dB; IM dist. 0.1% at 20 W continuous; S/N 86 dB; slew rate 10 V/μsec; damping factor 40:1 on 4 ohm loads; input sensitivity 250 mV rms; input impedance 20,000 ohms balanced. Features dynamic compliance circuitry with on/off switch; balanced differential inputs; push-pull dc complementary bridged output circuitry; 2/4 ohm speaker impedance selection; remote on/off; high and low-level inputs; electronic overload protection circuit; 2.5" H × 6" W × 5.5" D . . . . . $150

### HPA-60 Car-ponent™ Equalizer/Amplifier
Unit combines five band graphic equalizer and 50-W ch power amplifier. Equalizer center frequency slide controls at 60, 250, 1000, 3500, and 15,000 Hz, ± 12 dB boost or cut; has EQ bypass switch. Amp: 25 W ch continuous, both channels driven into 2 ohms from 20-20,000 Hz at 0.3% THD; S/N 80 dB; input sensitivity 250 mV; input impedance 20,000 ohms; features dual five LED output level indicators for each channel; 2" H × 8" W × 5.75" D . . . $180

## DRACO LABS

### D-45E Car Range Expander
Provides over 30-dB of added dynamic range and eliminates FM and tape hiss; features spectrum display for bass, midband, and treble frequencies; expansion ratio slide control; display control. Attack and release rates automatically adjustable to match program material; frequency response 20-20,000 Hz ± 0.5 dB; THD and IM dist. 0.1%; 12 V dc negative ground; 2¾" H × 8½" W × 7¾" D . $200

## FINCO

### Stereo Two FM Booster
Solid-state dual MOSFET FM power booster; designed to eliminate signal fading on mono and stereo stations; increases signal up to 16 times; features linear potentiometer gain control, pushbutton AM/FM switch, LED indicator, and antenna trimmer . . . . . $40

### Stereo One FM Booster
Designed to eliminate signal fading; increases signal up to three times; extends FM reception range with no effect on AM reception; has on/off switch and LED on indicator . . . . . $26

## FOSGATE ELECTRONICS

### PR-2100 The Punch Type II
Bi-amplified power amplifier with built-in variable electronic crossover and separate active equalizer with center frequencies set at 45, 175, and 20,000 Hz. Features automatic power switching with time delay; LED array for source material level; auto system shut-off; radio and tape unit inputs; power supplies for each channel and fully regulated power supply with overload protection; pulse-width-modulated power supply. Power output 200 W continuous into 4 ohms and 100 W continuous into 8 ohms; frequency response 20-20,000 Hz ± 0.25 dB; slew rate 60 V/μsec; damping factor 1000; sensitivity 0.5 V rms in; input impedance 20,000 ohms; noise −80 dB; 1¾" H × 8⅝" W × 3¼" D . . . . . $600

### PR-250 The Punch Type II
Car amplifier with separate active equalizer with 45 and 20,000 Hz center frequencies. Features auto system shut-off; auto power switching with time delay; fully regulated power supply and separate power supplies for each channel; oversized heatsinks; pulse-width-modulated power supply. Output 100 W continuous into 4 ohms, 50 W continuous into 8 ohms; frequency response 20-20,000 Hz ± 0.25 dB; slew rate 60 V/μsec; damping factor 1000; sensitivity 0.5 V rms; input impedance 20,000 ohms; noise 80 dB; 1⅝" H × 4" W × 2½" D. . $250

**PR-252.** Similar to PR-250 except equalizer has center frequencies set at 45, 175, and 20,000 Hz, separate radio and tape unit inputs, and LED array for source material level with on/off switch; 1¾" H × 8⅝" W × 3¼" D . . . . . $320

### PR-220 The Punch Type II
Underdash or hidden-mount amplifier with auto stop, auto power switching with time delay, built-in six-position active equalizer, and oversized heatsinks. Output 40 W total continuous into 4 ohms; frequency response 20-20,000 Hz ± 0.25 dB; slew rate 60 V/μsec; damping factor 1000; equalizer center frequencies set at 45 (± 18 dB) and 20,000 (± 12 dB) Hz; sensitivity 3.5 V rms in; input impedance 39 ohms; noise −80 dB; 2½" H × 6¾" W × 4¾" D . . . . . $140

## JENSEN

### A124 Power Amplifier
100-W biamplified power amplifier. Features direct coupled output capacitorless circuitry; two 40-W and two 10-W independent amplifiers; switchable input impedance; automatic power switching; full electronic protection; dc to dc converter power supply; large heatsinks; low loss shielded cables. Output 50 W ch continuous, both channels driven into 4 ohms from 20-20,000 Hz with 0.6% THD, 40 W ch into 4 ohms (bass amps), 10 W ch into 4 ohms (treble amps); frequency response 20-20,000 Hz; S/N 80 dB; max. input 50 W (rear), 12.5 W (front) . . . . . $280

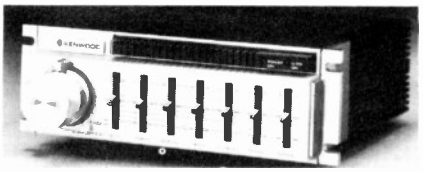
**A60.** 50-W biamplified version of A124; has two 20 W and two 5-W independent amplifiers; output 25 W ch continuous under same conditions, 20 W ch (bass amps), 5 W ch (treble amps); max. input 25 W (rear), 6.25 W (front). . . . . $200

### EQA3000 Graphic Equalizer/Amplifier
Unit combines 24 W power amplifier and five band graphic equalizer with center frequency slide controls at 80, 250, 1000, 3500, and 10,000 Hz, ± 12 dB boost or cut. Features dual 12 W amplifiers; long-throw level controls; automatic power switching; defeat switch; front to rear fader; full electronic protection; illuminated control panel. Amp output 12 W ch continuous, both channels driven into 4 ohms from 20-20,000 Hz with 0.3% THD; frequency response 20-20,000 Hz (flat position); S/N 80 dB; sensitivity 0.5 V for 1 W out; input impedance 47 ohms; supplied with mounting bracket . . . . . $180

### EQ400 Parametric Equalizer
15-band variable parametric graphic equalizer with fifteen equalization frequencies at 12-dB boost or cut. Features long-throw level controls, five bass/mid/treble band controls with LED indicators for each band, defeat switch, full electronic protection, automatic power switching, illuminated control panel, and front-to-rear fader control. Frequency response 20-20,000 Hz (flat); S/N 90 dB; input impedance 47 ohms; includes mounting bracket . . . . . $130

## KENWOOD

### KGC-737 Graphic Equalizer/Bi-Amplifier
Seven-band graphic equalizer with four built-in power amplifiers. EQ: center frequency slide con



trols set at 60, 150, 400, 1000, 2500, 6000, and 12,000 Hz, ± 12 dB boost or cut; has illuminated fader control and pushbutton defeat/bypass; frequency response 20-70,000 Hz; S/N 85 dB. Amps. output 5 W (front speakers), 15 W (rear deck speakers); THD 1.0%; S/N 85 dB. 2⅛" H × 6¹⁵/₁₆" W × 6½" D . . . . . $219

**KGC-747.** Same as KGC-737 without built-in power amps . . . . . $159

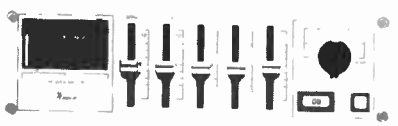
### KAC-801 Power Amplifier
Output 50 W ch from 20-60,000 Hz with 1.0% THD, 140 W total power; features remote control power switch, built-in dc-dc converter, and built-in electronic fault protection circuit; designed for trunk installation (can be mounted under car seat) . . . . . $219

### KAC-727 Power Amplifier
Output 15 W ch from 20-50,000 Hz with 1.0% THD, 40 W total power; built-in electronic fault protection circuit; designed for trunk installation (can be mounted under seat) . . . $95

## KRACO

### KE-7 Graphic Equalizer
Seven-band graphic equalizer with slide controls covering 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, ± 12 dB boost or cut; features variable fader control with built-in heatsink; right/left channel output power meters; earphone headphone jack. Output 50 W ch continuous, 40 W ch at 10.0% THD; frequency response 25-40,000 Hz; includes power supply and speaker wires; 65 mm H × 180 mm W × 200 mm D . . . $170

### KE-6 Graphic Equalizer/Booster
Underdash unit combines five band graphic equalizer with 30-W ch power amplifier. Equalizer has



frequency slide controls at 60, 250, 1000, 3500, and 10,000 Hz, ± 12 dB boost or cut and variable front to rear fader; amp has lighted power meter; pushbutton on/off with LED . . . . $90

### KE-5 Graphic Equalizer
Graphic equalizer with fader control; max. output 30 W ch continuous; five equalizer controls (60, 250, 1000, 3500, and 10,000 Hz); LED power on indicator; variable fader control with specially engineered heatsink; power on/off switch . . . . . $80

### KE-3 Graphic Equalizer
Max. output 25 W ch continuous; power on indicator; power on/off switch; illuminated output power meter; low/mid/hi equalizer controls; brushed aluminum front panel with black vinyl coated cabinet . . . . . $60

## LAKE COMMUNICATIONS

### 7100 Graphic Equalizer/Booster Amp
Compact seven-band graphic equalizer 100 W booster amp; center frequency slide controls at 60,

# 5 CAR STEREO ACCESSORIES

150, 400, 1000, 2400, 6000, and 15,000 Hz. ±12 dB boost or cut; features left and right LED output level display, sliding front-to-rear fader and volume controls, and tone defeat switch; 1.75" H × 7.5" W × 5.5" D ..... $120

### 701 Graphic Equalizer/Booster Amp

Seven-band graphic equalizer/booster with slide equalizer controls at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz; power output 25 W ch; fader control; pushbutton on/off with LED indicator; 1 13/16" H × 5 1/2" W × 6 1/2" D ..... $100

### 200 Power Booster

40 W continuous output; frequency response 50-15,000 Hz; input impedance 100 ohms; 8-ohm output impedance; bass boost control; 13.5 V dc negative ground; 44 mm H × 110 mm W × 140 mm D ..... $50

## LINEAR POWER

### 40A Power Amplifier

Direct-coupled complementary stereo power amplifier; low current drain; high or low signal inputs; 20 W/ch continuous into 4 ohms from 20-20,000 Hz ±0.25 dB with 0.2% THD; S/N 90 dB; max. current 5 A at 14.4 V dc; compact size ..... $110

**60A.** Similar to 40A except 30 W/ch continuous with 0.25% THD; features delayed turn-on, adjustable input gains, and rugged push-pull dc-dc converter internal noise suppression ..... $150

**90.** Similar to 60A except 45 W/ch continuous with 0.05% THD ..... $200

**150.** Similar to 90 except 75 W/ch continuous ..... $300

**300.** Similar to 150 except 150 W/ch continuous ..... $500

### Linear Power Preamplifier

Three-band preamp/equalizer with ±15 dB at 20 Hz bass, ±13 dB at 600 Hz mid, and ±12 dB at 20,000 Hz treble controls; two switchable stereo input channels with adjustable sensitivities and impedances; output level compatible with most power amps and adjustable from 0-2.5 V into 2.2k ohms via volume control; LED power on indicator; frequency response 20-20,000 Hz ±0.1 dB at 0.01% THD; S/N 70 dB ..... $130

## MARANTZ

### SA-2415 Stereo Power Amplifier

Compact wide-band switchable two- or four-speaker stereo power amplifier with booster and line-in modes. Two-amp output 30 W/ch into 4 ohms from 20-20,000 Hz with 0.05% THD, four-amp output 15 W/ch; input sensitivity/impedance 3 V 450 ohms (booster), 500 mV 10,000 ohms (line); 13.8 V dc; 2" H × 5 1/8" W × 10 1/4" D ..... $250

**SA-2040.** Similar to SA-2415 except four speaker amp only; output 10 W/ch into 4 ohms from 30-20,000 Hz with 0.5% THD; 2" H × 3 9/16" W × 9 13/16" D ..... $160

### SA-2020 Power Amplifier

10 W/ch into 4 ohms from 30-20,000 Hz with 0.5% dist., max. output 50 W; line-in impedance sensitivity 10,000 ohms/300 V ..... $75

### SA-247 Equalizer/Amplifier

Underdash seven-band graphic equalizer 60-W power amplifier. Equalizer center frequency slide controls at 50, 150, 350, 1000, 2500, 6000, and 16,000 Hz, 12-dB boost or cut at each frequency, 8-octave contour; ambience button; auto turn-on; front-rear fader control; output 15 W ch continuous into 4 ohms with 0.5% THD; frequency response 20-20,000 Hz; brushed aluminum plate in gold; 2 1/8" H × 6 3/4" W × 5 3/4" D ..... $160

## MATRECS

### MA-1050 Graphic Equalizer/Booster

Five-band graphic equalizer with balanced transformerless power amplifier; center frequencies set at 60, 250, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut; max. output 25 W/ch; frequency response 30-30,000 Hz; dist. 0.4% at 1 W, 1000 Hz; S/N 70 dB; input impedance 57 ohms; min. load impedance 4 ohms/ch; has booster bypass with power switch and complete protection against short circuit, overheating, excess voltage, and reverse polarity; 13.2 V dc; 2" H × 5 1/2" W × 7 1/8" D ..... $78

**MA-1040.** Similar to MA-1050 except input impedance switchable 10/40,000 ohms; has fader control; 2 3/8" H × 5 7/8" W × 5 3/4" D ..... $75

### MA-1000 Stereo Booster

Balanced transformerless power amplifier; output 25 W ch; frequency response 30-30,000 Hz; dist 0.4% at 1 W, 1000 Hz; S/N 70 dB; input impedance 10/40,000 ohms; min. load impedance 4 ohms/ch; has tone/variable output control; booster bypass with power switch; complete protection against short circuit, overheating, excess voltage, and reverse polarity; 13.2 V dc; 2 3/8" H × 5 7/8" W × 5 3/4" D ..... $50

## MITSUBISHI CAR AUDIO

### CV-23 Equalizer/Booster

Six-band graphic equalizer amplifier. Equalizer center frequencies set at 50, 150, 400, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut; booster output 30 W/ch continuous; features volume/fader controls with five LEDs/side; balance slide control ..... $160

### Car Power Amplifiers

Feature auto on/off switching with power-on LED and low-level DIN input connector; can be used with CZ-747 or CZ-692 AM-stereo FM radio/cassette deck

**CV-25.** 20 W/ch continuous ..... $120
**CV-22.** 10 W/ch continuous ..... $90
**CV-24.** 8 W/ch continuous ..... $50

## PANASONIC

### CJ-255Z Quadro-Boomer

Solid-state stereo power booster with dynamically boosted sound and four in-out channels; total output 76 W ..... $80

**CJ-156Z.** 20-W solid-state stereo power booster with dynamically boosted sound and heatsink ..... $55

## PIONEER

### AD-50 Graphic Equalizer/Amplifier

Five-band stereo graphic equalizer/amplifier; five frequency band tone controls; fader control; LED "power on" indicator; 10-LED power level display (five LEDs per channel); max. output 25 W channel continuous, 15 W with 1% dist. at 1 kHz into 4 ohms; frequency response 30-30,000 Hz −3 dB; S/N 65 dB; ±12 dB equalization range; equalization frequencies 60, 250, 1000, 3500, 10,000 Hz; 2 9/16" H × 5 7/8" W × 7 1/8" D ..... $220

### AD-360 Booster Amplifier

Booster amplifier with built-in protection circuits and auto on-off power switch; max. output 70 W channel continuous, 50 W channel into 4 ohms at 1000 Hz with 0.8% dist.; frequency response 20-30,000 Hz, 2 V input for max. output; 2 1/2" H × 9" W × 8" D ..... $200

### GM-120 Component Power Amplifier

Component stereo amplifier with short circuit protection; max. output 60 W/ch, 30 W/ch min. (both channels driven) into 4 ohms over 30-20,000 Hz at 0.3% THD; frequency response 20-30,000 Hz at −3 dB; THD 0.04% at 25 W, 1000 Hz; S/N 75 dB; 2 3/8" H × 7" W × 8 1/4" D ..... $180

### CD-7 Graphic Equalizer

Seven-band graphic equalizer features IC echo with time delay control and built-in dual amp balancer; equalization frequencies set at 60, 125, 250, 500, 1000, 3500, and 10,000 Hz ±12 dB; frequency response 20-30,000 Hz at ±3 dB; S/N 70 dB; output level 200 mV; delay time 0-7000 msec; 2" H × 5 7/8" W × 6 1/2" D ..... $180

### AD-30 Graphic Equalizer/Amplifier

Five-band stereo graphic equalizer/amplifier; five frequency band tone controls; fader control; two LED peak power indicators; LED power indicators; max. output 15 W/channel continuous, 10 W with 1% dist. at 1000 Hz into 4 ohms; frequency response 30-30,000 Hz −3 dB; S/N 65 dB; ±12 dB equalization range; equalization frequencies 60, 250, 1000, 3500, 10,000 Hz; 2" H × 5 7/8" W × 6 1/2" D ..... $130

### GM-40 Component Power Amplifier

Component power amplifier; max. output 20 W/ch continuous, 10 W/ch min. at 50-20,000 Hz into 4 ohms with 0.8% THD; 15-40,000 Hz −3 dB frequency response; less than 0.06% THD at 1.5 W, 1000 Hz; S/N 80 dB ..... $75

**GM-12.** Similar to GM-40 except 12 W amplifier; 6 W/ch continuous ..... $45

### BP-320 Booster Amplifier

Booster amplifier has max. output 20 W/channel continuous, 13 W/channel into 4 ohms at 1000 Hz with 0.8% dist.; frequency response 20-40,000 Hz; 2" H × 4 3/4" W × 5 7/8" D ..... $70

## PYRAMID/MOBILE AUDIO DEV.

### MA-270 Power Amplifier

270-W inverted power amplifier; features fully protected fused inputs and outputs; accepts high- and low-impedance signals; separate sensing lead on power input allows remote on/off switching. 100 W/ch continuous into 4 ohms from 15-50,000 Hz with 0.3% THD; IM dist. 0.5%; slew rate 30 V/μsec; clipping headroom 110 dB; S/N 70 dB (A weighted); output impedance 4-8 ohms; includes mounting hardware and mating connector harness ..... $400

### MA-100B Power Amplifier

Compact 100-W inverted power amplifier; accepts high or low impedance signals; thermal-protected circuitry; 50 W/ch continuous from 20-20,000 Hz with 0.01% THD; frequency response 20-20,000 Hz; 3.5" H × 3" W × 6" D ..... $218

### PMA-100 Power Amplifier

100 W continuous power amplifier features floating/common ground inputs and comes with mating connector cables; 50 W/ch continuous with 1.0% THD; frequency response 80-20,000 Hz ±3 dB; S/N 60 dB; IM dist 0.4%; output impedance 4 or 8 ohms; channel separation 45 dB ..... $176

### MA-1000 Amplifier/Equalizer

Unit combines ten-band graphic equalizer and 60-W power amplifier. Equalizer center frequency slide controls at 55, 110, 200, 360, 680, 1300, 2400, 4500, 8000, and 15,000 Hz, ±12 dB boost or cut. Power amp: 30 W/ch continuous into 4 ohms; frequency response 20-20,000 Hz; THD 0.5%; S/N 50 dB (low impedance), 65 dB (high impedance); input 2.5 V (low impedance), 100-700 mV (high impedance); input impedance variable 28 ohms (low), 50,000 ohms (high) with floating or common ground on low impedance; features five-LED output indicators/ch, four-way fader control, and diode-protected ICs; 1.5" H × 5.25" W × 1.375" D ..... $220

**MA-700.** Similar to MA-1000 except has seven-band equalizer with center frequency slide controls at 60, 150, 400, 1000, 2400, 6500, and 15,000 Hz ±12 dB; power amp same in MA-1000 except has tri-color 12-LED output level indicators ... $180

### MA-40 Amplifier/Equalizer
Unit combines 40-W power amplifier and two-band graphic equalizer; features concentric bass and treble controls, four-way fader, and EQ bypass with LED; frequency response 40-18,000 Hz; THD 0.5%; S/N 50 dB; input 2.5 V; input impedance 28 ohms; compatible with low-impedance units.... $92

### MA-7P Preamp/Equalizer
Surface- or in-dash mount unit combines seven-band graphic equalizer and preamplifier; features volume control and reversible (black/chrome) faceplate. Equalizer center frequency slide controls at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, ±12 dB boost or cut; frequency response 20-20,000 Hz; S/N 55 dB (low impedance), 65 dB (high impedance); input 2.5 V (low), 100-700 mV (high); input impedance 33 ohms (low), 56,000 ohms (high); 11-16 V negative ground; compatible with all radios and tape players and with high-impedance amplifiers; 1.5" H × 5.25" W × 1.375" D..... $108

## REALISTIC

### 12-1862 Autosound Amplifier/Equalizer
Unit combines 40-W power booster amplifier and seven-band equalizer with center frequency slide controls at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, ±12 dB boost or cut; features front-to-rear fader and two 10-segment LED power bar graph display; 12 V dc negative ground..... $80

### 12-1861 Autosound Amplifier/Equalizer
40-W power booster with built-in five-band graphic equalizer, ±12 dB boost or cut; has front-to-rear fader; 12 V dc negative ground..... $70
**12-1863.** Similar to 12-1861 minus fader control..... $50

### 12-1860 Autosound Amplifier
Power booster amplifier; output 12 W/ch; 12 V dc negative ground..... $28

## RECOTON

### SE50 Graphic Equalizer/Power Amplifier
Power amplifier/frequency equalizer features multiple speaker and defeat switches and power on/off with LED; amplifier output 15 W/ch continuous with 1.0% THD; frequency response 10-30,000 Hz −3 dB at 1000 Hz; five slide equalizer switches with center frequencies set at 50, 250, 1000, 3500, and 10,000 Hz, 12 dB boost or cut; 13.8 V dc..... $110

## SANYO

### PA6120 Biamp Stereo Power Booster
Trunk or under-seat mount biamplified stereo power booster delivers 120 W continuous total output power at 0.05% THD; biamp with two 50 W/ch continuous power woofer amps and two 10 W/ch continuous power tweeter amps; unit has motorized remote-control fader to adjust front/rear balance in four-speaker installations; dash-mount fader switch; auto power control; protective relay and five sec turn-on delay; power bandwidth 20-20,000 Hz; slew rate 70 V/μsec; 3" H × 4 7/16" W × 7 3/4" D.$280
**PA6060.** Same as PA6120 except 60 W continuous total output power..... $220
**PA6100.** Similar to PA6060 without biamp and motorized fader; 100 W continuous total output power into 4 ohms at 0.05% THD; 3" H × 7" W × 7 3/8" D..... $170
**PA6050.** Same as PA6100 except 50 W continuous total output power..... $150

### PA7000 Biamp Stereo Power Booster
Connects to auto stereo unit with 7.5 W or less output and delivers 56 W continuous total output power at 3% THD; 23 W/ch low-frequency amplifiers; 5 W/ch tweeter amp; designed for trunk or rear mounting; automatic turn on and off; separate underdash control unit for high and low frequency level controls with 20-ft cable; built-in 2000-Hz electronic crossover; power bandwidth 100-20,000 Hz; amp unit 3" H × 9" W × 7" D, control unit 1 1/2" H × 4 1/2" W × 2 1/2" D..... $60

### EQZ6400 Biamp Graphic Equalizer
Underdash biamplified seven-band stereo graphic equalizer combines four bands for woofer signal and three bands for tweeter signal with bass center frequencies set at 50, 150, 400, and 1000 Hz, ±12 dB and treble center frequencies set at 2500, 6000, and 15,000 Hz, ±12 dB; unit has built-in control for motorized faders in PA6060 and PA6120 amps; four LED bar graph bass/treble signal level meters; RCA line level inputs and multi-pin connector with switchable sensitivity; auto on/off power by car stereo; 2" H × 7 1/2" W × 5" D..... $110
**EQZ6200.** Similar to EQZ6400 without biamp and remote fader control; center frequencies set at 50, 150, 400, 1000, 2500, 6000, and 15,000 Hz, ±12 dB; equalizer defeat switch; audio muting switch reduces sound level 20 dB; LED left/right channel bar graph signal level meters; 2" H × 6 1/2" W × 4 3/4" D..... $80

## SOUND CONCEPTS

### AD1060 Concert Machine
Automotive delay system for use with car radio or tape deck; on/off switch; rear level and continuously-variable delay controls; delay control allows user to select a delay setting from 5 to 70 msec corresponding to sound path lengths of 5-70 ft; contains two 10-W amplifiers: 3" H × 7" W × 7" D..... $300
**1060RC.** Remote control for AD1060; allows Concert Machine to be installed in hidden location in vehicle; includes 12-ft cable..... $40

## SPARKOMATIC

### GE-1000 SPX™ Graphic Equalizer/Amp
Car unit combines seven-band graphic equalizer with 100-W amplifier. Equalizer has center-frequency slide controls at 60, 150, 400, 1000, 2400, 6000, and 15,000 Hz, ±12 dB boost or cut, and 12 tri-color LED level indicators/channel. Amp: features linear switch for amp linear frequency response, front-to-rear fader control, and protective relay circuit; output 50 W/ch continuous with 0.01% THD; frequency response 20-20,000 Hz; output impedance 4-8 ohms; 2 1/2" H × 7 1/2" W × 9 1/4" D..... $190

### GE-500 Graphic Equalizer/Booster
Car stereo booster amplifier produces visual response curve on illuminated screen; slide controls for five frequency bands (60 Hz, 250 Hz, 1000 Hz, 3.5 kHz, 10 kHz); front-to-rear fader control; power indicator light; audio by-pass switch; 20 W/ch continuous; frequency range 20-20,000 Hz; for use with all tape decks and radios, and speakers with power handling capability of 15 W or greater; 2" H × 6 3/16" W × 6 1/2" D..... $90

### LC-101 Power Amplifier
Full-spectrum car power amplifier; output 36 W continuous at 10.0% THD, 30 W continuous at 1.0% THD; frequency response 20-20,000 Hz; input impedance 27 ohms; output impedance 3 ohms; separate treble and bass boost slide levers; power level meter; for use with all tape decks and car radios; 1 3/4" H × 6 3/8" W × 5 1/2" D..... $50

## VISONIK

### AS1000 Car Power Amplifier
35 W/ch continuous, both channels driven into 4 ohms from 20-20,000 Hz ±0.25 dB with 0.25% THD; S/N 70 dB..... $300

### A-301 Car Power Amplifier
30 W/ch continuous into 4 ohms from 20-20,000 Hz with 0.25% dist.; includes two dc amplifier channels; oscillator-driven push-pull inverted circuit with ferrite-core power transformer; low-current remote turn-on feature; one-piece printed circuit board construction for all components and connectors; clamped power transistors to extruded heat sinks..... $150

### A-401 Power Amplifier
40 W/ch continuous, both channels driven into 4 ohms from 20-20,000 Hz with 0.2% THD; S/N 85 dB; accepts high- and low-level signal inputs; multi-ribbed heatsinks..... $128

### PA-1 Preamplifier Equalizer
Features bass, midrange, and treble controls; input selection for phono 1 and 2; volume and power on/off..... $130

### AS-2000 Auto-Sub™ Amplifier
Subwoofer amplifier; 60 W output below 160-Hz range; has bass equalization frequency (50-150 Hz) and 0 to +12 dB intensity controls and bass volume control; connects directly to speaker outputs of car radio, tape player, or car stereo/amp; complete subwoofer system when used with 6, 7, or 6 × 9-in woofers..... $100

## ZAPCO

### 150L Car Power Amplifier
Modular-designed low-distortion transformerless car power amplifier with separate high-efficiency switching power supply. Amp features double-sided mil-spec circuit boards and automatic turn-on with two-sec delay; output 150 W continuous total power from 35-20,000 Hz ±0.25 dB with 0.2% THD; slew rate 33 V/μsec; damping factor 600 into 4 ohms. Power supply contains toroid transformers with full r-f shielding and constructed of heavy cast aluminum; fully protected; operating power 730 mA (idle), 8 A (program). Amp: 3.25" H × 5.75" W × 5.25" D; supply 2.1" H × 7" W × 5.3" D..... $375
**150L with Energy Storage Module.** Same as 150L except energy storage is bought as plug-in module; output 165 W continuous total power from 16-20,000 Hz ±0.25 dB with 0.2% THD.... $440
**150LA.** Same as 150L except includes energy storage module; output 155 W continuous total power from 16-20,000 Hz ±0.25 dB with 0.08% THD..... $475
**PEX.** 12-dB/octave electronic crossover for bi amped 150L systems; provides 330 W total power with 6-dB extra headroom; supplied with 275-Hz crossover filter module..... $180

### PEQ Preamp/Equalizer
Mobile stereo preamplifier/nine-band octave graphic equalizer. Preamp: features adjustable input-stage gain (0-20 dB) with input overload LEDs; input clipping indicator; Allen-Bradley conductive plastic volume control; slew rate 13 V/μsec; dist 0.05% at 1 V rms into 5.1k-ohm load, 20,000 Hz; bandwidth 21.3-30,000 Hz; input-stage gain matches either high-level (3 V rms) or low-level (100 mV rms) output of any tape player. Equalizer: features separate left/right frequency slide controls at 50, 100, 200, 400, 800, 1600, 3200, 6400, and 12,800 Hz, ±18 dB boost or cut; low-Q filter of 1.4 for 1.28-octave bandwidth; 6-dB overall gain for high-output levels; output section has LED clipping detector and 22-dB muting switch; overload indicator threshold 1 dB of clipping; input impedance 47k ohms; output impedance 600 ohms. Die-cast aluminum case; includes heavy-gauge swivel bracket for underdash or above-surface mounting; 1 1/8" H × 8 3/4" W × 4 1/4" D..... $265

# 6 HEADPHONES

## AKG

### K-340 Stereo Headphones

Two-way stereo headphones incorporate electrostat-condenser, high-frequency transducers, dynamic

mid/low-frequency transducers, crossover, and five passive diaphragms in each circumaural earcup; frequency response 15-25,000 Hz; max. SPL 117 dB; matches 4-400 ohm output impedance; includes 9.8-ft coiled cable and standard stereo phone plug; 14 oz ..... $189

### K-240 Free-Field Headphones

Free-field stereo headphones; dynamic moving-coil transducer and six passive radiators in each circumaural cup; frequency response 16-20,000 Hz; 600 ohms ±20% impedance over 16-20,000 Hz; max. SPL 125 dB; supplied with 9.8-ft four-conductor cable and ¼-in phone plug; 10 oz ..... $89

### K-141 Monitor Headphones

Supra-aural stereo dynamic professional monitoring headphones with moving-coil transducers; frequency response 20-20,000 Hz; max. SPL 120 dB; matches 4-600 ohm output impedance; includes 9.8-ft four-conductor cable and standard three-conductor stereo phone plug; 9 oz ..... $69

### K-140S Stereo Headphones

Supra-aural stereo headphones with dynamic moving-coil transducers; frequency response 20-20,000 Hz; max. SPL 119 dB; 600 ohms ±20% impedance over 20-20,000 Hz; supplied with 9.8-ft four-conductor cable and ¼-in phone plug; 8 oz ..... $59

### K-40 Stereo Headphones

Ultra-lightweight supra-aural stereo headphones with dynamic moving-coil transducers; frequency response 30-18,000 Hz; max. SPL 117 dB; matches 4-200 ohm outputs; 9.8-ft four-conductor cable; three-conductor stereo phone plug; 4½ oz ..... $29

## AUDIO-TECHNICA U.S.

### ATH-7 Stereophones

Electret condenser stereophones; frequency response 20-22,000 Hz ±2 dB; sensitivity 98 dB SPL at 1 kHz (0 dB=0.002 μbar/V); impedance 4-16 ohms; includes impedance-matching adapter with headphone/speaker switching and normal/high-level LED indicators; 8¼-ft cord; adapter size 3½" H × 2⅜" W × 7" D; headset weight (less cord) 7.4 oz ..... $150

### ATH-6 Stereophones

Electret condenser stereophones; frequency response 40-22,000 Hz ±3 dB; sensitivity 98 dB SPL at 1 kHz; impedance 4-16 ohms; includes impedance-matching adapter with headphone/speaker switching; 8¼-ft cord; adapter size 1⅜" H × 3" W × 3⅜" D; headset weight (less cord) 7.4 oz ..... $100

### ATH-5 Stereophones

Dynamic moving-coil stereophones; frequency response 20-20,000 Hz; sensitivity 96 dB SPL at 1 kHz; impedance 4-16 ohms; 11½-ft cord; 7.25 oz. ..... $85

### ATH-3 Stereophones

Dynamic moving-coil stereophones; frequency response 25-20,000 Hz; sensitivity 94 dB SPL at 1 kHz; impedance 4-16 ohms; 11½-ft cord; 7.25 oz. ..... $65

### ATH-2 Stereophones

Dynamic planar moving-coil stereophones; frequency response 30-20,000 Hz; sensitivity 93 dB SPL at 1000 Hz; impedance 4-16 ohms; HD 0.7% max. at 110-dB SPL; 8.25-ft cord; 7 oz ..... $50

### ATH-1 Stereophones

Dynamic planar moving-coil stereophones; frequency response 30-20,000 Hz; sensitivity 93 dB SPL at 1 kHz; impedance 4-16 ohms; 6¼-ft cord; 4.75 oz ..... $30

## BEYER/DYNAMIC

### ET-1000-S Electrostatic Headphones

Electrostatic headphones; frequency response 10-25,000 Hz; sensitivity 100 dB SPL with 2 mV input; 4-8 ohm impedance; max. power 115 mV; comes with sintered bronze cover plates, 8-ft cord, and power supply capable of driving two sets of ET-1000 headphones ..... $279

**ET-1000.** Same as ET-1000-S without power suppy; 13 oz ..... $160

### DT-444S Wireless Infrared Headphones

Battery-powered headphones with ISS 76 infrared transmitter; frequency response 20-20,000 Hz; has separate volume controls/cup and stereo/mono switch; rechargeable NiCd batteries ..... $225

### DT-48 Dynamic Headphones

Moving-coil dynamic headphones; frequency response 16-20,000 Hz ±2 dB; supplied with 10-ft straight cord ..... $190

**DT-48K.** Same as DT-48 but with coiled cord ..... $195

### DT-480 Dynamic Headphones

Moving-coil dynamic headphones; frequency response 20-18,000 Hz; sensitivity 1 mW at 400 Hz for 115-dB SPL; impedance 5, 100, 400, and 2000 ohms; max input 1 W/phone ..... $115

### DT-100 Dynamic Headphones

Moving-coil dynamic headphones; frequency response 30-18,000 Hz; sensitivity 1 mW at 400 Hz for 110-dB SPL; impedance 5, 100, 400, and 2000 ohms; max. input 1 W/phone ..... $90

### DT-96 Dynamic Headphones

Moving-coil dynamic headphones; frequency response 30-17,000 Hz; sensitivity 1 mW at 400 Hz for 110-dB SPL; impedance 5-200 ohms; max. input 100 mW/phone; 5-ft cord; 8 oz ..... $75

### DT-440 Dynamic Headphones

Open high-velocity dynamic headphones with polyvinyl chloride diaphragm in Novodur housing; frequency response 20-20,000 Hz; sensitivity 1 mW for 100-dB SPL; impedance 600 ohms; chrome-plated finish ..... $65

**DT-441.** Similar to DT-440 but with different casing style; professional matte black finish ..... $75

### DT-220 Dynamic Headphones

Closed-ear dynamic headphones; frequency response 20-20,000 Hz; sensitivity 1 mW for 100 dB; 600-ohm impedance; max. input 42 mW (for 116-dB SPL); 260 g (without cable) ..... $60

### LKH-9 Pillow Phone

Frequency response 30-20,000 Hz; supplied with ¼-in jack for audio and mini plug for private TV or radio listening; matched carrying bag for storage ..... $35

### DT-302 Lightweight Headphones

Open-air high velocity dynamic headphones connect directly to high- or low-impedance outputs; frequency response 20-20,000 Hz; rated power 7 mW (2.1 V) for 600 ohms; sponge ear cushions; stereo phone jack plug; 2.3 oz (without cord) ..... $30

### DT-109 Moving-Coil Mic/Headphone

Lightweight moving-coil stereo headphones with

# 6 HEADPHONES

cardioid broadcast-quality moving-coil microphone; SPL 120 dB; left and right channels may be independently wired; removable ear cushions; high-impact plastic and stainless steel construction; field serviceable ..... $106

**DT-108 Moving-Coil Mic/Headphone**
Moving-coil stereo headphones with noise-cancelling microphone; frequency response 40-12,000 Hz; SPL 120 dB; mic rotates 180 degrees; foam-filled ear cushions and padded headband; field serviceable ..... $90

## BURWEN RESEARCH

**PMB 8 Orthodynamic Headphones**
Around-the-ear style with leatherette foam ear cushions; max. SPL 112 dB (1 kHz); 150-ohm impedance; max. input 2 W; sensitivity 130 mW for 100-dB SPL (1 kHz); 0.3% THD at 100-dB SPL (1 kHz); frequency response 15-26,000 Hz; has 10-ft cord; 12 oz ..... $115

**PMB 6 Orthodynamic Headphones**
On-the-ear style with leatherette foam ear cushions; max. SPL 121 dB (1 kHz); 140-ohm impedance; max. input 2 W; sensitivity 7 mW for 100-dB SPL (1 kHz); 0.3% THD at 100-dB SPL (1 kHz); frequency response 16-23,000 Hz; has 10-ft cord; 9 oz... $95

**PMB 4 Dynamic Headphones**
Around-the-ear style with leatherette foam ear cushions; max. SPL 114 dB (1 kHz); 400-ohm impedance; max. input 0.1 W; sensitivity 4 mW for 100-dB SPL (1 kHz); 0.3% THD at 100-dB SPL (1 kHz); frequency response 20-20,000 Hz; has 10-ft cord; 7.5 oz ..... $85

**PMB 40 Dynamic Headphones**
On-the-ear style with reticulated foam ear cushions; max. SPL 128 dB (1 kHz); 400-ohm impedance; max. input 0.1 W; sensitivity 0.2 mW for 100-dB SPL (1 kHz); 0.3% THD at 100-dB SPL (1 kHz); frequency response 20-20,000 Hz; has 10-ft cord; 7.5 oz ..... $70

**PMB 20 Dynamic Headphones**
On-the-ear style with reticulated foam ear cushions; max. SPL 118 dB (1 kHz); 400-ohm impedance; max. input 0.1 W; sensitivity 2 mW for 100-dB SPL (1 kHz); 0.3% THD at 100-dB SPL (1 kHz); frequency response 20-20,000 Hz; has 10-ft cord; 3.9 oz ..... $50

## CONCEPT

**CEH Stereo Headphones**
Orthodynamic stereo headphones; frequency response 20-25,000 Hz; impedance 150 ohms; sensitivity 96 dB SPL/mW; max. input 3 W; THD 0.25% at 95-dB SPL; includes 12-ft flat and coiled cords; 10.5 oz ..... $85

## ERCONA

**D-42 Headphones**
Dynamic stereo/mono headphones; supplied with detachable, washable soft rubber ear cushions; frequency response 30-20,000 Hz; output impedance 2 × 200 ohms (stereo), 100 or 400 ohms (mono); power/voltage at normal listening 0.3 mW/0.25 V; 100-dB SPL with 0.3 mW input; 5 mW max. power with 2% dist.; supplied with 6-ft unterminated 2 × 2 cable; 9.5 oz ..... $50

**RDF-224 Dynamic Headphones**
Dynamic stereo/mono headphones; removable soft-foam-padded vinyl ear cushions; supplied with 8-ft coiled cable and three-conductor phone plug; frequency response 20-18,000 Hz; output impedance 8 ohms ±20% (1 kHz); output level 100 dB (1 kHz); max. input 100 mW; 12 oz ..... $30

## GC ELECTRONICS

**90-108 Stereo Headphones**
Lightweight open-air stereo headphones with combined condenser/dynamic element traits; has 39-mm Mylar diaphragm; frequency response 20-20,000 Hz; sensitivity 98 dB/1 mW; impedance 4-16 ohms; 6-ft straight cord with 1/4-in stereo phone plug; 7.5 oz ..... $35

**90-106 Stereo Headphones**
Open-air stereo headphones with ultra-thin, high-velocity 37.5-mm Mylar diaphragm; frequency response 20-20,000 Hz; sensitivity 100 dB/1 V; impedance 4-16 ohms; lightweight double headband; 6-ft straight cord with 1/4-in stereo phone plug ..... $18

**90-104 Stereo Headphones**
Dynamic stereo headphones with 3-in element; frequency response 30-18,000 Hz; impedance 4-8 ohms; separate tone and volume slide controls/cup; adjustable padded headset; 10-ft coiled cord with 1/4-in phone plug ..... $16
**90-102.** Similar to 90-104 except lightweight version minus tone controls; has stereo/mono switch ..... $13

## INFINITY

**ES-1 Electrostatic Headphone System**
Includes electrostatic push-pull headphones and adaptor incorporating power supply and matching transformers. Headphones: features low-mass Polyurethin™ diaphragm; max. input 50 W at 100 Hz; max. output 118 dB SPL at 1000 Hz; sensitivity 98 dB SPL at 2 V in, 1000 Hz; frequency response 20-25,000 Hz ±2 dB; THD 0.3% at 100-dB SPL; source impedance 4-16 ohms; adjustable (11.5-13.5 in) padded band with padded earcups; 98-in cord; 9 oz. Adaptor: features front-panel output connectors (will accommodate two headsets), headphone/speaker switching (headphones remain connected), and power supply protection circuit and reset button; power supply connected between amp and speakers; walnut-enclosed; includes 33.5-in input cord and 67-in ac cord; 3" H × 5.25" W × 7.25" D ..... $275

## JVC

**HM-200E Headphone/Microphone**
Designed for binaural recording and monitoring; matched electret condenser mike with simulated auricle in each earpiece; mikes powered by AA cells contained in earpieces; three-way headphone level selector; mike tone selector; supplied with dummy head for off-the-operator recording. Mikes: sensitivity −67 dB ±2 dB; output impedance 600 ohms; S/N 45 dB; frequency response 50-10,000 Hz ±10 dB. Headphone: 8-ohm impedance; 96-dB sensitivity; frequency response 50-10,000 Hz; 2-m cord with two phone-type mike plugs and stereo-type headphone plug; mike stand screw sockets (5/16", 3/8", 5/8", PF 1/2", 1/4"); 1.32 lb. ..... $100
**BN-5.** Biphonic processor for HM-200E; processes binaural sources through stereo speaker..... $280

## KOSS

**ESP/10 Electrostatic Stereophones**
Electrostatic circumaural design with energizer. Headset bandpass response 20-22,000 Hz ±2 dB; sensitivity for 100-dB SPL 1.9 V rms at 1 kHz into E/10 energizer, 2.0 V rms pink noise; THD at 1 kHz and 100 dB SPL 0.38%; radiating surface area of electrostatic element 25 cm²/ch; black with silver accents; includes 10-ft cord. Energizer bandpass response 3 dB down at 15 Hz and 24 kHz; hum and noise 75 dB below sensitivity reference level (100

dB SPL); phase response at 20 Hz ±30 degrees, at 15 kHz −30 degrees; input impedance 3 ohms min. at 20 Hz and 20 kHz, 180 ohms max. at 800 Hz; min. recommended amp power 35 W/ch; overload voltage (for relay cut-out) 5.3 V rms pink noise into energizer; semi-peak-reading VU meters; LED overload indicators; automatic overload detector; wood-grain trim ..... $300

**PRO/4AAA Dynamic Stereophones**
Frequency response 10-22,000 Hz; dist. less than 0.5% at 1 kHz, 100-dB SPL; sensitivity 0.7 V rms sine wave at 1000 Hz, 0.24 V rms pink noise; impedance 220 ohms at 1 kHz; features Pneumalite ear cushions for noise isolation; 10-ft coiled cord; 15.5 oz ..... $85

**TECH/VFR Stereophones**
Dynamic stereo headphones with variable-frequency-response controls; slide-type controls at base of each earcup permit fine tuning of shape of response curve; frequency response 10-22,000 Hz; THD 0.3% at 1 kHz (100-dB SPL); sensitivity for 100-dB SPL 0.6 V rms sine wave at 1000 Hz, 0.275 V rms pink noise; nominal impedance 245 ohms at 1000 Hz; features Pneumalite ear cushions to exclude outside sounds; wide vinyl headband with self-adjusting yoke; black and chrome; equipped with boom microphone mount for professional applications; 4-conductor coiled cord; 16.8 oz (less cord) ..... $80

**HV/XLC Stereophones**
Lightweight high-velocity stereophones; frequency response 15-35,000 Hz; sensitivity for 100-dB SPL 1.0 V rms sine wave at 1000 Hz, 0.7 V rms pink noise; impedance 85 ohms at 1000 Hz; features separate volume and balance controls/cup; variable density contoured circumaural earcushions with twist lock mechanism for easy removal; 10-ft coiled cord; 8.4 oz less cord ..... $80
**HV/X.** Same as HV/XLC without volume and balance controls; impedance 90 ohms at 1000 Hz; 7.7 oz less cord ..... $70

**TECH/2 Stereophones**
Dynamic stereo headphones with 2-in polyester driver elements; frequency response 10-22,000 Hz; nominal impedance 245 ohms at 1000 Hz; sensitivity for 100-dB SPL 0.7 V rms sine wave at 1000 Hz, 0.3 V rms pink noise; THD 0.3% at 1000 Hz, 100 dB SPL; adjustable cushioned vinyl headband with adjustable stainless-steel yokes and slidebars and Pneumalite ear cushions; includes 10-ft coiled cord; 15.9 oz less cord ..... $60

**K/145 Dynamic Stereophones**
Slimline dynamic stereophones with 1.5-in polyester driver; frequency response 20-20,000 Hz; impedance 87 ohms at 1 kHz; sensitivity at 100-dB SPL 0.25 V rms sine wave at 1 kHz, 0.10 V rms pink noise; THD 0.5% at 1 kHz for 100-dB SPL; volume balance controls; Pneumalite ear cushions; padded simulated leather earcups, adjustable brushed stainless-steel yokes and slidebars; 10-ft coiled Y cord; molded plug; weight (less cord) 13.6 oz ..... $55
**K/135.** Similar to K/145 except has 2.5-in dynamic elements; response 10-18,000 Hz; impedance 98 ohms at 1 kHz; sensitivity at 100-dB SPL 0.09 V rms sine wave, 0.11 V rms pink noise; THD 1% at 1 kHz for 100-dB SPL; weight (less cord) 13.4 oz ..... $40

# FREE INFORMATION SERVICE

Here's an easy and convenient way for you to get additional information about products advertised in this issue. Just follow the directions below...and the literature will be sent to you free of charge from the manufacturer.

**a** Tear out one of the perforated postage-free cards. Please print or type your name and address where indicated. *Use only one card per person.*

**b** Circle the numbers on the card that correspond to the key numbers at the bottom of the advertisement that interests you. (Key numbers for advertised products also appear in the Advertiser's Index.)

**c** To order a subscription to STEREO REVIEW at current low introductory rates, simply check the appropriate box on the card.

**d** Simply mail the card. No postage is required.

**e** This address is for our "Free Information Service" only. All other inquiries are to be directed to Tape Recording & Buying Guide, One Park Ave., New York, N.Y. 10016.

Use only one card per person. (Void after Mar. 27, 1981)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | | | | | |

TR813

4 ☐ Please send me 12 issues of STEREO REVIEW for $4.99 and bill me.
(Full subscription price, $9.98)

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

(zip code must be included to insure delivery)

Use only one card per person. (Void after Mar. 27, 1981)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | | | | | |

TR812

4 ☐ Please send me 12 issues of STEREO REVIEW for $4.99 and bill me.
(Full subscription price, $9.98)

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

(zip code must be included to insure delivery)

Use only one card per person. (Void after Mar. 27, 1981)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | | | | | |

TR811

4 ☐ Please send me 12 issues of STEREO REVIEW for $4.99 and bill me.
(Full subscription price, $9.98)

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

(zip code must be included to insure delivery)

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 217 CLINTON, IA.

POSTAGE WILL BE PAID BY—

**1981 TAPE RECORDING & BUYING GUIDE**
P.O. BOX 2910
CLINTON, IA. 52735

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 217 CLINTON, IA.

POSTAGE WILL BE PAID BY—

**1981 TAPE RECORDING & BUYING GUIDE**
P.O. BOX 2910
CLINTON, IA. 52735

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 217 CLINTON, IA.

POSTAGE WILL BE PAID BY—

**1981 TAPE RECORDING & BUYING GUIDE**
P.O. BOX 2910
CLINTON, IA. 52735

**HV/1A Stereophones**
High-velocity stereophones with low-mass "Decilite" driver elements for 15-30,000 Hz coverage; will operate from outputs of 3.2 to 600 ohms; dist. 0.5% at 100-dB SPL; sensitivity 0.9 V rms for 100-dB SPL, will handle 5 V rms continuous with provision for 14-dB SPL transient peaks; 157-ohm impedance; acoustical sponge ear cushions; extendable headband with self-adjusting, pivoting yokes and soft padded vinyl cover; 3-conductor coiled cord (10-ft extended); 10.1 oz..... $50
**HV1LC.** Same as HV/1A except volume/balance control per earcup; sensitivity 1.1 V rms for 100-dB SPL; impedance 132.5 ohms; 10.8 oz..... $60

**HV/1 Dynamic Stereophones**
High-velocity stereophones with 2-in dia. drivers; operates from 3.2 to 600 ohm outputs; response 20-20,000 Hz; sensitivity 0.8 V rms for 100-dB SPL; impedance 168 ohms; capacity 5 V continuous with provision for 14-dB SPL transient peaks; 10.1 oz; 10-ft coiled cord ..... $50

**KO/727B Dynamic Stereophones**
Frequency response 10-18,000 Hz; THD 1.0% at 100-dB SPL; sensitivity 0.08 V rms for 100-dB SPL; 100-ohm impedance; 10-ft coiled cord; 16.5 oz; black ..... $40

**K/6ALC Dynamic Stereophones**
Frequency response 10-16,000 Hz; THD less than 1% at 1 kHz, 100-dB SPL; sensitivity 0.14 V rms for 100-dB SPL; impedance 100 ohms at 1 kHz; individual volume controls; supplied with 10-ft coiled cord; 14 oz..... $40
**K/6A.** Same as K/6ALC but without volume controls; sensitivity 0.15 V rms for 100-dB SPL..... $30

## MURA

**SP-205 Headphones**
Dynamic stereo headphones with Mylar cone elements; features separate volume and tone controls on each earcup and stereo/mono switch; frequency response 30-20,000 Hz ±5 dB; impedance 8 ohms; adjustable padded headband with cushioned earcups; 15-ft coiled cord with plug..... $63

**HB-1500 Headphones**
Open-air stereo headphones with high-polymer diaphragm drivers; max. input 0.1 W; sensitivity 100 dB SPL at 1 mW; frequency response 18-22,000 Hz; impedance 8 ohms; 10-ft coiled cord with plug; 4 oz ..... $60

**SP-504 Headphones**
Stereo headphones with 3-in dynamic drivers; features separate volume and tone slide controls on each earcup and stereo/mono switch; frequency response 20-18,000 Hz; impedance 8 ohms; adjustable padded headband; 10-ft coiled cord with plug. ..... $30
**SP-502.** Similar to SP-504 less tone controls; frequency response 30-18,000 Hz ..... $20

**SP-94 Headphones**
Lightweight dynamic stereo headphones with 2.25-in drivers; frequency response 35-15,000 Hz; impedance 8 ohms; 8-ft cord with plug..... $10

## PANASONIC

**EAH-520 Headphones**
Duo-cone headphone system; high efficiency; lightweight; separate bass and treble controls; adjustable head cushion; high-velocity design; 10-ft coiled fine cord; bronze and chrome ..... $65
**EAH-510.** Similar to EAH-520 except straight line cord; black and chrome ..... $55

**EAH-T70 Headphones**
High-efficiency high-velocity lightweight headphones; adjustable cushioned headband with click stop control; brown and chrome; 10-ft straight line cord..... $55
**EAH-T40.** Similar to EAH-T70 without click stop control..... $35

## PICKERING

**OA-7 Headphones**
Lightweight open-audio design; REE used in permanent magnet compound; foam-cushioned headband; earpiece yokes incorporate pivoting system enabling snug fit; nominal input impedance 100 ohms; frequency response 20-22,000 Hz ±5 dB; sensitivity 110-dB SPL at 0.2 V; max. input 0.1 W continuous; dist. 0.5% at 110-dB SPL; supplied with flat 10-ft cord; 6 oz ..... $70

**OA-5A Headphones**
Lightweight open-audio stereo headphones with 1.5-in samarium cobalt dynamic drivers; input impedance 100 ohms ±10% at 1000 Hz; max. input 0.25 W/ch continuous; sensitivity 110 dB SPL at 0.2 V in, 1000 Hz/ch; frequency response 20-22,000 Hz; dist. 0.25% at 110-dB SPL; adjustable padded vinyl headband with pivot yokes and nylon tricot-covered foam ear cushions; 10-ft 4-conductor cord with no-break connector; includes adapter plug for use with portable radios, TVs, and tape recorders; 5 oz less cord ..... $60

**OA-3A Headphones**
Lightweight open-audio design; 15 ohms ±10% at 1 kHz; input 0.2 W/channel continuous; sensitivity 100 dB SPL at 0.10 V input at 1 kHz for each channel; frequency response 20-20,000 Hz; dist. less than 0.5% at 110 dB SPL; comes with extended-adjustable headband with pivot yokes and padded vinyl cover; 10-ft four-conductor cord with molded no-break connector; 8.5 oz..... $45

## PIONEER

**SE-700 Stereo Headphones**
Features high-polymer driver elements; frequency range 20-20,000 Hz; matching impedance 4 to 16 ohms; sensitivity 100 dB/3 V ..... $100

**Monitor 10 Stereo Headphones**
Dynamic type covering a frequency range of 20-20,000 Hz, with 2¼-in free-edged polyester-film cone speaker in each earpiece; sensitivity 100 dB/mW; max. input power 700 mW/ch; comes with 16-ft, 5-in coiled cord; 23 oz ..... $80

**SE-505 Headphones**
Two-way stereo dynamic design with a woofer and tweeter in each phone; 8 ohms each channel; response 20-20,000 Hz; sensitivity 108 dB/0.3 V; features both tone and volume controls on each phone; max. input 500 mW each phone; 16-ft coiled cord ..... $75

**SE-6 Stereo Headphones**
Dynamic open-air stereo headphones with samarium cobalt magnets in 25-micron polyester film dome diaphragms; 150-ohm impedance; sensitivity 102 dB/mW at 1000 Hz; max. input 200 mW/ch; response 20-20,000 Hz; includes 9 ft, 5-in cord and Y-type cord with ¼-in short plug; 8.8 oz .... $70

**SE-405 Stereo Headphones**
Dynamic type covering a frequency range of 20-20,000 Hz; 8-ohm impedance; input power 500 mW each channel; unit features polyester-film diaphragm; special earpads with sliding-type adjusting headband and clickstops for easy listening; volume controls for both left and right channels; 16½-ft coiled cord ..... $55

**SE-4 Hear-Through Headphones**
Features super-thin polyester film dome drivers; frequency range 20-20,000 Hz; hear-through earpads; impedance 250 ohms; sensitivity 96 dB/mW (1000 Hz); max. input power 200 mW/channel; comes with 9-ft, 5-in Y-type cord; weight 7⅗ oz without cord, 9⅕ oz with..... $50

**SE-305 Stereo Headphones**
Dynamic type covering a frequency range of 20-20,000 Hz; 8-ohm impedance each channel; matching impedance 4 to 16 ohms; max. input power 500 mW each channel; comes with 16-ft, 5-in coiled cord; 15 oz..... $45

**SE-2 Stereo Headphones**
Dynamic stereo headphones feature ferrite magnetic circuits in 25-micron polyester film dome diaphragms; 150-ohm impedance; sensitivity 99 dB/mW at 1000 Hz; max. input 200 mW/ch; frequency response 20-20,000 Hz; includes 8 ft, 2 in cord and Y-type cord with ¼-in plug; 9 oz ..... $30

**SE-205 Stereo Headphones**
Dynamic type covering a frequency range of 20-20,000 Hz; cone-type speaker in each earpiece; matching impedance 4 to 16 ohms; max. input power 500 mW each channel; comes with 8.2-ft cable; 16 oz..... $30

## QUADRAFLEX

**Q45 Stereo Headphones**
Dynamic stereo headphones; frequency response 20-20,000 Hz ±2 dB; 80-ohm impedance; sensitivity 95 dB SPL/1mW; max. input 1800 mV; THD 1.0% at 95 dB SPL; includes 10-ft coiled cord; 10 oz..... $55

**Q25 Stereo Headphones**
Dynamic stereo headphones; frequency response 20-18,500 Hz ±3.5 dB; impedance 34.5 ohms; sensitivity 96 dB SPL/mW; max. input 1250 mV; THD 2.0%; includes 10-ft coiled cord; 10 oz. .. $30

**Q12 Stereo Headphones**
Dynamic stereo headphones; frequency response 50-14,000 Hz ±4 dB; impedance 50 ohms; sensitivity 90 dB SPL/mW; max. input 850 mV; THD 2.5%; includes 10-ft coiled cord; 8 oz. ..... $18

## REALISTIC

**PRO-IIA Stereo Headphones**
Professional headphones with 12 sq in mylar diaphragm speakers and 1-in voice coils; adjustable padded headband with air-filled ear cushions; frequency response 10-22,000 Hz; comes with 10-ft coiled cord and standard ¼-in plug; 4-16 ohms impedance; 19 oz ..... $50

**LV-10 Stereo Headphones**
High-velocity vented back headphones with 2-in dynamic elements; frequency response 20-20,000 Hz; dist. 0.5%; 4-16 ohm impedance; acoustic foam earpieces and soft vinyl-covered headband with self-adjusting yokes; 10-ft coiled cord and plug ..... $45

**PRO-30 Stereo Headphones**
Lightweight uniform-phase stereo headphones with low-mass planar driver and rare-earth magnets; lightweight coiled cord ..... $40

**NOVA-PRO Stereo Headphones**
High-acoustic-isolation stereo headphones with low-mass polyester drivers; volume controls on each earcup; frequency response 20-20,000 Hz; 4-16 ohm impedance; cushioned headband; 10-ft coiled cord..... $37

**PRO-20 Stereo Headphones**
Low-angle dynamic drivers; frequency response 20-16,000 Hz; 4-16 ohm impedance; snap-fit padded headband with foam vinyl earcushions; 10-ft coiled cord ..... $30

**NOVA-40 Stereo Headphones**
3½-in dynamic drivers; frequency response 30-18,000 Hz; 4- to 16-ohm impedance; soft cushion earcups; padded adjustable headband; 10-ft coiled cord and ¼-in plug..... $25

**NOVA-10 Stereo Headphones**
High-efficiency 2-in speakers; adjustable vinyl headband with cushioned earpads; frequency re-

# 6 HEADPHONES

sponse 50-15,000 Hz; has 10-ft cord and 1/4-in plug ..... $15
**NOVA-16.** Similar to NOVA-10 except has separate Glide Path® level controls ..... $20

## RECOTON

### ST-33 Stereo Headphones
High-velocity stereo headphones with super thin diaphragms; leather adjustable headband; frequency response 20-20,000 Hz; 50-ohm impedance; 4-150 ohms matching impedance; sensitivity 103 dB at 1000 Hz; max. input 20 mW; 10-ft coiled cord with stereo phone plug; 5 oz ..... $37

### ST-22 Stereo Headphones
Dynamic stereo headphones; all aluminum ear cases; leathery-soft ear cushions and headband; volume control for each channel; frequency response 20-22,000 Hz; 8-ohm impedance; 4-16 ohms matching impedance; sensitivity 110 dB at 1000 Hz with 1 mW; max. input 0.5 W; 3-in dynamic speakers; 10-ft coiled cord with stereo phone plug ..... $30

### ST-16 Stereo Headphones
Volume control for each channel; stereo-mono slide switch; frequency response 20-18,000 Hz; 8-ohm impedance; soft adjustable padded headband; soft ear cushions; 10-ft coiled cord with stereo phone plug ..... $20

## SANSUI

### SS-40 Headphones
Thin polyester 2 1/4-in wide dynamic drivers; frequency response 20-20,000 Hz; 25-ohm impedance; max. input 500 mW; sensitivity 108 dB/mW; 6.6-ft cord; 13.1 oz ..... $42

### SS-30 Headphones
Thin polyester 2 1/4-in wide dynamic cones; frequency response 20-20,000 Hz; max. input 500 mW; 8-ohm impedance; 11.5 oz ..... $30

## SENNHEISER

### HD 224 Headphones
Dynamic stereo headphones; frequency response 16-20,000 Hz; SPL 94 dB at 1 mW; THD 1.0%; 200-ohm nominal impedance; double-walled circumaural foam earpads; includes steel-stranded detachable 3000-mm cable; 252 g ..... $144

### HD 430 Headphones
"Open-aire" design dynamic headphones; frequency response 16-20,000 Hz; sensitivity 94 dB with 1 mW input, nominal SPL at 1000 Hz; HD 0.5%; impedance 600 ohms/ch; padded earpad rims and adjustable suspension strap; includes 10-ft cable; 7 oz ..... $126

### HD 424 Headphones
Deluxe "open-aire" design dynamic headphones; frequency response 15-20,000 Hz; sensitivity 17.7 μbar/V; 1 mW (1.41 V) per channel for SPL of 102 dB; dist. 1% at 22 V, 1 kHz; 2000-ohm impedance per channel; removable head and ear cushions; 10-ft cable; 6.5 oz (without cable) ..... $115

### HD 420 Headphones
"Open-aire" design dynamic headphones; frequency response 18-20,000 Hz; sensitivity 94 dB with 1 mW input, nominal SPL at 1000 Hz; HD 1.0%; impedance 600 ohms/ch; adjustable suspension strap and cushioned earpads; includes 10-ft cable; 4 oz ..... $89

### HD 414 Headphones
"Open-aire" design dynamic headphones; frequency response 20-20,000 Hz; sensitivity 17.7 μbar/V; 1 mW (1.41 V) per channel for SPL of 102 dB; dist. 1% at 22 V, 1 kHz; 2000-ohm impedance per channel; 10-ft cable; 5 oz (without cable) .. $79

### HD 400 Headphones
"Open-aire" design dynamic headphones; frequency response 20-18,000 Hz; sensitivity 1 mW for SPL of 88 dB; 600-ohm impedance per channel; 10-ft cable; 3 oz (without cable) ..... $46

## SIGNET DIVISION, A.T.U.S., INC.

### TK33 Stereophones
Dipolar electret condenser stereophones with power adapter. Stereophones feature high-compliance film moving diaphragm 45 mm diameter and 2 microns thick; suede-finish inner headband construction and pivotal porous vinyl ear pads. Passive impedance matching transformer adapter features stereophone/speaker operation and hi/lo stereophone sensitivity switches; two dual-color LED arrays in groups of six, first four indicating medium-to-loud normal reproduction and last two indicating high level peaks; no external power required; can accommodate two headsets. Frequency response 20-22,000 Hz ±2 dB; sensitivity 100 dB at 1 V, 1000 Hz; THD 0.1% at 110-dB SPL; matching impedance 4-16 ohms; includes 8.2-ft cord with special plug and 3.9-ft adapter cable with four-conductor plug. Stereophone 9.7 oz with cord; adapter 4 lbs; adapter 5.5" H × 2.4" W × 8.7" D ..... $250
**TK33S.** Additional stereophone only for TK33. $100

### TK22 Stereophones
Moving-coil dynamic stereophones feature high-compliance polyester dome diaphragm 20 microns thick and 45 mm diameter with 40-micron self-supporting silver/copper voice coil and FXD magnet; full-swivel foam earpieces and soft suede-finish inner headband; frequency response 20-20,000 Hz; sensitivity 96 dB at 1 mW, 1000 Hz; THD 0.4% at 110-dB SPL; matching impedance 4-16 ohms; includes 11 1/2-ft cord with plug; 9.2 oz with cord. $80

## SONY

### ECR-500 Electrostatic Headphones
Uni-electret open-back electrostatic stereo headphones with asymmetrical pentagon-shaped diaphragm; frequency response 20-20,000 Hz; sensitivity 91-dB SPL at 1 V rms (600 Hz); max. 114-dB SPL; HD less than 0.03% at 4 V rms, 1000 Hz in; lightweight construction; adjustable headband; push-pull driver system; includes adaptor with 30-ohm input impedance and 12-V max. input level; 3 1/8" H × 3 7/8" W × 7 5/8" D; cable 7 ft, 6 in; weight 12 oz ..... $120

### Z Series Stereo Headphones
Stereo headphones feature lightweight palladium-coated construction, uniform piston action across diaphragm surface, 30-mm diameter voice coils, magnets with copper-coated yoke and thin copper-clad aluminum wire, litz wire, and SBMC grille material; 110-ohm impedance; sensitivity 104 dB/mW; 50-mW rated input; include 2-m cord.
**DR-Z7.** Frequency response 20-25,000 Hz; THD 0.03% at 1000 Hz, 93 dB SPL; 420 g with cord .... $100
**DR-Z6.** Similar to DR-Z7 except 400 g ..... $85
**DR-Z5.** Similar to DR-Z6 except frequency response 20-22,000 Hz; THD 0.1%; 360 g ..... $70

### MDR Series Headphones
Ultra lightweight open-air stereo headphones with samarium cobalt magnets, high-excursion driver elements, oxygen-free litz wire cables, and minimal headband pressure.
**MDR-7.** Frequency response 16-22,000 Hz; sensitivity 101 dB/mW; impedance 55 ohms; 55 g less cable ..... $80
**MDR-5A.** Frequency response 18-22,000 Hz; sensitivity 98 dB/mW; impedance 32 ohms; 50 g less cable ..... $65
**MDR-3.** Frequency response 20-20,000 Hz; sensitivity 96 dB/mW; impedance 32 ohms; 40 g less cable ..... $50
**MDR-2.** Similar to MDR-3 ..... $40

### S Series Stereo Headphones
Stereo headphones feature 70-mm speaker, vinyl ear enclosures, rugged housing, and long curled cord; impedance 14 ohms; sensitivity 102 dB/mW; 100-mW rated input; frequency response 20-20,000 Hz; 3-m curled cord.
**DR-S5.** Volume and tone controls; 385 g ..... $50
**DR-S4.** Volume control; 375 g ..... $40
**DR-S3.** 350 g; no volume or tone control ..... $30

### DR-2 Stereo Headphones
Impedance 10 ohms; sensitivity 104 dB/mW; rated input 100 mW; frequency response 20-20,000 Hz; 2-m cord; 300 g ..... $22

## STANTON

### Stereo/Wafers XXI Headphones
Ultra-lightweight professional-standard headphone; frequency response 20-22,000 Hz ±4 dB; sensitivity 2 V for 100 dB SPL; max. power input 0.1 W continuous; dist. 0.5% at 200-dB SPL; 100-ohm impedance at 1 kHz; brushed blue denim finish; supplied with 10-ft flat cord with heavy-duty plug; 5.9 oz ..... $70

### Dynaphase 55 Headphones
Lightweight open-audio stereo headphones with 1.5-in samarium cobalt dynamic drivers; input impedance 100 ohms ±10% at 1000 Hz; max. input 0.25 W/ch continuous; sensitivity 110 dB SPL at 0.2 V in, 1000 Hz/ch; frequency response 20-22,000 Hz; dist. 0.25% at 110-dB SPL at 1000 Hz; adjustable padded-vinyl headband with pivot yokes and nylon tricot-covered foam ear cushions; 10-ft 4-conductor cord with no-break connector; includes adapter plug for use with portable radios and tape recorders; 5.5 oz less cord ..... $60

### Dynaphase 35 Headphones
Dynamic headphones with open-audio construction and 1 1/2-in Mylar diaphragm; 15-ohm impedance; frequency response 20-20,000 Hz; sensitivity 0.1 V for 100-dB SPL at 1 kHz; 0.5% dist. at 110-dB SPL; max. input 0.2 W/channel continuous; extend-adjustable headband with pivot yokes, padded vinyl cover, and vinyl-covered foam cushions; supplied with 10-ft cord and molded connector; 7 oz (less cord) ..... $45

## STUDER/REVOX

### RH 310 Stereo Headphones
Open-type lightweight headphones designed for amplifiers rated for 4-600 ohm load impedances; frequency range 20-20,000 Hz ..... $80

## SUPEREX

### PEP-81 Electrostatic System
Consists of PEP-81 headphones and CC-81 control console; headphone frequency response 15-18,000 Hz ±2 dB, 10-22,000 Hz ±5 dB; dist. 0.2%; impedance-matched to CC-81 for 4-16 ohms; isolation-type headphones with fully adjustable vinyl-covered headband and foam cushions and 15-ft coiled cord; control console has level controls for both channels (20-dB range), speaker/phone rocker, on/off switch; can accommodate two sets of headphones; requires 5 W per channel min. drive; console size 11" × 3 1/4" × 6 1/2" ..... $150

### PEP-79E Electrostatic System
Consists of PEP-74 headphones and CC-79E control console; headphone frequency response 15-18,000 Hz ±2 dB, 10-22,000 Hz ±5 dB; negligible dist.; impedance-matched to CC-79E for 4-16

ohms; trans-air lightweight headphones with fully adjustable vinyl-covered headband and foam cushions and 15-ft coiled cord; control console is designed for use with main amp level controls, has self-protecting circuits; console size 2½" H × 7" W × 4" D ..... $90

**SM-700 Headphones**
Dynamic headphones with 2¾-in Mylar diaphragm; 35-ohm impedance; frequency response 10-20,000 Hz ±3 dB; sensitivity 10 mW (0.6 V) for 110 dB at 400 Hz; 0.25% dist. at 400 Hz, 110-dB SPL; padded, fully adjustable steel and aluminum headband with foam-filled vinyl cushions; supplied with 15-ft cable, clothing clip, and molded stereo plug; 10 oz (less cable) ..... $70

**PRO B VI Stereophones**
Each earcup features dynamic woofer, ceramic tweeter, and L/C crossover; impedance 4-16 ohms; frequency response 15-22,000 Hz; fully adjustable, vinyl-covered and padded spring steel headband with vinyl covered urethane foam cushions; supplied with 10-ft coil cord with molded stereo plug ..... $60

**Classic CL-1 Headphones**
Lightweight, isolating-type headphones; frequency response 10-20,000 Hz; 35 ohm impedance; 0.3% dist. at 110-dB SPL (400 Hz); sensitivity 10 mW (0.6 V) for 110-dB SPL at 400 Hz; padded fully adjustable steel and aluminum headband with foam-filled vinyl cushions; 15-ft (extended) retractable cable with clothing clip and molded stereo plug; 10.6 oz (without cable) ..... $60

**TRL-99 Headphones**
Dynamic headphones with 2¾-in Mylar diaphragm; 35-ohm impedance; frequency response 15-20,000 Hz ±4 dB; sensitivity 6 mW for 100-dB SPL; 0.4% dist. at 400 Hz, 110-dB SPL; padded, fully adjustable, aluminum and steel headband with fabric-faced, foam-filled cushions; supplied with 15-ft cable, clothing clip, molded plug, and strain relief; 10 oz (less cable) ..... $55

**TRL-88 Trans-Linear Headphones**
Featherweight open-air stereo headphones with 1.75-in micro-Mylar transducers; frequency response 18-24,000 Hz ±5 dB; dist. 0.5% at 100-dB SPL; 7-ft Y cord with molded plug; 4.25 oz ..... $50

**TRL-3 Trans-Linear Headphones**
Open design headphones; frequency response 40-20,000 Hz ±5 dB, 5-dB bass boost between 70 and 200 Hz; 80-ohm impedance; 0.6% dist. at 110 dB (400 Hz); sensitivity 6 mW for 100-dB SPL; max. input 5 V; padded, fully adjustable aluminum and steel headband; urethane foam, snap-on cushions; 15-ft (extended) retractable cable with clothing clip, molded plug, and strain relief; 8.5 oz (without cable) ..... $45

**TRL-77 Trans-Linear Headphones**
Open design headphones; frequency response 45-20,000 Hz; 80-ohm impedance; max. input 5 V; adjustable, continuous padded stainless steel headband and open foam, snap-on cushions; 7-ft Y cord with molded plug and strain relief; 11.5 oz (without cable) ..... $35

**DP-903 Monitor Phone**
Single hand-held earphone with swivel grip; blends left and right channels into single earphone; frequency response 20-19,000 Hz; 180-ohm impedance; brown with gold trim; 7-ft cord with stereo plug ..... $20

**TRL-66 Headphones**
Dynamic headphones with 6-mm transducer; 8-ohm impedance; frequency response 40-15,000 Hz; high impact unbreakable plastic headband with padding and foam-filled vinyl cushions; supplied with 7-ft Y cord with molded plug; 9 oz (less cable). ..... $20

**SC-5 Stereophone Control**
For direct connection to speaker outputs of amplifiers; accepts two stereophones; has individual left/right level controls/phone and speaker/phones switch ..... $25

## TECHNICS

**EAH-830 Linear-Drive Headphones**
Low-distortion high-power-handling capacity; frequency range 15-35,000 Hz; max. input power 3000 mW; 125-ohm impedance; 0.3% dist.; 3-meter coiled cord; Supra-Aural ear pads; precise-fit, soft, wide-contact leather head pads; 450 g ..... $80

**EAH-820 Linear-Drive Headphones**
High-power-handling capacity; frequency range 15-30,000 Hz; max. input power 3000 mW; 125-ohm impedance; 0.3% dist.; 3-meter coiled cord; Supra-Aural ear pads; precise fit, soft, wide-contact leather head pads; 430 g ..... $60

**EAH-810 Linear-Drive Headphones**
Open-environment waveform response at eardrum; frequency range 20-25,000 Hz; max. input power 1000 mW; 63-ohm impedance; 0.5% dist. at 100 dB; 3-meter cord; Supra-Aural ear pads; precise-fit, soft, wide-contact leather head pads; 230 g ..... $40

**EAH-T805 Stereo Headphones**
Frequency response 20-20,000 Hz; max. input 200 mW; SPL 100 dB/mW; impedance 125 ohms. ..... $30

## TOSHIBA

**HR-811 Headphones**
Complementary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-30,000 Hz; 8.4 oz; comes with adaptor plugs ..... $75

**HR-X1 Headphones**
Complementary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-20,000 Hz; 5.6 oz; comes with adaptor plugs ..... $65

**HR-F1 Headphones**
Complementary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-20,000 Hz ..... $50

## UHER by WALTER ODEMER

**W 775 Stereo Headphones**
Dynamic stereo headphones with one active and six aux. membranes per system; half-open design; frequency response 16-20,000 Hz; SPL 94 dB; nominal impedance 600 ohms/system; nominal loading capacity 200 mW; dist. 1.0%; auto strap adjustment; gimballed earcups; 3-m cable; 330 g ... $184

**Featherweight Stereo Headphones**
Lightweight (2.2 oz) stereo headphones with 8-ft coiled cord; frequency response 20-20,000 Hz; 200-ohm impedance (1 kHz); has lightweight adjustable headband and yellow foam-cushioned earpieces.
**W675.** With five-pin plug for Uher cassette recorders ..... $84
**W676.** With phone plug for amplifiers ..... $84

## YAMAHA

**YH-1000 Stereo Headphones**
Orthodynamic-design headphones with 12.7-micron 30-mg polyester film diaphragm between cerium cobalt disc magnets; frequency response 20-20,000 Hz; output 103 dB/mW SPL; 3 W rated input, max. input 10 W; HD −50 dB at 90-dB SPL, −30 dB at 120-dB SPL; impedance 100 ohms; urethane foam-padded earcups, leather-finish head strap, universal ball-joint tilt adjustment, and lockable height-adjusting sliders; includes 7.9-ft cord with stereo plug; 19 oz. with cord ..... $220

**YH-100 Stereo Headphones**
Orthodynamic stereo headphones with lightweight polyester film diaphragms in dual-support drive unit with mutually opposed anisotropic ferrite magnets; frequency response 20-20,000 Hz; output 98 dB/mW SPL at 106 dB/V; rated input 3 W, 10 W max.; HD 0.3% at 90-dB SPL; impedance 150 ohms; double padded headband with supra-aural earcups; includes 8-ft straight cord; 340 g less cord ..... $85

**YH-1 Stereo Headphones**
Lightweight orthodynamic design featuring sintered ferrite disc magnets with combination voice-coil diaphragm between; frequency response 20-20,000 Hz; output 94 dB/mW SPL; 3 W rated input, max. input 10 W; HD 0.3% at 90 dB SPL, 3.0% at 120 dB SPL; impedance 150 ohms; soft leather strap distributes weight over entire head; supra-aural pads; 8-ft straight cord; weight 10.2 oz with cord ... ..... $65
**YH-2.** Same as YH-1 except output 93 dB/mW SPL; weight 8.1 oz with cord ..... $50
**YH-3.** Similar to YH-2 except 1 W rated input, 3 W max.; 7.4 oz with cord ..... $35

## ZENITH

**839-56 Stereo Headphones**
Streamlined stereo headphones with rotary tone and volume control/earcup; max. input 300 mW; sensitivity −100 dB ±3 dB at 200 Hz; frequency response 10-25,000 Hz; source impedance 8 ohms; foam earcups and headband; 8-ft cord; 13 oz ... $66
**839-54.** Similar to 839-56 without tone control; frequency response 20-16,000 Hz; 9-ft coiled cord ..... $55

**839-52 Stereo Headphones**
Stereo headphones with tone and volume slide controls/earcup; max. input 700 mW; sensitivity −90 dB ±3 dB at 200 Hz; frequency response 20-20,000 Hz; source impedance 8 ohms; padded earcups and adjustable padded headband; 10-ft coiled cord; 16 oz ..... $59

**839-32 Stereo Headphones**
Stereo headphones with volume control/cup; max. input 500 mW; sensitivity −104 dB ±3 dB at 200 Hz; frequency response 20-19,000 Hz; source impedance 8 ohms; padded earcups and adjustable padded headband; 10-ft coiled cord; 11 oz ..... $50

**839-50 Stereo Headphones**
Open-type stereo headphones; max. input 200 mW; sensitivity −108 dB ±3 dB at 200 Hz; frequency response 20-20,000 Hz; source impedance 8 ohms; adjustable padded earcups and headband; 6.5-ft cord; 12 oz ..... $33

**839-42 Stereo Headphones**
Teardrop-design stereo headphones; max. input 300 mW; sensitivity −106 dB ±3 dB at 200 Hz; frequency response 20-18,000 Hz; source impedance 8 ohms; padded earcups and adjustable foam padded headband; 10-ft coiled cord; 12 oz ..... $30

**839-55 Stereo Headphones**
Stereo headphones with volume slide controls/earcup; max. input 200 mW; sensitivity −90 dB ±3 dB at 200 Hz; frequency response 30-18,000 Hz; source impedance 8 ohms; padded earcups and adjustable padded headband; 10-ft coiled cord; 8 oz. ..... $27

**839-49 Stereo Headphones**
Lightweight stereo headphones; max. input 200 mW; sensitivity −110 dB ±3 dB at 200 Hz; frequency response 20-18,000 Hz; source impedance 8 ohms; padded earcups and adjustable headband; 6.5-ft cord; 11 oz ..... $23

# 7 MICROPHONES

## AKG

### D-330BT Hyper Cardioid Microphone

Hyper cardioid dynamic microphone with elastomer shock-suspended plug-in field replaceable transdu-

cer system; designed for the professional vocalist; features dual-band, three-position equalizer switches and hum and noise rejection systems; frequency response 50-20,000 Hz; sensitivity −60 dBm; impedance 200 ohms; dual windscreen pop filter; nickel-plated zinc alloy die-cast housing; includes SA-31 stand adapter and case; 2" dia. × 7.25" L; 12 oz. ..... $185

### D-200OE Super Cardioid Microphone

Super cardioid dynamic microphone with elastically shock-mounted transducer; for the professional entertainer or recording studio; frequency range 35-17,000 Hz ± 3 dB; sensitivity −52 dBm ASA; 200-ohm impedance; adjustable bass response via B-M-off switch; wire-mesh grille with integral pop filter; includes SA-12.1 stand adapter and case; nickel-plated finish; 2" dia. × 6½" L; 11 oz. ... $165

### D-320B Hyper Cardioid Microphone

Hyper cardioid dynamic microphone with elastomer shock-suspended field-replaceable transducer; designed for professional entertainer; features three-position EQ switch and hum rejecter; frequency response 80-18,000 Hz; sensitivity −57 dBm; impedance 200 ohms; dual windscreen pop filter; nickel-plated zinc alloy diecast housing; includes SA-31 stand adapter and case; 2" dia. × 7.5" L; 10.5 oz. ..... $145

### D-200E Two-way Cardioid Microphone

Cardioid dynamic two-way microphone for the semi-professional recordist and musician; frequency range 25-16,000 Hz ± 3 dB; sensitivity −56 dBm ASA; dist. 0.5%; 200-ohm impedance; includes SA-20 stand adapter and case; wire mesh grille and cotton-fiber screen; 1.5" dia. × 7" L; 8½ oz. .. $135

### D-310S Cardioid Microphone

Cardioid dynamic microphone with elastomer shock-suspended transducer; designed for vocal music coverage in the home, studio, or on stage; frequency response 80-18,000 Hz; sensitivity −58 dBm; impedance 200 ohms; features integral on-off switch, windscreen pop filter, and hum rejecter; nickel-plated zinc alloy diecast housing; includes SA-30 stand adapter and case; 1.75" dia. × 7.5" L; 8.5 oz. ..... $115

**D-310.** Similar to D-310S without integral on-off switch ..... $110

### D-1000E Cardioid Microphone

Cardioid dynamic microphone with elastomer shock-mounted transducer; doubles as studio mike and in-the-field mike; has B-M-S mode switch which provides up to 13 dB bass rolloff at 100 Hz and up to 6 dB midrange shelf attenuation at 1000 Hz; frequency range 40-17,000 Hz ± 3 dB; sensitivity −52 dBm; 200-ohm impedance; sintered bronze windscreen; nickel-plated housing; supplied with SA-12 stand adapter and case; 1.5" dia. × 6.25" L; 8½ oz. ..... $110

### D-190E Cardioid Microphone

Cardioid dynamic microphone for speech or music performing and recording; frequency range 30-15,000 Hz; sensitivity −52 dBm; 200-ohm impedance; sintered bronze windscreen; nickel-plated housing; supplied with SA-11 stand adapter and case; 1.5" dia. × 6.25" L; 6½ oz. ..... $95

**D-190ES.** Same as D-190E with integral on-off switch ..... $100

### D-160E Omnidirectional Microphone

Omnidirectional dynamic microphone designed for semi-professional recordist; frequency response 40-20,000 Hz; sensitivity −58 dBm; impedance 250 ohms; W-20 windscreen; nickel-plated finish; supplied with SA-23.2 stand adapter and case; ⅞" dia. × 5½" L; 4.5 oz. ..... $95

### D-130E Omnidirectional Microphone

Omnidirectional dynamic microphone with shock-suspended transducer; designed for newsfilm and ENG applications; frequency response 50-15,000 Hz; sensitivity −54.5 dBm; impedance 200 ohms; hum rejecter and sintered bronze windscreen; nickel-plated zinc alloy diecast housing; includes SA-30 stand adapter and case; 1.75" dia. × 7" L; 9 oz. ..... $80

### D-125E Cardioid Microphone

Cardioid dynamic microphone with shock-suspended transducer; for general-purpose applications; hum rejecter and heavy-duty wire mesh windscreen; frequency range 100-18,000 Hz; sensitivity −53.5 dBm; 200-ohm impedance; supplied with SA-30 stand adapter and case; 1.75" dia. × 7" L; 8 oz. ..... $80

### Stereo-Pair Cardioid Microphones

**D-120SPL.** Low-impedance package. Includes two D-120E cardioid dynamic microphones with stand adapters and cases, two KM-231.1 collapsible-tripod table stands, and two 15-ft low-impedance cable assemblies (female XLR-transformer with phone plug) ..... $175

**D-120SPH.** Same as D-120SPL except high-impedance package with two 15-ft high-impedance cable assemblies (female XLR-transformer with phone plug) ..... $190

**D-190SPL.** Low-impedance package; includes two D-190E cardioid dynamic microphones with stand adapters and cases; two KM-231.1 collapsible-tripod table stands; and two 15-ft low-impedance cable assemblies (female XLR-phone plug) ..... $205

**D-190SPH.** Same as D-190SPL except high-impedance package with two 15-ft high-impedance cable assemblies (female XLR-transformer with phone plug) ..... $220

### C-414EB Polydirectional Condenser Mic

FET condenser microphone with large-diaphragm capsule; features selectable omni, cardioid, hypercardioid, or figure-eight pattern, three-position (flat, 75-Hz, 150-Hz) bass roll-off switch, and 0, −10, −20 dB attenuator switch. Frequency response 20-20,000 Hz (all patterns); sensitivity −43.5 dBm; max. SPL 138 dB with 0.4% THD; impedance 200 ohms; 12-48 V phantom powered; supplied with SA-18.3 stand adapter, W-26 windscreen, and case; 1.75" dia. × 5.5" L; 12 oz. .. $695

**C-414E1.** Same as C-414EB except has nine selectable polar patterns via phantom-powered remote control; remote control unit can operate two microphones independently; includes one microphone, S-42E1 remote control, MK-23/20 66-ft cable, W-26 windscreen, SA-18.3 stand adapter, and case ... $1400

### C-450 Modular Condenser Mic System

Modular system consists of three interchangeable preamps, seven interchangeable small-diaphragm capsules, and associated accessories. All C-450 FET preamps have 5-30,000 Hz frequency range, 200-ohm source impedance, and 500-ohm load impedance; C-451E preamp has 9-52 V power; C-451EB and C-452EB have two-position bass roll-off; choice of matte-nickel or satin-black finish. All capsules are condenser-designed and have frequency range of 20-20,000 Hz. Capsules available are CK-1 cardioid, CK-1S cardioid with rising response, CK-4 figure-eight, CK-5 cardioid with shock-suspended transducer and integrated windscreen/pop filter, CK-8 short shotgun, CK-9 long shotgun, and CK-22 omnidirectional with built-in pop filter. Preamps and capsules available either separately or in combinations.

| | |
|---|---|
| C-451E preamp | $323 |
| C-451EB preamp | $344 |
| C-452EB preamp | $225 |
| CK-1 cardioid | $100 |
| CK-1S cardioid | $100 |
| CK-4 figure-eight | $235 |
| CK-5 cardioid | $187 |
| CK-8 short shotgun | $187 |
| CK-9 long shotgun | $220 |
| CK-22 omnidirectional | $106 |

## AUDIO-TECHNICA U.S.

### AT814 Unidirectional Microphone

Moving-coil dynamic cardioid microphone designed for professional recording and broadcasting studios; frequency response 50-16,000 Hz; sensitivity −56

dB (0 dB-1 mW/10 dynes/cm²); EIA sensitivity −150 dB; 600-ohm nominal impedance; features high-efficiency windscreen and balanced low-impedance output; includes 16.5-ft cable with XLR/A3F professional connector with ¼-in phone plug, tapered slip-in stand clamp, and carrying case ..... $120

**AT814/XLR.** AT814 with XLR/A3M connector on output end of cable ..... $124

### AT813 Unidirectional Microphone

Incorporates electret condenser permanently polarized element; 6-micron polymer diaphragm; frequency response 20-20,000 Hz; sensitivity −55 dB; 600-ohm nominal impedance; max. input SPL 125 dB; S/N 50 dB (1 kHz, 1 μbar); AA penlight battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector with ¼-in phone plug, slip-in stand clamp, carrying case, and battery ..... $105

**AT813/XLR.** AT813 with XLR/A3M connector on output end of cable ..... $109

### AT812 Unidirectional Microphone

Incorporates moving-coil dynamic element; frequency response 50-18,000 Hz; sensitivity −60 dB; 600-ohm nominal impedance; supplied with 16.5-ft cable with professional XLR/A3F connector, slip-in stand clamp, and carrying case ..... $95

**AT812/XLR.** AT812 with XLR/A3M connector on output end of cable ..... $99

### AT811 Unidirectional Microphone

Incorporates electret condenser permanently polarized element; frequency response 50-20,000 Hz; sensitivity −56 dB; 600-ohm nominal impedance; max. input SPL 130 dB; S/N 50 dB (1 kHz, 1 μbar); battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector with ¼-in phone plug, slip-in stand clamp, carrying case, and battery ..... $90

**AT811/XLR.** AT811 with XLR/A3M connector on output end of cable ..... $94

### AT803S Sub-Miniature Omni Microphone

Electret condenser permanently charged element; omnidirectional pattern; 5-micron polymer diaphragm; frequency response 50-15,000 Hz; sensitivity −57 dB; 600-ohm impedance; balanced output; battery holder/belt clip with on/off switch; uses AA penlight battery; includes clothing clip, windscreen, battery, and carrying case; 16½-ft cable; mic 0.4" diameter × 0.8" L ..... $90

**AT803S/XLR.** AT803S with XLR/A3M connector on output end of cable ..... $94

### AT802 Omnidirectional Microphone

Incorporates moving-coil dynamic element; frequency response 50-16,000 Hz; sensitivity −56 dB; 600-ohm nominal impedance; supplied with 16.5-ft cable with professional XLR/A3F connector, slip-in stand clamp, and carrying case ..... $80

**AT802/XLR.** AT802 with XLR/A3M connector on output end of cable ..... $84

### AT801 Omnidirectional Microphone

Incorporates electret condenser permanently polarized element; frequency response 40-18,000 Hz; sensitivity −48 dB; 600-ohm nominal impedance; max. input SPL 125 dB; S/N 50 dB (1 kHz, 1 μbar); AA penlight battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector, slip-in stand clamp, carrying case ..... $75

**AT801/XLR.** AT801 with XLR/A3M connector on output end of cable ..... $79

### AT805S Miniature Omni Microphone

Electret condenser permanently charged element; omnidirectional pattern; frequency response 50-15,000 Hz; sensitivity −57 dB; 600-ohm impedance; unbalanced output; built-in on/off switch; uses E675 battery; includes clothing clip, lavalier cord, windscreen, belt clip, battery, carrying case, and 16½-ft cable with ¼-in phone plug; mic 0.6" diameter × 2" L ..... $55

### AT816/2 Unidirectional Microphone

Stereo pair of unidirectional moving-coil dynamic microphones designed for home stereo recording; frequency response 60-15,000 Hz; sensitivity −62 dB; nominal impedance 600 ohms (matches 150-1000 ohm inputs); includes slip-on desk stands and 13-ft cables with ¼-in phone plugs ..... $60 pr.

## Artist Series Microphones

### ATM91 Unidirectional Microphone

Cardioid microphone with permanently polarized fixed-charge condenser element; 4-micron gold vaporized diaphragm; designed for vocal applications; frequency response 70-18,000 Hz; sensitivity −56 dB; EIA sensitivity −150 dB; 600-ohm nominal impedance; max. input SPL 130 dB; S/N 50 dB at 1000 Hz, 1 μbar; leakproof UM3 AA battery-powered; includes slip-in stand clamp and carrying case ..... $170

### ATM41 Unidirectional Microphone

Cardioid microphone with moving-coil dynamic element; frequency response 50-16,000 Hz; sensitivity −56 dB; EIA sensitivity −150 dB; 600-ohm impedance; includes slip-in stand clamp and carrying case ..... $165

### ATM21 Unidirectional Microphone

Cardioid microphone with moving coil dynamic element; designed for instrumental applications; frequency response 50-18,000 Hz; sensitivity −60 dB; EIA sensitivity −154 dB; 600-ohm impedance; with slip-in stand clamp and carrying case ..... $145

**ATM21SM.** Same as ATM21 except supplied with shock mount and windscreen in fitted case .... $170

### ATM31 Unidirectional Microphone

Cardioid microphone with permanently polarized fixed-charge condenser element; 4-micron gold vaporized diaphragm; frequency response 40-20,000 Hz; sensitivity −55 dB; EIA sensitivity −149 dB; 600-ohm impedance; max. input SPL 125 dB; S/N 60 dB at 1000 Hz, 1 μbar; leakproof AA battery-powered; includes slip-in stand clamp and carrying case ..... $138

### ATM11 Unidirectional Microphone

Cardioid microphone with permanently polarized fixed-charge condenser element; designed for instrumental applications; frequency response 50-20,000 Hz; sensitivity −56 dB; EIA sensitivity −150 dB; 600-ohm impedance; max. input SPL 130 dB; S/N 50 dB at 1000 Hz, 1 μbar; leakproof UM3 AA battery-powered; includes slip-in stand clamp and carrying case ..... $138

**ATM11SM.** Same as ATM11 except supplied with shock mount and windscreen in fitted case .... $163

**ATM10.** Similar to ATM11 but omnidirectional pattern; frequency response 40-18,000 Hz; sensitivity −48 dB; EIA sensitivity −142 dB; max. input SPL 125 dB ..... $120

**ATM10SM.** Same as ATM10 except supplied with shock mount and windscreen in fitted case .... $145

## AUDIOTEX

### Electret Condenser Cardioid Mic

Unidirectional pattern to minimize pickup from rear and sides; on/off slide switch; frequency response 50-13,000 Hz; impedance 600 ohms; sensitivity −69 dB (1 kHz); comes with 20-ft cable, desk stand, black vinyl storage case. 30-2316 ..... $57

### Dynamic Cardioid Microphone

For recording groups and soloists; cardioid pattern; wide, flat frequency response 50-17,000 Hz; output −58 dB (on high impedance); rugged construction; built-in windscreen; 20-ft cable with standard phone plug and adapter for floor or desk stand; built-in volume control with on/off switch; dual (hi/lo) impedance. 30-2314 ..... $42

### Cardioid Microphone

Response 100-10,000 Hz; output −64 dB (on high impedance); rugged construction; comes with 15-ft cable, standard phone plug, swivel holder, on/off slide switch, and windscreen for outdoor use; dual (hi/lo) impedance. 30-2312 ..... $37

### Cardioid Microphone

Response 100-12,000 Hz; dual impedance; comes with 10-ft cable with standard phone plug, on/off slide switch, desk stand; sensitivity −54 dB (high impedance). 30-2310 ..... $34

### Tie Tack Lapel Microphone

For PA and voice taping; frequency response 40-16,000 Hz; impedance 1000 ohms; sensitivity −72 dB ±3 dB; comes with 13-ft cord, tie-tack holder, mercury battery. 30-2318 ..... $25

### Floor-Type Stand

Heavy cast-iron, self-leveling base with polished chrome-plated telescoping tubing; adjusts from 34 in to 64 in; top of tubing has ⅝-27 thread to fit all standard mikes. 30-2360 ..... $22

### Microphone Boom

Fits all standard mike floor stands; has adjustable counterweight; movable clamp and hinge design for any desired position; standard ⅝-27 thread; 31-in long. 30-2370 ..... $20

## BEYER DYNAMIC by BURNS

### M-130 Bi-Directional Ribbon Microphone

Figure-8 bidirectional ribbon microphone incorporating two 0.012-in aluminum ribbons that move

one above the other with 0.020-in separation; designed for studio broadcasting or recording; frequency response 40-18,000 Hz; polar pattern provides 3-dB attenuation at 90 degrees; ribbon design protects from overload or mechanical shock; supplied with standard three-pin Switchcraft connector; 5.04" L ..... $389

### M-111 Lavalier Microphone

Miniature lavalier microphone with filter providing flat frequency response when unit is suspended over chest; designed for TV broadcasting; frequency response 60-15,000 Hz (decreases 6 dB between 700-800 Hz and rises to 8 dB from 1000-10,000 Hz); output −62 dBm; 200-ohm impedance; spring-mounted inner casing suspended within outer housing; available with standard Cannon three-pin connector or one-meter cable and 6-pin connector for use with company's TS 73 or TS 83 wireless pocket transmitter; clamp and cord in black leatherette case; black matte finish; 3.35" L ..... $169

**M-112.** Similar to M-111 minus chest filter; zinc alloy diecast case ..... $145

### MCE-5 Electret-Condenser Microphone

Broadcast-quality clip-on omnidirectional microphone designed for on-camera applications; frequency response 20-20,000 Hz; S/N 62 dB; max. SPL 116 dB at 1000 Hz; EIA sensitivity −141 dBm; electrical impedance 700 ohms; load impedance 2500 ohms; supplied with detachable windscreen and one-meter cable with 6-pin male connector; battery-powered with T3400 (or equiv.), Varta 4023, or Mallory Px23 battery or 12-/48-V phantom-powered; 60-hr battery life; non-reflecting dark surface; 6.5 g ..... $160

### M-400 Moving-Coil Cardioid Microphone

Moving-coil dynamic super-cardioid type; frequency response 50-15,000 Hz; sensitivity −146 dB (EIA); 200-ohm impedance; on-off switch; three-pin XLR termination; built-in blast filter; 24.6-ft cable; black anodized aluminum case and clamp ..... $119

### M-818 Matched-Pair Microphones

Cardioid dynamic matched-pair microphones; frequency response 150-16,000 Hz; output level −55.8 dBm; 500-ohm impedance; front-to-back separation 18 dB; comes with attached 6.5-ft ca-

# 7 MICROPHONES

bles with ¼-in phone plug, two table stands, mic clamps, stereo adaptor cable, mounting bar, and presentation case; 5.47" L ..... $150 pr.

## CALECTRO

### Q4-152 Cardioid Microphone
Cardioid dynamic microphone; frequency response 50-17,000 Hz; output −58 dB; impedance 30,000 ohms; 10-ft cord with connector and lavalier strap included ..... $34

### Q4-157 Omnidirectional Microphone
Lightweight omnidirectional dynamic microphone with satin silver finish; frequency response 100-10,000 Hz; dual impedance 250/50,000 ohms; output −79 dB (low), −60 dB (high); swivel holder and 15-ft cable included ..... $30

### Q4-158 Cardioid Microphone
Unidirectional cardioid dynamic microphone; frequency response 100-12,000 Hz; sensitivity −73 dB/600 ohms, −54 dB/50,000 ohms; dual impedance 600 ohms and 50,000 ohms; includes stand holder, base, and 10-ft cable with plug ..... $29

### Q4-170 Matched-Pair Microphones
Omnidirectional matched-pair stereo microphones for voice and stereo recording applications; on/off switch; windscreen; frequency response 100-10,000 Hz; impedance 500 ohms; sensitivity −74 dB; includes desk stand and 4-ft cord with plug ..... $17

### Q4-165 Cardioid Microphone
Unidirectional dynamic microphone for recording, broadcast or public address; removable black metal windscreen; on/off switch; frequency response 100-10,000 Hz; impedance 600 ohms; sensitivity −75 dB; includes desk stand and 6-ft cord with plug ..... $17

### Q4-142 Lavalier Microphone
Hand-held lavalier microphone; frequency response 70-12,000 Hz; output −57 dB; impedance 30,000 ohms; includes 3-ft cord with miniature phone plug ..... $14

### Q4-144 Replacement Microphone
Dynamic remote control microphone for portable recorders; frequency response 100-10,000 Hz; output −77 dB; impedance 50,000 ohms; dual plugs, desk stand, and concentric adaptor to modify microphone connector included ..... $8
**Q4-146.** Similar to Q4-144 except impedance 200 ohms; 4½-ft cord with dual plugs ..... $5

## CERWIN-VEGA

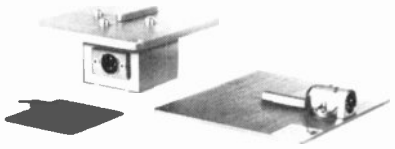
### Professional Series

### UE-1 Electret Cardioid Microphone
Uni-electret microphone for stage instruments; frequency response 80-20,000 Hz; dual 600- and 10,000-ohm impedances; sensitivity −70 dB ±3 dB into 600 ohms (0 dB = 1 V/1 μbar); built-in pop filter; on-off and tone impedance switches; includes 16-ft cable with ¼-in three-conductor phone plug and Cannon XLR-3-11C equivalent connector; 1.930" × 7.914" ..... $125

### UD-1 Dynamic Cardioid Microphone
Unidirectional dynamic microphone for live vocal application or studio use; frequency response 70-15,000 Hz; 600-ohm impedance; sensitivity −73 dB ±3 dB (0 dB = 1 V/1 μbar); built-in pop filter; on-off switch; includes 16-ft cable with ¼-in three-conductor phone plug and Cannon XLR-3-11C equivalent connector; 1.575" × 7.323" ..... $100

## CROWN

### Pressure Zone Microphones
Hemispherically-patterned electret microphones engineered to respond to coherent wave front at surface of acoustic boundary, thus eliminating comb filtering; designed for television, theater, concert, and PA applications. Features reduced pressure-calibrated electret modules mounted within a few millimeters of rigid surface and facing a boundary; need for fewer channels; simplified design for easier set up; handles 150-dB SPL. Equipped with standard power supply of combination transformer, battery, and phantom power supply arranged in 3-in-square metal cube or phantom power supply in cylindrical metal tube with XLR connectors; four models available in gold or black.



**General Purpose.** XLR connector, electret capsule, and mike cantilever mounted on ⅛-in aluminum plate 5 × 6 in; wall or floor positioning or suspension above choir or orchestra ..... $350
**Low Profile.** Cantilever holding electret capsule, mounted on 2 × 3-in aluminum plate; XLR connector at end of several feet of cable; suitable for conference rooms or television programming ..... $350
**Flush Mount.** All connections at section of mike extending below level of capsule, ensuring invisibility of mike; suitable for mounting into podium, lectern, or pulpit; cantilever capsule protected from objects or papers by three small metal pegs ..... $350
**Lavalier.** Smallest model of PZM™; designed to be worn on tie, scarf, or coat ..... $350

## ELECTRO-VOICE

### 644 Cardiline Microphone
Cardiline very directional dynamic microphone; flat response 40-12,000 Hz; −53 dB output; switchable high and low impedance; on off switch; MC4F-type mike connector and 15-ft cable with matching connector; gray finish ..... $186

### 1777 Cardioid Microphone
Cardioid microphone with electret element; frequency response 60-18,000 Hz; −54 dB output; 150-ohm impedance; EIA sensitivity −144 dB; powered by 4.5 V internal battery or 24-28 V phantom supply; built-in Acoustifoam filter; supplied with 15-ft cable, A3F connector, and stand adapter; zinc and aluminum with non-reflecting gray finish ..... $147

### 1776 Cardioid Microphone
Single-D cardioid electret condenser microphone; frequency response 60-18,000 Hz; −50 dB output; low impedance; on off switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand adapter; nonreflective gray finish ..... $122
**1776P.** Same as 1776 but with 25-ft cable with two professional connectors ..... $129

### 670A Cardioid Microphone
Single-D cardioid dynamic microphone; shaped response 60-14,000 Hz; −61 dB output (hi-Z), −60 dB output (lo-Z); switchable high and low impedance; on/off switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp; gray finish ..... $111

### 636 Omnidirectional Microphone
Omnidirectional dynamic microphone; flat response 60-13,000 Hz; −58 dB output; switchable high and low impedance; on/off switch; MC4F-type mike connector and 15-ft cable with matching connector; satin chrome finish ..... $107

### 671A Cardioid Microphone
Single-D cardioid dynamic microphone; shaped response 60-14,000 Hz; −56 dB output (hi-Z), −57 dB output (lo-Z); switchable high and low impedance; on/off switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp and integral windscreen/pop filter; satin chrome finish ..... $98
**671AP.** Same as 671A but with 25-ft cable with two professional connectors ..... $101

### 660 Super Cardioid Microphone
Continuously Variable-D super cardioid microphone; shaped response 90-13,000 Hz; −56 dB output; switchable high and low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp; satin chrome finish ..... $94
**660A.** Same as 660 with gray finish ..... $94
**660P.** Same as 660 but with 25-ft cable with two professional connectors ..... $98

### 647A Omnidirectional Microphone
Omnidirectional dynamic microphone; shaped response 60-12,000 Hz; −60 dB output; high- and low-impedance models available; integral cable; supplied with lavalier neckcord, belt clip, and stand clamp; gray finish ..... $87

### 627C Cardioid Microphone
Single-D cardioid dynamic microphone; shaped response 60-13,000 Hz; −58 dB output; switchable high and low impedance; on/off switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp; satin chrome finish ..... $78
**627CP.** Same as 627C but with 25-ft cable with two professional connectors ..... $84

### 631B Omnidirectional Microphone
Omnidirectional dynamic microphone; frequency response 80-13,000 Hz; −56 dB output; switchable high and low impedance; on/off switch; A3F type mike connector and 15-ft cable with matching connector; satin chrome finish ..... $74
**631BP.** Same as 631B but with 25-ft cable with two professional connectors ..... $78

### 607L Noise-Cancelling Microphone
Noise-cancelling dynamic microphone; shaped response 200-4000 Hz; −54 dB output; cancels sound more than ¼-in from face; low-impedance; MC1M-type connector and 15-ft cable with matching connector; gray finish ..... $71

### 626A Cardioid Microphone
Single-D cardioid dynamic microphone; shaped response 70-12,000 Hz; −56 dB output; switchable high and low impedance; on/off switch; integral cable; supplied with stand clamp; non-reflective fawn beige finish ..... $65
**626AP.** Same as 626A but with 25-ft cable with two professional connectors ..... $68

### 634B Omnidirectional Microphone
Omnidirectional dynamic microphone; shaped response 70-10,000 Hz; −57 dB output; high- and low-impedance models available; integral cable; gray finish ..... $44

### Professional Microphone Systems

### CL42S Condenser Shotgun System
Cardiline hypercardioid (distributed front above 1 kHz) microphone with electret element; frequency response 90-12,000 Hz; −33 dB output; 250 ohm impedance; A3F-type connector and small coil cord; supplied with shock mount, handle, and Acoustifoam windscreen; fawn beige micromatte finish ..... $640

### CH15S Hypercardioid Microphone
Hypercardioid microphone with electret element; frequency response 55-13,500 Hz; 150 ohm

impedance; supplied with miniature shock mount, utility storage case, and windscreen; fawn beige micromatte finish ..... $493

**DL42 Cardiline Microphone**
Cardiline very directional dynamic microphone; shaped response 50-12,000 Hz; −50 dB output; long-reach pickup; low impedance; integral cable; supplied with carrying case, windscreen, shock mount, and handle; fawn beige finish..... $450

**RE20 Cardioid Microphone**
Continuously Variable-D cardioid dynamic microphone; flat response 45-18,000 Hz; −57 dB output; built-in shock mounting and electrical shield; low impedance; bass tilt-down switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with metal carrying case and stand adapter; nonreflective fawn beige finish..... $405

**CO15P Condenser Omni Microphone**
Omnidirectional phantom-powered electret condenser microphone; designed for up-close studio and stage miking and distant pickups; frequency response 20-20,000 Hz; impedance 150 ohms; output −45 dB; max. SPL 145 dB at 1000 Hz, 1% THD; equiv. noise level −26 dB SPL, A weighted; includes 15-ft cable, 315A windscreen, 310A clamp, and metal carrying case; fawn gray micromatte finish; 7.5 oz ..... $257

**RE18 Cardioid Microphone**
Variable-D dynamic cardioid microphone; flat response 80-15,000 Hz; 150-ohm impedance; −57 dB output; integral shock mount; low-profile blast filter; A3F-type mike connector with 15-ft cable; supplied with stand adapter and vinyl carrying pouch..... $248

**CS15P Cardioid Microphone**
Single-D cardioid dynamic microphone; shaped response 40-18,000 Hz; −45 dB output; remote powering; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with windscreen, stand clamp, and metal carrying case; nonreflective fawn beige finish..... $239

**RE55 Omnidirectional Microphone**
Omnidirectional dynamic microphone; flat response 40-20,000 Hz; −55 dB output; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp and metal case; nonreflective fawn beige finish.... $235

**RE16 Super-Cardioid Microphone**
Continuously Variable-D super cardioid dynamic microphone; shaped response 80-15,000 Hz; −56 dB output; low impedance; bass tilt down switch; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp, metal carrying case, and integral windscreen/pop filter; nonreflective fawn beige finish ..... $231

**RE15 Super-Cardioid Microphone**
Variable-D dynamic super-cardioid microphone; designed for broadcast and high-quality sound reinforcement; frequency response 80-15,000 Hz; impedance 150 ohms; output −56 dB; EV acoustalloy diaphragm; includes 15-ft cable, 310A clamp, and metal carrying case; fawn beige micromatte finish; 6 oz ..... $222

**RE51 Omnidirectional Microphone**
Omnidirectional dynamic microphone; shaped response 60-10,000 Hz; output −54 dB; hands-free use; amplifier clips on belt; cough button, battery light, level adjustment, and on off switch; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with preamplifier and headband; black finish ..... $186

**CO85A "Tie-Tac" Omni Microphone**
Omnidirectional condenser element, electret microphone; shaped response 70-16,000 Hz; −56 dB output; battery housing/cable connector may be clipped to belt; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with windscreen, belt clip, tie clasp assembly, and metal carrying case; nonreflective fawn beige finish..... $166

**RE11 Super-Cardioid Microphone**
Continuously Variable-D super cardioid dynamic microphone; shaped response 90-13,000 Hz; −56 dB output; bass tilt down switch; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp, metal carrying case, and integral windscreen/pop filter; nonreflective fawn beige finish ..... $155

**RE50 Omnidirectional Microphone**
Omnidirectional dynamic microphone; shaped response 80-13,000 Hz; −55 dB output; double-wall, shock-isolated case and special cable for noise-free operation; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp, metal carrying case, and integral windscreen/pop filter; nonreflective fawn beige finish ..... $132

**DS35 Cardioid Microphone**
Single-D cardioid dynamic microphone; shaped response 60-17,000 Hz; −61 dB output; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp, metal carrying case, and integral windscreen/pop filter; nonreflective fawn beige finish ..... $125

**CO90 Miniature Omni Microphone**
Miniature omnidirectional microphone with electret element; frequency response 40-15,000 Hz; −57 dB output; 150 ohm impedance; EIA sensitivity −148 dB; battery powered; supplied with windscreen, belt clip, storage pouch, tie clasp, and 6-ft cable; fawn beige micromatte finish..... $125

**RE85 Omnidirectional Microphone**
Omnidirectional dynamic microphone; shaped response 90-10,000 Hz; −61 dB output; isolated shock-mounted construction and special cable for noise-free operation; low impedance; integral cable; includes lavalier neckcord, tie clasp assembly, carrying pouch, and belt clip; champagne finish . $118

**635A Omnidirectional Microphone**
Omnidirectional dynamic microphone; shaped response 80-13,000 Hz; −55 dB output; low impedance; A3F-type mike connector and 15-ft cable with matching connector; supplied with stand clamp; nonreflective fawn beige finish ..... $79

## ERCONA

**DC-21 Cardioid Microphone**
Cardioid condenser microphone; SYMSI 48 powering; frequency response 30-20,000 Hz ±3 dB; sensitivity −44 dB/Pa (over 200 ohms at 1 V); output 6.3 mV/Pa (over 200 ohms at 1 V); noise 25 dB (re $2 \times 10^{-5}$ Pa, A wtd.); 122-dB dynamic range; output impedance 200 ohms; operating voltage +48 +6/−8; current consumption 0.8 mA; satin chrome finish; supplied with stand adaptor and 33-ft cable ..... $250
**DC-20.** Similar to DC-21 but omnidirectional design; sensitivity −46 dB/Pa; output 5 mV/Pa; noise 26 dB; 124-dB dynamic range ..... $240

## JVC

**M-510 Electret Condenser Microphone**
Super-directional/unidirectional pattern; frequency response 40-20,000 Hz; sensitivity −68 dB (super), −71 dB (uni); S/N better than 50 dB; 13-dB gain loss in passive mode ..... $190

**M-201 Electret Condenser Microphone**
Frequency response 40-18,000 Hz; sensitivity −71

# 7 MICROPHONES

dB; S/N better than 47 dB at 1000 Hz; output impedance 600 ohms ..... $60

## MARLBORO SOUND WORKS

### M900 Cardioid Microphone
Unidirectional dynamic cardioid microphone; built in spherical wind screen; frequency response 50-17,000 Hz; output at 1000 Hz 74.6 dB (low impedance), 58.7 dB (high impedance); 200-ohm low impedance, 20,000-ohm high impedance; 16-ft detachable cable with XLR-connector .... $89

### M500 Cardioid Microphone
Unidirectional dynamic microphone for acoustic instruments; frequency response 50-16,000 Hz; output level at 1000 Hz 76 dB (low impedance), 56 dB (high impedance); 200-ohm low impedance, 20,000-ohm high impedance; 16-ft detachable cable with XLR-connector ..... $87

### M400 Cardioid Microphone
Cardioid condenser microphone; electret element; built-in FET preamp and 1½-V battery; frequency response 40-18,000 Hz ±3 dB; sensitivity 51 dB ±3 dB high impedance; 20-ft detachable cable with heavy duty Cannon-type connector ..... $49

### M300 Cardioid Microphone
Cardioid dynamic microphone; frequency response 60-15,000 Hz ±3 dB; sensitivity 58 dB ±3 dB high impedance; 20-ft detachable cable with heavy duty Cannon-type connector ..... $42

### M200 Cardioid Microphone
Cardioid dynamic microphone; frequency response 60-13,000 Hz ±3 dB; sensitivity 61 dB ±3 dB (high impedance), 80 dB ±3 dB (low impedance); 10-ft heavy duty detachable cable ..... $31

### M50 Dynamic Microphone
Dynamic microphone; frequency response 60-13,000 Hz ±3 dB; sensitivity 61 dB ±3 dB high impedance; 10-ft heavy duty cable ..... $21

### M30 Dynamic Microphone
Dynamic microphone; frequency response 70-12,000 Hz ±3 dB; sensitivity 56 dB high impedance; 10-ft heavy duty cable ..... $14

## MURA

### DX-30V Cardioid Microphone
Battery-powered electret condenser microphone; frequency response 20-18,000 Hz; sensitivity -48 dB (high impedance), -62 dB (low impedance); impedance 600 and 50,000 ohms; on-off switch; supplied with 20-ft cable with ¼-in phone plug, battery, mic holder, and styrofoam case with sleeve ..... $70

### DX-20V Cardioid Microphone
Slimline design; frequency response 60-15,000 Hz; sensitivity -56 dB (high impedance), -74 dB (low impedance); impedance 600 and 50,000 ohms; on/off switch; supplied with 20-ft cable with ¼-in phone plug, mic holder, and styrofoam case with sleeve ..... $50

### DX-129 Cardioid Microphone
Ball-type dynamic microphone with built-in pop and blast filters; frequency response 40-14,000 Hz; sensitivity -58 dB at 1000 Hz; impedance 600 and 50,000 ohms; on/off switch; supplied with 20-ft cable and stand adapter; black satin and chrome finish ..... $42

### DX-285 Omnidirectional Microphone
Electret condenser microphone with removable windscreen; for general recording and vocal work; frequency response 50-13,500 Hz ±3 dB; sensitivity -71 dB at 1000 Hz (0 dB at 1 V/1 μbar); impedance 600 ohms; includes 1.5-V battery, desk stand, and 20-ft cable with ¼-in phone plug. .. $40

### DX-247 Omnidirectional Microphone
Dynamic microphone with removable windscreen; for vocals and recording; frequency response 50-14,000 Hz; sensitivity -57 dB at 1000 Hz; impedance 600 and 50,000 ohms; on/off switch; includes 20-ft cable with ¼-in phone plug; black satin and chrome finish ..... $40

### EX-279 Omnidirectional Lapel Mike
Electret condenser lapel microphone with clothing clip; frequency response 30-16,000 Hz; impedance 600 ohms; supplied with 10-ft cable with mini-plug and battery ..... $30

## NAKAMICHI

### DM-1000 Dynamic Cardioid Microphone
Cardioid moving-coil microphone with low-mass diaphragm and voice coil for extended high-end response; designed especially for vocals; triple metal screen pop, blast, and wind filter; double casing and foam suspension reduce sensitivity to vibration; immune to hum and magnetic fields; frequency response 30-20,000 Hz ±3.5 dB; sensitivity -76 dB at 1 kHz (0 dB = 1 V/μbar); impedance 250 ohms; supplied with Cannon-type XLR-3 connector; anodized black matte finish; 10.4 oz ..... $280

### CM-300 Electret Condenser Microphone
Studio-type system with interchangeable capsules; basic set comes with CP-1 cardioid and CP-2 omnidirectional capsules, windscreen, 15-ft cable, XLR connector, battery, and stand adapter; built-in 10-dB attenuator pad; low-cut proximity effect compensator; frequency response 30-18,000 Hz (CP-1), 20-15,000 Hz (CP-2), 20-18,000 Hz (CP-3), 30-20,000 Hz (CP-4), all ±3.5 dB; impedance 200 ohms balanced; sensitivity -76 dB, ±2.5 dB (CP-1, CP-2, CP-4), -74 dB, ±2.5 dB (CP-3); 138-dB SPL max (CP-1, CP-2), 136-dB SPL max. (CP-3), 118-dB SPL max. (CP-4), all with 3% dist.; dynamic range 114 dB (CP-1, CP-2), 107 dB (CP-3), 94 dB (CP-4) ..... $165

**CP-3.** Optional small-diameter, super omnidirectional capsule ..... $40

**CP-4.** Super-directional (shotgun) capsule ..... $60

**CM-300T.** Tri-microphone system with three CM-300 microphone sets; designed for use in company's tri-microphone recording system; supplied with carrying case with space for headphones, cables, and accessories ..... $440

**CM-100.** Similar to CM-300 but powered by 1.5 V cell; 118-dB SPL max. with 3% dist.; dynamic range 94 dB; supplied with CP-1 cardioid capsule; accepts CP-2, CP-3, and CP-4 ..... $100

### DM-500 Super Cardioid Mic
Dynamic moving coil microphone, built in wind screen; super cardioid polar pattern; frequency response 50-15,000 Hz ±5 dB; impedance 250 ohms; sensitivity -73 dB, ±2.5 dB ..... $100

## NEUMANN

### fet-80 Condenser Microphones
A line of studio microphones that come in many configurations from omni, figure-8, cardioid, multiple pattern to multiple pattern stereo; all can be either battery or phantom (separate power supplies) powered except the U-87, which contains a switchable battery compartment

**KM-83.** Omnidirectional ..... $386
**KM-84.** Cardioid ..... $386
**KM-85.** Cardioid, with low frequency roll-off ..... $386
**KMS-84.** Pop-proof cardioid ..... $977
**U-47FET.** Cardioid ..... $1056
**KMR-82.** Shotgun ..... $926
**KM-86.** Three-pattern, switchable ..... $1050
**KM-88.** Three-pattern ..... $1114
**U-87.** Three-pattern ..... $1155
**U-89.** Five pattern ..... $1285
**N-80.** 117-V ac portable power supply for powering one or two fet-80 microphones ..... $74

## REALISTIC

### 33-1085 Electret Condenser Microphone
One-point stereo microphone with two back electret elements (two mics in one) in rotatable capsules; frequency response 30-18,000 Hz with selectable low-frequency contour; includes stand adapter; 16.5-ft cable with dual ¼-in plugs ..... $60

### 33-1080 Cardioid Microphone
Professional back electret design; cardioid pattern; switchable low-frequency contour; frequency response 20-20,000 Hz; 600-ohm impedance with low-impedance balanced option; includes foam windscreen and stand adapter; 16.5-ft heavy-duty cable with XLR-type connector; requires "AA" battery ..... $50

### 33-984 Highball Cardioid Microphone
Unidirectional dynamic microphone; frequency response 80-13,000 Hz; switchable impedance 600 (low) and 10,000 (high) ohms (low-impedance balanced option); on/off switch; ball screen pop and blast filter; rubber anti-shock ring; Cannon XLR-type connector; 16.5-ft cable with plug ..... $45

### 33-919 Dual Pattern Microphone
Stereo electret condenser microphone with two internal condenser capsules; features switchable wide and normal pickup patterns; frequency response 30-15,000 Hz; sensitivity -72 dB ±3 dB; 600-ohm impedance; requires "AA" battery .... $40

### 33-1045 Electret Condenser Microphone
Cardioid microphone; frequency response 30-15,000 Hz; 600-ohm impedance; supplied with 10-ft cord, ¼-in plug, desk stand adapter, mike stand adapter, and foam windscreen; requires "AA" battery ..... $30

### 33-992 Super Cardioid Microphone
Highly-directional cardioid dynamic microphone; frequency response 80-12,000 Hz; switchable impedance 600 and 50,000 ohms; on/off switch; supplied with cable, slip on stand adapter, and four-pin reversible plug for impedance change on cable ..... $30

### 33-1050 Featherweight Microphone
Omnidirectional electret condenser microphone; frequency response 20-13,000 Hz; ultra-slim 9/16-in diameter design; supplied with foam windscreen, 9-ft cable, ¼-in plug, and stand, 2.8 oz ..... $18

## RECOTON

### MM-630 Cardioid Microphone
Unidirectional cardioid electret microphone designed for music groups, recording studio, TV, and radio work; sensitivity -66 dB; frequency response 30-16,000 Hz; low impedance (200-600 ohms); operates on 1.5-V AA battery; supplied with 18-ft shielded cable, XL-type connector, swivel mike stand, and vinyl case; satin gold finish ..... $50

### MM-620 Cardioid Microphone
Unidirectional cardioid electret microphone designed for performing, broadcast, PA, and home recording; sensitivity -68 dB; frequency response 30-16,000 Hz; low impedance (200-600 ohms); operates on 1.5 V AA battery; supplied with 18-ft shielded cable with standard phone plug, swivel mike adapter, and vinyl case; satin gold finish ..... $40

### MM-610 Cardioid Microphone
Unidirectional cardioid electret microphone designed for performers; sensitivity -66 dB; frequency response 40-15,000 Hz; low impedance (200-600 ohms); operates on 1.5 V AA battery; supplied with 18-ft shielded cable with standard phone plug, swivel microphone adapter, windscreen, and vinyl case; satin gold finish ..... $37

### MM-330 Cardioid Microphone
Unidirectional dynamic cardioid microphone designed for performers; features built-in hi/lo and on/off switch; bull-head design; triple-mesh construction; includes 18-ft shielded cable with standard phone plug, swivel mike adapter, and vinyl case; silver finish ..... $34

### MM-600 Cardioid Microphone
Unidirectional cardioid electret microphone designed for tape recordists and PA systems; frequency response 50-13,000 Hz; low impedance (200-600 ohms); operates on 1.5-V AA battery; on/off switch; includes swivel stand adaptor, windscreen, 9-ft cable with standard phone plug, and vinyl case; satin gold finish ..... $27

### MM-750 Condenser Microphone
Electret condenser lavalier microphone designed for lecturers; sensitivity −72 dB; frequency response 50-12,000 Hz; low impedance (600 ohms); powered by 1.5-V Mallory MS76B or equivalent; includes 20-ft cable with 3.5-mm mini plug; 5/8" diameter × 1 3/4" long ..... $24

### MM-760 Omnidirectional Microphone
Omnidirectional tie clip electret microphone; output level 65 dB; frequency response 30-16,000 Hz; powered by 1.5-V AA battery (incorporated in plug assembly); includes 15-ft shielded cable, standard phone plug, and vinyl case; brush gold finish; 3/8" diameter × 5/8" long ..... $22

## SANSUI

### DM11 Cardioid Microphone
Unidirectional dynamic microphone; frequency response 100-15,000 Hz; 600-ohm output impedance; −76 dB sensitivity (frontal); meshed windscreen eliminates popping; ideal as vocal microphone; 6 meter cord ..... $110

### EM1 Cardioid Microphone
Unidirectional electret condenser microphone; frequency response 50-15,000 Hz; 600 ohm output impedance; sensitivity −71.5 dB (frontal); music/vocal off switch; three urethane foam windscreens in orange, blue and black for quick channel identification; includes holder, desk stand, 1.5 V dc "AA" penlight battery, and 6 meter cord with phone plug ..... $80

### MS1 Multi-Purpose Mic Stand
Microphone boom stand with arm for stereo pairing; mike-mount holes at both ends of adjusting boom; boom is 35 1/16-in long and rotatable over 360 degrees; supplementary bar is included to extend boom to 43 11/16-in; collapsible stand; four mike mounting screws (5/16", 3/8", 5/8", 1/2"); matte black finish ..... $200

## SENNHEISER

### MD 441 U Super Cardioid Microphone
Super cardioid dynamic microphone; frequency response 30-20,000 Hz; sensitivity 0.2 mV/μbar ±3 dB; brilliance switch for nominal 5-dB boost at 5 kHz; five-position bass attenuator; front-to-back ratio 20 dB, −3 dB; supplied with cable and quick-release mount for floor stand or MZT-441 table stand; takes MZW-441 windscreen; 1 3" H × 1 4" W × 9.6" L.
With low-impedance cable ..... $445
With high-impedance cable ..... $487

### MD 211 U Omnidirectional Microphone
Omnidirectional dynamic microphone; frequency response 40-20,000 Hz; sensitivity −58 dBm (0.13 mV μbar) ±2.5 dB; supplied with Cannon XLR connector and cable; 1" diameter × 4 3/4" L.
With low-impedance cable ..... $356
With high-impedance cable ..... $388

### MD 431 U Super Cardioid Microphone
Super cardioid dynamic vocal microphone; frequency response 40-16,000 Hz; sensitivity 1.4 mV at 94-dB SPL; output −55.5 dB at 1 mW/10 dynes/cm²; 200-ohm source impedance at 1000 Hz; built-in bass/proximity cut-off and pop filters; on-off switch with lock; metal housing with replaceable stainless-steel grille screen; double-housed and shock-mounted; can be used in mobile situations; includes quick-release clip with lock, XLR connector, 16-ft cable, and phone plug ..... $352

### MD 421 U Cardioid Microphone
Cardioid dynamic microphone; 200-ohm impedance; frequency response 30-17,000 Hz ±5 dB; sensitivity 0.2 mV/μbar ±3 dB at 1 kHz; EIA rating 145.8 dB; output level −53 dBm (1 mW/10 dynes/cm²); front-to-back ratio 18 dB, −2 dB; variable bass attenuator; supplied with XLR connector and cable; 7" × 1 7/8" × 1 13/16".
With low-impedance cable ..... $327
With high-impedance cable ..... $358

### MD 416 U Cardioid Microphone
Cardioid dynamic microphone; designed for close miking; frequency response 50-15,000 Hz; sensitivity 0.13 mV/μbar ±3 dB; 200-ohm impedance; built-in isolation system to eliminate handling noise; built-in pop filter, outdoor pop filter; supplied with Cannon XLR connector, threaded stand mount with quick-release clip, and cable
With low-impedance cable ..... $300
With high-impedance cable ..... $322

### MD 402 Super Cardioid Microphone
Dynamic microphone; response 50-15,000 Hz; output −57 dBm at 94 dB SPL; includes windscreen, 15-ft cable, and quick-release clamp ... $80

### Electret Condenser Mike System
One common powering module in balanced version (K3U) or unbalanced version (K1) serves three different compact heads: ME20 omnidirectional head, response 50-15,000 Hz, sensitivity 49 dBm, S/N 64 dBm min.; ME40 super-cardioid head, response 50-15,000 Hz, sensitivity 49 dBm, S/N 64 dBm min.; ME80 shotgun head, response 50-15,000 Hz, sensitivity 45 dB, S/N 70 dB min.
**K3U**. Powering module ..... $147
**K1**. Powering module ..... $122
**ME20**. Omnidirectional head ..... $87
**ME40**. Super-cardioid head ..... $122
**ME80**. Shotgun head ..... $172
**ME88**. Spot microphone head ..... $255

## SHURE

### 300 Ribbon Microphone
Power level −57.5 dB (0 dB = 1 mW/10 microbar); response 40-15,000 Hz; user selects high or low impedance; bi-directional; swivel mount to stand; use for speech and music; has 20 ft cable and connector; gray ..... $166

### 546 UNIDYNE® III Microphone
Dynamic cardioid type; power level −58 dB; response 50-15,000 Hz; dual low impedance; swivel mount to stand; use for speech, rock vocals, and music; comes with 20 ft cable and connector; chrome finish ..... $146

### 548SD UNIDYNE® IV Microphone
Dynamic cardioid type; power level −58 dB; response 40-15,000 Hz; dual impedance; hand-held with slip-in stand attachment; use for speech and music; has on-off switch, 15 ft cable, and connector; chrome finish ..... $115

### 565D UNISPHERE® I Microphone
Dynamic cardioid type; power level −57 dB; response 50-15,000 Hz; dual impedance; swivel mount to stand; use for speech, rock vocals, and music; has pop or blast filter, 15-ft cable, and connector; chrome finish ..... $105
**565SD**. Same as 565D except has on-off switch and professional three-pin connector ..... $107
**565SH**. Similar to 565D with swivel mount to stand and on-off switch ..... $107

### 516EQ Dynamic Equalizer Microphone
Unidirectional type designed for tape recording; complete equalization and response-shaping control; four switches (on mike handle) provide up to 16 different combinations of special effects, ranging from eliminating nasal and sibilant sounds to emphasizing various instruments; frequency response 50-15,000 Hz; impedance 150 ohms for connection to mike inputs rated at 100 to 3000 ohms; comes with foam windscreen, swivel adapter, cable, mini-plug adapter cable, and carrying case ..... $101
**516EQ-PR** Two 516EQ microphones ..... $182

### 55SH UNIDYNE® II Microphone
Power level −55.5 dB; frequency response 50-12,000 Hz; dual impedance; cardioid pattern; swivel mount to stand; designed for speech and music; supplied with three-pin connector and 15-ft cable ..... $101

### 545D UNIDYNE® III Microphone
Dynamic cardioid type; power level −58.5 dB; response 50-15,000 Hz; dual impedance; with slip-in stand attachment and swivel mount to stand; designed for speech, music, and tape recording; includes 15-ft cable; chrome finish ..... $95
**545SD**. Same as 545D with on-off switch on microphone barrel ..... $97
**545SH**. Similar to 545D with swivel mount to stand and on-off switch ..... $97
**545L**. Similar to 545D but has low impedance; supplied with lavalier cord, clip, and permanently attached cable ..... $75

### 578 OMNIDYNE® Microphone
Omnidirectional pattern; power level −60 dB; response 50-15,000 Hz; dual impedance; hand-held; use for speech and music; has on-off switch, a 15-ft cable, and connector; chrome finish ..... $86

### 579SB "Vocal Sphere" Microphone
Omnidirectional pattern; power level −57 dB; response 50-15,000 Hz; low impedance; has snap-in stand attachment, on-off switch, pop or blast filter; use for speech, rock vocals, and music; supplied with 20-ft cable and connector; chrome finish .. $73

### UNISPHERE® A Microphones
Cardioid pattern; power level −61 dB; response 50-13,000 Hz; high or low impedance; hand-held with slip-in stand attachment; use for speech, rock vocals, and music; have pop or blast filter, on-off switch; supplied with 15-ft cable and connector; chrome finish
**585SA**. High impedance ..... $73
**585SB**. Low impedance ..... $73
**585SAV**. Similar to 585SA but has volume control on microphone barrel ..... $80

### 589S UNIDYNE® C Microphone
Unidirectional dynamic type; power level −61 dB; response 90-13,000 Hz; dual impedance; built-in on-off switch with lockplate; internal rubber vibration-isolator shockmount; 15-ft two-conductor shielded cable with 3-pin female connector on mike end; die cast housing with silver metallic finish, stainless-steel grille; 7" × 1" 16"; weight 12 oz less cable ..... $73

### UNISPHERE® B Microphones
Cardioid pattern; power level −60.5 dB; response 80-13,000 Hz; high or low impedance; hand-held with slip-in stand attachment; use for speech, rock vocals, and music; have pop or blast filter, on-off switch; come with 15-ft cable and connector; chrome finish
**588SA**. High impedance ..... $57
**588SB**. Low impedance ..... $57

### Semi-Professional Microphones

### SM7 Dynamic Cardioid Microphone
Unidirectional microphone with flat, bass rolloff, presence boost, and bass rolloff/presence boost response tailoring; power level −57 dB (0 dB = 1 mW/10 μbar); frequency response 40-16,000 Hz; impedance 150 ohms for inputs rated at 19-300 ohms; dark gray foam windscreen and dark gray enamel finish ..... $370

# 7 MICROPHONES

### SM81 Condenser Cardioid Microphone
Unidirectional low-noise, low-distortion microphone; power level −39.5 dB; frequency response 20-20,000 Hz; impedance 150 ohms; low r-f susceptibility; selectable 10-dB attenuator; three-position low frequency response switch; range of power sources 12 to 48 volts; supplied with attenuator lock, windscreen, swivel adapter and cable; metallic vinyl finish ..... $250

### SM53 Dynamic Cardioid Microphone
Unidirectional microphone with built-in shock mount and hum rejection system; bass rolloff switch; power level −60 dB; frequency response 70-16,000 Hz; impedance 150 ohms; supplied with 20-ft cable and swivel adapter; neutral matte metallic finish ..... $246

### SM33 Ribbon Super Cardioid Mic
Supercardioid ribbon microphone for speech, instrumental and vocal recordings; bass response selector switch; power level −58 dB; frequency response 40-15,000 Hz; dual impedances 38 and 150 ohms; dark gray non-glare finish ..... $241

### SM59 Dynamic Cardioid Microphone
Unidirectional microphone with cartridge shock mount design; built-in pop filter; power level −61 dB; frequency response 50-15,000 Hz; impedance 150 ohms; aluminum, zinc, and stainless-steel construction; champagne enamel finish..... $158

### SM58 Dynamic Cardioid Microphone
Unidirectional microphone designed for close-working studio recording; built-in removable spherical windscreen; power level −57 dB; frequency response 50-15,000 Hz; dual impedances 38 and 150 ohms; dark gray finish ..... $152

### SM57 Dynamic Cardioid Microphone
Cardioid microphone for percussion instruments, pianos and string basses; power level −57 dB; frequency response 40-15,000 Hz; dual impedances 38 and 150 ohms; non-glare dark gray finish . $119

### SM63-CN Dynamic Omni Microphone
Miniature lightweight omnidirectional microphone with built-in humbucking coil, shock mount, and

breath and pop filter; output power level −56.5 dB; frequency response 50-20,000 Hz; impedance 150 ohms; Veraflex® grille damage-resistant to drops and impact, rust, moisture, and corrosion; champagne finish aluminum case; 2 8 oz..... $100

### SM17 Dynamic Omni Microphone
Miniature omnidirectional microphone designed for acoustic stringed and other instruments; power level −64 dB; frequency response 50-15,000 Hz; impedance 150 ohms; supplied with expansion and clip-mounting options, cable clips, and 10-ft attached cable ..... $77

### Accessories

### A15 Series In-Line Adapters
Modifies mic response; three-pin male output and female input connectors.
**A15AS.** Microphone attenuator ..... $28
**A15PRS.** Phase reverser ..... $24
**A15HP.** High-pass filter ..... $24
**A15LP.** Low-pass filter ..... $24
**A15PA.** Presence adapter ..... $24
**A15RS.** Response shaper ..... $24
**A15LA.** Line input adapter ..... $24
**A15BT.** Bridging transformer ..... $24
**A15TG.** Tone generator ..... $32

### A95 Series Line Matching Transformers
Connect low-impedance microphone to high-impedance input or vice versa; for use with most microphones and input jacks.
**A95A.** Lo-Z: 3-pin male; Hi-Z: Amphenol-type male ..... $20
**A95F.** Lo-Z: 3-pin female; Hi-Z: Amphenol-type female ..... $23
**A95P.** Lo-Z: 3-pin male; Hi-Z: 1/4-in phone plug ..... $22
**A95FP.** Lo-Z: 3-pin female; Hi-Z: 1/4-in phone plug ..... $25
**A95D.** Lo-Z: 3-pin male; Hi-Z: 1/4-in phone jack ..... $20
**A95FD.** Lo-Z: 3-pin female; Hi-Z: 1/4-in phone jack ..... $25
**A95U.** Lo-Z: 3-pin male; Hi-Z: 1/4-in plug and jack ..... $22
**A95UF.** Lo-Z: 3-pin female; Hi-Z: 1/4-in plug and jack ..... $25

### A97A Line Matching Transformer
Matches low-impedance (150 to 600 ohms) microphone outputs to medium-impedance (1000 to 10,000 ohms) inputs; three-pin male low-impedance connector; male Amphenol-type medium-impedance connector ..... $20

## SONY

### C-76 Condenser Cardioid Microphone
Unidirectional gun-type condenser microphone designed for theatrical use; frequency response 40-16,000 Hz; 250-ohm impedance; S/N 60 dB; sensitivity −58 dB; max. SPL 126 dB; dynamic range 112 dB; low-cut switch; battery-powered with optional external ac/dc power supply provision; LED battery indicator; XLR-3 mic connector; includes urethane windscreen; 1" diameter × 26 3/4" L . $795
**C-74.** Similar to C-76 except designed for media use; 1" diameter × 16 7/8" L ..... $675

### C-38B Condenser Microphone
Professional condenser microphone with switchable omnidirectional or unidirectional characteristics; features directivity switch and five-position function switch for mic adjustment; internal battery or phantom power; frequency response 30-16,000 Hz +2.5 dB; 250-ohm output impedance; S/N 70 dB; max. SPL 140 dB; dynamic range 116 dB; high-cut switch; pad switch; FET circuit; windscreen and shock mounting; fixed mike connector; 20 ft cable; comes with carrying case; 3" diameter × 8 11/16" L .... $545
**C-37P.** Similar to C 38B without high-cut switch and internal battery power; max. SPL 154 dB; dynamic range 130 dB; 1 7/8" dia. × 7 5/16" L ..... $495

### ECM-53FP Cardioid Microphone
Unidirectional cardioid back electret condenser microphone designed for desk or podium use; frequency response 40-15,000 Hz; 250-ohm output impedance; S/N 66 dB; max. SPL 126 dB; dynamic range 98 dB; movable head; battery-powered (optional ac/dc operation available); fixed mic connector; 10-ft cable; XLR-3 mic connector; includes windscreen, carrying case, battery, and stand adapter; diameter × 10 3/4" L ..... $295

### ECM-56F Cardioid Mike
Back electret condenser microphone; unidirectional; frequency response 20-20,000 Hz; 250-ohm output impedance; S/N 66 dB; max. SPL 134 dB; dynamic range 106 dB; low-cut switch; external phantom power system or battery power; battery check lamp; 90 degree adjustable angle; rubber cushion in mounting reduces vibration; fixed mic connector; 20-ft cable; 2" dia. × 8 1/4" L .. $265

### F-660 Dynamic Cardioid Microphone
Unidirectional dynamic microphone for vocal/orchestral recording; frequency response 100-10,000 Hz; 250-ohm output impedance; safety lock; XLR-3 mike connector; includes double windscreens and mic holder; 1 1/2" dia. × 6 1/2" L .... $250

### ECM-65F Cardioid Mike
Hand-held professional back electret condenser microphone for stage, broadcasting, or studio use; unidirectional; frequency response 70-20,000 Hz; 250-ohm output impedance; S/N 66 dB; max. SPL 137 dB; dynamic range 109 dB; double windscreen; phantom power system or battery power; XLR-3 mike connector; 20-ft cable; 1 1/2" diameter × 7" L ..... $235
**ECM-64P.** Similar to ECM-65F except omnidirectional mike for outdoor use; frequency response 40-20,000 Hz..... $235

### ECM-50PS Omnidirectional Mike
Professional omnidirectional electret condenser microphone with miniature design; frequency response 40-14,000 Hz; 250-ohm output impedance; S/N 66 dB; max. SPL 126 dB; dynamic range 98 dB; phantom power supply or internal battery; non-reflective satin nickel finish; comes with windscreen, carrying case and tie clip; fixed mike connector; 10-ft cable; 7/16" diameter × 13/16" L.... $225

### F-115 Omnidirectional Microphone
Omnidirectional dynamic microphone for outdoor use in all weather conditions; built-in waterproof screen; also has double-structured accessory windscreen; frequency response 40-12,000 Hz; 600-ohm output impedance; vibration-proof rubber mounting; balanced output with "Cannon" plug; fixed mike connector; 20-ft cable; 1 3/16" diameter × 6 7/8" L..... $160

### ECM-990F Cardioid Microphone
Single-point stereo back electret condenser microphone for studio-quality performance; unidirectional; frequency response 40-16,000 Hz; 200-ohm output impedance; S/N 64 dB; max. SPL 126 dB; dynamic range 96 dB; back electret/FET impedance translator; axis selector to adjust directional quality; low-cut switch; LED battery power indicator; Sony type mike connector; 10-ft cable; includes windscreen and mic holder; 3 1/2" diameter × 8 1/4" L ..... $150

### ECM-30 Condenser Omni Microphone
Professional omnidirectional condenser microphone with ultra-miniature design; frequency response 50-14,000 Hz; 250-ohm output impedance; S/N 60 dB; max. SPL 117 dB; dynamic range 83 dB; battery power; balanced output with "Cannon" XLR; fixed mike connector; 10-ft cable; includes carrying case, windscreen, and tie clip; 11/32" diameter × 19/32" L ..... $115

### ECM-23F Cardioid Microphone
Unidirectional back electret condenser microphone; 20-20,000 Hz frequency response; 250-ohm output impedance; S/N 44 dB; max. SPL 126 dB; dynamic range 96 dB; output for both balanced and unbalanced circuit; FET impedance translator; battery power; low-cut switch; pad switch; comes with windscreen, carrying case, mike cable, and mike holder; XLR-3 mike connector; 20 ft cable; 1 1/16" diameter × 7 1/2" L ..... $115
**ECM-33F.** Similar to ECM-23F except battery or phantom powered; S/N 66 dB; max. SPL 130 dB; dynamic range 102 dB; 1 1/16" diameter × 6 15/16" L . ..... $195

### ECM-41 Cardioid Microphone
Unidirectional electret condenser microphone designed for studio interviews; telescopic design; frequency response 50-13,000 Hz; 250-ohm output impedance; S/N 63 dB; max. SPL 126 dB; dynamic range 95 dB; satin nickel finish; fixed mic connector; 8-ft cable; XLR-3 connector; battery-powered; includes windscreen and mic holder; 3/4" diameter × 10 3/4-19 9/16" L adjustable ..... $100

### F-520 Dynamic Cardioid Microphone
Unidirectional microphone for vocal and instrument reinforcement; frequency response 80-12,000 Hz; output impedance 250 ohms; 16-ft cable with fixed phone plug connector; 2" dia. × 6 5/8" L..... $100
**F-420.** Similar to F-520 except designed for public address and recording applications; frequency response 100-12,000 Hz ..... $74

### ECM-170A Omnidirectional Mike
Omnidirectional electret condenser microphone for semi-professional use; good for recording or lecturing outdoors; frequency response 20-16,000 Hz; 200-ohm output impedance; S/N 64 dB; max. SPL 126 dB; dynamic range 96 dB; low-cut switch; output for balanced and unbalanced circuits; detachable windscreen; FET impedance translator; easy-to-hold grip; satin nickel finish; Sony type mike connector; 16-ft cable; includes mic cable, mic holder, and carrying case; 1" dia. × 6 1/16" L ..... $75

### ECM-150 Omnidirectional Mike
Omnidirectional electret condenser microphone with miniature design; frequency response 40-13,000 Hz; 250-ohm output impedance; S/N 60 dB; max. SPL 117 dB; dynamic range 83 dB; plug adaptor for mini and phone connections; on/off switch; includes windscreen, case with mike stand, tie clip, and battery; fixed mike connector; 6-ft 5-in cable; 11/32" diameter × 19/32" L ..... $65

### ECM-260F Cardioid Microphone
Unidirectional back electret condenser microphone; frequency response 50-14,000 Hz; 200-ohm output impedance; S/N 66 dB; max. SPL 126 dB; dynamic range 98 dB; battery-powered; 16-ft cable with phone cable plug; includes windscreen, battery, mic holder, stand adaptor, and carrying case; 1 1/2" diameter × 7 1/16" L ..... $65
**ECM-220FA.** Similar to ECM-260F except has fixed cable and 1/4-in phone plug termination ..... $50

### ECM-99A Cardioid Microphone
One-point stereo electret condenser microphone for semi-professional and amateur stereo recording; two unidirectional microphone capsules in one housing; frequency response 50-12,000 Hz; 250-ohm output impedance; S/N 60 dB; comes with windscreen, carrying case, mike holder and battery; satin nickel finish; fixed mike connector; 10-ft cable; 2 3/4" diameter × 7 11/16" L ..... $65

### ECM-31M Cardioid Microphone
Unidirectional electret condenser microphone designed for indoor/outdoor interviews; telescopic design; frequency response 50-13,000 Hz; 250-ohm output impedance; battery-operated; 8-ft cable with mini cable plug; includes urethane windscreen and mic holder; 3/4" diameter × adjustable 10 3/4-19 9/16" L ..... $55

### F-400A Dynamic Cardioid Microphone
Unidirectional microphone recommended for pop and rock vocals; frequency response 100-12,000 Hz; 250-ohm output impedance; fixed phone plug connector, 8-ft cable; 2 1/8" dia. × 7 1/8" L ..... $50

### ECM-16 Omnidirectional Microphone
Omnidirectional electret condenser lavalier microphone designed for interviews or conferences; features FET impedance translator; frequency response 50-13,000 Hz; 250-ohm output impedance; 6-ft cable; battery-operated; includes clip holder; 9/16" diameter × 1 9/16" L ..... $40

### F-320A Dynamic Cardioid Microphone
Unidirectional microphone for general use and speech applications; frequency response 100-12,000 Hz; output impedance 250 ohms; 8-ft cable with fixed phone plug connector; 2 1/8" dia. × 7 1/8" L ..... $38

### ECM-210M Cardioid Microphone
Unidirectional electret condenser microphone for general-purpose recording; frequency response 50-12,000 Hz; output impedance 200 ohms; S/N 64 dB; battery powered; fixed mike connector; mini plug fits most portable tape recorders; 8-ft cable; 1 1/2" diameter × 7 1/4" L ..... $35
**ECM-210S.** Similar to ECM-210M except has dual-pin plug for use with tape recorders that offer remote start and stop capability ..... $38

### F-99M Stereo Dynamic Microphone
One-point stereo dynamic microphone for hi-fi recording; frequency response 80-12,000 Hz; 200-ohm output impedance; mini-plugs connect to hi-fi system mic inputs; fixed mike connector; 5-ft cable; 1 1/8" diameter × 6 1/4" L ..... $35

### F-500 Dynamic Cardioid Microphone
Unidirectional microphone for general use; frequency response 80-12,000 Hz; 320-ohm output impedance; mini-plug connections; fixed mike connector; 8-ft cable; 1 7/8" diameter × 7 1/16" L ..... $23
**F-500S.** Similar to F-500 except has dual plugs for connection to recorders that feature remote start and stop capability; start/stop switch is on microphone body ..... $25

## STUDER/REVOX

### M3500 Dynamic Cardioid Microphone
Dynamic unidirectional moving-coil type; hypercardioid pattern; response 40-18,000 Hz; impedance 600 ohms; comes with windscreen, clamp, table stand, and case; Cannon XLR connector; each unit supplied with own frequency-response curve; all-metal construction with matte black chromium finish ..... $160

## TEAC

### ME-120 Dynamic Microphone
Cardioid or omnidirectional dynamic electret microphone; two-position response switch, 40-18,000 Hz (cardioid), 30-16,000 Hz (omnidirectional); supplied with stand attachment, two windscreens, and 15-ft cable ..... $120
**ME-80.** Same as ME-120 except response 50-16,000 Hz ..... $90
**ME-50.** Same as ME-80 except cardioid; unbalanced or balanced 10,000 or 200 ohms; response 50-14,000 Hz ..... $50

## TECHNICS

### RP-3540E Cardioid Microphone
Electret-condenser cardioid microphone; 600-ohm output impedance; −68 dB sensitivity; frequency response 40-14,000 Hz; requires "AA" batteries; comes with stand, mike holder, 3/8-in adaptor, and 5-meter cable; 42 × 227 mm ..... $70

### RP-3210E Cardioid Stereo Microphone
Electret-condenser cardioid stereo microphone; 600-ohm output impedance; −70 dB sensitivity; frequency response 50-12,000 Hz; "AA" batteries required; comes with stand, mike holder, 3/8-in adaptor, and 3-meter cable; 40 × 60 × 185 mm ..... $60

### RP-3500E Cardioid Microphone
Electret-condenser cardioid microphone; 600-ohm output impedance; −68 dB sensitivity; frequency response 50-12,000 Hz; requires "AA" battery; comes with stand, mike holder, 3/8-in adaptor, and 5-meter cable; 46 × 208 mm ..... $60

### RP-3330 Cardioid Microphone
Dynamic cardioid microphone; 400-ohm output impedance; −78 dB sensitivity; frequency response 50-12,000 Hz; comes with stand, mike holder, 3/8-in adaptor and 3-meter cable; 50 × 165 mm ... $30

## TOSHIBA

### EM-420 Cardioid Microphone
Unidirectional back electret condenser microphone; low cut switch for music or voice; frequency response 50-20,000 Hz; S/N 45 dB; long battery life; supplied with windscreen ..... $70

### EM-220 Electret Condenser Microphone
Back electret condenser microphone; frequency response 50-18,000 Hz; S/N 45 dB; long battery life ..... $40

## TURNER, div. of TELEX

### TC20 Cardioid Microphone
Cardioid dynamic microphone with two sets of rear-entry ports; frequency response 200-15,000 Hz; output −55 dB at 1000 Hz (re 1 mW/10 μbars); EIA sensitivity −149 dB; low impedance 200 ohms; black windscreen/pop filter constructed of series of screens of different mesh density; includes 20-ft two conductor cable, A3F-type mic connector, and stand adaptor; baked white enamel finish ..... $260

### SE Series Cardioid Microphones
Cardioid dynamic microphones with double-shock-mount acoustic-controlled cavities; frequency response 50-15,000 Hz; output −56 dB at 1000 Hz (re 1 mW/10 μbars); EIA sensitivity −149 dB; low impedance 150-200 ohms; on-off switch; satin chrome finish.
**SE11.** Includes 20-ft two-conductor cable, A3F mic connector, and stand adaptor; has 2.25-in ball screen head ..... $165
**SE13.** Same as SE11 except has 1.75-in slotted head ..... $165
**SE16.** Includes 40-in two-conductor cable wired in A3F-type mic connector and 15-in gooseneck with heavy-duty mounting flange ..... $150

### SE14 Omnidirectional Microphone
Omnidirectional dynamic microphone with double-shock-mount acoustic-controlled cavity; frequency response 50-15,000 Hz; output −59 dB at 1000 Hz (re 1 mW/10 μbars); EIA sensitivity −152 dB; low impedance 150-200 ohms; on-off switch; includes 20-ft two-conductor cable, A3F mic connector, and stand adaptor; satin chrome finish .... $140

### 2760 Omnidirectional Microphone
Omnidirectional dynamic microphone designed for live performances; frequency response 50-15,000 Hz; output −60 dB at 1000 Hz (re 1 mW/10 μbars); EIA sensitivity −153 dB; low impedance 150-200 ohms; steel mesh windscreen and blast filter; includes 20-ft two-conductor cable, A3F-type mic connector, and stand adaptor; satin chrome finish ..... $100

### Lavalier Omnidirectional Microphones
Lightweight omnidirectional dynamic lavalier microphones with matching lapel-clip and neckcord for hands-free operations; output −63 dB at 1000 Hz (re 1 mW/10 μbars); EIA sensitivity −156 dB; matte gold finish; 10.75 oz.
**35.** Frequency response 50-10,000 Hz; dual low (150 ohms) and high (40,000 ohms) impedances; includes 25-ft three-conductor cable and wired-in mic connector ..... $130
**35A.** Frequency response 50-12,000 Hz; low impedance 150-200 ohms; includes 25-ft two-conductor cable ..... $115
**S35A.** Same as 35A except has on-off switch . $125

## UHER by WALTER ODEMER

### M 646 Cardioid Microphone
Electret condenser cardioid microphone; frequency response 30-20,000 Hz; sensitivity 3.5 mV/Pa; 280-ohm impedance; supplied with table stand and windscreen; powered by internal primary battery or from recorder's mike cable with 8-pole plug ... $203

### M 634 Dynamic Cardioid Microphones
Stereo-pair dynamic shot-gun-type cardioid microphones with stereo-bar; all-metal design; frequency response 50-16,000 Hz; sensitivity 2.3 mV/Pa; low-resistive impedance; includes collapsible table stand and storage case ..... $194
**M 534.** Similar to M 634 except single microphone for desk use ..... $98

### M 139 Omnidirectional Microphone
Omnidirectional dynamic hand-held microphone; frequency response 50-15,000 Hz; sensitivity 3.2 mV/Pa; low-resistive impedance; includes detachable table stand ..... $42

# 8 MIXERS

## AHB by AUDIOMARKETING

### SD 12-2 Stereo Mixing Console

12 in/2 out stereo mixing console. Input section features input gain, ±12 dB equalization controls for treble (12,000 Hz), mid 1 (2600 Hz), mid 2 (700 Hz), and bass (150 Hz), foldback for independent mix, echo, pan, PFL (can check each individual channel during performance with no effect on main outputs), and channel fader slide control. Output section features foldback send of bass and treble equalization, echo send, echo return, tape output/foldback/PFL monitor select, and dual output faders. Output +18 dBm max. (program, foldback, and echo send); headphones 500 mW/ch into 8 ohms; input sensitivity −61 dB for +4 dBm program out; frequency response ±1.5 dB 40-20,000 Hz (mic), 20-20,000 Hz (line); noise −124 dBm (equiv. input at full gain), −60 dB (output at full gain); input attenuation 0-60 dB continuously variable; dist. 0.4% (mic in), 0.05% (line in); input impedance 1k ohms at 40 dB gain (mic), 50k ohms bridging echo 10k ohms (line); output impedance 100 ohms ..... $1190

*Company also manufactures Modular III Series multitrack recording consoles that accommodate from 8 in/4 out to 16 in/8 out configurations; supplied with electronic power supply; starting price $6050. Also, SR Series Sound Reinforcement Consoles are available in two mainframe options (20 and 28) and can provide up to 40 mic inputs, 50 line inputs, and 11 mixed outputs; supplied with electronic power supply; starting price $8000.*

## AUDIOKIT by AUDIOMARKETING

### Audiokit 62 Mixer

Six in/two out stereo mixing console. Input section features variable gain from mic to line, ±16 dB boost and cut treble (16,000 Hz) and bass (80 Hz) controls, foldback pre-fader aux. mix cue, effects post-fade aux. mix echo, left-to-right pan, and straight-line fader control; output section features aux. return, master level fader control, and VU meters. Sensitivity −60 dBm variable; output level 0 dBm at 600 ohms (main), −20 dBm into 10k ohms (echo/cue), +20 dBm (max.); dist. 0.1%; aux. input −10 dBm at 15k ohms; output noise −65 dBm unweighted; crosstalk −60 dB at 1000 Hz. Kit includes complete assembly of printed circuits and components plus ac power supply; assembly time approx. 8 hrs ..... $265
Assembled version ..... $395

## BIAMP

### 1642 Professional Mixing Console

Professional mixing console comprised of 16 inputs, four equalization bands, four separate echo/line channel returns, four submaster outputs, two main outputs, three auxiliary busses, and headphone monitoring. Input section includes low-impedance mic/high-impedance line switching; trim rotary controls continuously variable from 0 to −40 dB; aux. buss pre/post switch; aux. buss control; post-fader, post-EQ echo buss; monitor (adjustable to pre-fader, pre-EQ monitor buss); equali-

zation controls set at 12,500, 3700, 250, and 80 Hz with ±18 dB boost or cut; post-fader and post-EQ solo; mute; channel assignment switches; pan (auto odd-even scheme); dual-color LED indicators; input channel fader; wrist pad. Submaster section: channel inputs (17-20) with own level control; line record switch; sub send control; left/right program solo; sub master faders; sub master pan. Left main section: aux. buss, echo, and monitor solo and level controls; meter 3 assign; left main solo and fader controls. Right main section: phantom power (+48 V of power to mic inputs of 16 channels); headphone level control; meter 4 assign; right main solo. Other features include four lighted VU meters, LED overload indicators for each channel, mute on each channel, and priority solo system for instant monitoring. Frequency response 15-33,000 Hz ±1 dB; THD 0.02%; IM dist. 0.01%; slew rate 8 V/μsec; S/N 80 dB; crosstalk 75 dB at 1000 Hz, 60 dB at 10,000 Hz; 9½" H × 36¼" W × 31½" D ..... $3595

### 1682 Stereo Mixing Console

Stereo mixing console comprised of 16 inputs/stereo outputs, three equalization bands, left and right main master section, prefader, pre-equalization monitor, and built-in Accutronics reverb system. Input section features slide fader, pan, monitor, low-mid-high equalization with center frequencies set at 100, 2500, and 10,000 Hz, ±18 dB boost or cut, reverb/effects, and attenuator. Left/right main master section features monitor effects send, reverb and aux. level/pan, and low frequency filter. Rear panel features left/right main balanced and unbalanced, monitor out balanced and unbalanced, effects send/aux. input pan, left and right aux. in, stacking inputs for monitor and effects busses, low-impedance transformer inputs, high impedance line input, and channel patching. Frequency response 15-45,000 Hz ±1 dB; THD 0.02%; IM dist. 0.01%; slew rate 8 V/μsec; S/N 80 dB at 20-20,000 Hz balanced; crosstalk 75 dB at 1000 Hz; max. input level +10 dB (low impedance), +30 dB (line in); output levels 8 V rms into 600 ohms (balanced), 6 V rms into 600 ohms (unbalanced); 5¾" H × 32½" W × 16½" D ..... $1289
**1282.** Similar to 1682 but has 12 inputs/stereo outputs; 5¾" H × 27" W × 16½" D ..... $1019
**8802.** Similar to 1282 but has eight inputs/stereo outputs; 5¾" H × 20¾" W × 16½" D ..... $789

### 6702 Stereo Mixing Console

Stereo mixing console with six inputs/stereo outputs, two-band equalizer, prefader pre-EQ monitor, and built-in Accutronics reverb. Input channels feature rotary fader, pan, monitor, low and high EQ, reverb/effects, and attenuation controls. Left/right main master sections feature monitor effects send and reverb and aux. level/pan controls. Right and left main (unbalanced) rear panel features monitor unbalanced, effects send/aux. in pan, left and right aux. in, low-impedance transformer inputs, and high-impedance line input. Has lighted VU meter. Frequency response 15-45,000 Hz ±1 dB; THD 0.02%; IM dist. 0.01%; slew rate 8 V/μsec; S/N 80 dB from 20-20,000 Hz balanced; crosstalk 75 dB at 1000 Hz; max. input level −10 dB (low impedance), +30 dB (line in); output levels 9 V rms into 10,000 ohms, 6 V rms into 600 ohms (unbalanced); 6" H × 19" W × 12" D ..... $495
**6702B.** Balanced version of 6702; output levels 8 V rms into 600 ohms, 17 V rms into 10k ohms ... $549

## CERWIN-VEGA

### DM-1 Audio Mixer

For pro and semi-pro recording setups; frequency response 20-20,000 Hz ±1 dB (RIAA phono inputs), 20-20,000 Hz ±0.5 dB (line inputs); THD 0.05% at rated output at any frequency; IM 0.05% at rated output (SMPTE standard); noise (ASA standard "A" weighting, shorted inputs) high-level inputs 85 dB, phono inputs 80 dB both below full output; impedance 47k (RIAA phono inputs), 100k (line inputs); output level/impedance 2.5 V rms (program and monitor), clipping level 8.7 V rms (+21 dBm), load impedance 2k, output source impedance 100 ohms or less; tone controls ±10 dB at 50 Hz and 5k, turnover frequency 500 Hz; Autofade rate variable from 2 to 20 sec typically; talkover/mute; mute level 0-20 dB typically, on/off rate 2 sec typically; headphone output 1 W into 4 ohms; meter calibration +3 dB at 2.0 V rms at program output; illuminated VU meters for both output channels; bass/treble/stereo balance controls; 1½" H (less feet and knobs) × 19" W × 8" D ... $714

## DUBIE

### CD-10 Sound Control System

Integrates up to six recorders and receiver/amplifier through one-time patch cord hookup; dubs, records, plays back, mixes sound-on-sound, monitors, and fades; six solid-state four-position recorder controls; eight-position monitor select control; two fade controls; rear-panel connections for recorders and amplifier/receiver. Max. input signal 10 V at 1000 Hz; frequency response 0-100,000 Hz on all functions; 4" H × 13¹³/₁₆" W × 5¾" D ..... $150
**CD-5.** Similar to CD-10 except three-recorder capacity; 4" H × 9⅜" W × 4⅞" D ..... $100

## GLi

### 3990 Preamplifier/Mixer

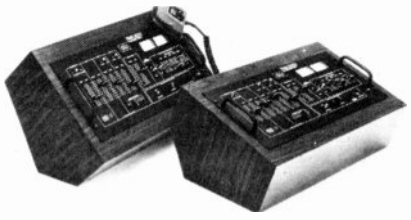
Preamp/mixer designed for creative audio, disco,

and disco-format broadcast use. Phono/aux. section: features two sets of line and phono inputs with own rotary level control and crossfader transition slide; special-effects third set of line/phono inputs; master level control with complete cueing capabilities; two sets of stereo main outputs and mono output; frequency response 20-20,000 Hz ±0.25 dB (phono and aux.); HD and IM 0.01% (phono and aux.); S/N 80 dB below 10 mV unweighted (phono), 90 dB (aux. inputs 1 and 2), 96 dB (aux. input 3); overload 320 mV at 1000 Hz (phono), 7 V (aux.); slew rate 9 V/μsec (phono and aux.); input impedance 47,000 ohms (phono), 40,000 ohms (aux. inputs 1 and 2), 50,000 ohms (aux. input 3); phono subsonic filter 18 dB/octave at 18 Hz. Microphone section: features balanced differential input, bass equalization, and optoelectronic talkover with adjustable program mute attenuator; frequency response 20-20,000 Hz ±0.25 dB; bass equalization ±8 dB at 80 Hz; S/N 80 dB below 10 mV; HD and IM dist. 0.01%; gain 60 dB (signal processor out), 80 dB (main out), 32 dB (input), 20 dB (equalizer gain), 6 dB (mix), 20 dB (line amp); overload 315 mV; slew rate 9 V/μsec; program attenuation talkover −2 to −20 dB. Signal processor section: features switchable signal processor loop; input S/N 100 dB below 100 mV; input impedance 100k ohms; output 1.75 V at 600 ohms and 10 V at 10k ohms; output impedance 500 ohms; output S/N 107 dB below 2 V out; output dist. 0.005%. Audition output section: can be directly connected to integrated or power amplifier; output 2 V at 600 ohms and 7 V at 10k ohms; HD and IM dist. 0.01% from 20-20,000 Hz; talkover muting 10.5 dB with audition output muted. Headphone amp: S/N 95 dB below 2 W into 9 ohms; max. output 3 W continuous into 8 ohms with 0.1% HD and IM; slew rate 12 V/μsec; frequency response 20-20,000 Hz ±0.1 dB; rack mountable 7" H × 19" W..... $850

**1010.** Audio processor for 3990; features complete tape facilities with two sets of tape monitor dubbing, low-noise three-band active equalizer, and electronic logic patching for stereo reverse, mono, and other combinations; frequency response 20-20,000 Hz ±0.25 dB; IM and HD 0.01%; S/N 90 dB; slew rate 9 V/μsec; illuminated VU meters with sensitivity adjust; rack mountable 3½" H × 19" W..... $350

### PMX-9000 Mixer/Equalizer

Combination mixer/graphic equalizer. Mixer: features two sets of switchable line and phono inputs



each with slide level control and crossfader transition slider and mic input channel with standby and talkover; complete cueing facilities with level and selector controls; S/N 76 dB below 10 mV (phono), 75 dB below clipping (mic), 85 dB (aux.); max. input 220 mV at 1000 Hz (phono), 200 mV (mic), 10 V (aux.); input impedance 47k ohms (phono), 600 ohms (mic); phono subsonic filter 18 dB/octave at 30 Hz; mic talkover 14 dB program level reduction. Five-band graphic equalizer with center frequencies at 60, 250, 1000, 3500, and 12,000 Hz, ±12 dB boost or cut; has bypass switch and switchable signal processor loop. Other features include illuminated VU meters with calibrated sensitivity control (−20 to +3 dB range); master level control; two sets of stereo main outputs; preset level indicators for all inputs and main outputs; rack mountable 8¾" H × 19" W..... $435

## JVC

### MI-5000 Master Mixer

Six-channel master mixer; each channel features 10-dB input level slide controls with 20-dB master input level control, independent pan pots, LED overload indicators, four-position mic/att/phono/line select switches, and echo switches with three-sec variable echo level control. Additional features include mix out/tape in monitor select switch; two VU meters; input jacks for phono, line, tape, and mic; recording, monitor, and headphone jacks. Min. input/impedance 0.2 mV/200-5000 ohms (six-channel mix), 1.4 mV/47k ohms (phono), 80 mV/100k ohms (line and tape); rated output level/impedance 0.3 V/600 ohms (rec and monitor), 0.3 mW/8-1000 ohms (headphones); frequency response 20-30,000 Hz −3 dB (mic and line), 30-20,000 Hz ±0.5 dB (phono RIAA), 10-25,000 Hz −1 dB (tape in); dist. 0.5%; S/N (IHF A) 56 dB (mic), 67 dB (line), 65 dB (phono); 127 mm H × 482 mm W × 347 mm D..... $430

### MI-E60 Microphone Mixer

Six-channel microphone mixer with reverberator. Frequency response 30-25,000 Hz −3 dB; reverberation time about 3 sec from 200-2,000 Hz; gain loss in passive mode 13 dB min..... $250

## LT SOUND

### BI-FET Mixing Patch Bay

Unit incorporates patch bay, 8-in/2-out mixer, and two switching mixing busses. Patch bay has source, monitor, aux. buss in, pre mix out, mixer, equalizer, aux. I, aux. II, noise-reduction encode, noise-reduction decode, mini-mixer pan in, and mixer input with switches. Mixer has two panning inputs, routing two inputs to left channel, two to right, and two to both channels. Three tape decks have three switches each for rec-play, buss A-buss B, and noise reduction in-out. S/N 90 dB below 1 V; THD and IM dist. 0.008%; slew rate 13 V/μsec; unity gain; 3.5" H × 19" W × 7" D..... $420

### MX-6 6X2 Mic-Line Mixer

Designed to generate multiple microphone signals from four-track record and equalization to mixed and panned stereo master. Features unbalanced low-impedance mic inputs and line level inputs, panners for each level, low-frequency switchable 2-40-Hz rolloff control, ±18-dB bass and treble controls for each channel with send-receive buss, and overall stereo volume control. Frequency response 20-40,000 Hz ±0.5 dB (rumble filter out); S/N 85 dB (line in); mic input impedance 2k ohms (low-impedance); line input impedance 47k ohms; output impedance 200 ohms; gain −35 dB (first mic gain stage), 0-20 dB variable (second mic and line gain stage); 3.5" H × 19" W × 6.5" D..... $250

## OPAMP LABS

### 1204RS Recording Studio Console

12-in/4 out, four echo buss, 8-track mixdown-monitor system; input channels: mix slide pot (film type) with 90-dB attenuation; input select: 0, −10, −20, −30 dB and mike level, line 1, 2, and 3; 12 echo send, four echo return, four echo return assign controls for four echo busses; low-frequency equalization (+12 dB): 1500 Hz (peaking), 3000 Hz (peaking), 5000 Hz (peaking), and 10,000 Hz (shelf); four output assign lit alternate action switches; four 4½-in lit VU meters for output assign channels, two 4½-in lit VU meters for stereo mixdown; four master pots; eight mono earphone pots; eight mixdown pan-gain pots; talkback and slate buttons; mike gain controls; built-in 1000 Hz oscillator; stereo record and monitor amps; external rack-mounted power supplies. Kit..... $6100
**1204RS.** Wired version..... $9700

### 1010 In/Out Matrix Transformer

Pushbutton 10-in/out lighted-switch matrix transformer; input impedance 10k ohms; gain 0 dB; load impedance 600 ohms; +24 dBm output; isolation 80 dB between inputs; plug-in solid-state amplifiers and transformers; barrier terminals for input and output; 7" H × 19" W × 14" D..... $2200

# 8 MIXERS

## PIONEER

### MA-62A 6-Channel Mixer
Has input facilities for up to six mikes; each channel has alternative terminal for line or phono inputs; two channels equipped with pan pots, four with location switches; mike attenuators for each channel; low-cut filters for mike input; portable design; two stereo output terminals; pointer-index markers for each of six long-throw faders (plus master volume faders); 5 3/16" H × 15 3/4" W × 10 3/8" D ..... $250

## SANSUI

### MA-7 Monitor Consolette
Monitor consolette features dual-function peak-hold meters reading watts or VU dBs and separate left/right full-range cue monitor speakers; has adjustable input sensitivity buttons (−20 to +20 dB) with variable level control; monitor level control; built-in 400 and 10,000 Hz calibration oscillator with oscillator level control; amplifier for headphones or speakers; rack-mountable ..... $330

### AX-7 Mixer/Recording Consolette
Four-input stereo mixer with built-in reverb unit features monitor selector (source, mixing out, tape 1, 2, 3); front-panel jacks for connection of portable stereo tape deck, etc; recording mode (tuner, AM/FM, mixing out, source/tape, three-position tape copy); mixing selector (source, tape 1, 2, 3, and off); mixing balance control; master volume control; reverberation selector permits addition of "reverb" to input connected microphones, guitars, and or line sources; reverberation control (0-3.2 sec); input selector (line, guitar, and mic with sensitivities 1 mV, 20 mV, 150 mV); panpots left and right for each channel; level controls; attenuator; low cut switch. Frequency response (source tape) 20-20,000 Hz +0 dB, −0.5 dB, (mic guitar line) 20-20,000 Hz +0 dB, −1 dB; THD 0.1% at or below 2 V rms; IHF hum and noise (mic) 61 dB, (guitar) 58 dB, (line) 69 dB, (source) 78 dB; channel separation 70 dB at 1000 Hz (source and tape); max. output 5 V into 47k ohms at 0.1% THD; 4 3/8" H × 16 15/16" W × 11 1/4" D ..... $300

## SHURE

### 700 Pro Master™ Sound System
Six balanced low-level transformer-coupled dual-impedance microphone input channels, each with pre-fader monitor send, effects reverb send, high- and low-frequency equalization, pan pot, input attenuator, LED clipping indicator, and volume control; master controls; handles condenser microphones through built-in 24-V simplex power supply; two additional aux. level inputs for channels 7 and 8. Feedback finder ten-band stereo equalizer with ISO center frequencies set at 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz ±10 dB boost or cut. LED status, peak-reading, power amp overload, and temperature warning indicators; rear-panel patch block; twin 200-W power amplifiers; frequency response 40-20,000 Hz ±2 dB ..... $1100

**701.** Speaker system for 700; has 15-in woofer and high-frequency horn; handles 150 W continuous; SPL 100 dB at 4 ft with 1 W; high-frequency horn has 60-degree long-throw or 120-degree wide-angle dispersion; 5/8-in plywood and structural foam enclosure ..... $495

### SE30 Gated Compressor/Mixer
High-quality gated memory compressor combined with a self-contained portable three-input mixer and remote amplifier; frequency response 30-20,000 Hz ±2 dB; gain below compression threshold, output terminated, (line) 600 ohms, (microphone) 150 ohms, (aux.) 47k ohms; input noise −129.5 dBV; dist. 0.5% THD at +15 dBm output, 30-20,000 Hz; compression ratio 10:1 typical from 10 to 20 dB compression, 5:1 min. from 10 to 30 dB compression; compression threshold (mike) −96 dBV at max. input gain, (line) −48 dBV; recovery time adjustable from 100 msec to 8 sec; attack time same as recovery time for increases up to 12 dB; gated memory less than 20 dB gain recovery after 1 min in "hold" condition; 108-132 V ac, 50/60 Hz; 3 1/2" H × 15" W × 10" D ..... $541

### M67 Professional Mixer
Professional mixer provides four low-impedance transformer-coupled balanced microphone inputs (one convertible to line input); balanced 600-ohm line and microphone level outputs; illuminated VU meter calibrated for +4 and +10 dB out; extremely low noise and r-f susceptibility; 108-132 V ac, 50/60 Hz; 2 3/4" H × 11 3/8" W × 7 1/2" D ..... $277

### M677 Accessory Mixer
Transistorized six-input accessory mixer for use with Shure models M67 and SE30; obtains power from associated Shure mixer or battery power supply ..... $258

### Microphone Mixers
All models have independent volume controls and a master volume control which simultaneously controls the gain of all inputs; 2 3/4" H × 11 3/8" W × 5 1/4" D; weight 4 lb.

**M68.** Input connections are male professional three-pin audio connectors for 120 V ac ±10%, 50/60 Hz ..... $162

**M68FC.** Input connections are female professional three-pin connectors for 120 V ac ±10%, 50/60 Hz ..... $162

**M68FCE.** Similar to M68FC, but for both 105-130 V ac, 50/60 Hz and 210-260 V ac, 50/60 Hz with three conductor cable ..... $166

## SONY

### MX-20 Professional Microphone Mixer
Eight-channel in/four-channel out microphone mixer for studio or sophisticated amateur record-

ings. Features three-position mic input attenuator; balanced mic input and output with XLR connectors; cascade connector for coupling two MX-20's to produce 16-channel input mixer; five-step equalization control in channels one through six; pan pot and dead center controls; slide master fader; slanted front panel with carrying handle; four VU meters; abundant output level. Mic input sensitivity −72 dB (0.2 mV), low impedance; line-in impedance 100,000 ohms, sensitivity −22 dB (60 mV); mike attenuation off, −15 dB, −30 dB, −45 dB; output impedance (line-out) 600 ohms balanced, 10,000 ohms unbalanced; output impedance (headphone) 8 ohms; frequency response 30-20,000 Hz +0 dB −1.5 dB; S/N 65 dB; 7 13/16" H × 18 5/16" W × 16 3/4" D ..... $1275

### MX-670 Microphone Mixer
Six-in two-out microphone mixer with full panning capability; for semi-professional or advanced amateur stereo recording; has ac/dc power operation for on-location or studio recording. Features pan pot control; two-position mic input attenuator; preset indicators; cascade connector; built-in oscillator; master fader. Mic input sensitivity −72 dB at 0.2 mV (low impedance); line-in impedance 100,000 ohms, sensitivity −22 dB at 60 mV; phono in impedance 50,000 ohms, sensitivity −51 dB at 2.2 mV; mic attenuation off, −15 dB, −30 dB; output impedance (line out) 600 ohms (low), 10,000 ohms (high); headphone output impedance 8 ohms; frequency response 30-25,000 Hz; S/N 60 dB; 3 3/8" H × 17 7/8" W × 10" D ..... $425

### MX-650 Microphone Mixer
Six in/two out-channel microphone mixer for sophisticated two-channel recording; each input channel can be set to feed left or right line output and each output channel can be Y-ed to left and right line outputs simultaneously. Features pan pot control; two-position mic input attenuator; pre-set indicators; cascade connector; built-in oscillator; master fader. Mic input sensitivity −72 dB (0.2 mV), low impedance; 100,000 ohms line-in impedance, sensitivity −22 dB (60 mV); phono in impedance 50k ohms, sensitivity −51 dB (2.2 mV); mic attenuation off, −15 dB, −30 dB; output impedance (line-out) low, more than 600 ohms, high, more than 10,000 ohms; output impedance (headphone) 8 ohms; frequency response 30-25,000 Hz; S/N 60 dB; 3 3/8" H × 17 7/8" W × 10" D ..... $310

### MX-510 Microphone Mixer
Five channel inputs; two channel outputs. Features two-way (battery/ac current) power source; five mic inputs for low impedance mikes; three line inputs for tape recorder, tuner or amplifier; two phono inputs for record player; pan pot control; slide master fader control; pre-set indicators; two VU meters. Sensitivity −72 dB at 0.2 mV (mic in, low impedance), −22 dB at 60 mV (line in), −51 dB at 2.2 mV (phono in, RIAA); impedance 100k ohms (line in), 50k ohms (phono in); mic attenuation off −20 dB; output level/impedance −5 dB at 0.435 V/10k ohms (line), −24 dB at 49 mV/8 ohms (headphone); frequency response 30-25,000 Hz; S/N 60 dB; 3" H × 13 1/4" W × 9 1/2" D ..... $225

### MX-7 Microphone Mixer
Six-in/two-out microphone mixer for semi-professional. Features preset indicators for reference during temporary level changes, auto input selector, distributor switch, and line input. Mic input sensitivity −51 dB at 2.2 mV (low impedance); line-in impedance 82,000 ohms; sensitivity −5 dB at 435 mV; line out load impedance 1000 ohms; level out 60 dB at 0.775 mV; 1 9/16" H × 10 1/4" W × 6 5/8" D ..... $70

**MX-5.** Similar to MX-7 except three-in one-out mic mixer for mono recordings; 2 1/8" H × 9" W × 5 1/4" D ..... $45

## SOUND WORKSHOP

### Series 30 Recording Console
Modular control center of in-line input/output design; designed for 8, 16, or 24 track studio; choice of 8-36 inputs and 8-24 outputs. Common features include proprietary active differential mic preamp; state/talkback/cue, independent studio monitor selector, echo return to monitor and cue, and internal oscillator; LED meter display of all outputs including bus, aux. sends, and mixdown; switchable phantom power bus for condenser mics; pre and post fader patch points; direct outputs on all channels; interface via Molex; nominal +4 dBm operating level, switchable to match −10 dBm level. Series 30 A includes pedestal base; three-band/three-frequency equalizer; 100-mm long-throw carbon faders; one cue send and one echo send bus; additional send bus available during mixdown. Series 30 B includes pedestal base; three-band equalizer with sweepable 20:1 frequency selection/band; switchable low-cut filters; Penny & Giles conductive plastic faders; two echo send busses; stereo cue send bus; fully-wired TT-type patch bay. Other options, such as VCA input subgrouping and ARMS automation, also available.

**3012.** 12-in mainframe providing from 8 in/8 out to 12 in/8 out configurations with A or B selection ..... $4445-$8660

**3020.** 20-in mainframe providing from 8 in/8 out to 20 in/16 out configurations with A or B selection ...

..... $4725-$12,855

**3028.** 28-in mainframe providing from 8 in/8 out to 28 in/24 out configurations with A or B selection ... ..... $4985-$17,035

**3036.** 36-in mainframe providing from 8 in/8 out to 36 in/24 out configurations with A or B selection ... ..... $5250-$21,220

### 1280B Recording Console

12-in/8-out recording console with studio-quality balanced transformer mic-pres; 8 × 2 stereo control room monitor mix; 8 × 1 musician's cue mix; independent 2-track mixdown buss; each input has three-band equalization, 35 dB trim control, push-button track assign, full panning, echo send, locking solo and mute switches, straight-line fader, and pre- and post-fader patch points; Tri-Lite LED readout for all 10 output busses; 105-125-V ac, 50 60 Hz, 20 W; 5½" H × 27" W × 20" D..... $3450

### 421 Broadcast/Disco Mixer

Stereo phono mixer/preamp designed for disco DJs and small broadcast and newsroom production. Features two stereo magnetic phono, two stereo tape, and one high- or low-impedance mic inputs; link jack patch points; low-end boost, flat, or cut EQ on mic input; selectable talkover up to 20 dB; active summing cue buss; switchable 35-Hz low-cut filter (12 dB/octave); Tri-Lite LED readout reads average system level and transient peaks; monitor select; plug-in 3-W headphone amp for mono or stereo operation. Input noise 72 dB below 10 mV (phono), −90 dBm unweighted (tape and link), −114 dBm (mic); input dist. 0.1% (phono and mic), 0.02% typical (tape and link); phono overload 100 mV; input impedance 47k ohms (phono), 10k ohms unbalanced (tape, mic, link); gain to program output 50 dB at 1000 Hz (phono), 14 dB (tape and link), 68 dB (mic); output impedance 47 ohms (program and tape link), 2.5k ohms (monitor); nominal output level −2 dBm (program), −6 dBm (monitor and tape/link); max. output level +20 dBm 600 ohms (program), +20 dBm 10k ohms (monitor and tape link); frequency response 20 20,000 Hz +0.25 dB; 5 25" H × 19" W × 5.5" D ..... $595

## TAPCO

### Catalina Series C-12 Mixing Console

12-in four sub-group direct out stereo and mono out sound reinforcement mixing console. Features mic line switching; front-panel patching system; switchable metering of all outputs; two pannable effects returns; three separate sub-busses comprising monitor, pre EQ/channel gain, pre or post aux. buss, and post effects buss; full priority solo system; headphone monitor system; ±18 dB bass, ±12 dB midrange, and ±18 dB treble EQs input channel; 100-mm slide-gain controls; front-panel mounted patchbay; +48-V phantom power for high quality condenser microphone Frequency response 20 20,000 Hz ±1 dB; THD and IM dist 0.02%; equiv input noise −128 dBV; output noise −80 dBV; max input level 0 dBμ at 0.775 V rms (mic), +30 dBμ at 25 V rms (line); crosstalk −70 dB; 7 5" H × 27" W × 26.5" D ..... $2375

**C-8E.** Expands C-12 to 20, 28, or more inputs; self powered with LED indicator and ac accessory receptacle ..... $1545

### Panjo 7212 Mixing Console

12 in 2 out stereo mixing console with transformer less electronically-balanced input circuitry. Features three-knob four-frequency equalization controls, +24-V phantom power, solo, pan pots, channel patching, slide faders, aux., monitor, and effects send busses with master level controls, gain trim control, overload LED, mic/line switch, internal headphone amplifier, and VU meters with meter switching. Frequency response 20-20,000 Hz ±1 dB; slew rate 13 V/μsec; THD and IM dist. 0.02%; equiv. input noise −130 dBV; max. input level +6 dBμ at 1.5 V rms (mic), +24 dBμ at 12 V rms (line); crosstalk −70 dB; 8.5" H × 21.5" W × 16" D..... $1795

**7416.** Similar to 7212 except has 16 in/4 subgroup direct out/stereo and mono out format; 8.5" H × 31.5" W × 16" D..... $3195

### 8201B Stereo Mixer

8 in/2 out stereo mixer with balanced inputs; expandable to 24 inputs with monitor and effects. Features two-knob two-frequency equalizer; transformer balanced mic and unbalanced line level inputs; monitor and effects buss; VU meters; +48-V phantom power; pan pots; patching with separate in/out jacks; mic/line switch with mic equalization; rumble filter. Frequency response 20-20,000 Hz; THD and IM dist. 0.05%; S N 83 dB; max output +18 dBm ..... $995

**6201B.** Similar to 8201B except 6 in 2 out and expandable to 22 inputs ..... $725

**8201REB.** Stereo expander with reverb for 8201B and 6201B; has eight balanced inputs, internal reverb with two-knob, two-frequency equalizer and pan pot, Accutronics type 9 tank for expander and master unit, monitor and effects send, +48-V phantom power, and pan pots ..... $975

### 6200 Stereo Mixer

6 in 2 out stereo mixer. Features two-knob, two-frequency equalization, effects buss with left/right return level controls, pan pots, VU meters, patching, balanced mic and unbalanced line level inputs, mic EQ, and rumble filter. Frequency response 15-40,000 Hz; THD and IM dist. 1.0%; S N 76 dB; max. output level +17 dBm ..... $445

*Company also manufactures 8- and 6-input balanced or unbalanced mono mixers with without reverb; prices range from $285 to $685.*

## TASCAM by TEAC

### Model 5B Mixing Console

8-in 4-out mixing console. Input module: 0, 20, or 40 dB of mic padding; 0-20 dB mic, tape, or line trim; foldback pre EQ and fader cue; foldback post EQ and fader echo; 15 dB boost or cut at 3 or 10 and 75 or 200 Hz; pan automatically engages for multi-output assignment; LED overload indicator; straight-line fader Submaster module: buss tape monitor; tape cue; monitor gain and pan; echo receive; submaster fader. Master module: 400-Hz test tone; four-channel monitor; studio monitoring; control room monitoring; solo level control; master fader; VU-type level averaging meters and peak-indicating LEDs; optional talkback module available Frequency response 30-20,000 Hz ±2 dB; S N 75 dB weighted (one input, mic or line), 65 dB weighted (8 inputs, mic or line); crosstalk 60 dB at 1 kHz; 0.3% THD max.; 117-V ac, 60 Hz, 40 W, 7½" H × 23⅛" W × 24½" D..... $1900

**Model 5BEX.** Eight-input expander for Model 5B ..... $1400

### Model 3 Mixing Console

8-in 4-out mixing console. Input section: 0, 20, or

40 dB of mic padding; mic line input selector; 15 dB boost or cut at 3 or 10 and 75 or 200 Hz; pan automatically engages for multi-output assignment; straight-line fader; three-position output-to-headphone (off/monitor/submix); master fader; PA mixing capability; six lo-Z balanced mic inputs; two hi-Z unbalanced mic inputs; aux. outputs in parallel with line outputs; accessory send and receive; VU-type level averaging meters and LED peak indicators. Frequency response 30-20,000 Hz ±2 dB; S/N 60 dB weighted min.; crosstalk −60 dB at 1 kHz; 0.3% THD max.; 117-V ac, 60 Hz, 18 W; 6¼" H × 18¼" W × 20⅓" D..... $990

### Model 1 Mixer

8-in/2-out line level mixer; independent gain and pan for each input channel; master gain; foldback for each channel; aux. outputs in parallel with line outputs; separate buss inputs; contains 1-W amp with level control for two stereo headphone feeds; S/N 78 dB weighted; frequency response 30-20,000 Hz ±1 dB; crosstalk −50 dB at 1 kHz; 0.3% THD max.; 117-V ac, 60 Hz, 8 W; 4⅜" H × 17⅛" W × 4" D..... $180

### MB-20 Meter Bridge

Teac meter bridge; four VU meters with LED peak-level indicator; built-in 4 × 2 monitor mixer, headphone amp, independent monitor switches, and a variable input sensitivity selector ..... $250

## TEAC

### 144 Mixer/Cassette Recorder

Unit combines mixing console with porta-studio cassette recorder. Mixer: features four mic/line in-

puts with trim, aux. send, ±10-dB bass and treble, pan, and slide fader controls; master section has buss monitoring with cue and review, track to track, dubbing without reconnecting, mixdown from four to two-channel stereo, Simul-Sync monitoring with separate cue mix system, and master fader controls; mic input −60 dB unbalanced; line input −10 dB (unbalanced 60k ohms); frequency response 20-20,000 Hz ±1 dB; S N 68 dB weighted Recorder: features two-motor logic control transport, two-channel record four-track playback, ±15% pitch control, double-action pinch roller for real-time pause, and built-in full-time Dolby noise-reduction system; tape speed 3¾ ips; wow and flutter 0.04% weighted; frequency response 20-18,000 Hz; S N 63 dB; crosstalk 50 dB at 1000 Hz ..... $1100

### Model 2A Audio Mixer

Features six inputs (mike or line in any combination), four outputs; level controls for each input channel; master output level control; cue out jack on each input channel; accessory send receive patch points on each output buss for reverb units, graphic equalizer, limiters, compressors, noise-reduction units, other signal processing equipment; four aux. outputs in parallel with four line outputs; selectable high-cut filters at 5 kHz or 10 kHz; low cut filters at 100 Hz or 200 Hz; color-coded push push channel assignment buttons with pan on each channel; 3¹⁷/₃₂" H × 13⁷/₁₆" W × 14⁹/₁₆" D..... $475

### MB-20 Meter Bridge

For line-level applications; complements Model 2A Audio Mixer; four VU meters; LED peak-level indicator; built-in 4 × 2 monitor mixer; headphone amp; independent monitor switches; variable input sensitivity selector ..... $250

# 9 SIGNAL PROCESSORS

## ADC PROFESSIONAL PRODUCTS

### Sound Shaper Three Paragraphic EQ

Three 12-band parametric graphic equalizer controlling up to 36 frequency ranges per channel, ranging from 26-21,500 Hz ±12 dB; graphic equalizer center frequencies set at 32, 56, 100, 180, 320, 560, 1000, 1800, 3200, 5600, 10,000, and 18,000 Hz; features internal switching and monitoring with line/record and tape monitor controls, EQ bypass, 24 linear potentiometers, and two vertical LED signal level meters ..... $500

### Sound Shaper Two MkII Equalizer

Twelve-band stereo frequency equalizer with center frequencies set at 30, 50, 90, 160, 300, 500, 900, 1600, 3000, 5000, 9000, and 16,000 Hz, ±12 dB boost or cut; each band/ch has linear potentiometer control with center detent. Features internal switching and monitoring with pushbutton line/record and tape monitor controls; pushbutton equalization bypass; dual seven-segment ±12 dB LED meter with 1-dB adjust switch and two channel LEDs; rear-panel variable frequency spectrum level balancing controls/ch; two main and two tape monitor inputs; two main and two tape outputs. Frequency response 5-100,000 Hz +1 dB; unity gain ±1 dB; output 9 V rms into 10k ohms; HD and IM dist. 0.02%; hum and noise −85 dB; output impedance 10 ohms at 1000 Hz; input impedance 75k ohms; 6¼" H × 16⅜" W × 6¾" D..... $330

### Sound Shaper One Ten Equalizer

Ten-band stereo frequency equalizer with center frequencies set at 31, 62, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±12 dB boost or cut; each band/ch has linear sliding controls with center detent. Features power, line/record, tape monitor, and EQ bypass pushbutton controls; two main and two tape monitor inputs; two main and two tape outputs. Frequency response 5-100,000 Hz +0/−1 dB; unity gain ±1 dB; output 10 V rms min. into 10k ohms; HD and IM dist. 0.02%; hum and noise −80 dB; output impedance 10 ohms at 1000 Hz; input impedance 75k ohms; 6¼" H × 14¾" W × 6¾" D ..... $230

**Sound Shaper One.** Similar to One Ten except five-band, two channel equalizer with center frequencies set at 60, 240, 1000, 3500, and 10,000 Hz; frequency response 5-100,000 Hz +0.5/−1 dB; no line/record or EQ bypass control; 5⁵⁄₁₆" H × 10¹⁄₃₂" W × 6¹¹⁄₁₆" D..... $120

## ADS

### ADS 10 Digital Time Delay System

Digital time-delay system with built-in amplifier (100 W/ch continuous into 4 ohms, 20-20,000 Hz, 0.08% THD), matching 2-way speakers. Delay section: three initial delays, first delay variable 10-40 msec, longest delay variable up to 100 msec; reverberation decay time 0-1.6 sec (variable 0 to −60 dB); controls include ambience-channel bandwidth, stage depth (first delay), hall size (remaining delays), extra outputs for additional amplifier-speaker systems; "Source Ambience Discriminator" extracts ambience in recordings, reduces reverberation of FM announcer voices; can be driven from line-level (preamp or tape out) or speaker terminals (using optional cables); LED delay indicators; ambience outputs, 30-13,000 Hz, +1/−3 dB, less than 0.3% THD+noise, 83 dB dynamic range. Power amplifier section: 94 dB S/N (A-weighted), frequency response 30-20,000 Hz ±0.5 dB. Model L10 speakers: 2-way (7-in woofer and 1-in soft-dome tweeter); frequency response 48-18,000 Hz ±3 dB, 38-20,000 Hz ±5 dB; efficiency 90 dB/watt; input range 50-100 W. Delay/amplifier 3½" H × 15¾" W (19" W optional) × 12" D. Speakers 15" H × 9¾" W × 6½" D..... $1150

**1001.** Similar to ADS 10 minus built-in power amplifier and matching speakers; optional bolt on rack handles (extends to standard 19 in) and walnut side panels available; black satin finish ..... $700

## ASHLY

### SC-66A Stereo Parametric Equalizer

Four-band stereo parametric equalizer for feedback control, acoustical tuning, tape-to-disc transfer, hum filtering, dialog equalization, and special effects. Each channel features low, low-mid, hi-mid, and high frequency band controls covering 16-800, 48-2400, 160-8000, and 480-24,000 Hz, respectively, with ±15 dB boost or cut controls/band, 3.3-0.05 octave bandwidth controls/band, and defeat switches for each band; ±15 dB master gain control with master defeat switch and LED peak overload on each channel. Input impedance 10k ohms, active balanced bridging; output impedance 50 ohm term, with 600 ohms or more; max. in-out level +20 dBm; frequency response 20-20,000 Hz ±0.5 dB; THD 0.05% at +10 dBV, 20-20,000 Hz; hum and noise −87 dBV (EQ in); rack-mount steel chassis; 5.25" H × 19" W × 6" D..... $599

**SC-63.** Three-band mono version of SC-66A minus low-mid frequency control and defeat switches for each band; 1.75" H ..... $369

### SC-55 Stereo Peak-Limiter/Compressor

Stereo peak limiter/compressor features bypass switch to limited or non-limited signal; ±30-dB gain control; 2:1-infinity ratio, 200 μsec-20 msec attack, and 100 msec-2 sec release controls; balance control; separate left/right output controls; gain reduction LED display at −20, −10, −6, and −3 dB; left and right threshold LEDs. Input impedance 10k ohms, balanced bridging; output impedance 50 ohm term, with 600 ohms or more; max. in-out level +20 dBm; frequency response 20-20,000 Hz ±0.5 dB; THD 0.05% at 0 dBV, 20-20,000 Hz; hum and noise −90 dBV, unity gain; 3.5" H × 19" W × 6" D..... $499

**SC-50.** Mono version of SC-55; features detector patch point for connection of equalizer in detector loop to produce frequency selective limiting; 1.75" H ..... $299

## AUDIO CONTROL

### C-101 Equalizer/LED Spectrum Analyzer

Ten-band two-channel graphic equalizer features 101 LED spectrum analyzer display. LED spectral display operates on various levels: shows controllable peak-reading modes (fast or slow); horizontal LEDs which indicate sound pressure level with external microphone or VU meter readings; switchable calibration levels from 2 dB/LED (analyzes pink noise and microphone) to 4 dB/LED (displays wider dynamic range). Center frequencies set at 32, 60, 120, 480, 960, 1920, 3840, 7680, and 15,500 Hz with ±15 dB range, −1 dB subsonic rolloff at 25 Hz, −3 dB rolloff at 20 Hz, and −21 dB rolloff at 10 Hz. Other features include continuously variable input level sensitivity with calibration; automatic mic/line input switching; built-in pink noise generator; stereo paired equalizer sliders; equalization tape button; 18-dB/octave subsonic filter; phase correlation rumble reducer circuit. Frequency response 3-100,000 Hz ±0.75 dB; dist. 0.025% at 1 V from 20-20,000 Hz; hum and noise −96 dB at 1 V, 10,000-Hz bandwidth; max. input 7 V; input impedance 100k ohms; max. output 7 V; output impedance 680 ohms; 3.5" H × 19" W × 6.5" D ... ..... $549

### C-22 Octave Equalizer

Ten-band two-channel octave equalizer with center frequencies set at 32, 60, 120, 480, 960, 1920, 3840, 7680, and 15,500 Hz with ±15 dB range, −1 dB subsonic rolloff at 25 Hz, −3 dB rolloff at 20 Hz, −21 dB rolloff at 10 Hz. Features stereo paired sliders, 18 dB/octave subsonic filter, equalization tape button, and phase correlation rumble reducer circuit. Frequency response 3-100,000 Hz ±1 dB; dist. 0.04% at 1 V from 20-20,000 Hz; hum and noise −96 dB at 1 V; max. input 7 V; input impedance 100k ohms; max. output 7 V; output impedance 680 ohms; 3.5" H × 19" W × 6.5" D ... ..... $229

### 520B Equalizer/Speaker Control System

Five-band equalizer/speaker control system with 18 dB/octave subsonic filter. Center frequencies set at 36, 60, 120, 1000, and 15,500 Hz; equalization range ±12-15 dB. Features tape monitor loop and separate function switches; l/r tape inputs/outputs and l/r main inputs/outputs. Frequency response 15-30,000 Hz ±1 dB; dist. 0.04% from 20-20,000 Hz, 1 V; hum and noise −96 dB at 2 V out, 90 dB at 1 V; max. input 7.5 V rms; input impedance 470k ohms; max. output 7.0 V rms; output impedance 600 ohms; 2.6" H × 12.3" W × 5" D..... $119

## BIAMP

### EQ/270A Graphic Equalizer

27-band 1/3-octave graphic equalizer with center frequencies set from 40-16,000 Hz with ±12 dB boost or cut. Features EQ bypass switch; LED overload indicator; transformer-type connectors and phone jacks on inputs and outputs; transformerless balanced lines in and out; combining filters. Frequency response 10-90,000 Hz ±1 dB, 15-30,000 Hz ±0.1 dB; THD and IM dist. 0.0075%; hum and noise −90 dB at 0 dB V refer-

ence, 115 dB below rated output; filter bandwidth 1/3 octave at 3-dB point with 6 dB attenuation; frequency tolerance ±2% of band centers; input impedance 600 ohms/500 ohms switchable; max. input +24 dB; slew rate 8 V/μsec; 3½" H × 19" W × 10" D ..... $495

### EQ/210 Graphic Equalizer

Ten-band two-channel graphic equalizer with center frequencies at 32, 64, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±15 dB boost or cut. Each channel has ten sliders, gain slider, EQ bypass switch, and LED overload indicator; four ¼-in phone jacks/ch for unbalanced/balanced input/output lines. Frequency response 6-45,000 Hz +0/−1 dB (control set flat); THD and IM dist. 0.005%; gain −3 dB unbalanced, 0 dB balanced; slew rate 1 V/μsec; output load impedance 600 ohms; input impedance 50,000 ohms, balanced or unbalanced; max. output +24 dBm at 8 V, unbalanced; S/N 84 dB below 1 V out; rack-mountable; 3½" H × 19" W × 5¼" D ..... $299

**EQ/110R.** One-channel version of EQ/210 ..... $185

**EQ/110.** Same as EQ/110R without rack mount ..... $175

### Quad Limiter

Multi-channel limiter/compressor features four front-panel threshold controls with LED for four independent channels. Threshold variable from −40 to +18 dB; output impedance 600 ohms unbalanced or balanced; input impedance 25k ohms unbalanced, 50k ohms balanced; frequency response 20-25,000 Hz ±0.5 dB; THD 0.03% at 1000 Hz; attack time 1 msec; release time 150 msec to 1.5 sec; S/N 102 dB; slew rate 8 V/μsec; 1¾" H × 19" W × 5½" D ..... $269

## CERWIN-VEGA

### GE-2 Stereo Graphic Equalizer

Covers 13 frequency bands (from 31.5 Hz to 16,000 Hz) ±12 dB; response 20-20,000 Hz ±1 dB with equalizer controls at center detent; rated output 2 V rms (2000 ohms or greater load impedance); control accuracy within 1 dB of calibrations; hum and noise less than 100 mV equivalent input noise; distortion (harmonic or IM) less than 0.05%; inputs: two each source and tape input, line; tape output (phono jack); half-octave control below middle C, octave control above; 5¼" H × 19" W (rack mount) × 17¼" D (incl. knobs) ..... $600

## CROWN

### EQ-2 Synergistic Equalizer

Eleven-band two-channel octave center equalizer with center frequencies set at 20, 40, 80, 160, 320, 640, 1250, 2500, 5000, 10,000, and 20,000 Hz, ±15 dB boost or cut; each channel features octave frequency adjust controls; ±20 dB tone controls with bass hinge points adjustable from 180-1800 Hz and treble hinge points adjustable from 1000-10,000 Hz; equalizer cancel and tone cancel master controls; and overload indicators. Rear panel has unbalanced inputs, balanced inputs with switchable unity/+10 dB gain selection, screwdriver-adjusted attenuation controls, and normal/inverted outputs. Frequency response 10-100,000 Hz ±0.3 dB, 20-20,000 Hz ±0.1 dB, controls flat with IHF load; hum and noise 90 dB below rated output, 20-20,000 Hz bandpass; IM dist. 0.01% at rated output; rated output 2.5 V rms into IHF load; input impedance 25,000 ohms unbalanced, 20,000 ohms balanced (transformerless); output impedance 300 ohms (normal), 600 ohms (balanced); satinized aluminum front panel with grey Lexan inlay; 7½" H × 19" W × 14½" D ..... $1195

## dbx

### dbx Tape Noise Reduction Systems

Provides 30 dB noise reduction and 10 dB additional headroom when recording with open-reel, cartridge, or cassette recorders; eliminates tape hiss and noise in live recording; prevents additional noise build-up in tape duplicating or recording off-the-air; also decodes dbx encoded discs.

**Model 122.** Two-channel switchable record or play. ..... $275

**Model 124.** Four-channel switchable record or play. ..... $399

**Model 128.** Two-channel switchable record or play plus linear and above-threshold expander/compressor ..... $450

**Model 224 Recording Technology Series.** Two channel simultaneous record/play; also decodes dbx discs ..... $275

### 155 Noise-Reduction System

Professional format, 4-channel tape noise-reduction system gives 30 dB of tape noise reduction at all levels over the entire audio spectrum with an additional 10 dB recording level; true rms detection for accurate encode/decode tracking; linear decibel compression/expansion over 100 dB range; no pilot tones or level match adjustments necessary; front-panel record and play level adjust; user-changeable modular circuit boards for each channel (spares available) ..... $550

### Dynamic Range Expanders

Permits listener to restore up to 20 dB of the dynamic range missing from records, tapes, or FM broadcasts.

**3bx.** Three-band linear expander with 30 gain-change LEDs in −20 to +12 dB range; 3¾" H × 17¾" W × 10½" D ..... $699

**3bx-R.** Remote control for 3bx; provides remote control of transition level, release time, and expansion ratio; system master volume; fade control ..... $149

**2bx.** Two-band linear expander with 20 gain-change LEDs and program-dependent release rate; 3¾" H × 17¾" W × 10½" D ..... $499

**1bx.** Single-band linear expander with ten gain-change LEDs and program-dependent release rate; 3¾" H × 11" W × 10½" D ..... $259

**118.** Compressor/expander with peak limiting/unlimiting capability; allows recordist to make full dynamic range tapes on moderately-priced recorders and obtain 20 dB or more improved (S+N)/N; LED indicator light ..... $219

### 21 Disc/Tape Decoder

Linear decibel compression and expansion system that encodes musical signal going onto record and decodes dbx-encoded disc or tapes upon playback; features noise reduction and tape/source monitor buttons; level match control; frequency response 15-30,000 Hz ±0.5 dB (Dolby off); max. output 4 V rms into 10,000-ohm load; THD 0.2% at 1000 Hz; hum and noise −94 dBV; 2¾" H × 8¾" W × 6⅝" D ..... $109

## EVENTIDE

### JJ193 Digital Delay

CMOS-logic digital delay line designed for recording studio, concert hall, auditorium, or radio station; produces signal doubling, realistic echo effects, synchronization of sound reinforcement speakers, and pre-echo delay. Features RAMs; variable time delay switches (0-max. in 2-dB steps); four outputs and one input; six-LED input level indicators; input level control. Input impedance 20k ohms balanced, 10k ohms unbalanced; input level −10 to +3 dBm (full dynamic range); output impedance 300 ohms electronically balanced; max. output level +22 dBm; dist. 0.2% at 1000 Hz; dynamic range 90 dB from clipping to noise floor; frequency response 30-12,000 Hz ±1 dB; 1.75" H × 19" W × 9" D ..... $1195

**CD254.** Similar to JJ193 except has two outputs; 0-254 msec time delay controllable by internal switches; no front-panel controls ..... $895

### HM-80 Harmonizer

Compact portable harmonizer features ±1-octave pitch control, 270-msec delay, word or short riff repeat, time reversal, and dry vs. effect output mix, and feedback controls; dynamic range 80 dB; 2.25" H × 10.5" W × 8.25" D ..... $775

### FL201 Instant Flanger

Oscillator, manual, remote, and envelope controls may be used in any configuration; features time delay circuitry, effect modifier block (designed to imitate motor or servo hunting bounce), and depth control (effects percentage of direct vs. delayed signal and relative phase of each); line in/out control and LED indicator; high level input and output (optional balanced line in/out available); LED mode indicators. Frequency response 50-15,000 Hz +1 dB (direct channel), 50-10,000 Hz +1.5 dB (delayed channel); dist. 0.05% below clipping (direct channel), 1.0% from 0 to +8 dBm input (delayed); dynamic range 112 dB at 15,000 Hz (direct), 75 dB (delayed); delay time variable between 200 μsec-10 msec; input/output level 0 to +4 dBm; input impedance 10k ohms unbalanced; 3.5" H × 19" W × 9" D ..... $700

### 2830 Omnipressor

Dynamic modifier combines functions of compressor, expander, noise gate, and limiter. Features continuously variable expansion/compression control (10:1 gate to −10:1 abrupt reversal); attenuation and gain limit controls (60 dB to ±1 dB); variable time constant controls (1000:1); bass/cut switch; logarithmic input/output/gain meter; in/out bypass switch. Frequency response 20-16,000 Hz +0/−0.5 dB; input/output level 0 to +8 dBm nominal; input impedance 10k ohms electronically balanced; output impedance 600 ohms nominal; gain unity, +10, +20 dB (agc disabled); compression continuously variable from 1:1 to unity to 10:1; expansion continuously variable from 1:1 to 10:1; S/N −90 dBm at unity gain; attack time continuously variable 100 μsec-100 msec; release time continuously variable from 1 msec-1 sec; 115 V ac, 50-60 Hz ±12% or 230 V ac, 50-60 Hz ±12%; 3.5" H × 19" W × 9" D ..... $700

## FURMAN SOUND

### PQ-6 Stereo Parametric Equalizer/Preamp

Three-band stereo parametric equalizer designed as instrument preamp, feedback suppressor in PA system, or patchable outboard equalizer for recording studios, broadcast stations, or stage productions. Each channel features ⅓-octave narrow/5-octave broad bass, midrange, and treble bandwidth controls with overlapping and variable frequency controls covering 20-500, 150-2500, and 600-10,000 Hz respectively and +20 dB boost to minus infinity cut equalization controls, EQ in/bypass with LED, and loudness-compensation level control. Input 100k ohms unbalanced, with max. input before clipping 430 mV rms for low level; output 10 ohms unbalanced, with max. output level 8.3 V rms; total available gain 26 dB (low-level in), 6 dB (high-level in); frequency response ±0.5 dB (bypass), 20-20,000 Hz (EQ flat); S/N 109 dB (bypass), 99 dB (EQ in and flat); dist. 0.015% (bypass), 0.025% (EQ flat); brushed and anodized aluminum front panel and steel chassis; rack-mountable; available in 115 V, 60 Hz or 230 V, 50/60 Hz; 3.5" H × 19" W × 8" D ..... $525

**PQ-3.** Mono version of PQ-6; 1.75" H ..... $315

### RV-1 Reverberation System

Reverberation system incorporates shock-mounted dual Accutronics 16-in spring assembly, fast-attack peak limiter, and quasi-parametric midrange controls. Features input, direct, and reverb level controls, LED limit threshold indicator (flashes green when gain reduction begins), and midrange frequency (160-1400 Hz), ±18-dB midrange EQ, and treble shelving (±18 dB from 2500-10,000 Hz) controls. Input 33k ohms unbalanced, at recommended −10 to +4 dBm level; output 47 ohms unbalanced, with max. output level 8.3 V rms; frequency response 45-7000 Hz; decay time 1.8 sec with 30-40 msec initial delay; limiter compression ratio 10:1; S/N 74 dB (A weighted, EQ flat); aluminum front panel and steel chassis; rack-mountable; 1.75" H × 19" W × 8" D ..... $290

# 9 SIGNAL PROCESSORS

## GLi

### EQ-1500 BI-FET Graphic Equalizer

Ten-band stereo graphic equalizer with center frequencies at 30, 60, 120, 240, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, +12 dB boost or cut. Features high-speed operational amplifier Bi Fet IC circuitry; 20 slide controls (10/ch) with center detent; EQ defeat switch with LED status indicator; main, aux., and tape monitor input switches; power switch with LED. Frequency response 20-20,000 Hz +0.5 dB (EQ flat), 0-500,000 Hz +0.1 dB (EQ bypassed); dist. 0.05% at 1 V rms out; THD and IM dist. 0.005% from 20-20,000 Hz at 5 V; slew rate 14 V/μsec; S/N 90 dB below 2 V rms; max. output 10 V before clipping; 19" rack-mountable..... $250

## INTEGREX

### Four-Ch Dolby B Noise Reducer Kit

Stereo unit incorporates four Dolby channels for simultaneous encoding/decoding for three-head tape machines; designed to reduce hiss in magnetic-tape recording machines; decodes commercially-available Dolby B-encoded cassettes or Dolby B FM radio broadcasts and/or encodes blank tapes from any source; cannot be used for discrete 4-channel encoding or decoding. Noise reduction 9 dB weighted (CCIR/ARM); min. sensitivity 35 mV rms (tape and Dolby FM tuner inputs), 40 mV rms (aux. input); impedance 47k ohms (all inputs), 300 ohms variable (all outputs); max. variable output level 580 mV rms (Dolby level); overload 18 dB above Dolby level for 0.3% THD; dist. 0.05% (all outputs at Dolby level); S/N unweighted, ref. Dolby level, at monitor output 76 dB (from aux. in), 80 dB (from tape and tuner in, Dolby on), 69 dB (from tuner in), at tape output 69 dB (from aux. and tuner in), 76 dB (from tuner in, Dolby FM on). Kit includes two-color fiberglass printed circuit board with component locations, all alignment circuits, and solid mahogany cabinet; assembly time approx. 10 hrs; 2.75" H × 15.5 W × 6.75" D..... $137

**Dolby Calibration Tapes.** Specify reel or cassette . $9

### DFM Dolby Noise Reducer

Decodes Dolby B-encoded cassette or reel tapes and Dolby-encoded FM broadcasts; front-panel on/off and Dolby-decoding in/out switches; rear-panel input level calibration, output level, and 25/75 μsec de-emphasis input select controls. Noise reduction 9 dB weighted (CCIR/ARM); sensitivity 35 mV rms min.; variable output level 580 mV at Dolby level, overload 18 dB above Dolby level for 0.3% THD; dist. 0.05% ref. Dolby level; separation tape input 58 dB at 2000 Hz, Dolby on; S/N 79 dB Dolby level (CCIR/ARM); aluminum anodized case; 2.5" H × 8.5" W × 4" D..... $100

## INTERSOUND

### PRV-1 Parametric Equalizer-Reverb

Accutronics Type 9 mechanical delay line single-channel reverberation system with two-band parametric equalization. Reverb: features input gain control with 0, 3, 6, and 12 dB LED reverb drive signal display; output level control; EQ/flat line and reverb routing controls; reverb and line level controls; balanced and unbalanced inputs and outputs requiring no transformers; provision for optional footswitch for reverb selection with LED; nominal input level, balanced and unbalanced, 0.80 V rms at 0 dBV; reverb decay time 3.0 sec; reverb S/N 68 dB; dry stage (reverb off) frequency response 20-20,000 Hz +1 dB and S/N 90 dB at 0 dB; THD 0.05% from 20-20,000 Hz; nominal output level 0.80 V rms (0 dBV) into 1k ohms (unbalanced) and 1.0 V rms (+2 dBV) into 600 ohms (balanced); nominal overall gain 0 dB (EQ flat), +26 dB max. Equalizer: features 12-dB/octave variable lo-cut filter; frequency controls ranging from 80-1800 Hz and 500-12,000 Hz; two bandwidth controls ranging from 0.25-3.0 octaves/band; separate +14-dB boost/cut controls; variable lo-cut turnover frequency control from 150-1200 Hz; steel rack-mount chassis; 3.5" H × 19" W × 11" D. ..... $455

## JVC

### SEA-80 Graphic Equalizer

Ten-band stereo graphic equalizer with center frequencies set at 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, +12 dB boost or cut. Features fluorescent analyzer display with left/right mode switch, memory, and level control (covers 32-16,000 Hz frequency range over 0-26-dB level range); built-in pink noise generator; 6-dB SEA switch (doubles input sensitivity to accommodate high inputs without distortion); SEA record switch (transmits signal to tape deck); tape monitor switch; −20-dB mic switch. Input impedance 47k ohms (SEA and tape monitor in); output impedance 100 ohms (SEA and tape rec out); rated output 2 V rms; frequency response 10-100,000 Hz +0/−1 dB; THD and IM dist. 0.003%; gain 0 dB/ 6 dB; 6¾" H × 17¾" W × 12¼" D..... $600

### SEA-50 Graphic Equalizer

Ten frequency "tone-zone" control ranges (one per octave) with +12 dB boost or cut; uses resonant circuits composed of resistors, capacitors and semiconductor inductors, one for each "tone zone" or frequency range band..... $290

### SEA-20GL Graphic Equalizer

Seven frequency "tone zone" control ranges (one per 1½ octave); each slide control covers 60, 150, 400, 1000, 4000, 6000, or 15,000 Hz tone zone; includes defeat, record, tape monitor, and input attenuator (0 dB/−6 dB) ..... $190

### BN-5 Biphonic Processor

Binaural processor for binaural effects through speakers; input terminals Line In/Tape Play at 80 mV/ 20 dB, 100 ohms input impedance; output terminals Line Out at 300 mV, −8 dB output level, 3.5k ohms Tape Rec output impedance; consumes 7 W; 3⅞" H × 15⅜" W × 9½" D. ..... $280

## KLH

### DNF 1201A Dynamic Noise Filter

Processes any two-channel or matrix encoded material from turntable, tape deck, cassette deck, receiver or tuner; pushbutton controls select proper noise reduction; sensitivity control with LED readouts; frequency response (min. bandwidth) −3 dB at 500 Hz, −10 dB at 1 kHz, −20 dB at 2.5 kHz; (max. bandwidth) +0.5 dB max. 10 Hz to 20 kHz, −3 dB at 30 kHz, −25 dB at 100 kHz; attenuation rate 9 dB/octave; noise reduction levels up to 30 dB above 5 kHz, 14 dB above 400 Hz; HD 0.2% max.; 0.0 dB gain at 1 kHz adjustable to 10 dB; internal noise 100 μV rms 20 Hz to 20 kHz; has 8 phono jacks and tape deck connectors; 2⅞" H × 17½" W × 8¼" D ..... $379

### TNE 7000 Transient Noise Eliminator

Impulse suppressor reduces or eliminates medium and small clicks, pops and ticks from turntable or tape deck; blanking duration 100-600 millionths of a second; blanking period filled by transition voltage; has defeat, tape monitor, threshold, and sensitivity controls; LED indicators for transient noise elimination and high-frequency calibration; frequency response 20-20,000 Hz ±0.5 dB; distortion 0.1% (THD), 0.5% (IM); internal noise 40 μV rms; 2⅞" H × 16¾" W × 7⅝" D..... $329

## LOGICAL SYSTEMS

### 8801 Dynamic Noise Filter

Variable bandpass filter designed to eliminate hiss and rumble from existing program material; also eliminates tape, record, and radio reception noise without interfering with music; no encoding or decoding necessary. Features mono bass circuit with 150-Hz crossover at 6-dB/octave; dynamic low-end 6-dB/octave filter; on-off/threshold, tape monitor, and hiss and rumble reduction defeat controls; tri-color LEDs indicating break frequencies from 3000-10,000 Hz. Hiss reduction 15 dB at 10,000 Hz; rumble reduction 20 dB at 10 Hz; program-dependent attack and release times; frequency response 20-20,000 Hz; S/N 75 dB below 2 V rms out, 20-20,000 Hz; THD 0.1% at rated output; IM dist. 0.01% at rated output; max. output 10 V into 10k ohms; input impedance 47k ohms, single-ended; output impedance 600 ohms; 1.75" H × 19" W × 7" D ..... $289

**8800.** Similar to 8801 except variable low-pass 9 dB/octave filter; minus hiss and rumble reduction defeat controls; has system defeat; does not work on existing program material; tri-color LEDs start at 1500-Hz break frequency; output impedance 100 ohms; 2.5" H × 9.75" W × 6.5" D..... $249

### 318 Silencer Noise-Reduction Kit

Eliminates hiss from tapes, records, AM/FM in playback/record through FET control circuitry design. Features on-off/threshold, tape monitor, and system defeat controls; tri-color LEDs indicating break frequencies from 1500-10,000 Hz; variable gyrator-type low-pass 9 dB/octave filter; no encoding or decoding. Hiss reduction 15 dB at 10,000 Hz; program-dependent attack and release times; frequency response 20-20,000 Hz; S/N 75 dB below 2 V rms out, 20-20,000 Hz; THD 0.1% at rated output; IM dist. 0.01% at rated output; max. output 10 V rms into 10k ohms; input impedance 47k ohms, single ended; output impedance 100 ohms. Kit includes circuit-board-mounted components, custom chassis, American black walnut end pieces, and assembly manual; 2.5" H × 9.75" W × 6.5" D. ..... $129

## LT SOUND

### PEQ Parametric Equalizer

Four-band stereo parametric equalizer covers 25-3000, 100-10,000, and 175-20,000 Hz bands, boost/cut band variable between 0.15 and 2.0 octaves, ±15 dB range. Features LED peak indicator, overall bypass switch, and bypass on each band. Frequency response 20-20,000 Hz ±0.5 dB; THD 0.007% and IM dist. 0.002%; S/N 90 dB below 1 V; slew rate 13 V/μsec; input impedance 47,000 ohms; balanced and unbalanced line inputs and outputs can drive 600-ohm loads; 3.5" H × 19" W × 7" D ..... $475

### ECC Echo Control Center

Single-channel unit functions as preamplifier for two low-impedance microphones and two low-level low-impedance line level aux. inputs, three-band equalizer, and echo and reverb control for mic level, EQ, and echo; features bi-FET op amp circuitry, relay on/off transient protection, and mu metal shielding for reverb unit. Delay dynamic range 85 dB below 1 V; dist. 0.5% at 1000 Hz, 0.775-V out; delay range 20-240 msec; frequency response of delay −1.5 dB; mic input impedance 2000 ohms for 600-ohm or lower mic; aux. input impedance 47k ohms; output impedance 200 ohms for 2k-ohm loads; EQ range ±18 dB for bass, midrange, and treble; rack-mountable; 2" H × 19" W × 7" D. $420

# 9 SIGNAL PROCESSORS

**RCC.** Reverb control center similar to ECC without echo capability; frequency response 10-40,000 Hz ±0.5 dB direct, 20-5500 Hz reverb; dynamic range 72 dB below 1 V; THD and IM dist. 0.05% ... $195

### RV-2 Stereo Reverberation Unit
Reverb unit for line-level inputs only; features −6-dB and peak amplitude LEDs; three equalization controls; direct, reverb, reverb drive controls; send-receive buss. Frequency response 2-40,000 Hz ±0.5 dB (direct); reverb 20-5500 Hz; reverb time 2.5 sec; input impedance 47k ohms; output impedance 200 ohms for 2k-ohm loads; S/N 90 dBm (direct); 2" H × 19" W × 7" D..... $305

### NR-2 Noise-Reduction/Range Enhancer
Two-channel unit provides 2:1 compander noise-reduction system and dynamic range enhancement system; for dual or independent tracking. Frequency response 20-20,000 Hz ±0.75 dB; S/N 90 dBm; dist. 0.2% at 1000 Hz; input impedance 47,000 ohms; output impedance 200 ohms for 2k-ohm loads; 2.5" H × 12.75" W × 6.15" D..... $195

### NR-4 Four-Ch Noise-Reduction Compander
Can switch four channels of noise reduction from record to play mode using two inputs simultaneously or two-channel simultaneous record and tape monitor decode; has bypass switches. Frequency response 20-20,000 Hz ±0.75 dB; THD 0.2% (compressed and expanded); slew rate 13 V/μsec; expander noise output −95 dBm; max. input level +26 dBm; 2.5" H × 12.75" W × 6.15" D ..... $185

**NR-8.** Same as NR-4 except provides eight channels of individually switchable record/play and bypass noise reduction or four-channel simultaneous record and tape monitor decode ..... $370

## MULTIVOX

### MX-312 Multi-Echo Chamber
Solid-state computer-type tape dumping system using 16-ft endless tape; has one record, one erase, and four playback heads and FG servomotor drive; produces up to 15 echo, 75 different repeat echo, reverb, echo/reverb, repeat echo/reverb, sound-on-sound, and swell reverb effects. Features mic and instrument input controls, nine modes of echo sound, repeat rate, and reverb effect, sound-on-sound, three-position tone switch, VU meter, three-position reverb/echo blend switch, four footswitch jacks and two output jacks. Wow and flutter 0.15%; delay time 100-800 msec; 6⅛" H × 17" W × 12" D ..... $695

## MXR

### One-Third Octave Equalizer
31-discrete-band one-channel ⅓-octave equalizer with center frequencies set at 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10,000, 12,500, 16,000, and 20,000 Hz, ±12 dB boost or cut; EQ in/out switch; dynamic range 108 dB; THD and IM dist. 0.01% at 0 dBV; frequency response 10-20,000 Hz +0/−1 dB; max. slew rate 7 V/μsec; max. input level +18 dBV; input impedance 20k ohms; output impedance 100 ohms; equiv. input noise −90 dBV; optional rack mount ears available; walnut side panels..... $350

### Fifteen-Band Stereo Equalizer
Fifteen-band stereo graphic equalizer, spaced ⅔-octave apart, with center frequencies set at 25, 40, 63, 100, 160, 250, 400, 630, 1000, 1600, 2500, 4000, 6300, 10,000, and 16,000 Hz, ±12 dB boost or cut; tape monitor and in/out switches; THD 0.02% at 0 dBV from 20-20,000 Hz, IM dist. 0.01% at 0 dBV (60 Hz/7 kHz, 4:1); frequency response 20-20,000 Hz +0/−1 dB; max. input +18 dBV; input impedance 20k ohms; output impedance 100 ohms; equiv. input noise −95 dBV; max. slew rate 7 V/μsec; optional rack mount ears available; walnut side panels..... $325

### Stereo Graphic Equalizer
Ten-band two-channel graphic equalizer with center frequencies 31, 62, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz; eight rear-panel phono jacks; two inputs, two low-impedance outputs, two tape-record outputs, two tape-monitor inputs; two switches control tape monitor function and equalizer bypass. Dynamic range 110 dB; control range ±12 dB; gain: unity ±1 dB (controls centered); max. output level: +18 dBV (10k ohms); input impedance 20k ohms; equivalent input noise −95 dBV; frequency response 20-20,000 Hz ±1 dB at 0 dBV; THD 0.05% at 0 dBV (20-20,000 Hz); IM 0.05% at 0 dBV (60/7000 Hz, 4:1) .. $220

### Dynamic Expander
Linear dynamic expander provides up to 8 dB of upward expansion and 21 dB of downward expansion; features front-panel release time control; adjustable expansion control (1:1 to 1.6:1); LED gain change and noise-reduction display; level control; in/out, monitor/normal, and pre/post switching. Max. input level +12 dBV; max. output +18 dBV; input impedance 40k ohms; output impedance 100 ohms; max. dynamic range 110 dB; max. slew rate 7 V/μsec; frequency response 20-20,000 Hz +0/−1 dB; attack time 5 msec max. (depending on program material); release time variable between 50-500 msec; optional rack-mount ears available .. $300

### Compander
Can be used with open-reel and cassette decks; dynamic range 100 dB; output impedance will drive 600 ohms or higher; equivalent input noise −88 dBV (20-20,000 Hz); input impedance 100k; compress/expand ratio 2:1; tracking accuracy ±1 dB per 20 dB; frequency response 30-20,000 Hz ±1 dB at 0 dBV, 3 dB down at 20 Hz and 40 kHz; THD 0.15% at 0 dBV (200 Hz-20 kHz), 0.75% at 0 dBV (50-200 Hz); IM 0.75% at 0 dBV (60 Hz/7 kHz, 4:1); level match control; bypass switch for cutting unit out of system; black anodized aluminum housing with walnut side panels..... $150

### System Preamp
Control preamplifier combines functions of preamp, mixer, and patch bay; can process two independent programs simultaneously. Features front-panel instrument input, two tape loops, two processor loops, integral headphone amp with independent level and selection controls, and left mono, right mono, and stereo reverse switching. RIAA equalization ±0.2 dB; phono S/N 87 dB; phono gain 40 dB at 1000 Hz; THD and IM dist. 0.005%; max. signal output +18 dBV; rear-panel ac convenience outlet; black anodized extrusion with solid walnut end pieces; optional rack-mount ears available; 3½" H × 19" W ..... $460

## NAKAMICHI

### High-Com II Noise-Reduction System
Designed to improve dynamic range of high-quality cassette decks; compressor/expander with two independent frequency bands and 2:1 ratio for max. suppression of noise pumping; 20-dB reduction of noise plus 3-7 dB headroom improvement; built-in 400-Hz calibration tone; two wide-range peak level meters; defeatable subsonic and multiplex filters; removable 19-in rack mount adaptors ..... $480

## NIKKO

### EQ-1 Graphic Equalizer
Ten-band stereo graphic equalizer (±12-dB boost or cut per band) with detented five-step boost/cut slider controls; frequency bands set at 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz; tape monitor switch; equalizer gain switch (−6 dB, 0 dB, +6 dB); pre + post EQ and tape monitor switch; LED equalizer in/out switch, LED power on switch. Frequency response 10-50,000 Hz ±1 dB; THD 0.007%; S/N 105 dB (IHF "A"); 3½" H × 19" W × 9" D..... $300

### EQ-2 Graphic Equalizer
Six-band stereo graphic equalizer with center frequencies set at 40, 125, 400, 1250, 4000, and 12,500 Hz, ±12 dB boost or cut. Features tape monitor switch; EQ in/out with LED; 12-position EQ slider control; power-on with LED. Frequency response 10-50,000 Hz ±1 dB; THD 0.05% from 20-20,000 Hz (IHF A); input impedance 100k ohms; output level/impedance 1 V, 5 V/560 ohms; gain 0 dB; rack mountable..... $200

## ONKYO

### E-30 Audio Equalizer
Nine-band stereo equalizer with center frequencies set at 63 (45/32 switchable), 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz; max. switchable range ±5 or ±10 dB in 0.5 or 1 dB steps; THD and IM dist. 0.01%; S/N 100 dB (IHF A); African wood veneer over Lauan plywood; 3¼" H × 17¾" W × 14⁹⁄₁₆" D..... $550

## JC PENNEY

### MCS 3030 Stereo Frequency Equalizer
Five-band stereo graphic equalizer with center frequency slide controls/channel at 60, 240, 1000, 2500, and 10,000 Hz, ±12 dB boost or cut. Features power and EQ on/off toggle switches with LEDs; tape/source tape monitor switch; left and right input/output, rec out, and playback jacks. Frequency response 10-50,000 Hz; THD 0.05%; S/N 95 dB nominal; 3¹³⁄₁₆" H × 16¹⁵⁄₁₆" W × 9¹⁄₁₆" D..... $150

## PHASE LINEAR

### 1100 Series Two Parametric Equalizer
Five-band stereo parametric equalizer with center frequencies set at 63, 250, 1000, 4000, and 16,000 Hz, ±12 dB boost or cut; separate gain controls and overload indicators for each channel; tape monitor loop with status indicator; bypass switch. Frequency response 20-20,000 Hz +0/−1 dB; THD and IM dist. 0.02% at rated output; rated output 2.0 V rms; input sensitivity/impedance 1.0 V rms/50k ohms; S/N 100 dB at 2 V; gain +6 dB max.; 5½" H × 19" W × 8" D..... $650

### 1000 Series Two Noise Reducer
Combines features of dynamic-range-recovery system with a correlation noise-reduction system, reduces noise and improves dynamics without pre-encoding; works in the tape monitor of a receiver or preamp; provides 10 dB noise reduction; 7.5 dB of increased dynamic range; adjustable dynamic low filter for reducing rumble and hum; total distortion less than 0.09%; input impedance 50,000 ohms; input level 250 mV rms; max. output voltage 8 V rms, better than 3 V rms into 2000 ohms; frequency response 20-20,000 Hz ±1 dB; high-frequency noise reduction begins at 2 kHz and is 3 dB, reaching 10 dB from 4 kHz to 20 kHz; low-frequency noise reduction begins at 200 Hz, ultimately reaching 20 dB at 20 Hz; passive subsonic filter rejection of −35 dB at 5 Hz; weighted overall noise reduction is −10 dB from 20 to 20,000 Hz; 3½" H × 19" W × 8½" D..... $400

## PIONEER

### SG-9800 Audio Frequency Equalizer
12-band stereo graphic octave equalizer with center frequencies at 16, 32, 64, 125, 250, 500, 1000,

2000, 4000, 8000, 16,000, and 32,000 Hz; level control range ±10 dB; frequency response 5-100,000 Hz +0/−3 dB; S/N 92 dB; output impedance 600 ohms max.; THD 0.006% at 1 V from 20-20,000 Hz; max. output 7.5 V; 5⅞" H × 16½" W × 14" D..... $395

### SG-9500 Audio Frequency Equalizer

10-band stereo graphic octave equalizer with center frequencies at 32, 64, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz; level control range ±10 dB; frequency response 5-70,000 Hz ±0/−1 dB; S/N 90 dB; input impedance 200,000 ohms; output impedance 600 ohms; THD 0.04% at 1 V (20-20,000 Hz); max. output 6 V; 5⅞" H × 16½" W × 13½" D..... $345

### RG-2 Dynamic Range Expander

Dynamic processor improves dynamic range of reproduced music and tape and record noise reduction levels; automatic operation; max. output 6.5 V; THD 0.05% at 1 V; dynamic expansion 4, 7, 10, 13, 16 dB; impulse response: attack time 0.3 msec; release time 120 msec; input impedance 50,000 ohms; output impedance 300 ohms; residual noise 10 μV; S/N 100 dB (1 kHz, dynamic expansion 16 dB); twin Fluroscan meters; 3⅞" H × 16½" W × 13¼" D..... $195

## REFERENCE by QUADRAFLEX

### 210EQ Graphic Equalizer

Ten-band stereo graphic equalizer with center frequencies set at 31, 62, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±12 dB boost or cut; has EQ/defeat output and rec out switches; source/tape monitor switch; rated output 2 V rms; THD 0.05%; S/N 85 dB; 7" H × 15½" W × 6¾" D..... $200

## ROLAND

### SEQ-331 One-Third-Octave Equalizer

31-band one-third-octave graphic equalizer covering 20-20,000 Hz, ±12 dB boost or cut. Features thirty-one center detent slide controls; level in/out and power on LEDs; EQ bypass switch; balanced and unbalanced inputs and outputs; phone plug or XLR connections. Frequency response 25-50,000 Hz ±1 dB; THD 0.03% typical; S/N 80 dB; rack-mountable..... $495

### SEQ-315 Stereo Graphic Equalizer

Fifteen-band stereo graphic equalizer with center frequency slide controls at 25, 40, 63, 100, 160, 250, 400, 630, 1000, 1600, 2500, 4000, 6300, 10,000, and 16,000 Hz, ±12 dB boost or cut. Features level in/out and power on LEDs; EQ bypass; balanced and unbalanced inputs and outputs; phone plug or XLR connections. Frequency response 25-50,000 Hz ±1 dB; THD 0.03% typical; crosstalk 60 dB at 1000 Hz; S/N 80 dB..... $450

## ROTEL

### RE-2000 Stereo Equalizer

Ten-band stereo octave equalizer with center frequencies at 32, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±12 dB boost or cut. Features coil-less circuitry; metalized film capacitor for output coupling; AMP-type constant voltage limiter in addition to current limiter circuits in power supply; tape dubbing facility; record/play and EQ bypass switches. Frequency response 10-100,000 Hz +0/−1 dB; THD 0.005%; S/N 100 dB (IHF "A"); input sensitivity/impedance 0.775 V/56,000 ohms; 5⅛" H × 19" W × 13¹³/₃₂" D..... $370

### RE-1010 Stereo Graphic Equalizer

Ten-band stereo graphic equalizer with center frequency slide controls/ch at 32, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±12 dB boost or cut. Features inductor-less circuitry, two tape monitors with dubbing, EQ record function, and bypass switch. Frequency response 15-45,000 Hz +0/−1 dB; HD 0.009% from 20-20,000 Hz, 1 V; input sensitivity/impedance 1.0 V/50k ohms (line and tape monitor 1, 2); output sensitivity/impedance 1.0 V/600 ohms (line and tape monitor 1, 2); hum and noise −108 dB; 3²⁷/₃₂" H × 16¹⁵/₁₆" W × 11¹³/₃₂" D..... $250

### RE-700 Stereo Graphic Equalizer

Seven-band stereo graphic equalizer with center frequencies at 40, 125, 400, 1000, 2500, 6000, and 15,000 Hz, ±12 dB boost or cut; features tone defeat and tape monitor switch; frequency response 10-100,000 Hz +0/−2 dB; THD 0.009%; S/N 100 dB; input sensitivity/impedance 0.775 V/55k ohms; output sensitivity/impedance 0.775 V/600 ohms; 5¹¹/₁₆" H × 16¹⁵/₁₆" W × 10" D..... $180

**RE-500.** Similar to RE-700 except 3¹¹/₁₆" H × 16¹⁵/₁₆" W × 10¹¹/₁₆" D..... $150

## SAE

### 2800 Stereo Parametric Equalizer

Four-band parametric equalizer system with control over cut/boost plus bandwidth frequency; separate controls for each channel; input level controls and peak indicators; tape equalization facilities for pre-equalized tape recordings; control functions are divided into four frequency bands (LO, LO-MID, HI-MID, HI); continuously variable frequency adjustment within each band covering 10-320 Hz, 40-1200 Hz, 240-7600 Hz, 1200-15,000 Hz; each band has slider control that adjusts gain over ±16 dB range, detent at center (0-dB) setting; bandwidth adjustment is slider control calibrated in octaves from 0.3-3.6; each channel has master-level slider providing up to 70 dB of attenuation; max. output before clipping 9 V into 10,000 ohms; input impedance 100,000 ohms; output impedance 500 ohms; nominal rated output 2.5 V; frequency response (controls at flat) 20-12,000 Hz ±0.25 dB; clipping level 8.5 V at 1000 Hz; THD 0.01% at 2.5 V, 0.028% at 8.5 V; −0.9 dB gain; front panel 8¾" × 19"; chassis depth 3½-in.. $600

**1800.** Two-band version of 2800 with lo band covering 40-1200 Hz and hi covering 1200-20,000 Hz; 5.25" H × 19" W × 3.5" D..... $350

**C-6.** Unassembled walnut cabinet for 2800..... $50

**C-4.** Unassembled walnut cabinet for 1800..... $45

### 180 Parametric Equalizer

Two-band stereo parametric equalizer with adjustable bandwidth (0.3-3.6 octaves) and center frequency in each control group; features tape equalization facilities and level match controls; frequency response 20-20,000 Hz ±0.25 dB; THD and IM dist. 0.02%; S/N 90 dB; 4¾" H × 17½" W × 3½" D..... $250

### 4100 Time Delay Ambience System

Time-delay ambience system features short, medium, and long time delay level slide controls from −70 to 0 dB; input and output level slide controls with LED peak level indicator; regeneration slide control from 0-10 msec; in/out direct, discrete, and blend controls. Frequency response 20-20,000 Hz +0/−0.5 dB; THD and IM dist. 0.5%; S/N 95 dB (front), 60 dB (rear); rated output 2.5 V, 6-V output at clipping; input impedance 50k ohms; output source impedance 500 ohms; output load impedance 600 ohms; insertion loss less than 1 dB with all controls centered; 2.75" H × 15" W × 8" D..... $500

## SANSUI

### SE-7B Graphic Equalizer

Ten-band graphic equalizer with center frequencies set at 32, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±12 dB boost or cut; features two-deck tape monitoring and dubbing, stereo output level control, and equalizer defeat/on/record controls. Frequency response 10-100,000 Hz +0/−1 dB; THD 0.08%; hum and noise −110 dB; matte black finish; 6⁵/₁₆" H × 19" W (with detachable handles for rack mounting) × 11¾" D..... $300

**SE-7S.** Same as SE-7B but with brushed aluminum finish faceplate and rosewood cabinet; 6⁵/₁₆" H × 17¹/₁₆" W × 11" D..... $300

### SE-5B Graphic Equalizer

Eight-band graphic equalizer with center frequencies set at 80, 160, 315, 630, 1250, 2500, 5000, and 10,000 Hz, ±12 dB boost or cut; frequency response 0-100,000 Hz +0/−1 dB; features tape monitor switch, equalizer defeat/on/record controls, and output level control; matte black finish; 4⅜" H × 19" W (with handles) × 11¾" D..... $230

### RA-700 Reverberation Amplifier

Continuously adjustable reverb time with visual indication; can handle two tape recorders simultaneously; adds echo effects during recording or playback; frequency response 20-30,000 Hz ±2 dB (at reverb time min.), 20-30,000 Hz ±10 dB (reverb max.); S/N 65 dB at 300-mV output; reverb time 1.9-3.2 sec (at 1000 Hz); input/output jacks; tape recording A and B, tape playback A and B; load impedance 100,000 ohms; simulated walnut-grain enclosure; 4¹⁵/₁₆" H × 11¹/₁₆" W × 10⁷/₁₆" D ... $190

## SANYO

### PLUS N55 Noise-Reduction System

Features Sanyo's "Super D" tape noise-reduction system designed to keep maximum separation between low and high frequencies with minimum distortion; fluorescent peak-reading signal level meters; multiplex filter, super D, tape/source monitor, and record calibration switches; left/right play level and left/right record level controls. Dynamic range 100 dB; THD 0.08% at 1000 Hz; frequency response 10-30,000 Hz ±1 dB; noise reduction 40 dB max. (using tape deck with 50-dB min. S/N); record/playback input level/impedance 350 mV/50k ohms; record/playback output level/impedance 350 mV/330 ohms; 1⅞" H × 17⅜" W (19" with handles) × 11¾" D..... $410

## SHURE

### SR107 Audio Equalizer

Ten-octave audio equalizer; rotary controls for each octave (15-dB boost or cut) at 31, 63, 125, 250, 1000, 2000, 4000, 8000, and 16,000 Hz; 15-dB master level control; LED overload indicator; 20-dB additional adjustable gain; equalizer bypass switch; designed for balanced or unbalanced line input, balanced microphone output, balanced/unbalanced line level output, and unbalanced aux. level output..... $297

### M63 Audio Master[k]

Combination equalizer, noise-reducer, and dynamic range enhancer/compressor system; two high-level inputs and five outputs (high-impedance high-level mic, high-impedance mic, low-impedance mic, 600-ohm balanced line, and headphone); high-pass and low-pass (6 dB/octave) filters; separate bass and treble (boost and cut) controls; output VU meter; 120 V ac ±10%, 50/60 Hz, 3 W; 2¾" H × 11¾" W × 6" D..... $176

## SONTEC

### HF-230 Stereo Parametric Equalizer

Three-band discrete parametric equalizer with separately-tuned 10-800/100-8000/400-25,000 Hz ranges; infinitely variable slope from 4-14 dB/octave; infinitely variable amplitude ±12 dB in mirror image; switchable upper and lower sections; no transformers, capacitors, or ICs in signal path; usable dynamic range 110 dB; noise 84 dB below 1 V out; THD and IM dist. 0.002% from −30 to 24 dBV; slew rate 200 V/μsec; black anodized rack mount aluminum; 1¾" H × 19" W × 6" D..... $990

## SONY

### PCM-10 Digital Audio Processor

Two-channel analog-to-digital pulse-code modula-

# 9 SIGNAL PROCESSORS

tion system using NTSC-standard TV signals; complies with 14-bit EIAJ-standard format and can be used with any Beta, U-matic, or VHS series home record/playback VTR. Features LCD peak program meter display with auto and manual peak-hold reset and clip level indicators; emphasis and de-emphasis circuits; audio line input and external audio output jacks; cyclic redundancy check code circuitry (CRCC) corrects up to 32 horizontal TV lines with subsequent errors compensated for by linear interpolation. Sampling frequency 44.056 kHz; recording density 2643M bits/sec; code 128 bits/1 TVH (includes 16 bits for CRCC and 28 bits for error correcting); data 14 bits/ch; dynamic range 85 dB; HD 0.03%; frequency response 0-20,000 Hz +1 dB; inputs −10 dB, 50k ohms unbalanced, using Cannon XLR-3-13 or phono jacks (line), 1 V p-p, 75 ohms unbalanced using phono jack (video); outputs −10 dB, 300 ohms unbalanced, using Cannon XLR-3-14 or phono jacks (line), −10 dB, 3.3k ohms unbalanced with phono jacks (external line), 1 V p-p, 75 ohms unbalanced with phono jack (video), −10 dB at 8-ohm load with stereo phone jack (headphone); supplied with 75-ohm coaxial cable with phono plugs, RK-112 connecting cord, power cord, and demo tape; 7⅞" H × 18⅞" W × 15¾" D ..... $5500

## SOUND WORKSHOP

### 262 Stereo Reverb

Stereo reverb system designed for professional interface. Input section: features balanced transformerless amplifier input circuitry, input mix without external patching, and +2 to −12 dB LED display indicators; impedance 10k ohms; −20 dBV (min.) and +20 dBV (max.) levels. Output section: features separate left and right dry/reverb mix with LEDs; source impedance 47 ohms; nominal level −2 dBm into 600 ohms. EQ section: features separate low and high slide controls/ch covering 50-1000 Hz (low) and 500-10,000 Hz (high) ranges at ±15 dB boost or cut. Other features include bi-FET preamp circuitry; noise level −80 dBm from 20-20,000 Hz, unweighted; nominal decay time 2.5 sec; ¼-in phone jacks; 3⅝" H × 19" W × 11" D ..... $750

**262B.** 262 with transformer-isolated balanced outputs; nominal output level +4 dBm balanced into 600 ohms; includes XLR connectors ..... $800

### 242C Stereo Reverb

Designed to interface with latest 4- and 8-track recording systems. Input section: features separate left/right level controls with peak-reading LEDs and input mix; impedance 10k ohms; −20 dBV min. and +20 dBV max. levels. Output section: left/right reverb level controls; source impedance 47 ohms; nominal level −8 dBm into 10k ohms. EQ section: left/right variable controls; +10 dB at 4300 Hz. Noise level −76 dBm from 20-20,000 Hz unweighted; decay time 2.5 sec; RCA phono jacks; 3⅝" H × 19" W × 11" D ..... $425

## SPECTRO ACOUSTICS

### 210R Stereo Graphic Equalizer

Ten-band stereo graphic equalizer with silicone-damped center frequency slide controls at 30, 60, 120, 240, 480, 960, 1920, 3840, 7680, and 15,360 Hz, ±15 dB boost or cut. Features gyrator synthesized inductor filter circuits; unity gain slide control for each channel (adjustable ±15 dB); pushbutton tape monitor, EQ tape, EQ line, EQ bypass, and LED power on controls. Frequency response 0-500,000 Hz ±0 dB (EQ bypassed); THD 0.03% at 1 V rms, 20-20,000 Hz, 0.0025% (EQ bypassed); IM dist. 0.0075% (60 and 7000 Hz, 4:1 at rated output); hum and noise 60 μV rms at any EQ setting; S/N 90 dB below 2 V rms; dynamic range 100 dB below full output level; max. unclipped output 10 V rms; output impedance 600 ohms; nominal input impedance 50k ohms; black and gold front panel; solid walnut or oak cabinet optional. 5.25 H × 19" W × 7" D ..... $300

**2102R.** Same as 210R minus unity gain controls; solid oak or walnut end panels optional; 3.5" H × 19" W × 7.625" D ..... $220

**2102S.** Same as 2102R except has silver anodized front panel; 17" W ..... $200

**2102.** 2102S with black panel ..... $200

## SUPEREX

### GEM-3 Graphic Equalizer

Ten-band stereo graphic equalizer with center frequency slide controls/ch at 31, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±14 dB; has separate volume and balance slide controls and on/off monitor switch. Frequency response 20-20,000 Hz ±0.5 dB; HD 0.04%; S/N 85 dB; input impedance 68k ohms; output impedance 600 ohms; rack mountable ..... $240

### GEM-1 Graphic Equalizer

Five-band stereo graphic equalizer module with center frequencies set at 60, 240, 1000, 3500, and 10,000 Hz, ±12 dB boost or cut. Features two-deck switching with tape record/play EQ and tape monitor controls; programmable capability with optional Superex program cards. Frequency response 10-150,000 Hz ±0.5 dB; HD 0.02% at 0 dB gain; rated output 2 V rms; dynamic range 8.5 V; S/N 92 dB; input impedance 50k ohms; output impedance 600 ohms ..... $90

## TAPCO

### 4400A Reverb System

Two-channel reverb system features four-band reverb equalizer/channel, input mute, reverb mix controls, reverb in/out switches, input and output level controls, and dual VU meters; can be connected at mixer output, with channel patching, or effects buss; inputs and outputs unbalanced. Frequency response 10-25,000 Hz; S/N 80 dB; THD and IM dist. 0.05% ..... $495

### C-201 Graphic Equalizer

Ten-band stereo graphic equalizer features ten ISO center frequency slide controls, ±15 dB boost or cut, gain control, and EQ in/out for each channel and LED overload indicators; balanced and unbalanced inputs and outputs (outputs balanced with auto ground loop compensation). Frequency response 20-20,000 Hz ±1 dB; THD and IM dist. 0.05%; S/N 110 dB; max. input level +20 dBm; max. output level +20 dBm; 3.5" H × 19" rack mountable ..... $395

**2202.** Similar to C-201 except with unbalanced inputs and outputs; max. input level +17 dBm; max. output level +18 dBm; S/N 90 dB ..... $290

### 2200 Graphic Equalizer

Ten-band stereo graphic equalizer with ten center frequency slide controls, EQ in/out, and output level meters with level adjust for each channel; balanced and unbalanced inputs and outputs. Frequency response 20-20,000 Hz +1 dB; HD 0.1%; S/N 80 dB; max. input +20 dBm; max. output +17 dBm; 6.25" H × 19" W ..... $340

## TEAC

### GE-20 Graphic Equalizer

Ten-band two-channel graphic equalizer with center frequencies set at 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz, ±10 dB boost or cut; each channel has 12 dB/octave high- (at 31.5 Hz) and low-pass (at 16,000 Hz) filters, input level control, and LED input overload indicator; unit features output level meter with output level control; operational amplifier-synthesized inductors. Frequency response 20-30,000 Hz ±0.5 dB; THD 0.03%; S/N 85 dB; input sensitivity/impedance 0.3 V, unbalanced/100k ohms; max. output level +18 dB at 8 V ..... $350

## TECHNICS

### SH-9010 Frequency Equalizer

Stereo universal frequency equalizer offers variable center frequencies; five slide pots provided for each channel (60 Hz variable between 20-180 Hz, 240 Hz variable between 80-720 Hz, 1 kHz variable between 333-3000 Hz, 4 kHz variable between 1.3-12 kHz, 16 kHz variable between 5.3-48 kHz); equalizer in/out switch; power on/off switch; one pair input and two pair output jacks provided; rated output voltage/impedance 1 V/300 ohms (1 kHz); THD 0.02%; input sensitivity/impedance 1 V/47k ohms (1 kHz); frequency response 10-20,000 Hz +0, −0.2 dB, 10-70,000 Hz +0, −3 dB; gain 0 +1 dB; S/N 90 dB; 3³³/₃₂" H × 19" W × 14¹¹/₃₂" D ..... $540

### SH-8020 Stereo Frequency Equalizer

Twelve-band stereo octave equalizer with center frequency slide controls at 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, 16,000, and 32,000 Hz, ±12 dB boost or cut, with LEDs on slide pots and +12 dB (green) and +3 dB (yellow) variable control range LED display with switch; additional features include switches for tape/source monitoring, source/rec out EQ position, normal/reverse, and EQ on/off with LEDs. Frequency response 5-100,000 Hz −3 dB; THD 0.01% from 20-20,000 Hz; S/N 100 dB; input sensitivity/impedance 0.5 V/47k ohms; overall gain 0 +1 dB; 6¹/₃₂" H × 16¹⁵/₁₆" W × 9¹⁹/₃₂" D ..... $350

## URSA MAJOR

### Space Station SST-282 Digital Reverb

Digital reverb, multi-tap digital delay, and delay-effects system using PCM circuitry with RAM. Features reverb processors and adjustable controls for reverb parameters including initial delay pattern, decay time, and high- and low-frequency decay time; eight audition delay taps; built-in mixer; 16 programs of delay times; reverb/echo feedback. Frequency response 20-7000 Hz; dist. 0.1%; dynamic range 80 dB; delay time 256 msec; reverb decay 3.5 sec; echo decay 10 sec ..... $1995

## WHITE INSTRUMENTS

### 4004 ⅓-Octave Passive Equalizer

Passive ⅓-octave equalizer with 24 ISO center frequency bands from 63-12,500 Hz, 15 dB cut; filters are double-tuned constant-K sections with two precision LC pairs. Features plug-in crossover network socket for bi-amp output; high-cut and low-cut adjustable finishing filters; calibrated logging and resetting dials. Frequency response 0-20,000 Hz, flat setting; dist. 0.1% to +18 dBm in ⅓-octaves; low-cut filter adjustable from flat-40-160 Hz, 15-dB/octave cut; high-cut filter adjustable from flat-16,000-10,000 Hz, 18 dB/octave cut; impedance 600-600 ohms, less than 1 dB insertion loss; 3½" H × 19" W × 9" D ..... $1250

### 4201 ⅓-Octave Active Equalizer

Active equalizer with 27 ⅓-octave bands from 40-16,000 Hz, 0 to −15 dB cut on continuous control. Features variable 20-160 Hz high-pass filter with 12 dB/octave rolloff; filter Q; all negative feedback circuitry; field-replaceable integrated circuits; transformer isolated 20,000-ohm input; two-buffered single-ended outputs; EQ in/out bypass switch. Frequency response 20 (−3 dB)-20,000 (−2 dB) Hz; dist. 0.1% from 20-20,000 Hz; noise −92 dBV at 20,000 Hz; gain variable from unity to +10 dB; max. output +18 dBV into 600 ohms; 3½" H × 19" W × 9" D ..... $840

**4203.** Same as 4201 except has two transformer-isolated 300-ohm outputs; max output +15 dBV into 600 ohms, +18 dBV into 5000 ohms $880

# 10 BLANK TAPE & ACCESSORIES

## AMPEX

**MPT (Metal Particle Tape) Cassettes**
Pure iron microparticles; metal bias; 70-μsec equalization.
367-C60. 60 min. ..... $9.99

**GMII (Grand Master II) Series Cassettes**
Cobalt-modified gamma ferric oxide; high bias; 70-μsec equalization.
366-C60. 60 min. ..... $4.79
366-C90. 90 min. ..... $5.89

**GMI (Grand Master I) Series Cassettes**
Premium gamma ferric oxide; normal bias; 120-μsec equalization.
365-C60. 60 min. ..... $4.29
365-C90. 90 min. ..... $5.39

**EDR (Extended Dynamic Range) Cassettes**
Premium gamma ferric oxide; normal bias; 120-μsec equalization.
377-C45. 45 min. ..... $2.69
377-C60. 60 min. ..... $3.29
377-C90. 90 min. ..... $4.29

**ELN (Extra Low Noise) Series Cassettes**
Gamma ferric oxide; normal bias; 120-μsec equalization.
374-C45. 45 min. ..... $1.79
374-C60. 60 min. ..... $2.39
374-C90. 90 min. ..... $3.29
374-C120. 120 min. ..... $4.69

**GM (Grand Master) Series Cartridges**
389-45. 45 min. ..... $3.99
389-90. 90 min. ..... $4.79

**ELN (Extra Low Noise) Series Cartridges**
385-45. 45 min ..... $2.99
385-90. 90 min ..... $3.69

**GM (Grand Master) Open-Reel Tapes**
356-1511JA. 1200-ft, 7-in reel, 1.5 mil.. $9.99
357-1511JA. 1800-ft, 7-in reel, 1.0 mil. $11.99
356-1731JA. 2500-ft, 10½-in NAB reel, 1.5 mil ..... $26.99
357-1731JA. 3600-ft, 10½-in NAB reel, 1.0 mil ..... $29.99

**ELN (Extra Low Noise) Open-Reel Tapes**
375-1511J1 1200-ft, 7-in reel, 1.5 mil.. $6.99
376-1511J1. 1800-ft, 7-in reel, 1.0 mil.. $8.99

**Accessories**
E4220BC. Demagnetizer/head cleaner for cassette players/recorders ..... $5.29
E4228BC. Demagnetizer/head cleaner for 8-track cartridge players/recorders ..... $6.29
ST-1. Cassette storage unit ..... $1.69

***Video Cassette Tape***

**Beta-Format Videocassettes**
101-L250-1C. 30-60 min. ..... $11.49
101-L500-1C. 60-120 min. ..... $14.49

**VHS-Format Videocassettes**
102-T60. 60-120 min ..... $16.95
102-T120. 120-240 min. ..... $22.95

## BASF

**Professional I Series Cassettes**
Ferric-oxide; normal bias/equalization for imported decks.
60 min. ..... $3.99
90 min. ..... $5.49

**Professional II Series Cassettes**
Super-chrome; normal bias; 70 μsec equalization.
60 min. ..... $4.49
90 min. ..... $5.99

**Professional III Series Cassettes**
Ferrichrome for "third" switch position.
60 min. ..... $4.29
90 min. ..... $5.79

**Studio I Series Cassettes**
Normal bias/equalization.
60 min. ..... $3.29
90 min. ..... $4.69

**Studio II Series Cassettes**
High bias; chrome equalization.
60 min ..... $3.49
90 min ..... $4.99

**Performance Series Cassettes**
Normal bias/equalization; mirror-polished tape; snap-pack or mailer-box enclosure.
45 min. ..... $2.59
60 min. ..... $2.79
90 min. ..... $3.99
120 min. ..... $4.99

**Studio Series 8-Track Cartridges**
High output/low noise; mirror polished; boxed or carded enclosure.
45 min. ..... $3.49
90 min. ..... $4.29

**Performance Series 8-Track Cartridges**
Low noise; back-lubricated tape.
45 min. ..... $2.99
90 min. ..... $3.69

**Ferro Series Open-Reel Tapes**
1800-ft, 7-in reel ..... $12.99
2400-ft, 7-in reel ..... $16.99
3600-ft, 7-in reel ..... $21.99

**Music Box**
Black plastic storage cabinet holds up to 40 cassettes; can be mounted on wall or set on shelf ..... $15.00

**Accessories**
8-track headcleaner ..... $2.19
Cassette headcleaner ..... $1.99
7-in plastic storage box ..... $2.99
7-in plastic reel ..... $1.79

***Video Cassette Tape***

**Betamax Format**
Chrome formulation.
**L-500.** 1-2 hrs. ..... $16.95
**L-750.** 1½-3 hrs. ..... $20.95

**VHS Format**
Chrome formulation.
**T-60.** 1-2 hrs. ..... $17.95
**T-120.** 2-4 hrs. ..... $24.95

## CERTRON

**High Energy Gamma**
Oxide formulation; durable binder system.
C-60 HE. 60 min ..... $1.99
C-90 HE. 90 min ..... $2.59
C-120 HE. 120 min ..... $2.99

**Low Noise**
C-30 LN. 30 min ..... $0.99
C-45 LN. 45 min ..... $1.09
C-60 LN. 60 min. ..... $1.19
C-90 LN. 90 min. ..... $1.59
C-120 LN. 120 min ..... $1.89

**High Density**
C-30 HD. 30 min ..... $1.29
C-45 HD. 45 min ..... $1.39
C-60 HD. 60 min ..... $1.59
C 90 HD. 90 min ..... $2.09
C-120 HD. 120 min. ..... $2.49

**Memotape for Minicassette**
MT30. 30 min. ..... $3.99
MT40. 40 min. ..... $4.99

**Micro Cassette**
M60 60 min ..... $3.99

**Dictation Cassette**
D30. 30 min. ..... $1.79
D45. 45 min. ..... $1.89
D60. 60 min. ..... $1.99
D90. 90 min. ..... $2.59
D120. 120 min ..... $2.99

**8-Track Cartridges**
8T-45. 45 min ..... $1.69
8T-65. 65 min ..... $1.89
8T-90. 90 min ..... $2.49

**Tape Accessories**
CHC. Cassette head cleaner ..... $0.99
8T-HC. 8-track head cleaner ..... $1.19

## DAK INDUSTRIES

**ML Cassettes**
Normal bias; 120 μsec equalization.
ML46. 46 min. ..... $1.49
ML60. 60 min. ..... $1.76
ML90. 90 min. ..... $2.49

# 10 BLANK TAPE

### HEC Cassettes
Normal bias and equalization.
- HEC 40. 40 min ..... $1.27
- HEC 60. 60 min ..... $1.57
- HEC 90. 90 min ..... $1.91
- HEC 120. 120 min ..... $2.96

### EC Special Length Cassettes
Normal bias and equalization.
- EC32. 32 min ..... $0.91
- EC62. 62 min ..... $1.03
- EC92. 92 min ..... $1.23
- EC122. 122 min ..... $1.82

### LNC Cassettes
Low noise; normal bias and equalization.
- LNC30. 30 min ..... $0.77
- LNC60. 60 min ..... $0.92
- LNC90. 90 min ..... $1.17
- LNC120. 120 min ..... $1.89

### C Voice Cassettes
Normal bias and equalization.
- C30. 30 min ..... $0.69
- C60. 60 min ..... $0.81
- C90. 90 min ..... $1.04
- C120. 120 min ..... $1.74

## DENON

### DX-5 Series
Double-coated FeCr-type music tape; broad bias curve and +8-dB increase in maximum output level; bias setting of 70 μsec; compatible with variety of cassette decks and program sources; ferrichrome position.
- FC-46. 46 min ..... $4.50
- FC-60. 60 min ..... $5.00
- FC-90. 90 min ..... $7.00

### DX-3 Series
Double-coated magnetic FeCr-type tape accommodates all types of cassette decks; normal bias setting; normal position.
- NC-60. 60 min ..... $3.99
- NC-90. 90 min ..... $5.60

## FUJI

### Metal Tape
Very high output, ultra-low noise, 7-12 dB higher MOL than chrome; metal bias; 70 μsec equalization.
- C46. 46 min ..... $8.30
- C60. 60 min ..... $9.10
- C90. 90 min ..... $12.00

### FX-I Premium Cassette Series
Pure Ferrix; normal bias; 120 μsec equalization.
- C46FX-I. 46 min ..... $4.25
- C60FX-I. 60 min ..... $4.89
- C90FX-I. 90 min ..... $6.70

### FX-II Premium Cassette Series
Beridox; high bias; 70 μsec equalization.
- C46FX-II. 46 min ..... $4.40
- C60FX-II. 60 min ..... $5.10
- C90FX-II. 90 min ..... $6.95

### FL Low-Noise Cassettes
- C46FL. 46 min ..... $3.00
- C60FL. 60 min ..... $3.40
- C90FL. 90 min ..... $4.70
- C120FL. 120 min ..... $6.50

### 8-Track Cartridges
- 8T-45 ..... $4.20
- 8T-90 ..... $5.60

### FB-151 Master Open-Reel Tapes
Ultra-low-noise, high-output, back-coated master recording tape; for use on tape recorders equipped with bias selector.
- 1200-ft, 7-in reel ..... $12.25
- 1800-ft, 7-in reel ..... $15.85
- 3600-ft, 10½-in metal reel ..... $43.20

***Video Cassette Tape***

### Videocassette Tapes
VHS Beridox; high impact ABS housing.
- **T-120.** 2-4 hr ..... $25.50
- **T-90.** 1½ hr ..... $22.95
- **T-60.** 1-2 hr ..... $18.35
- **T-30.** 0.5-1 hr ..... $15.50

Beta videocassettes.
- **L-500.** 1-2 hr ..... $17.50
- **L-370.** 1½ hr ..... $14.90
- **L-250.** 0.5-1 hr ..... $13.25
- **L-125.** 15-30 min. ..... $11.95

### Video Head-Cleaning Cassettes
- VCL-30. VHS format ..... $25.00
- BCL-20. Beta format ..... $18.50

## HITACHI

### ME Cassettes
Metal-tape bias current for metal-tape position.
- ME-46. 46 min ..... $8.45
- ME-60. 60 min ..... $9.45

### UD-ER Cassettes
Epitaxial magnetic substance; high output and energy, low distortion; normal bias; includes replaceable self-index label and leader tape.
- 60ER. 60 min ..... $4.00
- 90ER. 90 min ..... $5.50

### UD-EX Cassettes
Epitaxial magnetic substance for chrome position.
- 60EX. 60 min ..... $4.00
- 90EX. 90 min ..... $5.50

## IRISH

### Professional-Series Cassettes
In album/mailer.
- 261-C45. 45 min ..... $1.95
- 261-C60. 60 min ..... $2.20
- 261-C90. 90 min ..... $3.00
- 261-C120. 120 min ..... $5.30

In flip-top plastic box.
- 2000-C30. 30 min ..... $1.40
- 2000-C60. 60 min ..... $1.60
- 2000-C90. 90 min ..... $2.05

In flip-top plastic box and polybag.
- 2000-C60B. 60 min ..... $1.65
- 2000-C90B. 90 min ..... $2.10

### Low-Noise, Extended-Range Cassettes
Flip-top plastic box.
- 262-C60. 60 min ..... $2.85
- 262-C90. 90 min ..... $4.25

### Cassettes in Polybag
- 2000C-60SP. 120 min ..... $3.20
- 2000C-90SP. 180 min ..... $4.10

### 8-Track Cartridges
- 8T45. 45 min ..... $3.00
- 8T90. 90 min ..... $3.80

### Two 8-Track Cartridges in Box
- **2X42.** Two 42 min ..... $3.90
- **2X84.** Two 84 min ..... $4.40

### 270 Series Tape
Low-noise, high-output, back coated.
- 276-151. 1200-ft, 7-in reel ..... $13.15
- 277-151. 1800-ft, 7-in reel ..... $17.20

### 200 Series Professional Tape
Standard, 1½-mil, polyester base, ¼-in.
- 231-151. 1200-ft., 7-in reel ..... $7.35

Extra-length, 1-mil, polyester base, ¼-in.
- 241-151. 1800-ft., 7-in reel ..... $9.25

Double-length, ½-mil, polyester tensilized base.
- 251-151. 2400-ft., 7-in reel ..... $16.10

***Video Cassette Tape***

### Betamax Video Cassettes
- 551-L250-10X. ½-1 hr ..... $13.95
- 551-L500-10X. 1-2 hr ..... $16.95

## MAXELL

### MX Metal Cassettes
Metal bias/equalization.
- MX-46. 46 min ..... $11.25
- MX-60. 60 min ..... $12.50
- MX-90. 90 min ..... $14.95

### UD-XL-I Epitaxial Cassettes
Normal bias; 120 μsec equalization.
- C-60. 60 min. ..... $5.25
- C-90. 90 min. ..... $7.25

### UD-XL-II Epitaxial Cassettes
Chrome type; high-level bias; 70 μsec equalization.
- C-60. 60 min. ..... $5.25
- C-90. 90 min. ..... $7.25

### Ultra-Dynamic Cassettes
Normal bias.
- UD-46. 46 min. ..... $3.70
- UD-60. 60 min. ..... $4.00
- UD-90. 90 min. ..... $5.90
- UD-120. 120 min. ..... $7.90

### Low-Noise Cassettes
Normal bias.
- LN-46. 46 min. ..... $2.45
- LN-60. 60 min. ..... $2.70
- LN-90. 90 min. ..... $4.10
- LN-120. 120 min. ..... $5.30

### Ultra-Dynamic 8-Track
Normal bias.
- UD8T-46. 46 min. ..... $5.20
- UD8T-90. 90 min. ..... $6.50

### 8-Track Cartridges
Normal bias; low noise.
- LN8T-46. 46 min. ..... $3.95
- LN8T-60. 60 min. ..... $4.40
- LN8T-90. 90 min. ..... $4.95

### Low-Noise Open-Reel Tape
1. 5-mil polyester, normal bias.
- LN-50-60. 1200-ft, 7-in reel ..... $8.70
- LN-50-120. 2500-ft, 10½-in reel ..... $24.70

1-mil polyester
- LN-35-90. 1800-ft, 7-in reel ..... $10.00
- LN-38-180. 3600-ft, 10½-in reel ..... $28.00

0.5-mil polyester
- LN-25-120. 2400-ft, 7-in reel ..... $14.95
- LN-18-180. 3600-ft, 7-in reel ..... $21.25

### Ultra-Dynamic Open-Reel Tape
Ultra-dynamic, high-energy type, normal bias.
1.5-mil polyester
- UD50-60. 1200-ft, 7-in reel ..... $9.95
- UD50-120. 2500-ft, 10½-in reel ..... $28.30

1-mil polyester
- UD35-90. 1800-ft, 7-in reel ..... $11.50
- UD35-180. 3600-ft, 10½-in reel ..... $31.90

### Professional Epitaxial Open-Reel Tape
Back-coated, ultra-dynamic, high energy, normal bias type.
1.5-mil polyester
- UD-XL 50-60B. 1200-ft, 7-in reel ..... $12.45
- UD-XL 50-120B. 2500-ft, 10½-in reel .. $33.75

1-mil polyester
- UD-XL 35-90B. 1800-ft, 7-in reel ..... $14.00
- UD-XL 35-180B. 3600-ft, 10½-in reel .. $38.50

### Tape Accessories
- 7-in plastic reel ..... $4.75
- 7-in precision metal reel ..... $10.50

If lately your favorite recordings sound like they're gradually unrecording, it could be the tape they're on.

You see the oxide particles on some tapes just aren't bound on very well. And when the oxide particles come off, your music could come off sounding faded and weak.

Maxell, however, has developed a unique binding process that helps stop those oxide particles from taking a hike. We also polish our tape to a mirror finish to reduce friction, the major cause of oxide shedding.

So with Maxell, even if you play a tape over and over, the music won't disappear before your very ears.


IT'S WORTH IT.

Maxell Corporation of America 60 Oxford Drive Moonachie, N.J. 07074

CIRCLE NO. 12 ON READER SERVICE CARD

# 10 BLANK TAPE

10.5-in precision metal reel ..... $16.50
12 cassette plastic storage box ..... $5.95
12 8-track plastic storage box ..... $5.95
Tape recorder care kit ..... $8.95
Care kit replacement fluid and pads ..... $3.49

### *Video Cassette Tape*

**VHS Epitaxial Videocassette**
Cobalt-ferric oxide formulation; ½ in; mirror-finished tape surface and binder system keep head wear to a minimum.
T-60. 1-2 hrs ..... $19.95
T-120. 2-4 hrs ..... $28.50

**VHS High-Grade Epitaxial Videocassettes**
½-inch.
HG T-30. 30 min ..... $18.95
HG T-60. 60 min ..... $21.95
HG T-90. 90 min ..... $25.95
HG T-120. 120 min ..... $29.95

**Beta Videocassettes**
½-inch.
L-250 ..... $16.95
L-500 ..... $22.50

**U-matic Videocassette**
¾ inch.
KCA-30. 30 min ..... $28.50
KCA-60. 60 min ..... $41.50

**Open Reel Video Tape**
½ in EIAS Standard.
VT-5B. 30 min ..... $19.00
VT-7B. 60 min ..... $30.00

## MEMOREX

**HIGH BIAS Cassettes**
Ferrite crystal oxide formulation for high bias (chrome/$CrO_2$) setting; 70-μsec equalization with 4-5 dB noise reduction at high frequencies; built-in hub lock design accepts cassette from either direction; case has snap-lock hinge and overlapping lid.
HB-60. 60 min ..... $4.39
HB-90. 90 min ..... $5.99

**MRX$_3$ Cassettes**
Ferric oxide formulation; normal bias (120-μsec equalization).
C-30. 30 min. ..... $2.79
C-45. 45 min. ..... $2.99
C-60. 60 min. ..... $3.19
C-90. 90 min. ..... $4.79
C-120. 120 min. ..... $6.39

**8-Track Cartridges**
45 min. ..... $2.99
60 min. ..... $3.29
90 min. ..... $3.59

**Accessories**
Tape recorder care kit ..... $8.99
8-track head/capstan cleaner ..... $3.29
Cassette cleaning kit ..... $2.99
8-track head cleaner ..... $1.99
Cassette head cleaner ..... $1.99

### *Video Cassette Tape*

**VHS™ Video Cassettes**
½ in; low video noise/high r-f output; high Chroma output/low Chroma noise; features dust-proof plastic case with pressure-sensitive labels and removable black sleeve.
T-60. 1-2-3 hrs ..... $16.99
T-90. 1½-3-4½ hrs ..... $18.99
T-120. 2-4-6 hrs ..... $24.99

## NAKAMICHI

**ZX Cassette Tape**
Metalloy (metal-particle) formulation for use with metal-compatible decks only; features ultra-high coercivity and retentivity for improved distortion and MOL; 70 μsec equalization.
C60 ..... $9.75

**SX Cassette Tapes**
Single-coated; ionized cobalt and ferric oxide formulation; high coercivity permits use of $CrO_2$ bias and equalization (70 μsec) for 4-5 dB better S/N.
C60 ..... $6.30
C90 ..... $8.00

**EX II Cassette Tapes**
Single-coated; ferricobalt formulation; same bias and equalization (120 μsec) as EX tape; extra-low noise, high output.
C60 ..... $6.00
C90 ..... $7.80

**EX Cassette Tapes**
Specially formulated ferrocrystal tape for improved frequency response, S/N ratio, and dynamic range; special binder for even particle distribution and reduced head wear.
C60 ..... $5.30
C90 ..... $6.60

## PANASONIC

### *Video Cassette Tape*

**VHS Video Cassettes**
NV-T60. 1-2-3 hr ..... $17.95
NV-T120. 2-4-6 hr ..... $24.95

## QUASAR

### *Video Cassette Tape*

**VX-Format**
VC-60. 1 hr ..... $18.95
VC-120. 2 hr ..... $26.95

**VHS-Format**
VC-T60. 1-2-3 hrs ..... $14.50
VC-T120. 2-4-6 hrs ..... $19.95

## RCA

### *Video Cassette Tape*

**VHS Videocassettes**
VK125. 1-2-3 hrs ..... $14.95
VK250. 2-4-6 hrs ..... $19.95

## REALISTIC

**Supertape Metal Cassette**
44-960. 60 min ..... $9.95

**Supertape Chrome Cassettes**
44-930. 60 min ..... $3.49
44-931. 90 min ..... $4.49

**Supertape Gold Cassettes**
44-920. 45 min ..... $2.59
44-921. 60 min ..... $2.99
44-922. 90 min ..... $3.99
44-923. 120 min. ..... $4.79

**Low-Noise Cassettes**
44-601. 30 min ..... $1.49
44-602. 60 min ..... $1.89
44-603. 90 min ..... $2.59
44-604. 120 min. ..... $3.19

**Concertape Cassettes**
44-605. 60 min ..... $0.88
44-620. 90 min ..... $1.25

**Concertape 3-Pack Cassettes**
44-606. 30 min ..... $1.99
44-607. 60 min ..... $2.59
44-613. 90 min ..... $3.59

**Supertape High-Output Low-Noise Tape**
44-1872. 900-ft, 5-in reel ..... $3.49
44-1878. 1200-ft, 7-in reel ..... $4.99
44-1877. 1800-ft, 7-in reel ..... $5.59
44-1880. 3600-ft, 7-in reel ..... $9.99

**Concertape**
44-1018. 1800-ft, 7-in reel ..... $1.95

**Low-Noise Tape**
44-733. 300-ft, 2⅜-in reel, 0.5 mil ..... $1.19
44-734. 225-ft, 3-in reel, 1.0 mil ..... $1.19
44-760. 600-ft, 3¼-in reel, 0.5 mil ..... $1.99
44-753. 900-ft, 5-in reel, 1.0 mil ..... $2.49
44-752. 1200-ft, 5-in reel, 0.5 mil ..... $3.49
44-754. 1800-ft, 7-in reel, 1.0 mil ..... $4.49
44-758. 2400-ft, 7-in reel, 0.5 mil ..... $5.49
44-766. 3600-ft, 7-in reel, 0.5 mil ..... $7.29

**Supertape 8-Track Tape**
44-842. 45 min ..... $2.99
44-843. 90 min ..... $3.89

**Low-Noise 8-Track Tape**
44-840. 40 min ..... $1.99
44-841. 80 min ..... $2.59

## RECOTON

**Cassettes**
Low-noise, ferric-oxide tape.
RC5-60. 60 min, five pack ..... $3.99
RC5-90. 90 min, five pack ..... $5.79
RU4-60. 60 min, four pack ..... $5.39
RU4-90. 90 min, four pack ..... $6.79

## RKO TAPE

**Broadcast I Cassettes**
Ferric formulation; normal bias; 120 μsec equalization; housed in five-screw polystyrene shell.
C-60. 60 min ..... $4.10
C-90. 90 min ..... $5.75

**Ultrachrome Cassettes**
Chromium dioxide formulation; chrome bias; 70-μsec equalization; housed in five-screw polystyrene shell with chrome notch.
C-60. 60 min ..... $4.10
C-90. 90 min ..... $5.75

**XD Cassettes**
Ferric bias; for home recording.
C-45. 45 min ..... $2.85
C-60. 60 min ..... $3.15
C-90. 90 min ..... $4.40

## SCOTCH

**Metafine Cassettes**
Fine metal magnetic particle formulation; delivers max. output up to 10 dB better than typical chrome tapes and up to 7 dB greater than oxide tapes; low distortion, added high frequency response, and improved S/N.
45 min ..... $7.19
60 min ..... $7.99
90 min ..... $10.29

**Master I Cassettes**
Features premium grade, low-noise ferric oxide; for use with recorders in the normal or 120 μsec equalization position; album or "C-Box" (40 cents additional) packaging; improved shell for critical mechanical permanence and three-head recorder equipment.
45 min ..... $3.79
60 min ..... $4.09
90 min ..... $5.39

**Master II Cassettes**
Features chrome-compatible modified ferric oxide

# YOU DON'T OFFER A BETTER WARRANTY WITHOUT A CASSETTE TO MATCH.

## INTRODUCING NEW, IMPROVED SOUND FROM NEW, IMPROVED SCOTCH® MASTER™ CASSETTES.

Redesigned cassette shells have new snubber posts and better tape guides. Result: flutter problems are virtually eliminated.

Pressure pads that hold tape against heads have short, tight fibers to help prevent possibility of dropouts.

Master II has a different, better oxide formulation. Sounds great!

Inside our cassettes is a new kind of shim that improves tape feed—winds better.

Greatly improved manufacturing process gives Master III higher and brighter highs than ever before.

Redesigned album boxes are stronger, protect better.

Better lubricant and binder insure Master III against squeal and head clogging.

All of these improvements are part of our continuing effort to make Scotch Master Cassettes sound better than ever.


## INTRODUCING THE NEW SCOTCH® LIFETIME SATISFACTION WARRANTY

With our new and improved cassettes you'll probably never have to use our new warranty. But it's good to know that if the unexpected *ever* happens, here's what we'll do. If, *for any reason,* you're not satisfied with a Scotch® Master™ Cassette, send it back to 3M and we'll replace it free.

## SCOTCH® MASTER™ CASSETTES. THE TRUTH COMES OUT.

3M

CIRCLE NO. 23 ON READER SERVICE CARD

# 10 BLANK TAPE

for use with recorders operating in the $CrO_2$ or 70 μsec equalization position; improved cassette shell for critical mechanical performance and three-head recorder equipment; 3-dB S/N improvement over current $CrO_2$ cassettes; album or "C-Box" packaging (40 cents additional for "C-Box").
45 min (album only) ..... $4.39
60 min ..... $4.79
90 min ..... $5.99

### Master III Cassettes
Features improved FeCr dual-layer construction which provides 3-dB improvement in output at low frequencies, 2-dB boost at high frequencies over existing tapes; improved cassette shell for critical mechanical performance and three-head recording equipment; album or "C-Box" packaging (40 cents additional for "C-Box").
45 min (album only) ..... $4.39
60 min ..... $4.79
90 min ..... $5.99

### Dynarange Cassettes
High-output, low-noise ferric oxide cassette featuring full dynamic range throughout the audible sound spectrum; special back treatment for improved mechanical performance; album package.
45 min ..... $2.79
60 min ..... $3.29
90 min ..... $4.59
120 min ..... $6.39

### Highlander Cassettes
Low-noise oxide formulation for all-purpose cassette use; polyester base.
45 min ..... $1.69
60 min ..... $1.99
90 min ..... $2.99
120 min ..... $4.39

### Master 8-Track Cartridges
Features high-output low-noise ferric-oxide coating for high-frequency sensitivity of 6 dB higher and S/N at low frequencies 6 dB higher than standard cartridges; fully compatible, oxide coating heavy-duty lubricated polyester backing.
M-8TR-45. 45 min ..... $4.29
M-8TR-90. 90 min ..... $4.99

### Dynarange 8-Track Cartridges
Features low-noise ferric oxide; fidelity uniform throughout audible frequency range; heavy-duty binder; lubricant system; precise tape-to-head alignment.
S-8TR-45. 45 min. ..... $3.19
S-8TR-90. 90 min. ..... $3.99

### Master XS (Extra Sensitive) Open-Reel
Features mastering quality tape for critical music applications; excellent print and max. output properties; biased to be compatible with most retail open-reel decks.
7-in reel, 60 min at 7½ ips, 1 mil ..... $13.39
10½-in metal reel, 120 min at 7½ ips, 1 mil ..... $35.69

### 206-207 Open-Reel Tapes
Polyester base, "Posi-Trak" backing, leader, and trailer.
206. 7-in reel, 60 min at 7½ ips, 1.5 mil . $7.99
207. 7-in reel, 90 min at 7½ ips, 1.0 mil . $9.99

### Dynarange Open-Reel Tapes
Provides high-fidelity recording even at 3¾ ips; multi-purpose tape providing full dynamic range throughout audible spectrum; S/N is 4 to 6 dB better than standard tapes.
211. Polyester backing, white yellow trailers, 5-in reel, 30 min at 7½ ips, 1.5 mil. ..... $4.09
7-in reel, 60 min. ..... $6.29
212. 5-in reel, 45 min at 7½ ips, 1.0 mil . $4.89
90 min, 7-in reel ..... $8.39
213. 7-in reel, 120 min at 7½ ips, 0.5 mil tensilized ..... $12.59
214. 5-in reel, 90 min at 7½ ips, 0.5 mil tensilized ..... $8.39
180 min, 7-in reel ..... $16.59

### Highlander Open-Reel Tapes
All-purpose economy tape for vocals as well as speech.
228. 7-in reel, 60 min at 7½ ips, 1.5 mil . $5.49
229. 7-in reel, 90 min at 7½ ips, 1.0 mil . $7.59

#### *Video Cassette Tape*

### VHS-Format Videocassettes
T-30. ½-1 hr. ..... $18.45
T-60. 1-2 hrs ..... $21.75
T-120. 2-4 hrs ..... $27.95

### Beta-Format Videocassettes
L-250. ½-1 hr. ..... $14.95
L-500. 1-2 hrs ..... $18.95
L-750. 1½-3 hrs. ..... $23.95

### Videocassette Head Cleaners
Head-cleaning tape with recorded message, "When you can read this message, your heads are clean. Stop the player now."
VHS-format ..... $28.95
Beta-format ..... $27.95

## SONY

### Metal Series Cassettes
70-μsec metal equalization.
Metallic 46. 46 min. ..... $8.00
Metallic 60. 60 min. ..... $10.00
Metallic 90. 90 min. ..... $13.00

### FeCr Series Cassettes
Normal or FeCr bias; 70-μsec FeCr equalization.
FeCr-46. 46 min. ..... $4.35
FeCr-60. 60 min. ..... $4.75
FeCr-90. 90 min. ..... $6.10

### EHF Series Cassettes
Cobalt-adsorbed magnetic tape; high bias; 70 μsec equalization.
EHF-46. 46 min ..... $3.70
EHF-60. 60 min ..... $4.15
EHF-90. 90 min ..... $5.75

### SHF Series Cassettes
Ferric oxide magnetic tape; normal bias and 120-μsec equalization.
SHF-46. 46 min ..... $3.40
SHF-60. 60 min ..... $3.85
SHF-90. 90 min ..... $5.20

### HFX Series Cassettes
Normal bias; normal or 120 μsec equalization.
HFX-46. 46 min ..... $3.00
HFX-60. 60 min ..... $3.20
HFX-90. 90 min ..... $4.55
HFX-120. 120 min. ..... $6.20

### LNX Series Cassettes
Normal bias; normal or 120 μsec equalization.
LNX-46. 46 min ..... $2.05
LNX-60. 60 min ..... $2.25
LNX-90. 90 min ..... $3.20
LNX-120. 120 min. ..... $4.15

### Microcassette
Ferric oxide; three to a package.
3MC. 60 min ..... $3.80

### Elcasets
Type I: SLH tape.
LC-60. 60 min ..... $8.00
LC-90. 90 min ..... $10.60
Type II: FeCr tape.
LC-60. 60 min ..... $10.60
LC-90. 90 min ..... $12.80

### 8-Track Cartridges
8T-46HF. 46 min. ..... $3.30
8T-46HF-C. 46 min. ..... $3.30
8T-90HF. 90 min. ..... $4.20
8T-90HF-C. 90 min. ..... $4.20

### Open-Reel Tapes
FeCr Series.
FeCr 7-550BL. 90 min ..... $14.00
FeCr 11-1100BL. 180 min ..... $39.00
ULH Series.
ULH 72-370BL. 60 min ..... $9.00
ULH 7-550BL. 90 min ..... $11.50
ULH 11-1100BL. 180 min ..... $31.00

#### *Video Cassette Tape*

### Video Cassettes
Betamax I, II, and III formats; available in blister pack or standard package.
L-125. 15/30/45 min ..... $10.95
L-250. 30/60/90 min ..... $12.95
L-500. 60/120/180 min ..... $16.95
L-750. 90/180/270 min ..... $20.95
L-830. 200/300 min ..... $23.95

## STUDER/REVOX

### 621 Magnetic Tape
Low-noise high-output mastering tape; highly compliant; 3600 ft on silver or black NAB metal reel; packaged in Novodur library box. ..... $36.00

## TDK

### "MA-R" (Metal Alloy-Reference) Cassettes
Metal bias; 70-μsec equalization; housed in revolutionary diecast shell and reference standard mechanism.
MA-R C60. 60 min ..... $15.60
MA-R C90. 90 min ..... $21.00

### "MA" (Metal Alloy) Cassettes
Metal bias; 70-μsec equalization; housed in precision plastic shell housing and laboratory standard mechanism.
MA-C60. 60 min. ..... $11.60
MA-C90. 90 min. ..... $15.60

### "SA-X" (Super Avilyn-Extended) Cassettes
Double-coated Super-Avilyn-particle tape; high bias; 70-μsec equalization; high output and wide dynamic range; housed in precision shell and laboratory standard mechanism.
SA-X C60. 60 min ..... $6.30
SA-X C90. 90 min ..... $8.90

### "SA" (Super Avilyn) Cassettes
Cobalt-ferric formulation; high bias; 70-μsec equalization; extended frequency response and low noise.
SA-C60. 60 min ..... $5.25
SA-C90. 90 min ..... $7.40

### "OD" (Optimum Dynamic) Cassettes
Optima Ferric magnetic particle formulation; for mastering and critical recording needs; normal bias; 120-μsec equalization; high MOL and wide dynamic range.
OD-C60. 60 min ..... $4.70
OD-C90. 90 min ..... $6.60

### "AD" (Acoustic Dynamic) Cassettes
Normal bias; 120-μsec equalization; high-end response and output level; for home and car decks.
AD-C46. 46 min ..... $3.60
AD-C60. 60 min ..... $3.85
AD-C90. 90 min ..... $5.60
AD-C120. 120 min. ..... $7.75

### "D" (Dynamic) Cassettes
Normal bias; 120-μsec equalization.
D-C30. 30 min ..... $2.50
D-C46. 46 min ..... $2.75
D-C60. 60 min ..... $3.00
D-C90. 90 min ..... $4.15

D-C120. 120 min ..... $5.00
D-C180. 180 min ..... $7.00

**"EC" (Endless) Cassettes**
Endless-loop design permits continuous repeating of recorded material; back coated; available with or without foil strip for machines with automatic shut-off sensor.
EC-20S(F). 20 sec ..... $5.25
EC-30S(F). 30 sec ..... $5.35
EC-1M(F). 1 min ..... $5.50
EC-3M(F). 3 min ..... $5.60
EC-6M(F). 6 min ..... $6.25
EC-12M(F). 12 min ..... $7.50

**"AD" (Acoustic Dynamic) 8-Track**
Gamma ferric oxide formulation; extended frequency response; high saturation and output level; broad dynamic range; high S/N and minimum distortion.
8TR-45AD. 45 min ..... $5.50
8TR-90AD. 90 min ..... $7.00

**"D" (Dynamic) 8-Track Cartridges**
Low noise; high output.
8TR-45D. 45 min ..... $4.40
8TR-90D. 90 min ..... $5.35

**"L" (Audua) Open-Reel Tape**
High-density ferric oxide coating; high output, low noise.
L-1200. 1200-ft, 7-in plastic reel ..... $10.00
L-1800. 1800-ft, 7-in plastic reel ..... $12.50
L-3600M. 3600 ft, 10½-in NAB metal reel ..... $35.00

**"LB" (Audua) Open-Reel Tape**
High-density ferric oxide back-coated tape; high output; low noise.
LB-1800. 1800-ft, 7-in plastic reel ..... $15.65
LB-3600. 3600-ft, 10½-in NAB metal reel ..... $42.50

**"S" (Superior) Open-Reel Tape**
Low noise, high output.
S-1800. 1800-ft, 7-in plastic reel ..... $10.00
S-3600P. 3600-ft, 10½-in plastic reel .. $23.75

***Video Cassette Tapes***

**Super Avilyn VHS Videocassettes**
VAT-120. 2-4-6 hr ..... $30.00
VAT-90. 1½-3-4½ hr ..... $25.75
VAT-60. 1-2-3 hr ..... $21.75
VAT-30. ½-1-1½ hr ..... $19.50

**Super Avilyn Beta Videocassettes**
Special formula designed to give crisp, clear picture and brilliant color.
BAL-500. 1-2-3 hr ..... $22.00
BAL-250. ½-1-1½ hr ..... $15.50

## ZENITH

**High Performance Series Cassettes**
Normal bias; 120-μsec equalization; five-screw, see-through construction of graphite creased shims, spoked roller guides, beryllium spring, and felt pressure pad.
C45. 45 min ..... $2.95
C60. 60 min ..... $2.99
C90. 90 min ..... $3.89
C120. 120 min ..... $5.25

**High Performance 8-Track Cartridges**
Low noise.
45 min ..... $3.63
90 min ..... $4.49

***Video Cassette Tape***

**Beta Video Cassettes**
For Beta II or Beta III machines.
L500. 2-3 hrs ..... $14.95
L750. 3-4½ hrs. ..... $17.95
L830. 3½-5 hrs. ..... $20.95

# 10 ACCESSORIES

## ALLSOP

**Allsop 3 Cassette Deck Cleaner**
Cassette deck cleaning kit designed to clean pinch roller, capstan, and head in 20-40 sec; cleaner has two non-abrasive felt pads and ribbonless wiper arm; includes cassette-sized cleaner and cleaning solution ..... $6.95
**Refill Kit.** Comprised of three large and three small non-abrasive felt pads and 1-oz bottle of cleaning solution ..... $2.95

**Allsop 3 Video Cassette Recorder Cleaner**
Cassette-format video cassette recorder cleaner cleans audio and video heads, pinch rollers, and capstan in 4-6 seconds (shuts off automatically); designed for VHS-format video recorders (Beta-format cleaner will be available soon); has absorbent cleaning chamois and non-abrasive felt pads; includes cleaning solution ..... $29.95
Replacement cartridge with cleaning solution ..... $8.95

## R.B. ANNIS

**K20/B5 Han-D-Kit**
Kit's purpose to measure and eliminate magnetism in recorder components before recorded tapes are damaged; includes gauss-calibrated (5-0-5) pocket magnetometer that measures level of magnetism, magnetically soft and magnetically hard test sensor strips, 1¾-in clip-on extension probe, and Han-D-Mag, a dual-use sine-wave demagnetizer with 350-oersted demagnetizing field ¼-in beyond tip of 2¼-in long plastic-jacketed probe and 900-oersted field ¼-in beyond flush pole end of Han-D-Mag; can be used for bulk erasing of ¼-inch-wide tape ..... $41.50
**K25/S5.** Same as K20/B5 except includes larger jewelled magnetometer with ten times calibration stability ..... $73.45

*Company also sells individual components of kit separately as well as different gauss ranges of the 20 and 25 magnetometers.*

## ASPEN

The company carries a complete line of tape accessories for use with open-reel, cassette, 8-track, and car tape equipment.
**Head Cleaner Kit.** Includes Aspen aerosol spray tape head cleaner, extension nozzle, and six 4-in wipe heads ..... $3.89
**Wipe Heads.** 25 6-in jumbo tip swabs per package .. $1.29

**Plastic Wax**
Dustcover cleaner and polisher; removes scratches from plastics and eliminates static electricity; for use on plastic, wood, glass, metal, formica, vinyl, etc.
8 oz ..... $3.59
16 oz ..... $5.95
32 oz ..... $10.79

**Decktester**
8-track cartridge for home and auto use to check 8-track tape decks for tape speed-time, speaker rattle, speaker phasing, wow and flutter, head alignment, crosstalk, channel switching, and worn heads ..... $8.95

**Video Disc Cleaner**
Cleans and polishes video discs; removes scratches, eliminates static, and retards dust accumulation, smudges, and fingerprints.
Heavy-duty model ..... approx. $6.00
Light-duty model ..... approx. $5.00

## AUDIO CONTROL

**C50A LED Realtime Analyzer**
LED spectrum analyzer with built-in pink noise generator and microphone. Features 101-LED spectrum display that shows fast or slow peak-reading modes, sound pressure level with external mic or VU meter readings, and pink noise and microphone analyses with switchable calibration levels from 2- to 4-dB/LED. Other features include continuously variable input level sensitivity with calibration; auto mic/line input switching ..... $399.00

## AUDIONICS OF OREGON

**RVR-RVP Series Drop-In Modules Kits**
User-replacement electronics kits designed to improve noise specifications of the non-Dolbyized Revox A-77 tape decks by 1.5 dB; kits include record and playback drop-in modules and externally-fitted bias-trap network. A-77 improvements with modules: record amp overloads at min. 6 dB above saturation levels of any tape at any frequency; THD 0.2% at 6 dB above saturation; response at 20,000 Hz – 1.5 dB at 7½ ips; recalibrates meter sensitivity due to headroom increase. Available for 3¾-7½ and 7½-15 ips A-77 models; factory-calibrated for bias, equalization at two speeds, record gain; user adjustable in conjunction with A-77 instruction manual.
Complete RVR RVP kit ..... $425.00

## AUDIOTEX

The company carries a complete line of tape accessories for use with open-reel, cassette, and 8-track equipment.
**30-129.** Tape Care Kit, Jr. contains head cleaner, cotton swabs, and cleaning cloth ..... $2.70
**30-630.** "Blast-off" tape head cleaner, 3-oz aerosol can ..... $2.00
**30-128.** Same as 30-630 except in 6-oz aerosol can ..... $3.55
**30-124-1.** Recording head cleaner, 2-oz bottle ..... $1.70
**30-124-2.** Recording head lubricant, 2-oz bottle ..... $1.70

## BIB

**Audiophile Edition**

**90-AE Tape Head Demagnetizer**
Tape head demagnetizer designed for cassette, 8-track, and reel-to-reel recorders; built-in automatic off switch when not in use; includes two removable probes ..... $24.95

**115-AE Tape Head Cleaning Kit**
Multi-angled tape head cleaning tools for use on all tape recorders; includes inspection mirror with cleaning brush, bottle of cleaning fluid, and replacement tips ..... $14.95

**24-AE Cassette Tape Splicer**
⅛-in cassette tape splicer suitable for recording tape of any thickness; makes diagonal or butt splices ..... $14.95
**20-AE.** ¼-in recording tape splicer ..... $14.95

**121-AE Tape Head Cleaning Fluid**
Professional fluorocarbon formula; cleans tape heads, capstans, and pinch rollers; residue free and safe for all recorder surfaces ..... $3.45

**Videophile Edition**

**VE-6 Tape Head Demagnetizer**
Demagnetizes heads and guides of all video recorders; built-in off switch when not in use; supplied with two removable probes ..... $24.95

**VE-4 Dust-Away Air Blast**
Compressed-air spray blaster removes dust, dirt, and oxide deposits accumulating around tape travel

# 10 ACCESSORIES

path; moisture-free and temperature-constant..... $4.50

### VE-5 Maintenance Cleaning Tools
Video recorder cleaning tools with lint-free cleaning pads at tips; cleans video and audio heads, tape guides, and pinch rollers; package of five..... $4.50

### VE-7 Video Tape Head Cleaning Fluid
2-oz video tape cleaning fluid in glass bottle; cleans video and audio heads, capstans, and tape guides of all video machines; non-toxic and non-flammable..... $4.25

### VE-8 Anti-Static Fluid
2-oz bottle of anti-static fluid cleans TV screens, video camera lenses, and exterior electronic equipment surfaces; non-flammable and non-toxic..... $3.75

### VE-2 Video Maintenance Kit
Comprises five VE-5 cleaning tools, VE-7 head cleaning fluid, VE-4 dust-away air blast, inspection mirror, anti-static cleaning cloth, and maintenance manual on VHS and Beta format recorders.. $24.95

## CALECTRO

### Tape Accessories
**Q4-234.** Standard demagnetizer fits most reel-to-reel and cassette equipment; operates on house current; tip protected with resilient plastic... $7.50
**Q4-235.** Cartridge and cassette type demagnetizer designed for home recorders and players using the standard 4 or 8 track slip-in cartridge; operates on house current..... $8.50
**Q4-238.** Cassette tape head cleaner..... $1.55
**Q4-239.** Cartridge tape head cleaner; includes two additional belts..... $2.50
**Q4-237.** Tape recorder and player maintenance kit contains two 2-oz bottles of head cleaner and lubricant, cleaning brushes, and long handle cotton swabs..... $2.30
**Q4-236.** Tape head cleaner/lubricant and cotton swabs..... $1.40
**Q4-230.** Metallic sensing tape for use on recorders with electronic switching controls; designed for contact or photo sensing recorders..... $2.00
**Q4-231.** Mylar splicing tape for any type of recording tape; 1/2" W × 100" L..... $0.88

*Calectro also manufactures a line of adaptors, phono and phone plugs, and phone jacks.*

## EVENTIDE

### THS224 Real-Time Spectrum Analyzer
Real-time audio spectrum analyzer designed to interface with 8K, 16K, and 32K Commodore PET computers; also compatible with PME-1 and Big Mem add-on memory boards; responds to various addresses in $B000-$BFFF range. Functions: prints display axes and frequencies on screen; displays bar graph of data determined during analysis; performs statistically independent real-time analysis for each call; sets and resets fast/slow decay mode; sets and resets averaging mode; sets and resets logarithmic display mode; analyzer gain adjustable 0-48 dB; error message. Input level +14 to −20 dBV; input impedance 10k ohms balanced; 31 two-pole filters from 20-20,000 Hz on ISO center frequencies; resolution 7 mV (linear display mode); specify 8K, 16K, or 32K PET..... $595.00
**VTU02.** As above but interfaces with Radio Shack TRS 80 computer with Level 2 BASIC and disk..... $595.00
**AIB232.** As above but interfaces with Apple computers; plugs into any I/O connector..... $545.00

## EV-GAME

### Electro-Care Tape Cleaning Products
**TC-1.** 8-track head cleaner cartridge; spun polyimide Mylar-backed fabric belt..... $2.49
**TC-2.** TC-1 with recorder head cleaning fluid; to be applied on cartridge belt..... $2.98
**TC-3.** Cassette head cleaner cartridge; 48-in polyimide Mylar-reinforced belt..... $2.49
**TC-4.** TC-3 with recorder head cleaning fluid. $2.98
**TC-5.** 8-track head and capstan cleaner cartridge with head cleaning fluid; spun polyimide Mylar-backed belt with microlon™ fiber for capstan..... $3.49
**TC-6.** Tape head cleansing fluid..... $1.49
**TC-7.** 6-in cotton swabs..... $2.19
**TC-8.** 8-track and cassette cleaning kit comprised of cleaning swabs and tape head cleansing fluid..... $2.98

## FIDELITONE

### 8503 Video Cassette Storage Chest
Solid walnut lacquer-finished partitioned storage chest holds up to 24 VHS video cassettes; thumb-slot opener, kerf-mounted hinge, and dado lid stop..... $83.95
**8504.** Same as 8503 except holds up to 24 Beta video cassettes..... $77.95
**3143.** Similar to 8503 except holds up to 12 VHS or Beta video cassettes..... $57.95

### 8500 Audio Cassette Storage Chest
Solid walnut lacquer-finished cassette chest holds up to 64 cassettes; has two flocked-vacuum-formed insert trays; thumb-slot opener, kerf-mounted hinge, and dado lid stop..... $93.95

### 3135-01 Audio Cassette Storage Chest
Solid walnut lacquer-finished cassette chest holds up to 24 cassettes; has flocked-vacuum-formed insert, thumb-slot opener, kerf-mounted hinge, and dado lid stop..... $45.95
**3135.** Same as 3135-01 except holds up to 36 cassettes..... $52.95
**8505.** Similar to 3135-01 except holds up to 12 cassettes..... $27.95
**8509.** Similar to 8505 without lid; holds up to 36 cassettes..... $21.95
**8508.** Similar to 8509 except holds up to 24 cassettes..... $19.95
**8507.** Similar to 8508 except holds up to 18 cassettes..... $17.95
**8506.** Similar to 8507 except holds up to 12 cassettes..... $15.95

## LOGICAL SYSTEMS

### 1081 Real Time Audio Analyzer Kit
LED audio analyzer features 81-LED spectrum display over 10-octave audio range; has level and mic/aux./voice select controls. Input level 1 V nominal; input impedance 100k ohms; frequencies set at 31.2, 62.5, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz in 3-dB steps; meter accuracy 0.5 dB/step. Kit includes circuit-board-mounted components, 3.5-in-high black anodized rack mount chassis, and assembly manual; unit hooks up to receiver, preamp, tape machine, mixer, or audio jack of video tape recorder; 3.5" H × 19" W × 7" D..... $179.00
Wired version..... $295.00

## MAGNESONICS

### Modular Tele-Cord Electronic Secretary
Records telephone communication through hook-up with cassette recorder; includes modular duplex adaptor (connects to modular line plug and telephone line), sub-miniature plug connecting to remote input of recorder, and miniature plug connecting to aux. or mic input of recorder..... $49.95

### Erase-Sure
Erases cassette or 8-track cartridge to −65 dB from 0 reference; includes four "AA" batteries; 2 3/4" H × 4" W × 3 1/2" D..... $24.50
Ac adaptor..... $9.50

### Rapid Rewind
Designed to check and test cassettes before recording for cassette tape tension stabilization, tape binding elimination, and uniform tape pack; winds C-60 cassette in 30 sec; includes four "AA" batteries..... $24.50
Ac adaptor..... $9.50

## MURA

### Muradapter
Converts cassette into 8-track cartridge; cassette loads directly into machine for 8-track conversion; has fast forward..... $59.95

## NAKAMICHI

### PS-100 Power Supply
Provides ± 10 V dc for Nakamichi BlackBox Series components; can power up to six components..... $100.00

### DM-10 Head Demagnetizer
Slim-line, easy-to-use recorder head demagnetizer; designed for company's cassette decks..... $28.00

## REALISTIC

The company's tape accessory line is as follows:
44-210. Bulk tape eraser..... $15.95
44-215. Tape head demagnetizer..... $5.95
44-207. Illuminated head demagnetizer..... $13.95
44-1165. Electronic cassette demagnetizer..... $19.95
44-212. Open-reel tape splicer..... $5.95
44-214. Cassette tape splicer..... $5.95
44-222. Tape recorder care kit..... $5.95
44-626. Cassette repair kit..... $1.09
44-627. 8-track cartridge repair kit..... $3.95
44-670. Cleaning swabs and 2-oz Freon head-cleaning solvent..... $2.99
44-667. Cassette tape carrying case..... $21.95
44-671. 8-track tape carrying case..... $15.95
44-612. Cassette storage album..... $2.99
44-209. Electronic cassette winder..... $9.99
44-280. 7-in metal reel..... $6.95

## RECORDER CARE/NORTRONICS

### QM333 The Splicer
Edits, repairs, or adds leader to magnetic tape; designed for 1/4-in reel-to-reel, 8-track cartridge, and cassette tapes; slits tape; has pop-out tape guide..... $16.80

### Professional Splicing Blocks
Grooved silver or gold anodized aluminum splicing blocks with two deep slits for straight and diagonal cuts; includes double-backed adhesive and stainless-steel cutting blade; 5 3/4" × 1" × 5/16".
**QM-311.** For 1/4-in tapes..... $22.00
**QM-312.** For 0.150-in cassette tapes..... $22.00
**QM-313.** For 1/2-in video and audio tapes..... $30.00

### Reel Tabs
Pre-cut Mylar or metal tabs in dispenser box; comes in quantities of 50, 200, or 1000; 1/2-in Mylar tabs in quantities of 200 or 1000 also available.
**QM521.** 1/4-in reel tabs; 50/package..... $4.40
**QM522.** Cassette reel tabs; 50/package..... $4.40
**QM524.** 1/4-in metal-sensing reel tabs; 50/package..... $4.40

### QM-707 Handylap
Kit includes lapping block with five 5 × 9-in coarse abrasive black lapping sheets of paper, five 5 × 9-in medium abrasive yellow sheets, and five 5 × 9-in fine abrasive red sheets..... $77.80
**QM-702.** Coarse lapping paper; black..... $7.20
**QM-703.** Medium lapping paper; yellow..... $12.20

**QM-704**. Fine lapping paper; pink ..... $12.20

### QM-230 Cassette Bulk Eraser
Self-powered hand-held unit completely erases cassette tapes; requires no batteries or external power source; contoured Cycolac case with wood grain finish ..... $32.20

### QM-211 Bulk Eraser
Bulk eraser generates a 60 Hz magnetic field which completely erases pre-recorded reels, cassettes and 8-track cartridges up to ½-in wide; features touch-control Microswitch that activates on fingertip pressure and deactivates when unit is put down; built-in thermal overload protect circuit; hand-contoured Cycolac case; coiled cord ..... $47.00
**QM-212**. 220-V professional bulk eraser ..... $52.00

### QM-250 Professional Bulk Tape Eraser
Demagnetizes professional cassette, ¼-in, ½-in, and 1-in open-reel, broadcast 8-track cartridge, and ½-in VHS/Beta video cassette tapes; holds up to 10½-in reel sizes; 3.25" H × 10" W × 7" D ..... $290.00

### QM-202 Head Demagnetizer
Head demagnetizer for use with reel-to-reel, cassette, and 8-track recorders; features long, flexible, plastic covered probe that reaches the most inaccessible heads; leaf switch activates with fingertip pressure and deactivates when unit is put down; built-in thermal overload protect circuit; Cycolac case ..... $20.80
**QM-203**. 220-V professional head demagnetizer ..... $22.80

### QM-280A Cleaner/Demagnetizer
Removes residual magnetism and accumulated oxide and dirt deposits from 8-track heads; includes ac cord for 110-120 V ac operation, 50-60 Hz ..... $21.00

### Head Cleaners
**QM-140**. For cassettes ..... $3.00
**QM-141**. For cassettes; includes liquid head cleaner ..... $3.40
**QM-180**. For 8-track tape ..... $3.20
**QM-181**. For 8-track tape; includes liquid head cleaner ..... $3.60
**QM-182**. Combination 8-track head/capstan cleaner ..... $3.80

### Alignment Tapes
**AT-2108**. For cassette recorders ..... $13.80
**AT-2008**. Master recording provides zero reference, azimuth alignment, and DIN frequency response tests; includes 3000-Hz tone for speed and flutter ..... $49.80
**AT-820**. For 8-track; 8-min cycle ..... $11.60
**AT-320**. Designed for NAB type endless loop mono and stereo cartridge recorders/players; 7.5 ips master recording tests and adjusts head azimuth, program frequency response, program record level, stereo head phasing, cue tone sensitivity, and tape speed ..... $52.80
**AT-120**. ¼-in reel-to-reel 7.5 ips master recording tape ..... $49.60

### Cassette Storage/Carrying Cases
Burl walnut vinyl book-like cassette case; cassettes and hubs lock in place.
**QM408**. Holds max. 8 cassettes ..... $8.00
**QM412**. Holds max. 12 cassettes ..... $9.20
**QM416**. Holds max. 16 cassettes ..... $11.00

### VCR Maintenance Products
**QM-50**. Deluxe video recorder care kit includes 10-oz Super Blast spray, 16-oz tape head cleaner spray, anti-static dustcloth, 25 cellular foam swabs, and disposable wipers ..... $24.40
**QM-95**. VCR maintenance kit includes spray head cleaner, cellular foam swabs, anti-static dustcloth, and screwdriver that removes headcover screws ..... $14.80
**VCR-103**. Tape head cleaner spray for VCR heads, pinch rollers, and capstans; 3 oz ..... $4.20
**VCR-105**. Tape head cleaner liquid removes dust, dirt, and tape oxide deposits from VCR heads and parts; 3.2 fl oz ..... $3.80
**VCR-109**. High-velocity jet air stream Super Blast Spray cleaner eliminates loose tape oxide dirt and dust; 10 oz ..... $4.60
**VCR-205**. Head demagnetizer with angled tip; removes residual magnetism from heads, rollers, and guides ..... $21.20
**VCR-211**. Video bulk eraser erases Beta II and VHS-format cassettes; generates 60-Hz magnetic field; touch-activated microswitch that deactivates when put down; Cycolac case; includes ac power cord for 110-120 V ac operation, 50-60 Hz ..... $47.00
**QM-313**. Grooved anodized aluminum splicing block for repairing or editing ½-in video cassettes; two deep slits for straight or diagonal cuts; includes double-backed adhesive ..... $30.00
**VCR-506**. Illuminated inspection mirror for dark, hard-to-reach areas of VCR ..... $6.60
**VCR-512**. Cellular foam cleaning swabs for VCR heads and surfaces ..... $4.80

### Car Tape Maintenance Products
**AS-9**. 3-oz spray cleaner and 100 six-in cotton swabs ..... $6.00
**AS-141**. Cassette life extender features non-abrasive cleaning belt; includes liquid cleaner ..... $3.40
**AS-183**. 8-track head/capstan cleaner; designed for use every ten hrs; includes liquid cleaner ..... $4.20
**AS-206**. 8-track/cassette head demagnetizer; plugs into car cigarette lighter ..... $28.30

## RECOTON

### V-100 Video Tape Storage Cabinet
Holds Betamax and VHS tapes; stores up to 18 video tapes in walnut finish cabinet ..... $39.95

### 190TC Cartridge Carrying Case
Stores 24 8-track tapes in vinyl- or suede-covered case; padded handle; lock and key ..... $15.95

### 196TC Cassette Attache Case
Stores 30 cassettes in individual compartments in suede- or vinyl-covered attache case ..... $15.95

### CS-8 Cartridge Carousel
Stores 24 8-track cartridges in individual compartments in plastic smoke-finish carousel ..... $10.99

### CS-1A Cassette Carousel
Stores 20 cassettes vertically in plastic smoke finish carousel ..... $5.99

### RBM-44 Magicare Demagnetizer
8-track head demagnetizer and cleaner; designed for use after every 15-20 hrs of playing time; operates on standard 110 volt current; UL approved ..... $9.99

### RBM-45 Magicare Demagnetizer
Cassette demagnetizer designed for home use after 15-20 hrs of playing time; operates on 110 volt current ..... $9.99

### RBM-41 Magic Cartridge Kit
"Magic Cartridge" functions as head cleaner, capstan cleaner, track selector test, speaker phasing test, and channel balance test; includes ¾ oz Magic Tape Dew cleaning fluid and the Magic Wand Applicator with six replacement pads ..... $6.99

### RBM-40 Magic Cassette Kit
Includes 10-ft cassette head cleaner in plastic case, ¾ oz Magic Tape Dew cleaning fluid, and Magic Wand Applicator with six replacement pads ..... $5.99

### RBM-42 Magic Tape Cleaning Kit
Includes ¾-oz Magic Tape Dew cleaning fluid and Magic Applicator with interchangeable brush and pad and six replacement pads ..... $2.99

### RBM-43 Magicare Tape Editing Kit
For cassette and reel to reel; includes aluminum dual-purpose splicing block, leader tape, splicing tabs, 12 blank cassette labels, and razor blade ..... $0.99



## ROBINS

### 24-001 Video Cassette Eraser
Heavy-duty video cassette eraser erases video cassettes and tapes and audio cassettes, cartridges, and reels; erases in seconds; reduces tape to low noise level; no tape contact or wear during erasure; has built-in momentary contact switch; 110-120 V ac intermittent duty (one minute on, 20 minutes off); 6 A; 4 lbs; UL approved; 5" × 5" × 3.5" ..... $58.50

### 24-014 Audio Tape Eraser
Erases cassettes, cartridges, open reel, digital cassettes, and magnetic stripe film; erases in seconds; reduces tape to low noise level; no tape contact or wear; has built-in momentary contact switch; 117 V ac intermittent duty (one minute on, 20 minutes off); 220-V model also available; 5 A; 2 lbs; UL approved; 4" × 2.5" × 4.5" ..... $34.50

### Whistle Stop Head Demagnetizer
Automatic electronic cassette head demagnetizer in cassette format; removes accumulation of residual magnetism from heads of home or car cassette tape machines; whistling tone, indicates erasing action; powered by two 1.5-V batteries (included) ..... $26.50

### 25-011 Universal Head Demagnetizer
Universal head demagnetizer with changeable tips permitting use with reel-to-reel, cassette, and cartridge equipment; 110-120 V ac, 50/60 Hz operation; UL approved ..... $15.50

### 34-000 Cassette Attache Case
High-impact plastic attache-style case holds up to 16 cassettes and/or home and business computer cassettes; snap-lock carrying handle ..... $5.40
**34-000C**. 34-000 with smoked top ..... $6.50

# 10 ACCESSORIES

## ROTEL

### RY-1010 Peak Level Spectrum Analyzer
Ten-band octave peak-level spectrum analyzer with built-in pink noise generator and separate mono electret condenser microphone; enables user to see sound characteristics on display as signal passes through component; also measures line input, live microphone sources, and residual noise levels. Spectrum analyzer display: ten bands with signal frequencies at 32, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz; features twelve LED indicators for each band showing peak level; 12/24/36-dB range selector switch; calibration control; one-octave bandwidth bandpass filter for ten bands. Pink noise generator: frequency response 20-20,000 Hz +0/−0.5 dB; output level 100 mV/3k ohms. Microphone: omnidirectional type with two-position music/voice tone control switch; frequency response 30-16,000 Hz ±2 dB; includes stand and cable. Additional characteristics include three-position line mode switch for measuring each channel separately or simultaneously; input sensitivity/impedance 0.2 mV/30k ohms (mic), 2 mV/30k ohms (line); $3^{27}/_{32}$" H × $16^{15}/_{16}$" W × $11^{13}/_{32}$" D ..... $470.00

## RUSSOUND/FMP

### QT-1 Quad Patching/Control Center
Passive switching center expands tape monitor loop of audio system to accept two- or four-channel noise-reduction systems, graphic equalizers, matrix decoders, and up to four mono, stereo, or quad tape recorders, with switching functions handled through front-panel switches or patch cords; supplied with 16 shielded patch cords. Front panel switches include record, mix, 2-/4-channel, play, monitor, and aux. input and output modes; front panel patching jacks for source/recorders in, recorders/source copy buss, recorder/monitor out, equalizer in/out, noise reduction encode in/out, and noise-reduction decode in/out. Rear panel connects all recorders and accessories with 72 RCA type phono pin jacks. Insertion loss less than 0.5 dB when operating recorders or decoders singly, 6 dB when mixing two channels or two recorder outputs; walnut finish vinyl cabinet; $4^{13}/_{16}$" H × $13^{7}/_{8}$" W × 5" D ..... $299.95

**QT-1 RM.** Rack-mount version of QT-1; semi-gloss black metal cabinet; $5^{7}/_{32}$" H × 19" W × 5" D ..... $299.95

**SP-1.** Same as QT-1 except for two-channel stereo systems only; switching capacity for up to four stereo tape recorders and five stereo accessories in any combination of recording, playback, monitoring, or dubbing; supplied with 12 shielded patch cords; walnut vinyl finish cabinet and semi-gloss black front panel; 5" H × $7^{3}/_{4}$" W × $4^{7}/_{8}$" D. $189.95

Rack-mount version of SP-1; $4^{1}/_{8}$" H × 7" W × 5" D ..... $189.95

## SCOTCH

### ERK-130 Cassette Edit/Repair Kit
Contains precision splicing block; spindle for manually winding cassette tape; six polyester picks (adhesive tipped for retrieval of tape ends lost in housing); six 130-mil splicing tabs; detailed instruction booklet ..... $3.39

### Pre-Cut Tabs
**SPT-7/32-36.** 36 pre-cut 1.0-mil polyester splicing tabs ..... $1.39

**SST-7/32-18.** 18 pre-cut aluminized sensing tabs ..... $1.39

**SK-7/32.** 12.5 ft of 1.9 mil polyester splicing tape in dispenser kit ..... $2.29

### Head Cleaners
**S-C-HC.** Cassette head cleaner ..... $1.79

**S-8TR-HC.** 8-track head cleaner ..... $2.99

### C-Box Cassette Storage System
Stackable/interlocking cassette storage/carrying boxes with pushbutton drawers; easy access and index label for quick identification.

Sleeve of three empty C-Box units ..... $3.29

C-Box wall bracket ..... $2.39

C-Box carrying handle ..... $2.39

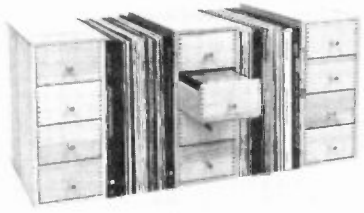
Box of 10 empty "C-Box" units with handle and bracket ..... $12.29

25 drawer labels and insert cards ..... $1.99

Car saddle ..... $9.99

## SOUNDAIDS

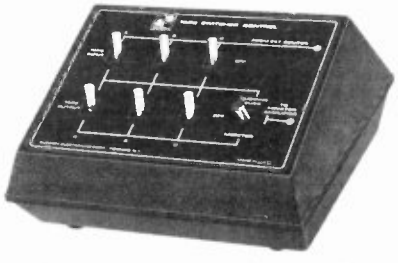
### Cassette Storage Cabinet
Wood cabinet with lock-jointed corners and four hand-fitted drawers holding up to 17 cassettes;



drawers have recessed sides for easy removal of cassettes; designed to fit standard record shelves so as to function as record dividers or support shelves (with more than one cabinet); $12^{3}/_{4}$" H × $5^{9}/_{16}$" W × $12^{3}/_{16}$" D ..... $38.00

## SUPEREX

### TSB-3 Graphic Tape Switching Console
Stereo tape switching console features color-coded tape duplication processes graphically illustrated on



front panel; three-deck capability; functions include duplicating recordings or broadcasting on three tape decks, mixing two sources for documentary effect, and transfer of program material from one tape deck to another while monitoring and recording additional different program source; both inputs and outputs include stereo, one amplifier, and three tape decks or auxiliary components; dubbing bank for use with any stereo amplifier or receiver with monitoring facilities; controls include three input and three output toggle switches and one output line selector toggle switch; rear panel phono jacks; $2^{3}/_{4}$" H × $6^{1}/_{4}$" W × $4^{3}/_{4}$" D ..... $50.00

## TDK

### HD-11 Tape Head Demagnetizer
Portable hand-held universal tape head demagnetizer designed for open-reel or cassette tape decks; operating time less than one second; red LED "on" indicator and green LED "ready-to-use" indicator; side-mounted activator switch; plastic-covered metal tips; includes two 1.5 V dry-cell batteries ..... $43.75

### HD-01 Head Demagnetizer
Automatic head demagnetizer with less than one-second operating time; housed in transparent cassette shell with surface-mount LED indicator to show demagnetization is taking place; self-contained battery ..... $30.00

### HC-1 Head Cleaner
Non-abrasive cassette tape machine head cleaner ..... $2.25

## TEAC

### E-2 Bulk Eraser
Handles 7- and $10^{1}/_{2}$-in reels; built-in pilot light and circuit breaker guard ..... $100.00

### RMK Recorder Maintenance Kit
Kit includes 3-oz bottle of HC-1 head cleaner, 3-oz bottle of rubber cleaner, 3-oz bottle of stainless polish, cotton swabs, and cleaning cloth ..... $9.00

### Flight Cases
Tough vinyl-covered wooden trunk-designed flight transport cases for 2340 Teac series open-reel tape recorders; meet Airline Transport Association specifications.

**FC-24.** For 2340 Teac series ..... $145.00

**FC-34.** For A-3440 Teac tape recorder ..... $155.00

**RC-3.** For Tascam Model 3 mixer ..... $150.00

**FC-5.** For Tascam Model 5A mixer ..... $190.00

**FC-8.** For Tascam 80-8 and 40-4 open-reel recorders ..... $225.00

### PB-64 Patch Bay
Has 64 RCA phono connectors on both front and rear panels; compatible with low-loss audio cables ..... $100.00

*Available directly from company's test labs is their line of calibration and alignment tapes in cassette format for 70- and 120-μsec equalization levels. Teac also manufactures a series of low-capacitance audio cables, plastic 900- and 1800-ft reels, NAB hub adaptors, and test tone oscillators.*

## TAPE RECORDING & BUYING GUIDE 1981 ADVERTISERS INDEX

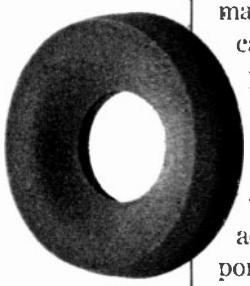
# Introducing a totally new concept in stereophones.

The new Koss HV/X high velocity stereophone represents a remarkable breakthrough in hear-thru stereophone design and performance. For the first time, Koss engineers have been able to create a lightweight, hear-thru stereophone that combines the transparency of high velocity phones with the superior bass performance of closed-type phones. The result is a breathtaking musical experience.

Koss HV/XLC

## CONTOURED VARIABLE-DENSITY EARCUSHIONS

While most lightweight, hear-thru stereophones have earcushions that fit against the ear, the new Koss HV/X features a unique, contoured, variable-density cushion that fits around the ear. Not only does this unique earcushion design create a far more comfortable stereophone but it has also allowed Koss engineers to create a dramatically better element design as well.



These new variable-density earcushions are made up of a very porous material that is acoustically transparent at the perimeter of the earcushion yet compressed toward the center region. This varies the pattern of acoustic resistance over portions of the earcushions creating the proper seal for specific bass frequencies while allowing the flow of middle and high frequencies at the perimeter of the earcushions.

## LIGHTWEIGHT ELEMENT

The uniqueness of the new variable-density earcushions made it possible for Koss engineers to design a lightweight element that reproduces a Sound of Koss you have to hear to believe. Incredibly, even though the overall weight of the element was reduced, Koss engineers were able to develop a magnet with enough magnetic density to drive an extra large diaphragm. With a response range of 15 to 35,000 Hz, the new Koss HV/X will drive you into ecstacy and our competitors nuts.

## HEARING IS BELIEVING.

Slip into the new Koss HV/X or HV/XLC with volume/balance controls at your audio dealer soon. You'll like the best of both worlds: the open, airy, up-front sound of hear-thru stereophones and the deep, rich bass performance of closed-type stereophones.

And while you're with your audio dealer, listen to our full line of Koss stereophones and CM loudspeakers. There's no sound quite like the Sound of Koss.

*For more information on the HV/X, our full line of stereophones and loudspeakers or our new Koss K/4DS digital delay system, write c/o Virginia Lamm.*



**KOSS® stereophones/loudspeakers**

**hearing is believing™**

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

# HIGH PERFORMANCE HIGH BIAS.


**AMPEX GM II HIGH BIAS TAPE.**

When you're recording music that's rich in high frequencies, you need a high performance tape. Ampex GM II high bias cassettes. They retain and release every note and nuance. Especially those found in highly amplified electronic music.

GM II's high performance begins with the magnetic particle. The ones we use are smaller, permit higher volumetric loading and greater uniformity of dispersion on the tape surface. This produces a more consistent energy, increased output sensitivity, and a substantial reduction in the third harmonic distortion level. Our unique oxide formulation and new processing techniques extend the high end while they lower the noise floor (-62.8dB @ 333Hz). And to make certain that tape-to-head contact is precise, we use our exclusive Ferrosheen™ calendering process to give the tape an ultrasmooth, glossy surface.

GM II's True-Track™ cassette mechanism is an audio achievement in and of itself. Every aspect, from the fore and aft guide system to the computer-torqued cassette housing screws, says high performance. Then every Ampex cassette must pass our stringent quality control standards.

GM II high bias, high performance tape. Use it next time you're recording a passage that's rich in high frequencies. You'll hear what a difference it can make when your high bias tape delivers high performance.

For complete information and specifications on all Ampex premium tapes, write us for a copy of our Full Line Brochure.

**AMPEX**

*The Tape of the Stars*

Ampex Corporation, Magnetic Tape Division, 401 Broadway, Redwood City, CA 94063 415/367-3888

CIRCLE NO. 3 ON READER SERVICE CARD