

# TAPE RECORDING & BUYING GUIDE 1982

THE COMPLETE CONSUMER'S DIRECTORY OF CASSETTE DECKS • CAR STEREO • VIDEO RECORDERS SIGNAL PROCESSORS • MICROPHONES • BLANK TAPES INCLUDES FULL SPECIFICATIONS • FEATURES • PRICES

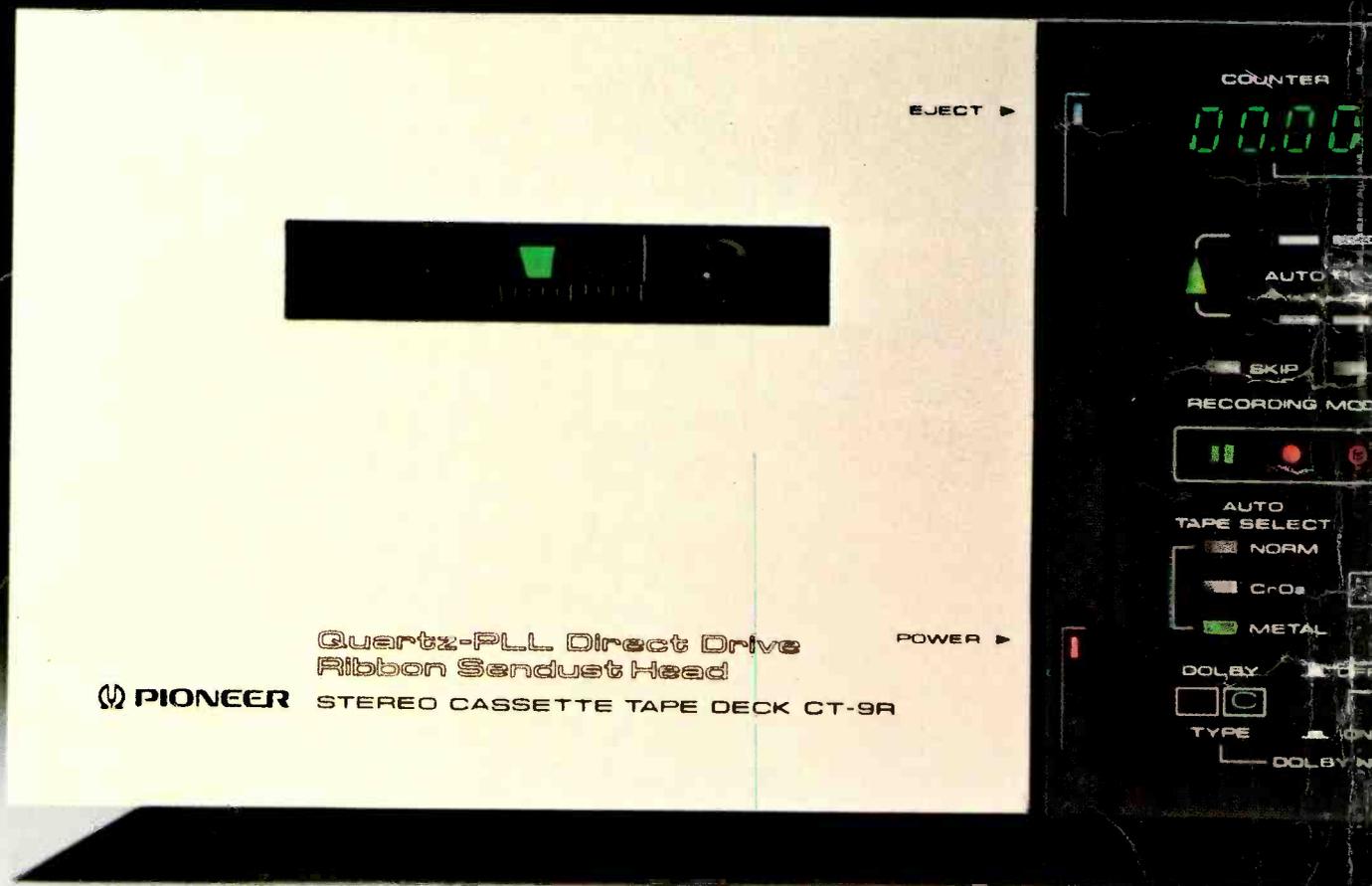
**ALSO:** Experts discuss how to choose and use Audio & Video equipment

**PLUS:** Hirsch/Houck Lab Tape Deck Test Reports



*High Fidelity for Humans:*

# NOW WHEN IT DOESN'T HAV



Anyone who records on tape knows what a pain it is to run out of tape before running out of music.

Pioneer has relieved this pain. Along with quite a few others inherent in the designs of practically all components being built today.

We've done it through a concept we call *High Fidelity for Humans*. A design and engineering idea so far reaching, that for the first time components are as pleasant to live with as they are to listen to.

For example, our new CT-9R cassette deck shows you a digital readout of the precise amount of recording time left on a tape.

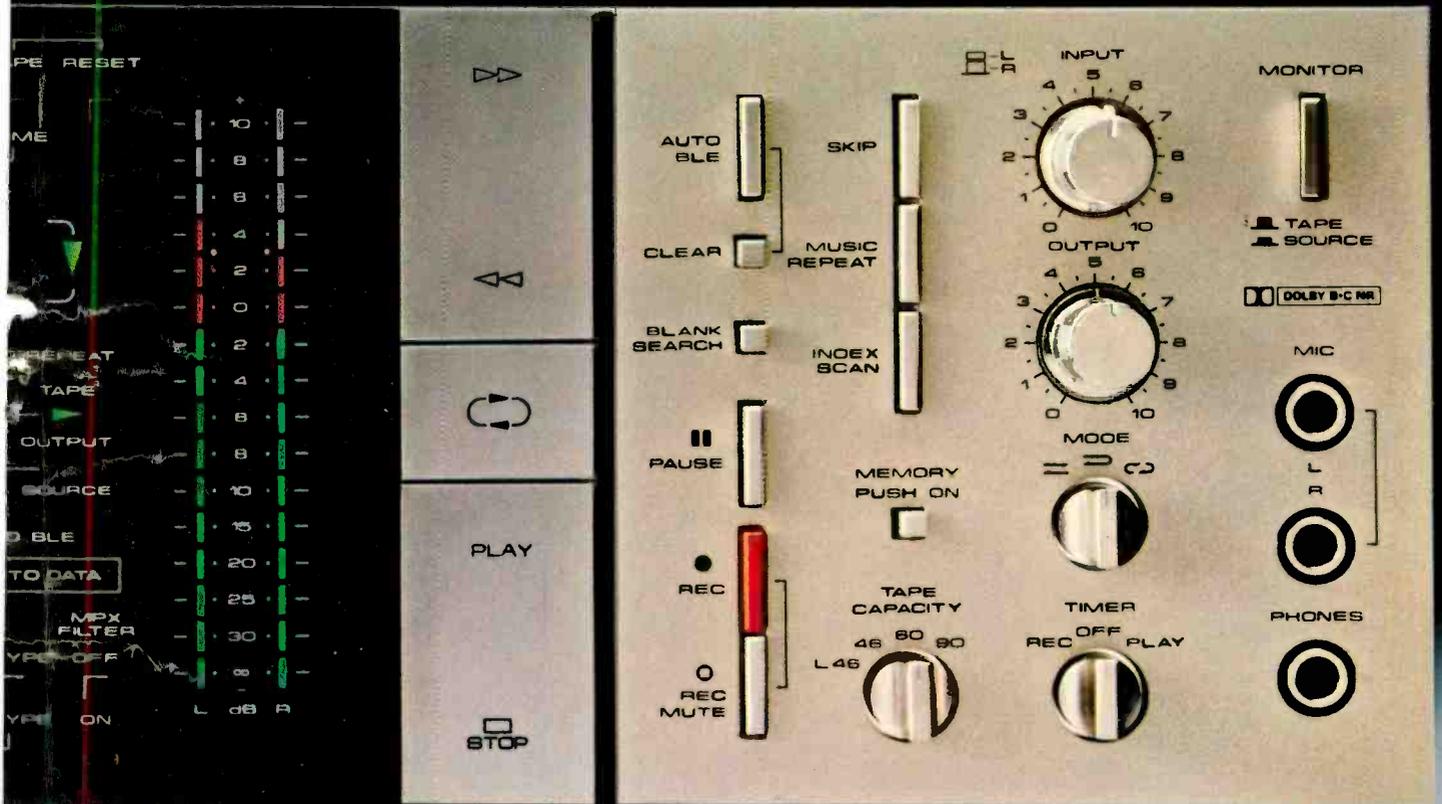
Touch a button and find your favorite song. Because the CT-9R Index Scan breezes through your tape, automatically stopping to play the first five seconds of each piece of music.

If you want to hear a song over, you don't press REVERSE. STOP. PLAY. REVERSE. STOP. PLAY, until you find the beginning. Instead, you simply press the Music Repeat button. The deck does the rest.

The CT-9R even plays both sides of a cassette, automatically.

But don't get the idea that we've produced a cassette deck that is just a lot of fun to play with. It's also a lot of

# YOU RECORD, WE TO END LIKE THIS



fun to listen to.

Our signal-to-noise ratio and high frequency response set a standard in state of the art electronics due to the creation of totally unique record and play heads. They're called RIBBON SENDUST heads and they're only on Pioneer cassette decks.

We've also attained extraordinary record and playback accuracy. Because we've seen to it that the drive capstan and both the take up and supply spindles are driven directly by their own motors. We call it our 3 Direct Drive motor transport and it, too, is exclusively Pioneer's.

Plus, we have Dolby C. The latest in Dolby engineering,

designed to once and for all rid you and your tape of hiss.

If you're the least bit skeptical that a cassette deck could do so much so well, we suggest you visit your nearest Pioneer dealer.

You can see the CT-9R for yourself, as well as an entire line of new Pioneer cassette decks.

But be forewarned. After seeing these, you'll begin to see cassette decks that just play music for exactly what they are.

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## PIONEER®

We bring it back alive.

CIRCLE NO. 22 ON READER SERVICE CARD

# WHY SPEND \$200 MORE ON A BETTER TAPE DECK WHEN ALL YOU NEED IS \$2 MORE FOR A BETTER TAPE.



No matter how much you spend on a tape deck, the sound that comes out of it can only be as good as the tape you put in it. So before you invest a few hundred dollars upgrading your tape deck, invest a few extra dollars in a new Maxell XLI-S or XLII-S cassette.

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Now this might not sound exactly earth-shattering, but it can help your tape deck live up to its specifications by improving output, signal-to-noise ratio and frequency response.

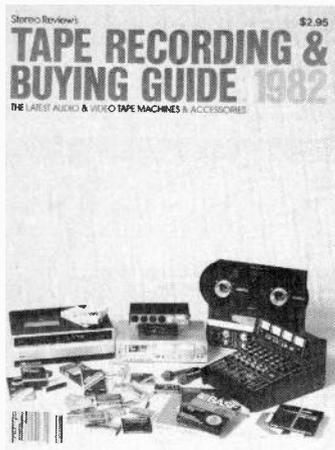
Our new XL-S cassettes also have an improved binder system, which helps keep the oxide particles exactly where they're supposed to be. On the tape's surface, not on your recording heads. As a result, you'll hear a lot more music and a lot less distortion.

There's more to our XL-S tape than just great tape. We've also redesigned our cassette shells. Our new Quin-Lok™ Clamp/Hub Assembly holds the leader firmly in place and eliminates tape deformation. Which means you'll not only hear great music, but you'll also be able to enjoy it a lot longer.

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**IT'S WORTH IT.**

Maxell Corporation of America, 60 Oxford Drive, Moonachie, N.J. 07074  
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Cover Photo: Justin and Barbara Kerr

Cover Equipment (from left to right, front to back): Audio-Technica Model 817 Microphones, Teac Model 2A Mixing Console with MB-20 Accessory VU Meters, RCA VET 65 Videocassette Recorder; Denon DR330 Cassette Deck; Mitsubishi CZ-747 Car Tape Player/AM-FM Receiver; Shure M-63 Equalizer/Noise Reducer/Range Enhancer; Revox B77 MKII Open-Reel Tape Deck. Blank Tape: Ampex, BASF, Denon, Fuji, Hitachi, Irish, Loran, Maxell, Memorex, Nakamichi, Quasar, RKO, Scotch, Sony, TDK.

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# TAPE RECORDING & BUYING GUIDE 1982

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(Continued on page 97)



# At last there's a cassette transport that fully exploits the precision of quartz.

You expect precision from quartz-locked direct-drive. But with a wow and flutter specification of 0.019% WRMS, the JVC DD-9 goes beyond your wildest expectations.

Audibly, this means complete freedom from pitch wavering. Plus uncanny clarity in the high frequencies thanks to almost total absence of flutter.

What else can you expect from a deck that's this accurate? Dolby<sup>®</sup> C for one thing. It reduces noise by 20 dB (versus 10 dB with the previous Dolby system). And it operates much farther down into the midrange, giving 15 dB noise reduction even at 500 Hz.

Against this newfound background of silence you'll hear a greater resolution of musical details, especially with wide-range source material.

There's other JVC magic in the DD-9, too. Like our computer B.E.S.T. system that automatically measures every tape you use. Then sets bias, EQ and noise-reduction values to achieve ruler-flat response with lowest possible distortion. While JVC's heralded Sen-Alloy (SA)<sup>®</sup> Heads give you supremely low distortion plus rugged durability, all in a three-head configuration.

\* Dolby is a trademark of Dolby Laboratories

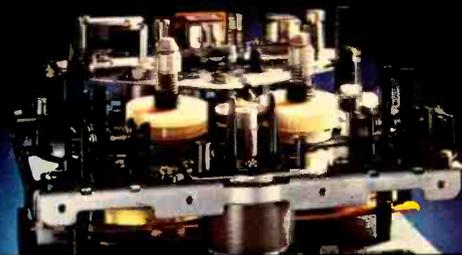
There's also an electronic-digital tape/time counter. Peak VU fluorescent level meters. Memory and Auto Rewind. And full logic transport controls.

Is there a place in your system for a deck as accurate as the DD-9? Or the DD-7 or DD-5, both with wow and flutter at 0.021% WRMS? Why not visit a JVC dealer and find out.



DD-7 with quartz-locked direct-drive.

Quartz-locked direct-drive transport.



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# HOW TO MAKE BETTER-SOUNDING CASSETTE RECORDINGS



By Ivan Berger

**I**F the professionals make better-sounding tape recordings than you do, the credit doesn't *all* belong to their recording gear. Today's better cassette decks are as good in many respects as professional open-reel decks of a decade or so back—decks that are still in use in some studios. No, the real “professional” difference is *technique*, and many of the professional techniques are things *you* can do as readily even though you are usually dubbing whereas they are working with live material. And there are other tips as well, most of which don't apply to professional recording, that can help you get better-sounding results.

## Tape/Deck Matching

The first step toward getting good recordings is to match your recorder and your tape properly. Setting your deck's bias and equalization switches to match the tape type is important, of course, but it's not quite the whole story. Matching your deck to the *precise* tape formulation you are recording on will help you squeeze the last possible decibel of performance from it. Many of the newest decks can do this job automatically, but they're among the most expensive models. More moderate-priced decks have metering or indicating circuits that show you when the bias is

# BASF Chrome. The world's quietest tape is like no tape at all.

Today, only one high bias tape is able to combine outstanding sensitivity in the critical high frequency range with the lowest background noise of any oxide tape in the world.

That tape is BASF's Professional II.

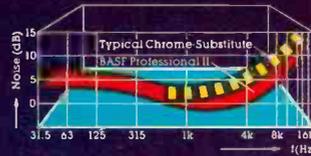
Professional II is like no other tape because it's made like no other tape. While ordinary high bias tapes are made from modi-

fied particles of ferric oxide, Professional II is made of pure chromium dioxide. These perfectly shaped and uniformly sized particles provide a magnetic medium that not only delivers an absolute minimum of background noise, but outstanding high frequencies as well.

Like all BASF tapes, Professional II comes encased in the new ultra-precision cassette shell for perfect alignment, smooth, even

movement and consistent high fidelity reproduction.

With Professional II, you'll hear all of the music and none of the tape. And isn't that what you want in a tape?



The difference in noise level between PRO II and ordinary high bias tape is greatest where the human ear is most sensitive (2-6 kHz).

## GUARANTEE OF A LIFETIME

All BASF tape cassettes come with a lifetime guarantee. Should any BASF cassette ever fail — except for abuse or mishandling — simply return it to BASF for a free replacement.

## Mobile Fidelity Sound Lab

BASF Professional II is so superior it was chosen by Mobile Fidelity Sound Lab for their Original Master Recording™ High Fidelity Cassettes. These state-of-the-art prerecorded cassettes are duplicated in real time (1:1) from the original recording studio master tapes of some of the most prominent recording artists of our time.



# CHROME



# BASF

For the best recordings you'll ever make.

correctly set for the particular tape you're recording on.

But you can get a good match even without such aids. If your deck has a continuously variable bias control, try adjusting it slowly as you make a test tape of a record that is sonically as similar as possible to the kind of material you're planning to record (live, off the air, or whatever). Listen critically so you can find which bias setting gives the best balance among good high-frequency response, low distortion, and low noise. (Optimizing for one of these qualities alone is sure to worsen at least one of the others.) If the bias control on your deck is not continuously variable (or if there isn't any control at all), buy a selection of different brands and types of cassettes and try recording the same material on each of them to see which gives the best results. You won't be wasting money on the tapes that turn out to be less than the best, since the quality spread between the best and the worst on your machine is likely to be fairly narrow; cassettes from reputable manufacturers should all give you at least good results. But once you know which tape brand and type performs the very best on your machine, stick with it (and bear in mind that C-60 and C-90 cassettes that are nominally of the same formulation will have slightly different performance characteristics).

To be absolutely sure of maintaining the best possible tape/deck match, take two more tips from the pros. First, buy your preferred tape a dozen or so cassettes at a time so as to ensure that they will all have *exactly* the same characteristics. Manufacturers have been known to make unannounced improvements in tape formulations that change their performance characteristics; even when this isn't a factor, buying tapes in quantity will ensure that you won't run out at an awkward time—and you may get a larger discount. Second, before each critical recording, recheck and readjust (if necessary) your deck's bias (assuming this is possible) to make sure the internal settings haven't drifted.

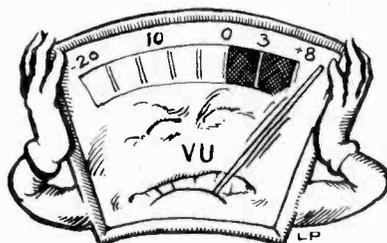
## Level Setting

Using a less than optimum tape can subtly "fog" a recording, but the wrong recording level can ruin it altogether. Unfortunately, what constitutes the *right* recording level varies from tape to tape, from deck to deck, and according to the material you're taping. A good general rule is to set the level so that the meter needle or level indicator twitches occasionally during the softest passages and moves past 0 or into the red area only briefly during the loudest ones. But, like all general statements, this has

to be qualified by the specific recording and by what is said in your recorder's instruction manual.

● **Meter Types:** The same signal will register higher on a *peak-reading* meter than on an *average-reading* one (such as a VU meter) since, after all, a signal's average value will always be less than its highest (peak) value. The difference can be anywhere from 3 to 8 dB, depending on the material being recorded, so don't try to convert mentally from one system to the other; just learn how to interpret the one your machine uses.

Some new machines have meters or bar-graph indicators with expanded scales, and these require a little different thinking too. Obviously, a signal level that barely causes the needle to twitch on a meter whose scale stops at -20 dB will provoke vigorous needle movement on one whose scale goes all the way down to, say, -45 dB. Moreover, different manufacturers may set their meters' 0-level points differently. Setting it low gives lots of headroom for undistorted recording above the 0 point, but it also increases the risk that soft passages will be recorded with too little gain and be excessively hissy on playback. Setting the 0 level high gives a better signal-to-noise ratio—but at an increased risk of overload distortion in loud passages.



● **Headroom and Saturation:** Tape decks—and, even more, tapes—differ in their ability to handle strong signals without overload distortion due to saturation of the head or the tape. This is especially true at the higher frequencies (above 8,000 Hz or so), but since these are usually overtones and are rolled off a bit by many microphones, much of what you record won't contain enough high-level, high-frequency sound to cause trouble. If your deck can record on pure-metal tape, that's the obvious type to use for critical recordings of treble-rich material; improved high-end headroom is the greatest benefit of metal tape.

● **Presetting Levels:** It's best, of course, if your recording level is set correctly from the moment you begin tap-

ing. And it's usually possible to sample the source material beforehand to determine what the level should be. If you're recording from FM, it's easy—FM has a comparatively limited dynamic range that's easy to get on tape. One caution, however: you can't judge the level of a music program by the announcements between musical selections. Some stations deliberately cut back their volume during such announcements, feeling that it's unrealistic for an announcer to sound as loud as an orchestra or rock band. Others soup up the level of the commercials.

If you're dubbing from a disc or another tape, just play the loudest passages and set your levels so that they can be recorded without distortion. This is especially easy with records, since the loudest passages can often be spotted by eye; they are the areas where the disc surface appears roughest.

● **Riding Gain:** Unless you're taping material with a limited dynamic range on a recorder with a wide one, no single level setting will quite manage to keep the recorded signal both well above the noise in quiet passages *and* comfortably below the distortion point in loud ones, so you'll probably have to adjust the level settings during the recording—what the pros call "riding gain." This won't be as necessary in dubbing as in live recording, but you'll still have to do some of it, especially when you're dubbing from audiophile recordings with extra-wide dynamic range.

Too many amateurs don't "ride" gain, they *chase* it—dashing to the level knob to turn it down once a loud passage becomes distorted, then turning it up again when the signal becomes too soft and hence potentially hissy. Tapes made that way sound awful: passages no sooner build to a *fortissimo* than they're pulled back into an anticlimax; a delicate *pianissimo* is no sooner established than the level is pumped up again. And, of course, there's an audible increase in noise or distortion just before each delayed correction. The trick in riding gain is to anticipate where the music is heading and to achieve the proper level setting for each passage *before* the crucial moment. Reduce the gain slowly while a crescendo builds so the sense of its development is only slightly diminished, not destroyed. Raise the gain *slowly* as the music's average level drops so the softest sections will be clearly audible above the noise yet remain relatively soft. If you know well the music you are recording, riding gain properly becomes easy.

● **Cleaning and Demagnetizing:** You should periodically clean and demagne-

# RECORDING...

"... the art of live recording is the art of knowing where to place your microphones."

tize your tape deck's heads—as well as the tape guides, capstans, and everything else that comes in contact with the tape. I generally do this after about thirty hours of recording, but I also do it just before *each* important taping session. Be careful, though, not to get any machine lubricants (as opposed to cleaning fluid) on the capstan or pinch-roller, and don't use a demagnetizer close to a tape or while the recorder is turned on.

It's worth checking whether there's any audible difference between recordings you make on brand-new blank cassettes and those recorded over previous material. If there is, get a good bulk eraser to remove *all* the old signals from tapes you want to reuse.

## Taping Off the Air

So much for the basics; now for specific tips on different kinds of recording jobs. Let's start with the easiest, taping off the air. As I've mentioned, what makes it easy is the limited dynamic and frequency range of most broadcasts. And with FM you'll also find that a recording level that works for one station will almost always be good for any other as long as you're using the same tuner and don't change *its* output-level settings. Some stations regularly broadcast Dolby-level calibration tones at a 50 per cent modulation level (6 dB below maximum modulation), and if you catch one of these test tones you can use it to calibrate your recording as well as Dolby levels.

Speaking of Dolby, you'll find that most decks equipped with Dolby noise-reduction circuitry also have a switch position marked "MPX Filter" or the like. It's wise to switch in this filter whenever you tape a stereo FM program, for without it remnants of the FM-multiplex pilot tone leaking from your tuner or receiver may fool the Dolby circuits into acting as if there were more high-frequency audio in the signal than is actually there.

A recording from FM can be no better than the received signal, so make sure this is as good as possible. Tune in the station accurately and orient your

antenna for the cleanest signal. Compare the signal quality in stereo, mono, and (if your tuner has it) "high-blend" mode (this is sometimes, confusingly, labeled "MPX Filter") to see which one gives the best-sounding results. Since reception conditions do change, make all these checks as close as you can to the airtime of the program you want to tape—but not so close that you'll be pressed for time to resolve any problems you encounter. With today's equipment there's rarely any need to warm it up beforehand, but there's no harm in this either.

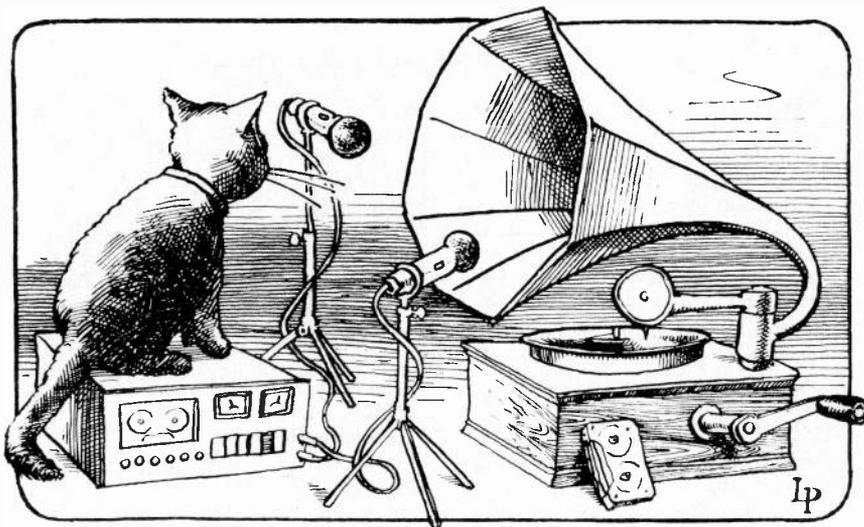
Try to match the tape length to that of the music program you're taping if you know in advance what that will be. Broadcasts of classical music are usually listed in advance in station program guides or local FM magazines (some even give timings!). For specific pop selections you'll just have to be ready to go when what you want comes on, though programs featuring specific genres or artists are sometimes announced ahead of time. Planning your taping in advance ensures that you won't be frantically scrambling for a blank tape while something you want has already started. And keeping a

this semi-automatically). If you're taping a broadcast of a live concert, though, it isn't a good idea to cut the recording sharply when the music is over; fade out gradually during the applause—and try not to shear off the last few seconds of hall reverberation.

At each announcement break, check the amount of tape remaining and the expected length of the next selection. If you won't be able to get it all without an interruption, take advantage of the intermission to turn the cassette over or to switch to a new one. Finally, if you're in doubt about whether something is worth taping off the air, tape it anyway; you can always reuse the tape if you decide later that the program isn't worth preserving.

## Dubbing

There are many reasons you might want to dub your own records or tapes: to preserve irreplaceable old records; to copy discs or open-reel tapes on cassettes for use in a car or with a portable player; to arrange an evening's worth of singles or album cuts for continuous play during a party; to make a tape anthology of your favorites from several



blank tape cued up and the recording levels set whenever you listen to FM ensures that you'll be ready to tape when opportunity beckons.

Convenient as it is to use a timer to record programs aired when you're not around, it pays to be on hand if possible for taping off the air. That way you can use the deck's pause control to edit out commercials and unwanted announcements. If your machine (or car player) has an automatic music-finding system, be sure when you record to leave a few seconds of silence between selections (decks with "record-mute" switches do

sources; to duplicate your own demo tapes to send copies off to record companies... and so on.

If you're dubbing a record, be sure beforehand that the disc and stylus are clean and that the turntable is running at precisely the *desired* speed (which is not always the nominally *correct* speed, since you may sometimes want to alter the pitch and tempo slightly). Audition the record carefully beforehand to make sure your turntable has no trouble tracking it; you may need to use one that is better at handling warps. You'll certainly want to use your amplifier's

infrasonic filter, assuming there's one built in, to keep inaudible low-frequency signals from overloading the tape. (An external infrasonic filter is available for \$73 in kit form, \$93 factory wired, from Ace Audio, 532 Fifth Street, East Northport, N.Y. 11731.)

If you're dubbing old discs, be sure to use the proper stylus—old mono LPs require 1-mil styli and old 78s 3-mil ones; stereo styli are considerably smaller. Some of the major cartridge manufacturers, such as Shure, Pickering, and Stanton, offer these older-type styli in plug-in form for at least some of their models.

You may also want to use an equalizer when you're taping old records, either to filter out noise or to correct for the differences between older and newer disc-recording curves. If your equalizer doesn't process the signal it feeds to your tape deck, you can reconnect the deck to the outputs that ordinarily feed the equalized signal back to your system. The monitor outputs of your deck can then be connected to the former equalizer-input jacks.

If your system is at all prone to acoustic feedback, keep your monitoring level very low while dubbing discs

When dubbing from other tapes, there are fewer points to keep in mind. First, make sure that the playback deck is also clean, demagnetized, and has its 70/120- $\mu$ sec playback-equalization switch set to match the tape in use. If you are dubbing from one cassette to another, try both machines as the playback unit for the same source tape to see which works best (in general, the *better* deck should be used as the playback machine).

It is probably worth using Dolby (or whatever other noise-reduction system you have) even when you're dubbing from a source that's already noisy. True, Dolby circuitry can't clean up pre-existing noise, but it will keep the noise from building up further. And if you're recording from a Dolbyized tape, decode it in playback and then re-encode it while dubbing; even though this means the signal has to pass through extra Dolby circuits, it will help ensure that the Dolby circuits track properly when you play back the dub. (If the source you want to dub is *very* noisy, you may want to investigate a one-step noise-reduction accessory from such companies as KLH, Phase Linear, etc.)

the kind of sound you want to get on the tape. Here are a few basic guidelines:

1. *Distance matters most.* Moving your mikes in closer doesn't just make the sound they pick up louder—you could do much the same thing by merely turning up the gain. Microphone distance strongly affects the balance between the direct and the reflected sounds the mikes pick up. The closer the mike, the more sonic details it will get; the farther away the mike, the more hall ambiance and sense of spaciousness its signal will have. Usually you'll want some of each, but you'll have to pick the balance between them for yourself; experiment to see what works. You'll find that overly close miking brings in sonic details you might prefer not to hear, such as the slide of a musician's fingers across strings; set your mike too far away, on the other hand, and the instrumental sound will be submerged in reverberation.

2. *Stereo perspective is controllable.* There are two basic stereo microphone setups that amateurs can easily use: a crossed pair of directional microphones facing forward in a V configuration on the same stand or a spaced pair of microphones (whether directional or not) on separate stands. Crossed pairs can give a more stable stereo image, but spaced pairs let you get closer pickup of more instruments and a wider stereo "stage." Again, experiment to find which you prefer—and for what.

3. *Too many mikes is madness.* Not all pros agree with this—I've seen as many as twenty-eight microphones at a classical-music recording session—but more and more audio engineers are coming to realize that although a multiplicity of microphones may give more control over individual instruments and sections, it gives less control over the sound as a whole; moreover, excessive miking sometimes creates strange "comb-filter" effects that add an unnatural quality to the sound. In any case, it pays to learn basic recording techniques using only a couple of mikes, gradually adding more as you master those you already have.

## RECOMMENDED READING

**T**HE following four books make up an extremely useful small reference library for the recordist. If you are unable to find them at your local bookstore, library, or audio shop, you can order directly from the publishers at the addresses given. Be sure to include applicable state and local sales taxes when ordering by mail.

● *Sound Recording*, by John Earle, 368 pp., illus., hardbound, \$21.95 (postpaid on prepaid orders). Van Nostrand Reinhold Co., 135 W. 50th St., New York, N.Y. 10020.

● *Handbook of Multichannel Recording*, by Alton Everest, 322 pp.,

illus., \$10.95 hardbound, \$7.95 softbound (postpaid on prepaid orders). Tab Books, Blue Ridge Summit, Pa. 17214.

● *Modern Recording Techniques*, by Robert Runstein, 368 pp., illus., softbound, \$9.95 plus 50¢ postage. Howard W. Sams & Co., Inc., 4300 W. 62nd St., Indianapolis, Ind. 46206.

● *The Recording Studio Handbook*, by John Woram, 496 pp., illus., hardbound, \$37.50 postpaid. Sagamore Publishing Co., 1120 Old Country Road, Plainview, N.Y. 11803.

(you might even shut your speakers off completely and monitor entirely through headphones). You also needn't record the click as the stylus settles onto the record. Just put your deck into record/pause mode, then release the pause control as soon as you hear the set-down click. You can do the same trick in reverse when the record is finished by shifting into pause before the stylus goes into the noisy lead-out groove. It helps, of course, if your turntable and tape deck are located close to one another—or if your deck has a remote control.

## Live Recording

What the professionals do most—and amateurs least—is to make live recordings through microphones. This is enough of a challenge that whole books have been written on the subject (see the accompanying box), so I'll just hit the high points.

Basically, the art of live recording is the art of knowing where to place your microphones. There's no one "right" place: it varies with the acoustics of the room you're taping in, the kind of music (or other material) you're taping, and

## A Final Note

Bear in mind that top-quality equipment is not necessarily required for top-quality results. In fact, a talented and knowledgeable recordist is likely to turn out better-sounding tapes with a mid-price cassette deck than a novice with a professional-quality open-reel machine. Time spent sharpening your recording skills will pay off in better performance from whatever level of equipment you are able to afford. □

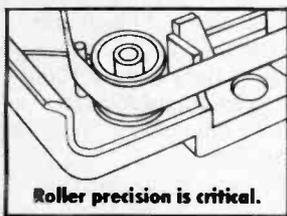


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And remember: getting it there is half the fun.



NOW MORE THAN EVER  
WE ASK: IS IT LIVE, OR IS IT

**MEMOREX**



**T**HE original cassette machine, the Norelco Carry-Corder from Philips, was a marvel of simplicity. There were no adjustments to make (other than in signal level), no choice of tape type or speed or noise-reduction system to confuse the user. It was the audio-tape equivalent of the Kodak Brownie box camera, which may not have made the greatest pictures but was certainly an easy device to use.

Today anyone shopping for a high-fidelity cassette deck must choose among hundreds of models with a broad range of features, capabilities, and prices. Capabilities and prices will interest the prospective buyer, but the *features* are what most clearly distinguish one cassette deck from another in the marketplace. And since features to a large extent determine cassette-deck performance and price, a shopper can arrive at some preliminary buying decisions once he understands what features are available and what they will do for him.

## Tape and Machines

Any recorder's performance is intimately linked to that of the tape being used. Over the past couple of years metal tape (whose magnetic coating contains fine particles of metal alloy instead of metal oxides) has become so important to marketing in the audio industry that even inexpensive cassette decks are now "metal-compatible." Metal tape does have advantages, mainly in its high overload limits at high frequencies. It does, however, require higher bias and record levels than other tape types. In order to make machines metal-compatible, manufacturers have had to redesign their record and erase heads as well as bias and record-amplifier circuitry. It's safe to say that because of the necessary expense of such designs, the cheapest current metal-compatible models will not really get the most out of metal tape.

Getting the most out of a non-metal tape doesn't require redesign, but it does require careful adjustment of those deck characteristics to which a tape is most sensitive. Within each of the four major subcategories of tape (standard ferric, chrome and chrome-equivalent, ferrichrome, and metal) there is a wide variation in the optimum settings for bias, recording equalization, and sensitivity (standard recording level).

Many recent decks have been equipped with front-panel "bias-trim" or "equalization-trim" variable controls in addition to the bias and equalization *switches* used to set the deck for the general tape type. Proper use of

these trim controls can improve high-frequency response for any particular tape, but some decks require that the adjustments be made by ear. This can be done easily only if your deck has separate record and playback heads so you can hear the effects—for better or worse—as you make the adjustments.

This year's decks have begun to take full advantage of affordable microprocessor technology by "computerizing" the adjustment not only of bias but of recording equalization and sensitivity. This full range of calibrations is rarely available without computer control because of the difficulty of adjusting all the interrelated settings at once by hand. A built-in microprocessor can optimize a deck's performance in a few seconds for almost any tape.

## More Headroom

Recorder/tape adjustments can be critical in making a truly accurate recording of demanding musical materi-

al. But even the optimum settings are a compromise (though an acceptable one) between the conflicting demands of low noise, low distortion, and the ability to record loud high-frequency signals.

One way around the problem is double-speed recording, which increases high-frequency "headroom" by running the tape at 3¾ inches per second instead of the standard 1⅞ ips. Double-speed recording does, however, require twice as much tape for an equivalent playing time.

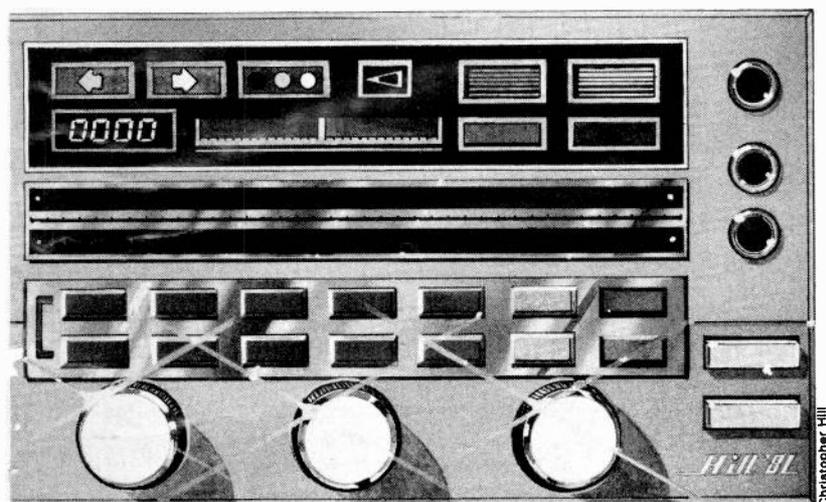
Another approach is the logical extension of all those automatic bias and equalization adjustments. Dolby HX (headroom extension), found on a few manufacturers' models this year, is a circuit that continuously varies bias and record equalization according to the demands of the music, producing the best moment-to-moment compromise. Dolby claims that use of this circuit effectively yields lower distortion at both high and low recording levels and in-

# CASSETTE DECK FEATURES



# A GUIDE FOR BEGINNING BUYERS

By Mark P. Fishman and Stephen H. Owades



creases maximum potential output levels at high frequencies. Tandberg has a somewhat similar system of its own, called Dyneq (Dynamic Equalization), which adjusts only equalization to achieve a similar result. Both systems are active only during recording, and the resulting tapes will play normally on any deck.

## Level Setting

In order to stay above a tape system's noise "floor" and below its distortion "ceiling" (that is, within the recording "window"), the recording levels must be set with care. The wider the dynamic range of the source material, the more critical this level-setting process is and the more important the level-metering system employed.

Most current cassette recorders, except for the least expensive models, have some sort of peak-indicating device to register short, high peaks in the music. This used to consist only of a

light-emitting diode (LED) that would flash if the level exceeded a predetermined overload point; it was used in conjunction with standard average-reading mechanical meters. Nowadays, rows of LEDs (or other opto-electronic indicators) have replaced the meter movements entirely in many cassette-deck models.

Being electronic and without mechanical inertia, such metering devices can easily be designed to follow peaks or averages or to hold the highest peak value of the signal at the touch of a switch. Because of the discrete steps in which they work, however, they give only the illusion of precision, and frequently at the expense of usable accuracy. If the steps are too many decibels apart, the display loses much of its usefulness as a guide for setting recording levels.

To be most useful, any meter should have a scale reading from at least  $-30$  dB to  $+5$  dB. A good peak-reading mechanical meter will be easier to read in

the critical area around 0 dB than a coarsely segmented display. Some of these meters have a switchable slow decay built into the drive circuit so that they can hold the highest peak value for some time.

Since microprocessors are so good at calibrating the machine for individual tape characteristics, the next step is to design them to set the recording level as well. Indeed, at least one manufacturer has announced a deck which does just that. Since levels in music are constantly varying, however, wide-dynamic-range source material may require some "gain riding" during recording, something that at the moment can be done well only by a human who knows the score—the musical score, that is.

## Noise Reduction

Manual gain-riding during recording is one way of fitting the music into the dynamic-range limitations of a machine and tape, but the end product of such gain-riding is a recording with less dynamic range than the original. Noise-reduction systems can be considered a form of electronic gain-riding that employs frequency- and level-sensitive circuitry to reduce the dynamic range of the incoming signal in a predictable way that can be exactly reversed.

The Dolby-B noise-reduction system was the breakthrough that allowed cassettes to be taken seriously for recording music. Introduced in 1970, it has since become *de facto* the world-wide standard for cassette noise reduction, and it is available on virtually every cassette deck made. Dolby B acts only on high frequencies, where it produces an improvement in signal-to-noise ratio of slightly less than 10 dB. Encoded tapes can be played back without decoding (in cars, on portable equipment, and so forth) with reasonable quality. (JVC's ANRS noise-reduction system is generally compatible with Dolby B.)

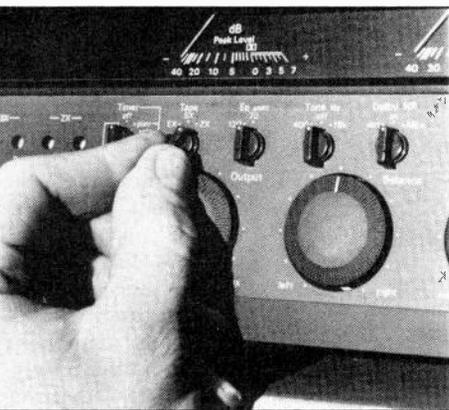
All machines with Dolby-B circuits incorporate a filter for removing the 19-kHz pilot tone from stereo FM broadcasts before recording. This filter is necessary to avoid confusing the Dolby high-frequency level-sensing circuits while taping off the air. Some cassette decks can switch out the multiplex filter for widest frequency response in other recording applications, though such a switch is useful only if the deck has a usable response above 15 kHz or so.

Other manufacturers, in an effort to achieve greater noise reduction than Dolby B's 8 to 10 dB, have developed an assortment of compressor/expander (compander) systems. The longest-es-

## cassette decks...

established compander system for consumer use is the dbx II, which operates on all audio frequencies simultaneously. When recording through the dbx II system, the dynamic range of the incoming signal is cut in half as it is fed to the tape. This two-to-one (2:1) compression enables the signal to fit comfortably within the limitations of the recorder and tape. On playback the signal is re-expanded to the original dynamic

range, effectively suppressing noise during the recording process by some 30 dB. While outboard (non-built-in) dbx II processors have been available for some years, the system has only recently been introduced into a few cassette decks. Some of these decks also include switching that makes possible decoding of dbx-encoded records as well as playing and recording tapes.



"... one of the most welcome features in today's equipment is the provision for adjusting bias levels, recording equalization, and recording level ..."

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Recent years have seen the introduction of several new 2:1 compander systems intended to compete with dbx II. High-Com II and Super-D, both of which split the audio range into two frequency bands while operating, are incompatible with each other and with the single-band dbx. As yet, High-Com II and Super-D are available only as outboard devices that can be added to any manufacturer's cassette deck. ADRES (Automatic Dynamic Range Enhancement System) is another 2:1 compander system, but it is incompatible with dbx and is not yet available as an outboard unit. While all of these systems are intended to provide more noise reduction than Dolby B (some claim up to 30 dB more), they do not compete with it directly because no one of them has or is likely to achieve the same marketplace acceptance as Dolby B.

Dolby Laboratories itself has introduced a new noise-reduction circuit of-

fering a 20-dB improvement in signal-to-noise ratio. Christened Dolby C, it has been offered to all present Dolby licensees at no additional fee, and at least fifteen companies have indicated their intention to put it in some new models. Dolby states that a C-encoded tape played back through a B-type decoder will sound much the same as a B-encoded tape played without a decoder—that is, fairly good. And every deck incorporating one of the Dolby-C systems will include a Dolby-B system as well, so it looks as though Dolby B will continue as the cassette noise-reduction standard.

the effective relative angle (azimuth) between the heads is somewhat dependent on the physical characteristics of the particular tape and cassette housing. Head misalignment results in a loss of high-frequency response and a slight increase in noise. Correcting for such alignment variations has always been a cumbersome task at best, but now several high-price decks use their microprocessors to perform this azimuth adjustment quickly and automatically for each tape.

Another automatic function available on some decks is a search system. In an effort to give the cassette medium some of the instant accessibility inherent in disc recordings, auto-search systems look for and count silent pauses between musical selections. In a few machines specific tape-counter numbers or timings can be entered and located. With the most advanced of the automatic search units, selections designated by the operator can be programmed for playback in any desired sequence. One deck can even be operated by a home computer!

As another convenience feature, most decks can be set up to be started by a timer to make unattended recordings. Unfortunately, the maximum length of a program you can record this way is 60 minutes with a C-120 cassette. There is a way around this limitation—a half-speed cassette deck that runs at  $1\frac{1}{16}$  inch per second. Several are available. Variable-speed playback is available on a few decks, a feature useful for matching the pitch of the recording to an instrument or for correcting a speed error made on another machine.

### Moving Parts

Up to this point we have not discussed the mechanical operation and functions of the cassette deck. Yet attention should be paid to the various features available with the latest cassette-deck mechanisms because mechanical stability and precision are vital with the slow speeds and narrow track widths used in cassette recording.

For example, dual-capstan drive is one good way to ensure smooth tape motion since it isolates the tape in the head region from frictions in the cassette shell. And several new decks in Japan include special "tensioning" arms for much the same purpose. Separate motors for capstan(s) and hubs simplify the mechanical operation of the transport for improved reliability and gentler tape handling. Direct drive (in which the capstan is an extension of the motor shaft) is an elegant approach to reducing wow and flutter since tape speed can be controlled by precise electronic circuitry.

Three-head decks permit playback of a recording while it is being made in addition to allowing separate optimization of head characteristics for the record and playback functions. In a few three-head decks the record and playback heads are in separate mountings and

### The Future

The latest features available on cassette decks point in several directions. On one hand, there is an array of incompatible noise-reduction systems, making life still more complicated for the average buyer. But then there are the various improvements in the man-machine connection, such as useful metering devices and computer controls that make it possible to get optimized results with little trouble.

For example, one of the most welcome features in today's equipment is the provision for adjusting bias levels, recording equalization, and recording level for optimum performance with any tape. And, depending on the deck, these adjustments can be made automatically as well as manually. In a very real sense, we have come full circle: the sophistication of computer technology brings us back to the operational simplicity that was so much a part of the original cassette concept. □

# Understanding Tape Noise-Reduction Systems

By Craig Stark

**I**F the serpent that tempted Eve in the Garden of Eden had hissed, the First Lady, like today's audiophiles, would instantly have known that something was wrong. The human ear can put up with a fair amount of distortion, and can easily tolerate less than state-of-the-art high-frequency response, but if tape hiss becomes audible the illusion on which high fidelity depends is immediately shattered.

Unfortunately, the slow speed (1 7/8 ips) and narrow tracks (0.021 inch) of the cassette medium almost guarantee the audibility of tape hiss unless an effective noise-reduction system is used. For over a decade, one such system—Dolby B—has served as a kind of unofficial “standard” for cassette decks, but the constantly improving quality of taped music reproduction has led audiophiles to demand even greater amounts of hiss-suppression than the 8 to 10 dB that the original Dolby B can provide. Ingenious

engineers have responded by producing a number of alternative noise-reduction devices, the very variety of which can be confusing to the audio newcomer.

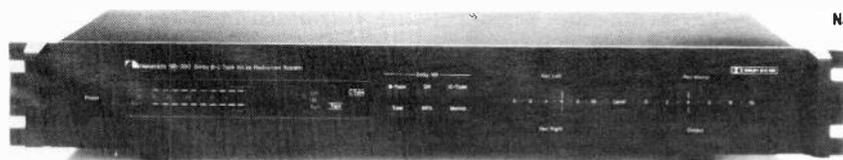
## The Basic Approach: Dolby B

To understand how these various noise-reduction systems work and help you decide which of them may be best for you, let's start with how and why Dolby B works. Hiss, as the name implies, is primarily a high-frequency phenomenon, so the simplest way to reduce its annoyance would be to turn down your treble control. While this would undoubtedly cut down the hiss, it also would equally eliminate the high frequencies in the music, giving you noise-free lo-fi.

If you were to boost the high frequencies *before* you recorded them, however, and then turn down the treble control

during playback, the hiss would be reduced *and* the proper frequency balance would be restored simultaneously. Quite independent of Dolby B, this noise-reducing procedure is in fact built into FM broadcasting and tape and LP recording standards, so that if Dolby B (or any other NR system) were simply to boost all the highs still more before recording, the tape would overload (“saturate”). As every recordist painfully learns, a tape can hold only so much energy, and the slower the tape speed, the less high-frequency storage capacity it has.

Dolby's idea, then, was not to boost all the high frequencies, but only the very soft high frequencies. When the music is very loud, tape hiss is not heard anyway, because the music “masks” (overrides) its audible effects. Only on soft passages does hiss become a problem, and here it is safe to boost the treble even more than usual during recording (turning it back down by the same amount during play-



Nakamichi NR-200

Typical of the most popular tape noise-reduction systems on the market are the Nakamichi Dolby B-C system (above) and the dbx dynamic range enhancer/noise-reduction system (right).



dbx II Model 128

back), for the low level insures against tape overload.

Dolby B works by analyzing the level and frequency content signal of the incoming music to produce a control signal that manipulates the amount of treble boost during recording and inversely manipulates the amount of treble cut during playback. The maximum manipulation—about 10 dB at the highest, softest frequencies—was set so that the variations themselves would not become audible, using circuitry available at the time of its introduction.

Without reawakening commercial altercations long past, it should be noted that the ANRS noise-reduction system used in many JVC tape decks is functionally almost indistinguishable from Dolby B. So successful has this basic approach been that Dolby B or ANRS is incorporated into almost every cassette deck that even claims high-fidelity quality.

## New Approaches to Lower Noise

In this country, at least, the major competition to the Dolby system (both in consumer and professional applications) has come from dbx Corporation. Available built into some decks or as an add-on accessory, the dbx system represents a somewhat different approach. Consider the following data: live symphonic music has a maximum dynamic range (the ratio between the loudest sounds and the faintest reverberant echoes in the hall) of approximately 100 decibels. With no noise reduction, the signal-to-noise ratio of a good cassette deck is approximately 50 dB. If the 100 dB range were compressed into 50 dB during record, then expanded back again by the same 2:1 ratio during playback, the tape could hold the full dynamic range of the orchestra, keeping residual noise below the softest recorded sounds.

This is certainly a somewhat simplified picture of the dbx approach, but it emphasizes some of the differences from the traditional Dolby B. The latter strives for a *maximum* of 10 dB in noise reduction and works principally on frequencies above 1000 Hz. dbx and the somewhat similar (but different enough to be playback-incompatible) Sanyo Super-D systems work primarily on an overall loud-to-soft ratio. As with any engineering solution to a problem, each side can point convincingly to the weaknesses of the other's "trade-offs".

From the dbx side it is to be noted that not only is Dolby B limited in its maximum effect, it is also somewhat "level dependent". (You've seen the "Dolby-level" markings on cassette deck meters.) If the sensitivity of a given tape varies

markedly (more than  $\pm 2$  dB) from the tape used in adjusting the deck at the factory, some decoding error in frequency response will be introduced during playback.

On the other hand, while the dbx system does not require a "reference level" adjustment, and unquestionably offers more noise reduction per se, any deviation in the recorder's overall record/playback frequency response will be magnified by the 2:1 compression/expansion ratio. Further, the more a signal is electronically manipulated, the more likely it is that, under some listening conditions, the manipulations, themselves will become available. "Noise modulation," "pumping," and "breathing" are the terms applied to noise-reduction systems to describe the situation in which the operation of the system itself becomes audible, offsetting its beneficial effects on tape noise. Not unnaturally, dbx has taken steps in its circuitry to avoid this kind of problem, but whether or not either Dolby or dbx can be "heard" to operate is a decision that must be left to the ears of the buyer.

## Splitting Bands and Levels

One way to reduce the likelihood of audible "side effects" from a noise-reduction system is to split the frequency range to be covered into separate frequency bands. In this way, what happens at one end of the audible spectrum cannot affect ("modulate") what happens at the other end. The professional Dolby A and its chief European competitor, from Telefunken, both split the 20-to-20,000-Hz range into four separately-processed bands, but the cost of this kind of approach is prohibitive for consumer applications. The Nakamichi Hi Com II (designed in cooperation with Telefunken) is an excellent two-band design that doubles the 10-dB noise reduction of Dolby B, without audible side effects. As of this writing, however, it appears that most recorder manufacturers (even including Nakamichi) who do not choose to incorporate the dbx system, yet insist on more noise suppression than Dolby B can provide, are choosing the "split-level" approach of Dolby C.

A number of decks with the Dolby-C noise-reduction system are now beginning to reach the market, though it is expected that most of the initial offerings will be high-end models. The reason for this is not the cost of the circuitry itself (less than \$10 at the manufacturing level), but the fact that the recorder's own circuits must be unusually noise-free to profit from the 20 dB of noise-reduction that Dolby C offers.

Oversimplifying again, Dolby C can

be said to consist basically of two Dolby-B type processors, operating in tandem. When one is switched out, the deck operates as a normal Dolby-B machine. When the second processing circuit is switched in, activating the Dolby-C mode, the noise-reduction system operates on still lower-level signals, where Dolby B would already have contributed its maximum effect.

In addition to doubling the effective noise-reduction of the B-type unit, however, Dolby C extends the frequency range of the processing downwards by about two octaves, thus reducing middle as well as high-frequency hiss. Further, to eliminate the possibility of audible side-effects from very high-frequency variations (above 10 kHz), special anti-saturation and antiskewing circuitry is included.

## Which System for You?

For most audiophiles the original Dolby-B (or ANRS) systems offer sufficient noise-reduction, and they have the additional advantage that nearly all pre-recorded cassettes are Dolby-B encoded. Also, the noise-reduction encoding is sufficiently subtle that it is possible to play a Dolby-B tape without decoding it (in a car system, for example) and still have a listenable sound. In many automobile players, indeed, the slightly "bright" frequency response is desirable, since it compensates for deficiencies in the car unit's own response.

The greatest overall noise reduction is provided by the dbx (or Sanyo Super-D) system, and many of the dbx decoders also provide facilities for playing dbx-encoded records. While still limited in number, the catalog of these LP's is steadily increasing, and anyone who has ever heard one will agree that they are among the most sonically spectacular records ever produced. At the same time, dbx places the highest premium on the flatness of a recorder's overall frequency response. In some circumstances a number of listeners even claim they can hear the dbx system working.

Dolby C occupies the middle ground between Dolby-B and dbx systems. A C-encoded tape played on Dolby B has the same kind of "slightly bright" character that a B-encoded tape has when played on a non-Dolby machine; and a C-encoded tape played without any Dolby decoding is very decidedly bright. Played back on a deck with Dolby-C noise-reduction circuitry, these tapes are—for the really critical audiophile—an extraordinary improvement on Dolby B.

In the end, the best hi-fi advice is to listen and compare, for yours are the ears you must satisfy. □

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of the tape and the heads. Because of the high standards we demand, Sony had to invent its own binder.

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# THE DOLBY HX SYSTEM

## BY CRAIG STARK

**M**OST 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 to use metal-particle cassette tapes, which have an inherently higher storage capacity for high-level high frequencies. But a very interesting *electronic* approach to alleviating this problem is offered by Dolby Laboratories as the Dolby "HX" headroom-extension system; which requires no additional coding/decoding apparatus and can be used on any normal deck.

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 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.

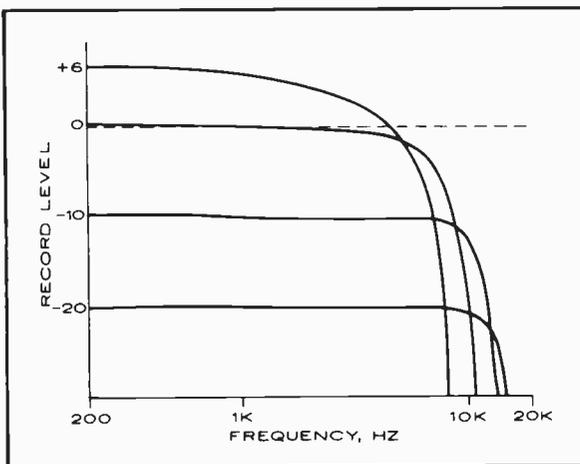
**T**HAT, in essence, is how the Dolby-B noise-reduction system operates. However, since the control signal is already there in any Dolby-equipped deck, could it not be used for a *second* purpose as well, in addition to its primary function of controlling Dolby encoding of the low-level high frequencies? 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. So, a flat response is maintained, and more high frequencies can be "fitted" onto the tape.

**W**ILL 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.



# IMPROVING CASSETTE TAPE

**T**HOUGH metal-coated tapes have received most of the publicity during the past couple of years, the major tape manufacturers have been hard at work improving their oxide-based tapes. Judging from recent announcements from Fuji, Maxell, Memorex, and TDK, their development programs have been following basically parallel paths.

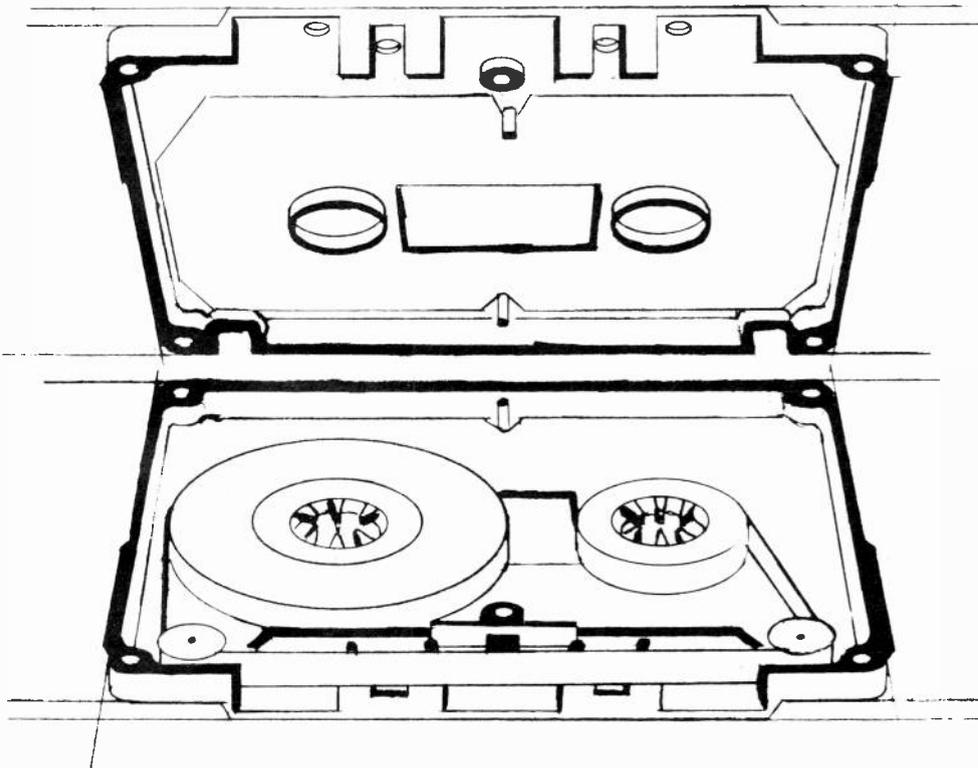
Some of the incentive for this activity may have resulted from a slight let-down in the general enthusiasm for metal tape following the fanfare of its introduction. Unquestionably, there has been considerable "oversell" of the new tape, and the lessening of enthusiasm has been aggravated by the inevitable time lag between the announce-

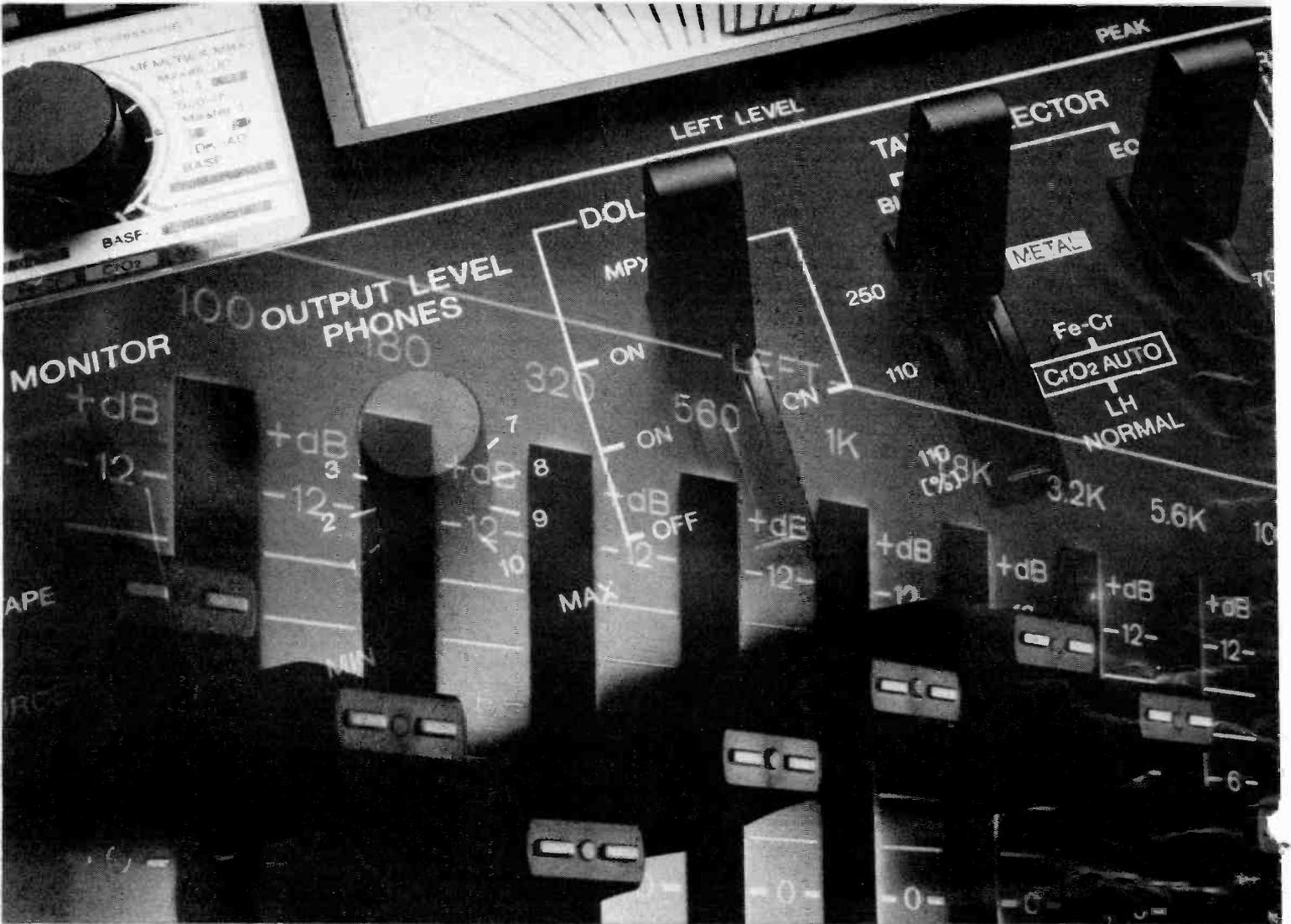
ment and the availability of the tape itself, the initial variability in the tape's characteristics, the delayed appearance of hardware capable of exploiting its unique qualities—and the high cost of the tape.

Now that even the lowest-priced cassette decks are beginning to boast "metal compatibility," it is becoming apparent to anyone who has used this tape that metal, per se, is not the answer to everyone's cassette recording problems. On many decks, metal tape is hardly distinguishable from any good grade of ferric-oxide tape (except perhaps in those rare cases where one wishes to record live music that has a strong high-frequency content). Indeed, the most obvious difference be-

tween the two is usually price—metal tape costs roughly twice as much as premium oxide-coated tape.

Initially, there were production problems in the manufacture of metal tape, and the differences in magnetic properties between the tapes from different manufacturers sometimes made it difficult to realize their qualities to the fullest. If we can accept the latest statements from the tape manufacturers, most of these problems have been overcome, and the public can now choose among metal tapes from several manufacturers. It is a bit early to determine if there are substantive performance differences among them, but it is gratifying to see that the very high price of the early metal tapes has been shaved





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considerably in some of the newer products on the market.

What about those "old-fashioned" oxide-coated tapes? Well, we now have new FX-1 and FX-2 formulations from Fuji, plus Fuji Metal and a lower-price "standard" tape, FL. According to Fuji, these tapes tend to have slightly higher output and lower noise than their similarly named predecessors, resulting in an overall dynamic-range improvement of 1.5 to 3 dB, depending on frequency. Maxell has added two new tapes, XL I-S and XL II-S, plus MX metal tape, to its line, supplementing rather than replacing the well-established UD, UD XL-I, and UD XL-II. Here, too, the manufacturer claims that an improved process gives more uniform particle dispersion, greater bias latitude, lower noise, and less print-through, with an overall dynamic-range improvement of 1.5 to 2 dB.

Not all the tape development is taking place in Japan. Memorex has been busy as well, and the result of its labors is a pair of new tapes, MRX I (which replaces the MRX3), Memorex High Bias II (replacing the High Bias tape), and a new Metal IV tape. The numerical designations of the new Memorex tapes conform to the present international standards, which designate standard-bias, 120-microsecond-equalized tapes as Type I; high-bias, 70-microsecond-equalized tapes, including chromium dioxide and "chrome equivalents," as Type II; ferrichrome tapes, nearly extinct at this time, as Type III; and metal-coated tapes as Type IV. BASF has also upgraded various tapes in its line, mostly by enhancing the packing density of the oxide particles; in addition, the new shells have improved structural integrity, larger spring pads, redesigned roller guides, and so forth. And 3M also has improved the shell mechanics in its Scotch Master line.

**R**ETURNING to Japan, we find TDK's new line featuring an improvement on the popular SA tape. The new SA-X tape is similar to SA in its bias requirements and frequency response, but SA-X (like the other new premium tapes we have mentioned) offers improved sensitivity and a higher output level at all frequencies, giving it a 1- to 2-dB advantage in signal-to-noise ratio.

The magnetic improvements in all these tapes are certainly worthwhile, though we would hardly expect any of them to be dramatically better-sounding than its predecessors (or even its competitors). The sonic improvements of a couple of decibels more dynamic range, plus a little better high-fre-

quency headroom, are likely to be relatively subtle at best.

Together with the improvements in tape coatings have come many modifications in mechanical details that may well be at least as important as what has gone into the tape itself. These mechanical improvements are difficult to quantify, but they are much more obvious to the user, if only in a negative sense (a jammed cassette is not very subtle in its effects!). Without attempting to dissect the new cassettes and compare their mechanical constructions and tighter dimensional tolerances (which could not be done very meaningfully anyway), I can see from the claimed advantages of each make that their manufacturers have been addressing the same problems, although I have no way of knowing to what extent each has been troubled by them.

Among the generic problems of cassettes has been the maintenance of a uniform, tightly controlled tape path, so that the actual magnetic pattern recorded on one machine will match the playback-head azimuth of another (or even of itself, in the case of a three-head recorder). It was this problem that led to the requirement in most early three-head recorders that the recording-head azimuth be aligned to the playback-head azimuth, not only for each cassette used, but for each *side* of the cassette as well. Other problems, also related to the control of the tape motion, include a shifting of the tape in the cassette at right angles to the direction of tape movement (leading to inter-channel crosstalk), uneven torque that can create wow or in severe cases prevent the tape from moving in the fast-forward or rewind mode, and the ultimate defect of jamming or tape breakage, to name just a few.

The announcements of the tape manufacturers indicate that they are taking similar steps to correct these conditions. Among the modifications are tape hubs and guide rollers of improved plastic materials that have tighter mechanical tolerances and new low-friction slip sheets (which prevent the tape packs from binding against the inside of the cassette shell and help maintain an even tape pack on the hubs). In addition, most new tapes seem to be catering to the practical needs of the user, and there is a trend toward new designs for cassette boxes that expose most of the cassette to view.

The box for the new Memorex cassettes, moreover, is designed so that whichever direction the cassette is inserted (with the tape opening facing either the top or bottom of the box), the box can be closed with the cassette hubs firmly locked in place. It will also stay

open at any angle and, like the cover of a record player, has detents at the fully open and closed positions.

I noted with some interest that Maxell and Memorex have taken exactly opposite steps in designing their molded cassette shells to keep the tape path linear and uniform across the cassette opening. Maxell (along with most other manufacturers) has made the two halves of the case as symmetrical as possible, so that their junction is exactly along the center line of the tape path, while Memorex (and BASF) has made the molded pieces strongly asymmetrical so that they meet on a line along the tape's outer edge.

**I** AM not going to attempt to draw any sweeping conclusions about the relative merits of the various tapes and cassette constructions. Although tape manufacturers, more than most, tend to publish full specifications of their products complete with details of their test conditions, there are enough differences between test standards that interbrand comparisons are not always feasible from printed specifications. Furthermore, most of these data do not have any unique relationship to the ultimate sound quality provided by the tape, merely to the recorder adjustments needed for optimum results with the tape. The very important question of how effective the mechanical improvements and features really are can be answered only by the manufacturers themselves, and there is no way for a consumer to judge relative merit except by personal experience.

It is my feeling that, although each of these many improvements may be rather minor, their combined effect is a substantially improved product compared with the best cassettes of even a few years ago. The gap between oxide and metal-coated tapes has been narrowed (and it was never as significantly large as many people claimed or believed). Metal-tape prices have dropped, while premium oxide tapes have become more expensive than ever, so a choice between them must be made on the basis of the specific tape recorder to be used. For the majority of low-price machines, metal offers no advantages commensurate with its cost, and in many cases even a high-bias (Type II) tape is not audibly better than a good Type I tape. The recordist with a good machine, preferably with three heads, who is a perfectionist or wishes to tape audiophile records or do live recording will probably find metal tape the answer to his needs—but the only way he can be sure is to try the different tapes for himself. □

# Prerecorded Cassettes

## For Audiophiles

By David Ranada

I've always been partial to the cassette medium, not for the way the cassette deck is commonly used (the ethically questionable practices of dubbing from broadcasts or friends' records), but as a means of providing, through the prerecorded cassette, music of high sonic quality at low cost. Cassettes, if properly recorded, can offer lower noise, fewer defects, longer playing life even on substandard equipment, and longer uninterrupted playing times than most long-playing discs. Prerecorded cassettes can even give better high-frequency performance than an LP's inner grooves.

Unfortunately, until recently there has been very little effort among manufacturers to realize the full capabilities of the medium. Advent, InSync, and CBS MasterSound have been among the few exceptions. To that list you can now add Vanguard, Mobile Fidelity, and JVC as companies that have chosen to apply audiophile criteria and techniques to the production of cassettes of high sonic quality.

Vanguard's releases in its SuperChrome cassette series are duplicated at fairly low speed on chromium-dioxide tape stock and use Dolby-B encoding. While these characteristics sound very much like those of the CBS Mastersound cassettes, there is a major difference: price. Vanguard's "Two-fers," containing the program equivalent of two LPs per cassette, sell for \$10.98. Artists with such double-length cassettes include Joan Baez (CAT 41/42), Buffy Sainte-Marie (CAT 3/4), the Clancy Brothers (CAT 53/54), and P. D. Q. Bach (CAT 719/20). There is also a group of classical releases including music by Vivaldi (CA 470665), Stravinsky (CA 471177), and Mussorgsky (CA 471188), Handel's *Messiah* (CA 410090/2), and Bach's *Brandenburg Concertos* (CA 471208/9). How do they sound? Very good. The only major defect I found on the SuperChrome tapes I heard was some slight overmodulation distortion of the trumpet in the Bach *Brandenburg Concerto No. 2*. Wow and flutter were not a problem, nor was the noise level.

Audio Source (1185 Chess Dr., Foster City, Calif. 94404) is importing several cassettes that have been duplicated at low speed onto metal tape by JVC in Japan.

Priced at \$29.95 each, the first three releases feature Irakere (MDS-4), Sadao Watanabe (MDS-1), and Dave Grusin (MDS-7). As can be expected from metal tape, the high-frequency performance of these recordings is very good, as is the noise level. The cleanest-sounding cassette, containing what to my ears is the most interesting music, is the Dave Grusin *Mountain Dance* tape, derived from a digital-master recording.

Mobile Fidelity, known for recutting and repressing various LPs, has taken another unusual route with cassette releases. The Mobile Fidelity cassettes are said to be recorded at playing speed (1 7/8 inches per second) directly from the master tape. Even the Dolby-B unit employed is said to be improved, with reduced harmonic distortion and extended frequency response. These cassettes are probably the closest that consumers can get to master-tape sound, at least until digital playback enters the home. They cost \$1 more than the equivalent Mobile Fidelity discs.

Regardless of how they were duplicated, the Mobile Fidelity cassettes sound superb. The tapes I heard (Steely Dan, C-033; Pink Floyd, C-017; Earl Klugh, C-025; and Zubin Mehta conducting excerpts from *Star Wars* and *Close Encounters*, C-008) all had very low noise levels, wide dynamic range, full-range frequency response, and no obtrusive distortion. At times I felt that I was missing some of the uppermost high-frequency octave (10,000 to 20,000 Hz), but this is probably because of a slight head-alignment mismatch between Mobile Fidelity's duplicating machines and my playback unit. I also heard some slight modulation noise with certain selections, but this could just as easily stem from the original analog recordings as from the duplication process.

In short, these releases demonstrate that prerecorded cassettes can sound fully competitive with their disc counterparts and in some ways (noise, end-of-side distortion) superior. They also seem to show that prerecorded cassettes are reaching their final peak of development, barring another breakthrough in tape formulation or the use of more advanced noise-reduction systems. □

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# A BASIC VOCABULARY OF TAPE RECORDING

By David Ranada

**R**ECORDING 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.

**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.

**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 obtain-

ing 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<sub>2</sub>, 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.

**Componder**—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 com-

panding 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 *componder* 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 Normenausschuss)**—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

(Continued on page 26)

# INTRODUCING LORAN.<sup>TM</sup> THE MOST ADVANCED AND REVOLUTIONARY AUDIO CASSETTE IN THE WORLD.



Neither the heat of the desert, nor the cold of Alaska, nor the oven temperature of a closed car in the sun, nor falling on the floor can stop Loran from delivering incredibly clear, accurate and beautiful sound.

The Loran cassette has the only shell in the world made of Lexan<sup>®</sup> resin, the incredibly tough space age material used for bullet proof vests and bank teller windows. Unlike other cassettes it can stand up to extremes of heat and cold. It will not warp at 250° Fahrenheit or shatter at 60° below zero. That means you can leave Loran on an exposed dashboard all day long and still have trouble free performance.

Another unique Loran feature is the Safety Tab<sup>™</sup> (patent pending). A ½ turn of the Safety Tab<sup>™</sup> makes it virtually impossible to erase a recording. However, unlike all other cassettes, you can restore its erase and record capability by simply turning the Safety Tab<sup>™</sup> back to its original position.

Loran's unique tape formulations offer performance that matches the advanced technology of the Loran shell and tape guide systems.

Our Chrome equivalent high bias tape is coated with separate layers of two different oxides. It offers extremely low residual noise levels ( - 56 dB, A weighted, relative 0 VU ) and an MOL of + 6 dB relative of 0 VU for 3 percent distortion. This tape provides magnificent low-end response, in addition to the high-end response normally found in other Chrome equivalent formulations.

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*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 recorders 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 compatibility 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 ( $\gamma \text{Fe}_2\text{O}_3$ ). 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  $\pm 0$ -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

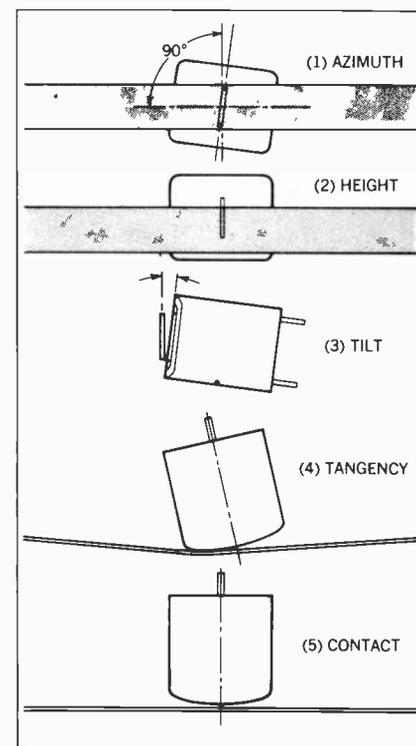
varying magnetic field which is picked up and retained by the tape; or (c) play back a recording by sensing the varying magnetic patterns on a tape and converting them to electrical signals. The break in the "ring" of a head is called the gap the length and width of which help determine the *frequency 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 incomparable 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.

**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 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.

**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 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, etc.

(Continued on page 28)

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

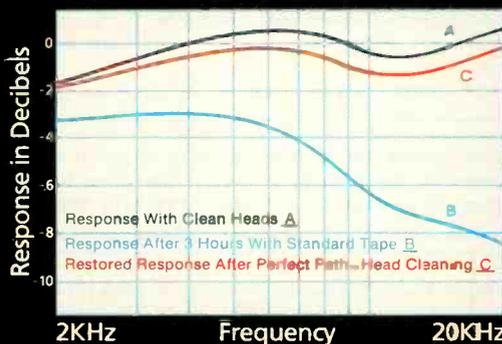
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**Noise-reduction system**—An electronic circuit that attempts to achieve a reduction of noise level without changes in musical content. There are two basic types of noise-reduction systems: *companders* (complementary record-playback systems) and 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 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.

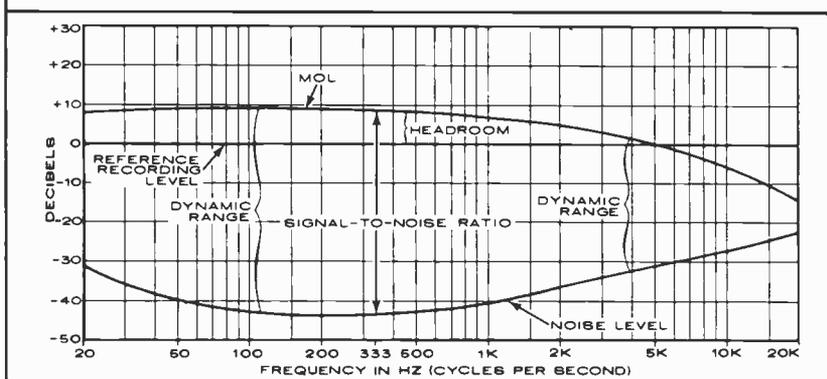
**Two-motor transport**—A transport in which one motor drives the *capstan(s)* and another drives the *feed* and take-up reels. This arrangement is often used in cassette decks.

**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.



**1939...FIRST DIRECT-DRIVE TURNTABLE SYSTEM.**  
**1951...FIRST MOVING-COIL CARTRIDGE.**  
**1972...FIRST DIGITAL (PCM) RECORDING.**



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*Denon's professional products range from blank tape to 24-track recording consoles to fully automated radio stations; their accomplishments include the development of PCM (digital recording), one of the most significant advancements in the history of recorded sound.*

*In the U.S. Denon is known primarily by those in the know. In Japan, the land where electronics is king, Denon is king of the land.*



## **1981...THE DENON DR-330 AND DR-320 SERVO-TENSIONER THREE-HEAD CASSETTE DECKS.**

Many manufacturers would lead you to believe that three heads alone can transform a cassette deck. Denon's experience with professional studio tape-recorders proved that lack of uniform tape-to-head contact and proper transport stability, can create serious phase problems—especially in the high frequencies—whether the recorder has three heads or two.

To solve this problem, Denon developed a unique Tape Tension Servo Sensor, a system that maintains uniform tape-to-head contact during record and playback. In addition, Denon originated the Non-Slip Reel Drive mechanism (without clutches) which provides the extremely stable tape movement and prolongs the deck's life.

Before the development of the DR-330 (Speed Control and fine Bias Adjustment), Denon built two-head decks, which many audiophiles prefer even to the most expensive conventional three-head units.

With the development of the Tape Tension Servo Sensor and Non-Slip Reel Drive, Denon has realized the full potential of the three-head configuration.

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# AN AUDIOPHILE'S GUIDE TO VIDEOCASSETTE RECORDERS

By Ellen Milhan Klein

**W**HAT do most owners of video-cassette recorders (VCRs) use their machines for? All the surveys seem to agree: the current two million or so use their machines mostly for unattended automatic recording of TV programs. The next most popular uses are recording of one program while watching another, recording the program being watched for later re-viewing, and playing commercially prerecorded tapes. And, according to the surveys, the least popular use for VCRs up to now has been "home movies," probably because one of today's video color cameras costs about as much as the recorder itself.

## Which Format?

As a preliminary to getting into the various VCR performance options and their significances, it would be best to take a close look at the advantages and disadvantages of each of the two major U.S. consumer-video formats: Beta, invented by Sony, and VHS (Video Home System) by JVC. After you weigh them, you may decide that the choice of most buyers—VHS—is not the one for you. However, the bottom line of *my* experience is that you won't go wrong with either format.

As usual, it's easier to understand differences if you understand similarities first. Both Beta and VHS machines use cassettes that contain 1/2-inch-wide magnetic tape which is extracted and wrapped halfway around a head drum so that only one of two rotating heads is sweeping the tape at any one moment. Further, both formats get more mileage from a foot of tape in the same way—by rotating the heads at an angle to the tape path. This "helical-scan" system creates more "writing area" (recording space) on the 1/2-inch wide tape [see Figure 1(a)] than would otherwise be possible without using multiple heads or shifting them. All machines achieve the required 4-MHz or so video fre-

quency response not by zipping the tape past a stationary head but by moving it slowly while a pair of alternating tape heads spin at high speed.

The two formats differ in the size of their cassettes and in the way the tape is extracted and wrapped around the head drum. These engineering differences have implications for the maximum record/play time as well as some of the features that can be offered. For example, in Beta's "omega-wrap" system [Figure 1(b)] a single arm extracts the tape from the cassette and wraps it in a—you guessed it—Greek-omega-shaped path halfway around the head drum and past the audio, control, and erase heads. This circuitous path minimizes tape twist as it moves past the heads. The VHS format uses two arms to remove and position the tape. Its system is dubbed "M-load" because the tape traces an M-shaped path past the several heads [Figure 1(c)].

When a cassette is loaded into a deck, the tape is totally enclosed within the plastic cassette case. Beta machines take longer to extract and thread the tape, but they leave the tape wrapped during FAST FORWARD and REWIND. VHS machines, on the other hand, take a few seconds to unload the tape before each FAST FORWARD or REWIND. Of course, there are arguments between the advocates of each format as to which procedure causes more tape and/or head wear. But what you'll notice more than possible wear is that the VHS machine's loading and unloading process often backspaces the tape two or three counter-digits' worth. This makes it quite difficult to cue a tape precisely and may result in several seconds' worth of action being taped over by a subsequent recording. (I have learned to dovetail segments by monitoring the playback of the recorded portion, pressing PAUSE at its end and then pressing RECORD.)

There are other engineering differences between the formats. Since they use a slightly larger head drum, Beta models can achieve a faster writing

speed (690 cm/sec versus 580 cm/sec) for the same 1,800-rpm head speed.

Many readers may already know that the size of the cassette and the maximum record/play time vary with the recorder's format. Beta cassettes are slightly smaller, and their size is designated by the tape length in feet. As of this writing, Beta cassettes range from L-125 to L-830. Of course, since VCRs offer you a choice of operating speeds, the available play/record time depends both on the speed selected and on the tape length. The first Betamax had only one speed, dubbed Beta-I, which recorded for one hour with the tape running at 4 cm/sec. For those who wanted to tape TV movies, this left something to be desired—like half a feature film, say—so the next machines slowed the tape to 2 cm/sec. This Beta-II (or X2) became the new standard speed. More recently, a third speed known as Beta-III (and also as X3 or LP) has appeared in most new machines. (Incidentally, current Sonys can play Beta-I tapes, but no new consumer machine will *record* at that speed.)

VHS machines and tapes use a simpler, though sometimes misleading, nomenclature. Tapes are designated by "T" for time (instead of Beta's "L" for length), followed by the number of record/play minutes available at standard playing (SP) speed. They range from T-30 to T-120. The first VHS machines (which offered only SP) transported the tape at 3.335 cm/sec. Later, some manufacturers added Long Play (LP), half the speed of SP, and/or a Super Long Play (SLP), also known as Extended Play (EP), running at one-third the SP speed. Thus, when product literature describes a unit as a 2/4/6-hour machine, the time is based on using a T-120 cassette.

**H**ow do tape length and operating speed affect performance? First, to fit a longer tape into a Beta cassette case, the tape itself had to be made thinner. Longer VHS tape lengths could be ac-

commodated simply by changing the diameters of the supply and take-up reels. And, as with any type of tape recording, the slower the speed the more critical the head-gap size. The gap was 58 microns originally on both Beta-I and VHS SP-only machines. To achieve reasonable response at slower speeds, the head gaps of both Beta and VHS machines were narrowed to 29 microns. The result has been a slight loss of recording quality at the fastest speed because, for technical reasons, the narrower head gaps cannot put as much video information on the tape. This is the reason that many manufacturers are now using separate sets of heads for the SP and SLP modes. This allows optimizing the gaps for two of the three speeds, and it is also probably responsible for a noticeable improvement of quality in the latest SLP machines.

You'll find if you test view the lineup on your VCR dealer's shelf that no machine's recording/playback picture quality will match that of the original broadcast, although SP and Beta-II tapes will come *very* close. There will be some deterioration in picture clarity as you step down from the fastest speed to Beta-III or LP/SLP. But I've found more variation in performance among the various VHS *models* I've checked (even those made by the same manufacturer) than between Beta and VHS machines per se.

That may seem like fence straddling, but it brings me back full circle to my original advice: I think you *can* be happy with either format.

Evaluate each machine and pick the one that offers the combination of features you want at a price that suits you. For example, Model X's performance is great at its fastest speed and much poorer at its slowest. But it offers the special effects you want (see "Features" below) only at the slowest playback speed. Meanwhile, two-speed Model Y performs about the same at both speeds, not as good as X at its faster speed, but noticeably better than at its slower one; furthermore, it comes with a remote control that permits special effects and fast searches at either speed. Which one should you choose? Either choose Model Y or keep looking.

A few last words about format: don't forget that Beta and VHS tapes are *incompatible*. You cannot play a friend's VHS tapes on your Betamax, although you can dub from one machine to another with no problem (unless, of course, you're breaking the law by trying to duplicate a copyrighted tape). If you choose VHS, you will probably be satisfied with a 2/6-hour machine,

which offers the best compromise between optimum fidelity and economy. A 4-hour mode is really necessary only to play tapes recorded at that speed, and only a few commercially available ones are. If you're upgrading your VCR, it might help to know that although the new table models from Akai, JVC and Sansui can *record* only at SP EP, they can *play* LP tapes. (Incidentally, all new machines automatically adjust their playback to the speed at which the tape was recorded by reading the sync signal put on the tape during recording. This means you won't have to remember what recording speed you've used.)

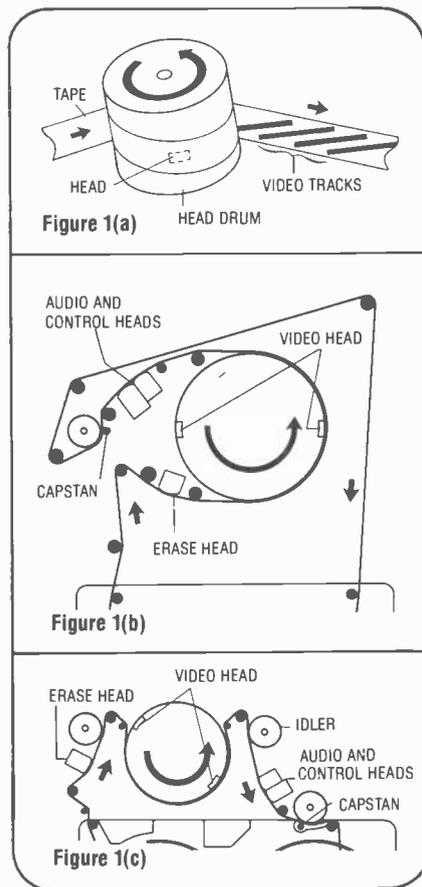
## Tuners and Timers

Taping television means that your VCR has to have a tuner section. Every console VCR has one built in, but for TV taping the portable battery-powered recorders must be paired with a separate tuner/timer/battery-charger module—except for Sharp's new all-in-one portable VCR. (Usually you'll need only the recorder module when you play roving cameraperson.) Antenna connections to either type of machine are simple and are usually well explained in the VCR manuals. The 75-ohm coaxial and/or 300-ohm flat ca-

bles leading from your normal TV antenna connect to the VHF and UHF inputs at the rear of the VCR (or tuner module). Other coaxial and flat cables lead from the VCR's outputs to the VHF and UHF antenna terminals of any television set (see Figure 2, page 00). All necessary cables and matching transformers are usually packaged with the VCR equipment.

In the latest-model VCRs, the old-fashioned rotary channel selectors have been replaced by twelve to fourteen electronic channel-selector pushbuttons. Each pushbutton (they can be pressed in any order) has an associated fine-tuning control hidden in a separate compartment, and you can tune the pushbuttons to correspond to any available VHF or UHF channel (see Figure 3, page 00). Every VCR has an automatic fine-tuning (AFT) circuit that locks the signal in after you've fine-tuned it (sometimes activated by closing the door of the tuning compartment).

The r.f. converter built into almost all VCRs is actually a very low-powered TV transmitter that "broadcasts" the video signal from the VCR via a coaxial cable to the antenna input of your TV set. The r.f. converter can be adjusted to work on TV channels 3 or 4, whichever is unused in your locality. A few new TV sets have inputs that will accept video and audio signals directly from the VCR; this eliminates the need for the converter and gives slightly improved performance. Incidentally, all recorders have a TV/VCR switch that allows either the normal antenna signal or the VCR's r.f. output signal to be fed to the TV set's antenna terminals.



## Features, Plain and Fancy

All of the features you could possibly want in a VCR are available somewhere. Trouble is, they're not all to be had in one unit. You'll have to look for the machine that offers the most of what you want, whether it's a programmable timer, high-speed picture search, special effects during playback, full-function remote control, or get-up-and-go portability. Following is a rundown on what features are available together with my views (based on extensive home and field use) on their significance and usefulness.

● **Timers.** A year and a half ago, I was happy to have a machine that could record one show in my absence. But no more—not since multi-event programmable timers found their way into my home. Working in conjunction with the built-in digital clock display, they can be set to tape five to eight programs over a one- or two-week period.

And most of them are easily programmed using the VCR's special set of timer-control buttons to enter the day (and week, if necessary), the start *and* stop times or just the start time, the recording time, and the channel for each program desired (see Figure 4). The deluxe timers will signal when two programs overlap, they have NiCad-battery back-ups to protect your entries in the event of a short power failure (or need to unplug the unit), and they let you lock the channel number or control panel so your settings can't be accidentally disturbed.

Before you get carried away by the possibilities, remember that you're still limited to (at most) 5 or 6 hours of recording on a single cassette. (Sony's BetaStack cassette changer holds four cassettes and attaches to the newer Betamax; it extends your unattended recording time to 20 hours.) It's been my experience that a simple one-day/one-event timer is not quite enough, but eight events over two weeks are more than I've ever needed. As of this writing I'm at least 20 hours behind in my video viewing, so it's apparent that one has to learn to use the feature selectively or bear the guilty burden of a huge backlog of unviewed tapes. If you have a multi-event timer, however, you can use it as a TV-addict friend does: he programs his timer whenever he gets a new *TV Guide* and leaves his machine in the timer-record mode all the time just in case he forgets to watch.

● **Picture Search.** Sony certainly knew what it was doing when it introduced BetaScan picture search, which is analogous to the "cue and review" function of audio-

cassette decks. After I once used picture search, it became a necessity. It enables me to breeze through commercials and to quickly locate a sequence I want to watch again. The original BetaScans allowed tape review at three times normal speed, but the newer Beta machines are far faster. Sony's SL-5800 has a variable five to twenty times normal, while Toshiba's machines offer search speeds of seventeen or forty times normal. VHS units now offer picture search too, though they are not as fast; cue-and-review of nine to twenty-one times normal speed is available. Two caveats: the very-high-speed searches seem more gimmicky than useful, so I wouldn't choose a unit solely on the basis of its having one. And some of the search functions are limited to one or two of the slower recording/playback speeds or work only in the forward direction, so make certain you get one that will meet your particular requirements.

● **Indexing.** A few machines have indexing features in addition to picture searches. They're known by different names—for example, Akai's is the Instant Program Locating Search and Sony calls its the Tab Marker. They all stop at the beginning of a recorded segment in FAST FORWARD and (sometimes) REWIND. Some VCRs sense the breaks between segments, others insert—and can respond to—an electronic cue signal after every stop or pause. Like audio-cassette decks, every VCR lets you use its digital counter to stop at 0000 in REWIND and sometimes in FAST FORWARD.

● **Special Playback Effects.** Special ef-

fects are receiving more than their fair share of attention these days. It's hard to find a unit without freeze-frame, perhaps frame-by-frame advance, and some slow-motion (*slo-mo* in video jargon) capability. Some units even let you vary the slow motion from freeze to one-third of normal speed. (Freeze frame is not likely to be *totally* frozen; it may look more like Jell-O than ice.) These features may appeal to the user who wants to review his golf swing or the final skirmish in the Super Bowl, but I'm more interested in the possibilities of faster playback; JVC's HR-6700U, for example, lets me zip through a 2-hour tape in 1 hour *with sound*.

● **Remote Controls.** There are remote controls and then there are *remote controls*. Some are limited to providing pauses—handy for interrupting recording during commercials or taking a phone call during playback. On the other hand, there are full-function remotes that permit the armchair viewer to do everything but load the cassette into the machine. Every machine with a picture search or special playback effects lets you command it from afar; in fact, you cannot operate these functions of the Sony SL-5800 and others from the machine itself. At least a half dozen of the newest machines offer a full-function infrared wireless remote, all remotes come with a thin 15- to 20-foot cable that plugs into the unit. Those remotes with channel-changing buttons (which sequence forward and perhaps in reverse through the channels you've finetuned the VCR to receive) will come in handy if you also want to use the VCR as a tuner for normal viewing. It does help if you can see the VCR's channel numbers from across the room (you can't with all of them) since you won't necessarily know by what's on the screen what channel you're tuned to.

● **Audio Features.** Although there are many like it in Japan, Akai's ActiVideo unit (see VCR directory listings) is at the moment the only VCR in the U.S. with stereo-sound-recording capability and Dolby noise reduction. As VCR fans know, most recorders permit subsequent audio dubbing of a narrative or music onto a previously recorded tape using a microphone or other program source. And most Beta machines are set up to work with a (very expensive) PCM digital-audio recording adaptor.

● **Auto-stop, Auto-rewind.** Video tapes, like audio ones, should be disengaged (unwrapped from the head drum) during long pauses between recordings. For this reason, many new machines have an auto-stop provision which unloads the tape after any pause exceeding 5 minutes or so. Other models revert (whether you like it or not) to the record or play mode, whichever they were in, after a long pause. And some, like the Mitsubishi, Panasonic, and Sony models, automatically rewind the tape when it reaches the end.

● **Locks.** There's nothing as frustrating as coming home and finding that somebody has disturbed a recording you left in progress or, worse, defeated your carefully pro-

## The CATV Connection

As you probably know, cable television takes the TV broadcast signals (VHF, UHF) together with the cable-only channels and pipes them into Channel 3 or some other unused frequency. If you're a cable subscriber, you might be wondering how your cable service will be affected if you add a VCR to your system. It all depends on how you hook up the equipment. There will be no problem if the cable service does *not* include a converter box or descrambler, for in such cases the cable will be connected to the VCR just as a normal antenna would be. Here are the other possibilities:

In one setup, the CATV converter box is connected to the VHF antenna inputs of the VCR and the VCR-to-TV hookup is done in the usual manner. Both the TV and the VCR are then essentially monitors, receiving (over, say, Channel 3) whichever channel is selected at the box. This arrangement precludes making unattended recordings on different channels as well as recording one channel while watching another.

Another option is to wire the cable through the VCR to the converter which connects to the television. While

you can then *watch* any broadcast, selecting the TV channel at the box, your VCR will not *record* CATV stations since its tuner cannot be tuned to them. On the other hand, you can apply the timer capability to any combination of regular VHF or UHF broadcasts you want.

If the VCR is "cable-ready" (that is, if it can be tuned to mid-band or super-band CATV channels as well as to Channels 2 to 83), then the converter box can be eliminated and full advantage can be taken of the VCR's programmability. But unless your TV set is also cable-ready, the converter box must be connected to it if you want to watch one CATV channel while recording another.

If you get *two* converters and a switch box, you can view any channel while recording any other, but you must make your selections manually. Alternatively, there are accessories available to convert the cable's output frequencies to the UHF band: this not only permits you to use your TV's remote tuning control (if it has one) but, more important, maintains the VCR's programmability.

grammed timer. Several units therefore have channel locks or panel locks that help prevent this. (The Akai is the only one that has a key lock, perhaps just in case your kids are tempted to check out your off-limits tape library.)

**Memory Back-up.** A battery back-up will preserve the clock and any timer settings in the event of brief power outages.

● **Transition Editing.** Owners of older VCRs are familiar with the annoying jitters and glitches that show up between recorded segments during playback. The latest machines, particularly the portables, now have circuits that back up the tape so as to dovetail the start of one passage with the end of the one before it, provided only that you pause—not stop—between them.

## Portables

One manufacturer puts it nicely: “A portable can work at home, but a home deck isn’t portable.” Because today’s portable recorders combine features of the 22- to 40-pound a.c.-powered stay-at-home models with the ability to record on-the-go, they are the (almost) perfect choice for consumers who aren’t willing (or able) to buy two units. Until recently portables have lagged behind in offering some of the niceties common to home decks—such as two or three speeds, programmable timers, special effects, and picture searches—but they are catching up fast.

A portable system essentially consists of two basic pieces: a battery-operated recorder and a TV tuner/timer/power-supply/charger module (see Figure 5). There is also a separate a.c. adaptor available that can serve as a power supply/recharger if the tuner/timer function isn’t also required. The recorder modules are somewhat less than a foot square across the top, are about 5 inches thick, and weigh from 9 to 20 pounds including their built-in rechargeable battery packs. They come with handles or shoulder straps and have optional carrying cases. All will operate (and recharge) on household current when connected to their tuner/timer or a.c. adaptor. And in field use, their battery packs are rated to supply a nominal 1½ hour of continuous recording time. In actual practice, somewhat less time is available because of the starts and stops of real use. The NiCad battery packs used by Akai, GE, JVC and Sanyo will recharge in 1½ hours, while lead acid types take up to 8 hours. This makes it necessary to tote a spare along if you intend to do extensive taping. The third power option, a 12-volt d.c. source, usually employs an accessory cable that plugs into your car’s cigarette-lighter socket.

Most, but not all, portable recorders

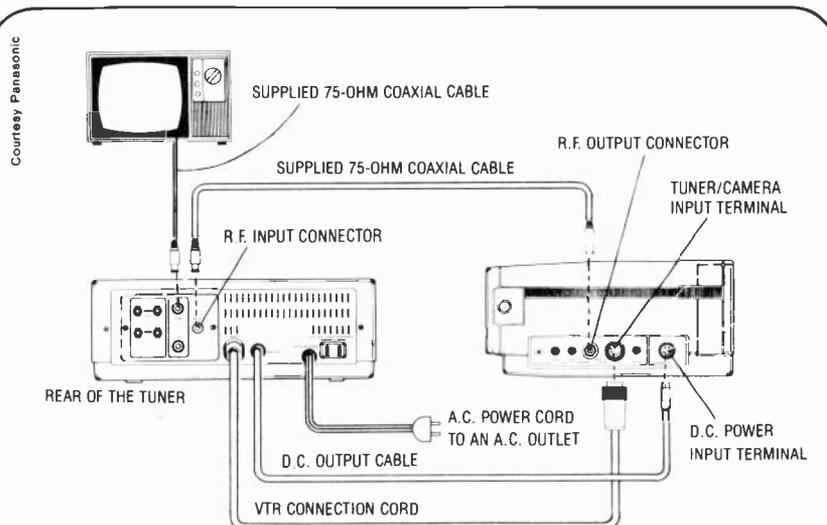


Figure 2. Typical in-home hookup of a two-piece portable system. For portable use, the camera plugs into the multi-pin socket at the side of the recorder, which works with the tuner component in the home. The tuner also serves as a power supply and battery charger.

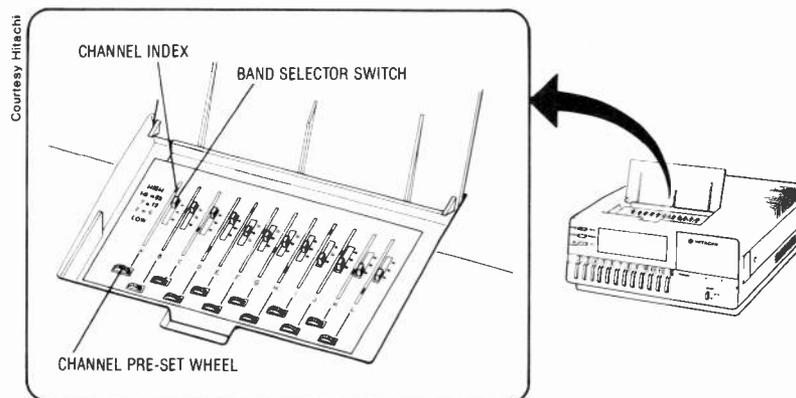


Figure 3. The fine-tuning controls are usually concealed in a separate compartment in those units that employ electronic pushbutton tuning. In general, any channel can be assigned to any pushbutton, including UHF and, sometimes, cable channels.

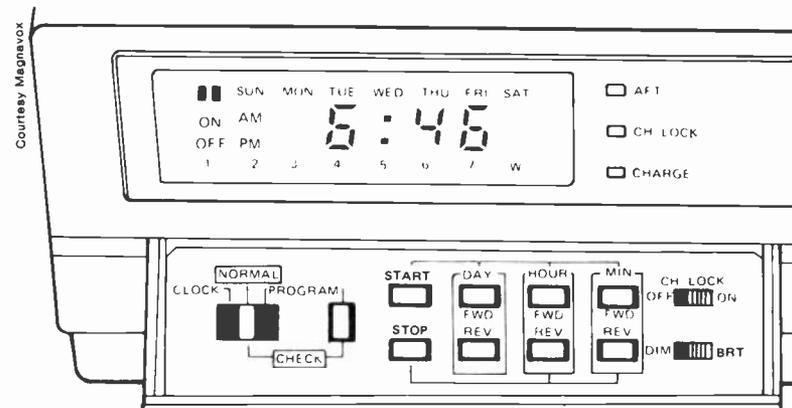


Figure 4. The flexibility of the programming available on different VCRs varies tremendously from model to model, but all have at least a one-day/one-event timer that makes unattended recording possible.

offer the same two or three speeds that are available on console models. The transition editing and special effects may be included as well. But picture search, which I wouldn't want to do without, is just now being added to portables.

The companion tuner/timer modules for portables are about the same size as the recorder units and can be placed be-

neath or beside them on a shelf or table. In general, these timers are just as programmable as those in the console models. In case you're wondering, either the tuner/timer or the a.c. adaptor can be used to power the recorder for use with a camera and to recharge a depleted battery pack. Some a.c. adaptors can recharge two batteries at once, the one inside the VCR plus another plugged

directly into the adaptor.

I don't want to overlook the new 7-pound portable recorder from Funai Electric of Japan, sold in the U.S. as the Model 212 under the Technicolor label. Using a different and incompatible format (the micro-helical system), it has one speed and records for a maximum of 30 minutes on its special small-size cassette.

### SELECTED VIDEOCASSETTE RECORDERS—TABLE MODELS

Manufacturer	Model	Price	Speeds	Timer		Playback			Fast	Picture Search	Remote				Weight	Special Features
				Events	Days	Freeze	Frame Advance	Slow Motion			Speed x Normal	Pause/Freeze	Special Effects	Search		
<b>BETA FORMAT</b>																
Sanyo	VCR5050	\$1295	BII,BIII	1	1	●	●			15 <sup>2</sup>	●	●	●			a,b,c,d,e,g,h,k
	VCR4200	895	BII,BIII	1	3						●					b,c,g
	VCR4300	995	BII,BIII	1	7	●	●			9 <sup>2</sup>	●	●	●			b,c,g
Sears	5310	685	BII,BIII	1	1						●					l
	5314	785	BII,BIII	1	3					5-20	●					c,l
	5322	995	BII,BIII	8	14	●	●	● <sup>6</sup>	2X	5-20	●	●	●			a,b,c
Sony	SL5800	1400	BII,BIII	4	14	●	●		3X	5-20	●	●	●			a,c,f,h,j
Toshiba	V-8000T	1245	BII,BIII	1	7	● <sup>2</sup>			2X <sup>2</sup>	17 <sup>2</sup> ,40 <sup>2</sup>	●	●	●			c,d
	V-8500T	1495	BII,BIII	8	14	●	●	●	2X <sup>2</sup>	17 <sup>2</sup> ,40 <sup>2</sup>	●	●	●			a,q,v
Zenith	VR9750J	1300	BII,BIII	4	14	●	●	●	3X <sup>2</sup>	10	●	●	●			a,b,c
<b>VHS FORMAT</b>																
Akai	VS-1	N/A	SP,SLP	8	14					7	●		●			c,j,m,q
GE	1VCR2002X	989	SP,EP	1	1						●					l
	1VCR2014X	1439	SP,LP,EP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>5</sup> ,3X <sup>5</sup>	4 <sup>3</sup> ,10 <sup>5</sup>	●	●	●	●		a,q,w
Hitachi	VT-8500A	1295	SP,LP,EP	5	7	● <sup>5</sup>	● <sup>5</sup>	● <sup>5</sup>	3X <sup>5</sup>	10 <sup>5</sup>	●	●	●			a,b,c,d,e
	VT-8000A	1295	SP,LP,EP	1	10	● <sup>5</sup>				10 <sup>5</sup>	●		●			c
JVC	HR-6700U	1350	SP,EP	6	7	●		●	2X <sup>3</sup> ,3X <sup>5</sup>		●	●				a,b,d,q
	HR-7300U	N/A	SP,EP	8	14					7 <sup>3</sup> ,21 <sup>5</sup>						a,b,c,e,j,m,q
Magnavox	8315	795	SP,LP,SLP	1	1						●					k
	8325	1195	SP,LP,SLP	1	1	● <sup>5</sup>				9 <sup>4,5</sup>	●	●	●	●		b,c,e,v (opt)
	8335	1325	SP,LP,SLP	8	14	● <sup>5</sup>				9 <sup>4,5</sup>	●	●	●	●		b,c,e,v (opt),x
	8345	1595	SP,LP,SLP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>3,5</sup>	9	●	●	●	●		b,c,e,q,v,v
Mitsubishi	HS-302U	1075	SP,LP,EP	1	1	●		● <sup>5</sup>		9 <sup>4,5</sup>	●	●	●	●		c,e,m,v
	HS-310U	1350	SP,LP,EP	8	14	●		● <sup>5</sup>		9 <sup>3,4</sup> ,15 <sup>5</sup>	●	●	●	●		c,e,m,v
Panasonic	PV-1270	open	SP,LP,SLP	1	1						●					k
	PV-1370	1145	SP,LP,SLP	1	1	● <sup>5</sup>	● <sup>5</sup>			9 <sup>4,5</sup>	●	●	●	●		b,c,e
	PV-1470	1295	SP,LP,SLP	8	14	● <sup>5</sup>	● <sup>5</sup>			9 <sup>4,5</sup>	●	●	●	●		b,c,e,v (opt),x
	PV-1770	1595	SP,LP,SLP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>3,5</sup>	9	●	●	●	●		b,c,e,q,v,x
JC Penney	5012	N/A	SP,LP,SLP	1	1											
	5013	N/A	SP,LP,SLP	8	14	● <sup>5</sup>				9 <sup>4,5</sup>	●		●	●		v (opt),x
	5303	N/A	SP,LP,SLP	1	1	● <sup>5</sup>									11	b,c,d,e,v (opt),x
	5507	N/A		8	14										11	e,f,x
Philco	V1011	849	SP,LP,SLP	1	1						●					k
	V1551	1199	SP,LP,SLP	8	14	● <sup>5</sup>				9 <sup>4,5</sup>	●		●	●		v (opt),x
Quasar	VH5015SW	open	SP,LP,SLP	1	1						●					k
	5160	1140	SP,LP,SLP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>3,5</sup>	9	●	●	●	●		b,c,d,e,f,l,q
RCA	VFT190	open	SP,LP,SLP	1	1						●					
	VFT250	1075	SP,LP,SLP	1	1	● <sup>5</sup>				9 <sup>4,5</sup>	●		●	●		v (opt)
	VFT450	1200	SP,LP,SLP	8	14	● <sup>5</sup>				9 <sup>4,5</sup>	●		●	●		v (opt)
	VFT650	1400	SP,LP,SLP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>3,5</sup>	9	●	●	●	●		b,c,e,f,q,v,x
Sansui	SV-R5000	N/A	SP,EP	8	14	●	●	●		7,21						j
Sharp	VC-7400	895	SP,EP	1	1						●					d,o,p
Sylvania	VC2210	N/A	SP,LP,SLP	1	1						●					k
	VC3110	N/A	SP,LP,SLP	8	14	● <sup>5</sup>				9 <sup>4,5</sup>	●		●	●		v (opt),x
	VC3610	N/A	SP,LP,SLP	8	14	● <sup>3,5</sup>	● <sup>3,5</sup>	● <sup>3,5</sup>	2X <sup>3,5</sup>	9	●	●	●	●		q,v,x

## Fade Out

There is obviously lots of activity in the VCR marketplace, and it shows no sign of slowing down. There are almost daily new entries of competing formats despite the jitters of an unsure economy and the very real potential competition of the videodisc. VCR manufacturers

are producing cheaper VCRs (at, say, \$695 list price) to offset the competitive threat of the videodisc. They also plan to introduce more expensive—and higher-quality—units to appeal to the growing videophile audience. It's safe to predict that the upcoming high-end VCRs will pay increased attention to audio performance, with such sonic im-

peratives as noise reduction and stereo becoming commonplace. Ready for export in Japan are a variety of videophile components, including some very high-resolution picture monitors, and several U.S. audio companies are also hard at work on highend video products. The picture is clear—the Eighties will be the video decade. □

### SELECTED VIDEOCASSETTE RECORDERS—PORTABLE MODELS

Manufacturer	Model	Price	Speeds	Timer		Playback			Fast	Picture Search	Remote				Weight	Special Features
				Events	Days	Freeze	Frame Advance	Slow Motion			Speed X Normal	Pause Freeze	Special Effects	Search		
<b>BETA FORMAT</b>																
Sanyo	VPR4800	\$1045	BII,BIII			●	●			9 <sup>2</sup>	●	●	●		10.2	b,u
	VTT481	350		1	7											
Sears	5360	1195	BII,BIII			●	●	●		5-20	●	●	●		13.2	b,q
				8	14											x
Sony	SL2000	N/A	BII,BIII			●		●	2X						9.3	b,c,j,w
	TT2000	N/A		4	14											r,v
Toshiba	V9035	1545	BII,BIII			● <sup>2</sup>		● <sup>2</sup>	2X <sup>6</sup>	17 <sup>2</sup>	●	●	●		13.2	q,v
				8	14											
<b>VHS FORMAT</b>																
Akai	VP-7350	1200	SP,LP			●	●	●	2x	4 <sup>5,6</sup>	●	●	●		15	a,i,m,s
	VU-7350	395		6	7										11	d
GE	1CVP2020X	1350	SP,LP,EP			● <sup>5</sup>	● <sup>5</sup>			9 <sup>5</sup>	●	●	●		13	u
				8	14										9.9	
Hitachi	VT-6500A	1150	SP,LP,EP			● <sup>5</sup>	● <sup>5</sup>	● <sup>5</sup>		10 <sup>5</sup>	●	●	●		11	b
	VT-TU65A	450													9.3	
JC Penney	5503	N/A	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>				●	●			11	
				1	1											
	5507	N/A	SP,LP,SLP			● <sup>4,5</sup>	● <sup>4,5</sup>			9 <sup>4,5</sup>	●	●	●		11	e,f,x
JVC	HR-2200U	1100	SP			●	●	●		10	●	●	●		11.4	b,e,r,u
	TU-22U	320		1	10										9.6	
Magnavox	8377	1400	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>			3 <sup>3,6,4,9</sup> <sup>5</sup>	●	●	●		13.4	e,t
				8	14										9.9	
Panasonic	PV-4100	1195	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>			9 <sup>5</sup>	●					b,r
	PV-A35P	395		8	14											
Philco	V-1720	N/A	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>			9 <sup>5</sup>	●	●	●		14	
				1	1										10	
RCA	VFP 170	1400	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>	● <sup>5</sup>		9 <sup>5</sup>	●	●	●		11.1	b
				8	14										9.2	
Sharp	VC2250	1000	SP	1	1	●				5 <sup>6</sup>					20	b,o,r
	(all-in-one portable)															
Sylvania	VC4250	N/A	SP,LP,SLP			● <sup>5</sup>	● <sup>5</sup>			9 <sup>5</sup>	●	●	●		14	
				1	1										10	
<b>OTHER</b>																
Technicolor	212	995	1 speed			●	●								7	d,r
	(tuner pending, other brands can be used)															

<sup>1</sup>Beta-II only <sup>2</sup>Beta-III only <sup>3</sup>SP only <sup>4</sup>LP only <sup>5</sup>SLP/EP only <sup>6</sup>cue only

#### SPEED CODES:

Beta machines

BI = Beta-I

BII = Beta-II

BIII = Beta-III

VHS machines

SP = standard speed

LP = long play

SLP/EP = super long play, also called extended play

a - program indexing

b - transition editing

c - auto rewind

d - auto stop

e - panel/channel lock

f - memory back-up

g - sleep timer

h - takes PCM adaptor

i - stereo with Dolby

j - Beta-I playback

k - mechanical tuning

l - no audio dub

m - 24-hour clock

n - LCD clock display

o - front-loading cassette compartment

p - tape-remaining indicator

q - four videotape heads

r - a.c. adaptor included

s - key lock

t - one-event/one-day timer available

u - Ni-Cd battery pack

v - wireless remote

w - linear time indicator

x - mid/superband cable tuning

# TAPE DECK TEST REPORTS

By Hirsch-Houck Labs



**Fisher DD-300 Cassette Deck**

The Fisher DD-300 "Studio-Standard" is a moderately priced, front-loading cassette deck with two motors, two heads, logic-controlled solenoid transport operation, and the ability to use metal tapes as well as more conventional formulations.

The single capstan of the DD-300 is directly driven by one servo-controlled motor, while a second, governor-operated d.c. motor drives the supply and take-up reels. The record/playback head is constructed from "MX/Ferrite," which we take to mean that the pole-piece area, where the tape actually contacts the head, is made of one of the various sendust alloys while the core of the head is ferrite. Both materials are capable of accepting the high bias requirements of metal tape (approximately 50 per cent greater than is needed for CrO<sub>2</sub>-type formulations), and both have superior wear properties compared to even "hardened" permalloy.

Cassettes are placed, tape openings downward, into slides on the rear of the transparent plastic door that covers the cassette well. The transparency of the cover, together with an illuminated orange area behind the cassette itself, permits full visibility of the cassette during operation, making it possible to estimate the amount of tape remaining on a side of a cassette.

Directly beneath the cassette well are pushbutton-actuated controls for REWIND, FAST FORWARD, PLAY, RECORD, STOP, and PAUSE transport functions, along with a RECORD MUTE pushbutton intended to permit the deletion of incoming material without stopping the tape—a limited kind of electronic editing. The typical three-digit mechanical tape counter is provided, but separate MEMORY and AUTO REPEAT buttons are used to permit either stopping the highspeed rewind at "000" or continuing it to the actual end of the tape, as well as to permit putting the machine into PLAY mode automatically at either point. The AUTO REPEAT function is overridden when the deck is in its fast-forward mode; in play, however, if both MEMORY and AUTO REPEAT buttons are depressed simultaneously, the recorder stops at "000," rewinds to the start of the side, and then replays again for as long as the buttons are depressed.

A three-position switch turns the Dolby noise-reduction off, on, or on with a multiplex filter to eliminate any residual 19-kHz stereo FM pilot signal that might be passed on by a tuner or receiver. A second switch enables the DD-300 to be operated from an external timer in either record or play mode. A four-position switch sets the bias and equalization for metal, ferric, CrO<sub>2</sub>-type, or ferrichrome

tapes, and a two-position switch selects whether recordings will be made from the rear-panel "line-input" jacks or from the front-panel microphone inputs; mixing is not possible. Concentric recording-level controls are provided, along with a playback-level control that affects both regular outputs and the level at the headphone jack.

The record-level meters are "VU" types, each having two scales: from -20 to +5 VU for most tapes and from -20 to +8 VU for metal formulations. A reading of 0 VU is marked at 3 dB below Dolby level on both scales, and the metering system is supplemented by peak-reading LED indicators for 0 VU, +3 VU, and +6 VU. The meter scales are illuminated in blue below 0 VU and in orange at 0 VU and above.

The normal "line-level" input and output connectors are located on the rear panel of the DD-300. Overall, the unit measures 17<sup>3</sup>/<sub>8</sub> x 5<sup>1</sup>/<sub>4</sub> x 10 inches in width, height, and depth; it weighs approximately 13 pounds. Available with either a silver or a black front panel, the DD-300 has a retail price of \$349.95.

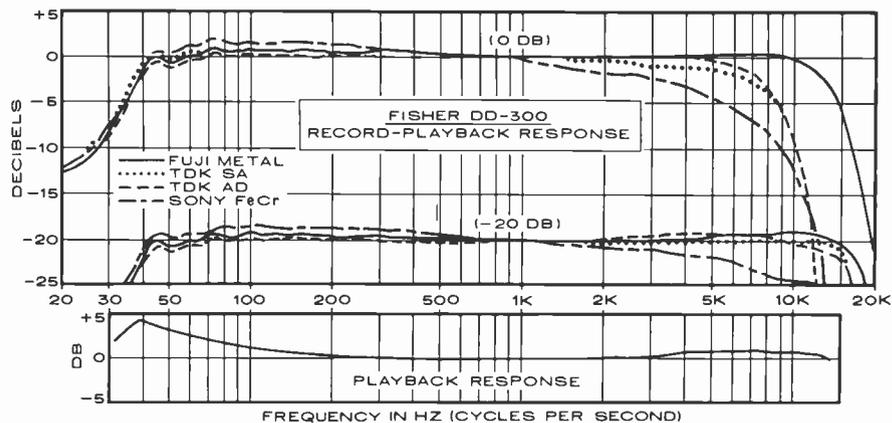
● **Laboratory Measurements.** Our sample of the DD-300 was supplied with Fuji metal tape, TDK SA (CrO<sub>2</sub>-type), TDK AD (ferric), and Sony FeCr (ferrichrome), so we used these cassettes for our evaluation. Playback frequency response, measured with Teac MTT-216 and MTT-316 test tapes, was exceedingly flat over the tapes' 31.5-Hz to 14-kHz range; the slight rise at the very lowest frequencies shown in the accompanying graph is not a property of the deck but occurs when full-track test tapes are used on a quarter-track machine.

Overall record-playback response, measured at the customary -20-VU level, dropped by 3 dB at 18 kHz with the metal tape, at 16 kHz with TDK SA and AD, and, as the graph shows, rather earlier (between 7 and 8 kHz) with the ferrichrome. The considerable advantage of metal tape in the high-frequency range is clear not only from the wider frequency response, but from the curves made at a 0-VU input level. Even at 10 kHz, there is a full 8-dB advantage, and this increases rap-

idly at higher frequencies. The low end of the DD-300 fell off rapidly at frequencies below approximately 40 Hz.

The Dolby-level markings (200 nanowebbers/meter) were at +3 VU on the meter scales and were within 0.75 dB of the level on our test tape. At a 0-VU input, using a 1,000-Hz test tone, the third-harmonic distortion was 1.25 per cent with Fuji metal tape and 0.7, 0.6, and 1.5 per cent with TDK SA, TDK AD, and Sony FeCr, respectively. The metal and ferrichrome tapes permitted a +4-dB signal before reaching the 3 per cent distortion point used for signal-to-noise ratio measurements; the comparable "headroom" for TDK SA was +5 dB, and for TDK AD it was +6 dB. Unweighted signal-to-noise measurements, without Dolby noise reduction, were 53.5 dB for Fuji metal and Sony FeCr, 53.8 for TDK AD, and 54.2 dB for TDK SA. Adding Dolby and using CCIR/ARM weighting, these figures improved to 65.3, 68, 65.8, and 65.8 dB, respectively.

Wow and flutter, using a Teac MTT-111 test tape, registered 0.085 per cent on the DIN peak-weighted system and 0.071 per cent on a weighted-rms basis. Fast-forward and rewind times for a C-60 cassette were between 80 and 85 seconds. An input-signal level of 0.075 volt at the line input produced a 0-VU indication and an output of 430 mV (0.43 volt). Comparable sensitivity through the microphone preamplifier was 0.69 mV, and overload began to be detectable in the microphone stage at 0.042 volt—somewhat on the low side for recording live music, but

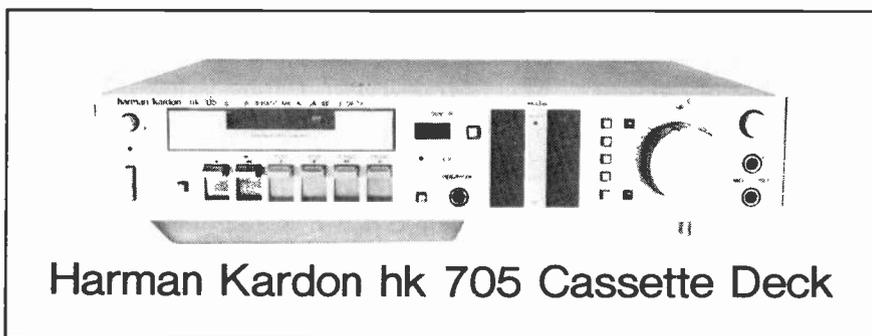


Frequency response with four different types of tape.

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● **Comment.** For listening to prerecorded

tapes and for making copies of FM broadcasts and of most disc materials, the Fisher DD-300 proved to be an excellent performer. Dubbing very demanding discs or wide range master tapes of live music brought out a slight loss below 40 Hz or so and also demonstrated the high-frequency advantage of metal-alloy tape. Given its price level, one could not expect the Fisher DD-300 to be the full sonic equal of decks in the \$1,000-and-up price range, but it functioned flawlessly throughout our tests, and we can recommend it as a fine value.



**T**HE Harman Kardon hk 705 is the first available cassette recorder that incorporates the new Dolby HX "headroom-extension" system. The HX process (described more fully in Craig Stark's "Tape Talk" in the September 1979 issue of STEREO REVIEW) extends the high-frequency overload capability of a Dolby-B equipped cassette deck during recording by reducing both the record bias and equalization at those moments when strong treble content is present in the music. By lowering the bias, the high-frequency capacity of the tape is enhanced: though this is at the cost of some increase in low-frequency distortion, this distortion is less than would be generated by treble overload (saturation). *HX-processed tapes are playback-compatible with all Dolby-B recorders*, and the claimed benefits in high-fre-

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The hk 705 is a slim, front-loading deck that uses a single Sendust record/playback head and a capstan driven by a d.c. servomotor. A second motor is used to pull the cassette inside the deck after it is laid onto a tray that pops out from the front of the unit when the eject button is pressed. When the cassette is locked into place, an angled mirror permits viewing the amount of tape remaining on a side through a window in the entry slot. Access for routine cleaning is provided by a removable tab on the top of the deck.

Control of the tape motion is provided through a series of mechanically interlocked piano-key levers. A RECORD MUTE button is provided for inserting a quiet space between

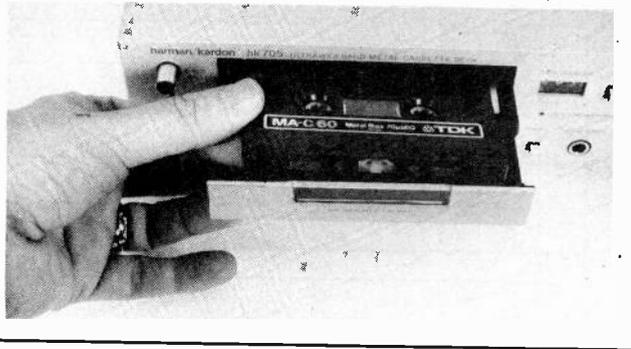
selections, and a TAPE END light begins to blink when approximately three minutes of tape remain on a side. The three-digit counter contains a "memory rewind" feature that works with the zero setting, permitting quick return to a selected spot on the tape.

Twelve peak-reading LEDs per channel (green below 0 dB, red above) form the vertically oriented level indicators, which are calibrated from -20 to +8 dB with the 0-dB point marked as Dolby level (200 nWb/m). A vertical row of pushbuttons adjacent to the LED indicators provides bias and equalization switching for four tape types: metal, CrO<sub>2</sub>, ferrichrome, and ferric. Additional front-panel pushbuttons are provided to insert a subsonic (below 20 Hz) filter and to activate either the regular Dolby noise-reduction system or its HX version. These latter two buttons are illuminated.

The large record-level control uses concentric knobs to permit independent adjustment of the left and right channels. An output-level control, which affects both channels equally, also varies the level at the headphone jack, one that is designed to accept headphones with 8-ohm (or higher) impedance. The front-panel microphone jacks are intended for use with medium-impedance (600-ohm) mikes.

The rear panel of the hk 705 has phonojack input and output connectors, an FM-multiplex switch, and a ground post. Overall, the unit measures 15¼ x 3 x 12⅝ inches and weighs slightly under 13½ lbs. Price: \$449.

The withdrawal mechanism of the hk 705's cassette loading tray is motor driven.



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Playback equalization was checked using our new Teac MTT-216 (120-microsecond) and MTT-316 (70-microsecond) calibrated tapes, which extend the test range from 31.5 to 14,000 Hz. As the graph indicates, the hk 705 proved exceptionally accurate in playback response over this range, well inside a  $\pm 2$ -dB tolerance. The Dolby-level calibration, tested with both Teac and TDK reference tapes, was also accurate, within the resolution ( $\pm 1$  dB) of the LED indicators on either side of the 0-dB marking.

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Distortion at 1,000 Hz, measured at the 200-n Wb/m Dolby 0-dB level, was 0.7, 2.2, 1.7, and 1 per cent, respectively, for our ferric, CrO<sub>2</sub>, ferrichrome, and metal reference tapes. Listed in the same order, these tapes required input levels of +5, +2, +3, and +4.5 dB before distortion reached the 3 per cent third-harmonic point used for signal-to-noise ratio measurements. Unweighted S/N without Dolby-B was 52.8, 54.4, 55.7, and 55.8 dB for the four tapes, respectively, and these figures increased to 65, 66.6, 67.7, and 67.8 dB, respectively, with Dolby noise reduction and standard IEC "A" weighting. The S/N with Dolby plus CCIR/ARM weighting was 63.2, 66.1, 67, and 66.5 dB.

Wow and flutter measured 0.035 per cent with the usually specified weighted-rms method, and 0.046 per cent when using the DIN peak-weighting scale. Both of these figures are exceptionally good, especially for a single-capstan deck. Fast-wind times for a C-60 cassette averaged 76.5 seconds.

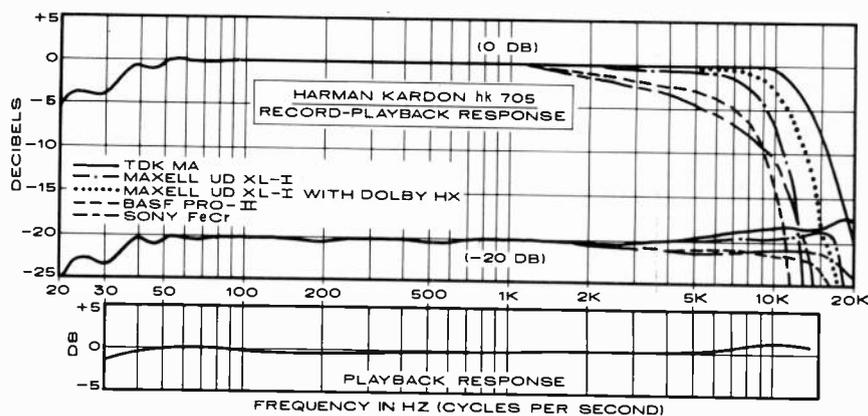
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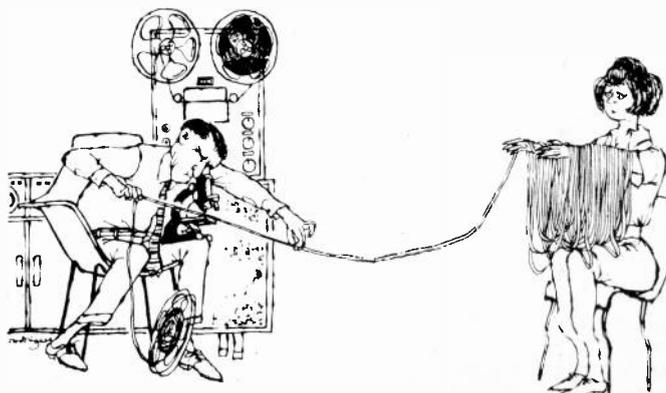
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however. The best way to illustrate its effectiveness in terms of measurements is to refer to the 0-dB level curves for overall record-playback response. With Maxell UD XL-I tape, the high-frequency overload point using the HX system fell almost exactly halfway between the curve shown for Maxell UD XL-I and that shown for the metal TDK-MA.

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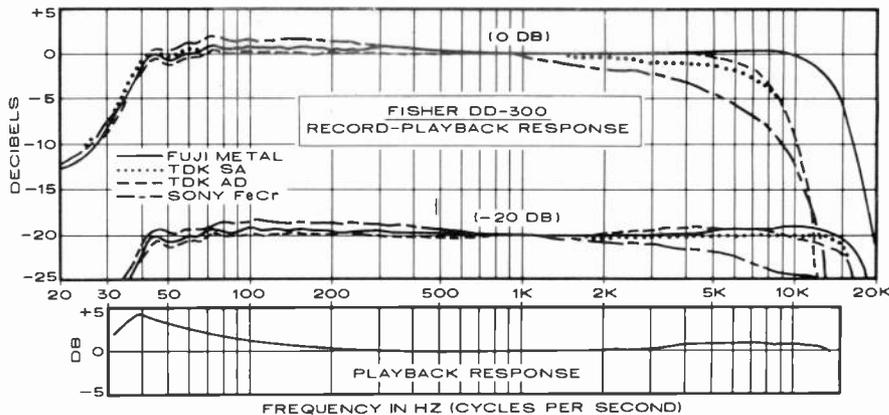
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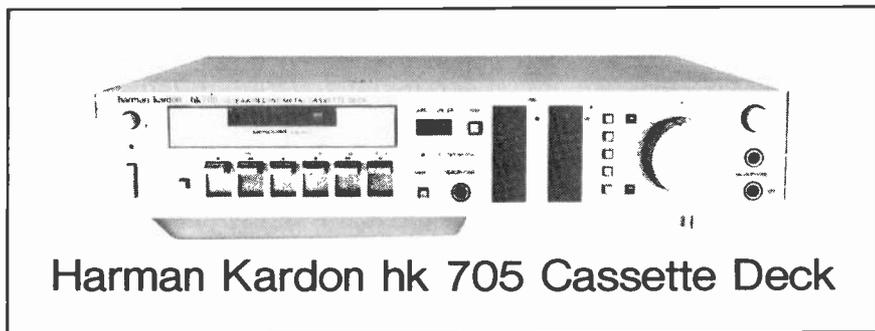


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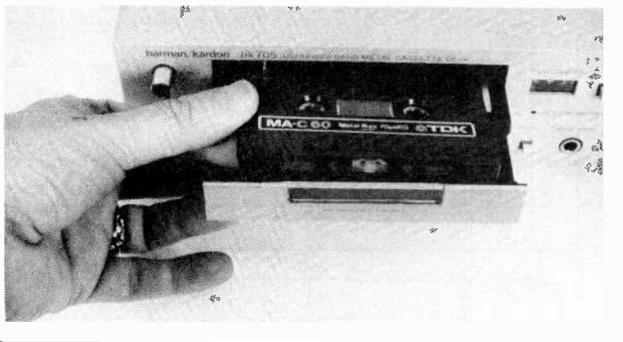
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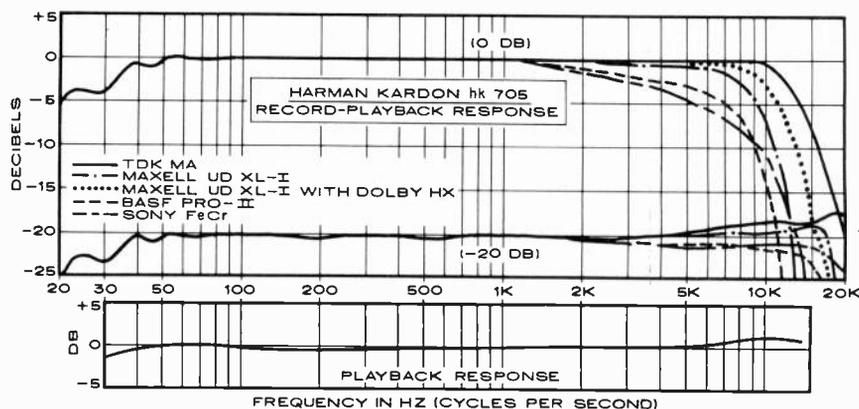
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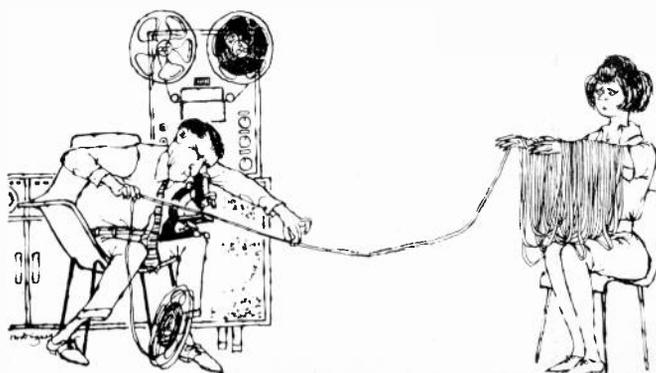
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Frequency response for four different types of tape.



The Hitachi D-3300M is a three-head, two-motor cassette deck featuring the micro-processor-controlled ATRS (Automatic Tape Response System) developed by Hitachi and used in a slightly different form in its top-of-the-line Model D-5500M. Although some of the convenience features of the D-5500M have been deleted from the lower-priced D-3300M, in their essentials the two machines are very much alike.

The D-3300M has metal-tape record/play capability, a double-Dolby system for monitoring off the tape with correct frequency response and noise levels, solenoid-operated tape transport functions, and fast-acting fluorescent peak-level indicators that hold readings above 0 dB for an extended time.

Some unusual operating modes, such as auto rewind play/stop, are found in the recorder. It can be set to automatically rewind the tape at the end of play and stop when the beginning has been reached or go into play and repeat the tape indefinitely. There is also a conventional memory rewind that stops the tape when the index counter returns to 000. The D-3300M can be controlled from an external clock timer in the power line for unattended recording or playback.

In most respects, the front-loading D-3300M presents a conventional appearance, with light touchbuttons below the cassette door controlling the transport through solenoids. Colored lights above the buttons show the selected mode of operation. A REC MUTE button kills the incoming signal to the recording circuits while it is held in. This allows program material to be conveniently deleted from a recording.

Although they are electronically and magnetically distinct, the record and playback heads of the D-3300M are housed in a single case. Separate line and microphone input record-level controls are provided, and the two sources can be mixed. Each control is actually a pair of clutch-coupled potentiometers for individual channel level adjustment. Playback level is controlled by a single knob.

The fluorescent peak-level indicators—a pair of horizontal lines formed of closely spaced luminous segments—are calibrated from -20 to +6 dB and respond very rapidly to program peaks. Pressing PEAK HOLD causes the maximum level above 0 dB to be displayed until the button is pressed a second time or the recorder is shut off.

Most novel among features of the deck is its ATRS. To use it, one first selects the basic tape type by pressing one of the four pushbuttons—UD-ER (NOR), UD-EX (CrO<sub>2</sub>), FeCr, or METAL. In general, ferric tapes use the NOR setting, while ferricobalt and chromium-dioxide tapes take the CrO<sub>2</sub> setting. A green light in the center of each button glows when a given button is activated.

Next, the machine is put into the REC mode and the button marked TEST is pressed. The automatic test sequence begins and, after about 10 seconds, the tape rewinds to the start of the test section and the machine stops. At this point, the red light in the center of the TEST MEMORY button comes on, signifying that optimal parameters of bias, record level, and equalization are stored in the computer's memory. If desired, recording can be made without further use of the ATRS controls. Data is retained in memory, even with power off, with two silver cells.



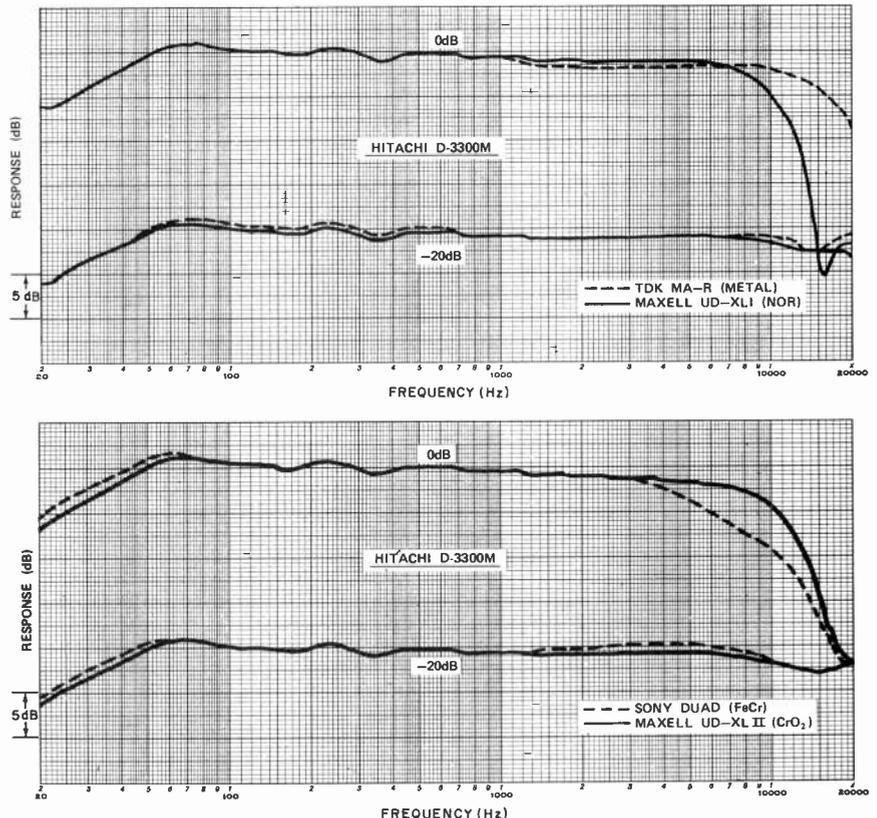
## Hitachi D-3300M Stereo Cassette Deck

Alternatively, one can store the computer-derived information in a memory assigned only to the tape-type button that was used for the ATRS operation. This releases the TEST MEMORY for use with another type of tape. To load this data into the regular memory, it is necessary to press only the TEST MEMORY and adjacent MEMORY buttons in that order, holding both in and releasing TEST MEMORY first: From this point on, touching the tape type button will optimize the recorder for that particular tape formulation. The information assigned to each button can be changed at any time by running another tape through the test

and loading the test memory into memory.

A window next to the buttons contains red lights that illuminate in rapid sequence to show which test frequency (1, 7, or 15 kHz) is being used at any time during the ATRS operation. A fourth light (BATT) shows that the memory cells are installed and operating properly; if the cells become weak or are absent, this light flashes.

In the automatic test, the computer first records a 1-kHz standard-level tone on the tape and checks the playback level. If the primary tape selection is incorrect, or if the leader tape is passing over the heads, the TEST



Frequency-response curves for four different types of tape.

button light flashes to indicate an error.

If the correct tape type has been selected, the machine's logic circuits vary the bias current in 32 steps, noting which value gives the maximum playback level as bias is increased and again as it is decreased. The average of these two bias levels is stored and used for the following tests. Next, the recording level is varied in 32 steps of 0.25 dB each to find the value that gives a correct playback level at 1 kHz. Then, frequencies of 7 and 15 kHz are recorded in turn, with the computer adjusting equalization in 32 steps to obtain uniform output at all three frequencies.

Since there is some interaction between these adjustments, the entire process is repeated two more times before the parameter settings are stored in TEST MEMORY. During the tests, the turns of the tape hubs are monitored by the computer so that the tape is re-wound to where the test began.

When the stored data is transferred to the individual tape memories, it is available at any time the associated buttons are pressed. This transfers the information in 5-bit data units to the peripheral circuits, establishing bias, level and equalization.

Although the D-3300M lacks the wireless remote-control feature of the D-5500M, it has an optional *wired* remote-control unit that operates all transport functions.

The Hitachi D-3300M is 17"W × 10"D × 6½"H and weighs 18.5 lb. Suggested retail price is \$750.

● **Laboratory Measurements.** For our bench tests, we used Maxell UD-XLII for CrO<sub>2</sub>, Sony Duad for FeCr, and TDK MA-R for metal tape. Frequency response at -20 dB was virtually identical for all tapes, typically ± 2 dB from 35 to 20,000 Hz, with slightly depressed output above 10 kHz and falling response below 50 Hz. Differences between the tapes became more apparent in measurements taken from a 0-dB record level. Here, the two Maxell tapes showed a falling response above 8 kHz, which intersected the -20-dB curve between 15 and 20 kHz. The Duad tape response began to fall off at 4 kHz, but it did not meet the -20-dB curve until 8 kHz. Not surprisingly, the TDK MA-R metal tape was flat to 10 kHz, falling off modestly to -8 dB at 20 kHz, where it was still 12 dB above the -20-dB response.

Dolby tracking was fairly good at levels of -20 and -30 dB, with response changing by no more than 2 dB at any frequency when the Dolby system was turned on. At -40 dB, the tracking was nearly perfect. The switchable MPX filter had no effect on the response up to 15,000 Hz but attenuated the 19-kHz response by at least 30 dB.

Playback frequency response was measured with BASF (DIN) and Teac 116SP test tapes for the 120- and 70-microsecond playback characteristics, respectively. Both responses were within ± 1 dB over the range of the tapes, from 30 or 40 Hz to 10 kHz.

A 0-dB recording indication required a line input of 71 to 72 millivolts (mV) at 1 kHz, the corresponding maximum playback level was between 0.49 and 0.70 volt, depending on the tape (Duad gave the lowest output, UD-XLI the highest). Microphone sensitivity for 0 dB was 0.82 millivolt; overload occurred at 62 millivolts.

Third-harmonic distortion in the playback of a 1-kHz tone recorded at 0 dB was between -37 and -44 dB (1.4% to 0.36%), depending on the tape. Metal tape gave markedly lower distortion than any of the others. The input level that gave 3% distortion in playback was about +2 to +2.5 for ferric tapes, +5.5 dB for Duad tape, and +6.5 dB for metal tape. Referred to that level, the unweighted signal-to-noise ratio (S/N) in the output was 54 to 55 dB with all tapes except UD-XLI (NOR), which measured 50.5 dB. Using the Dolby system and CCIR/ARM weighting, the NOR tape gave a 60.5-dB S/N reading; UD-XLII, 64.5 dB; metal, 65.8 dB; and Sony Duad (FeCr), 66.7 dB. Noise increased by only 2.5 dB through the microphone input at maximum gain.

The fluorescent "meters" responded with exactly correct VU ballistic characteristics, and their 0-dB indications corresponded with the 200-nWb/m standard Dolby level. Tape speed was 0.75% slow, and a C60 cassette was moved from one end to the other in 92 seconds in fast forward and rewind. Flutter was extremely low, meeting Hitachi's specification of 0.023% wrms. A weighted peak (CCIR) reading reached 0.04%. These are excellent flutter data.

● **Comment.** The short ATRS cycle time of about 10 seconds makes it perfectly practical

to use it before making any recording, instead of using a set of previously stored data in one of the tape memories. This also has the advantage of compensating for any possible batch-to-batch tape formulation property differences.

One demanding test of a cassette deck's fidelity is to record FM tuner interstation noise and compare the playback with the incoming signal. This had to be done via the amplifier's tape-monitor switch, since the "source" playback from the tape deck was slightly brighter than the incoming signal. Playback from the D-3300M was almost perfectly accurate with UD-XLII tape, even at a -6-dB recording level—and very nearly as good at 0 dB! UD-XLI performed nearly as well. Sony Duad gave a distinctly duller sound than either ferric tape in this test, and TDK MA-R's playback was slightly *brighter* than the incoming signal, even at levels of 0 dB and higher! This recorder proved itself capable of making highly accurate recordings of just about any program one might encounter. With records and FM broadcasts, it was audibly perfect in its reproduction of the original program.

Although everything on the D-3300M worked with total smoothness and freedom from "bugs," one must practice with this machine to use it with confidence. For example, the procedure for making the ATRS alignment and storing it in memory is not at all obvious from the control markings. It is necessary to read the manual and make a few trial runs to render it as automatic for the operator as for the recorder. Also, the operation of the PAUSE button is somewhat unusual. A momentary touch on the button stops the tape, without disengaging REC if it is in use. However, to release PAUSE, the play button must be touched. It is not necessary to use REC simultaneously, since the machine's logic system will remember that it was in the recording mode.

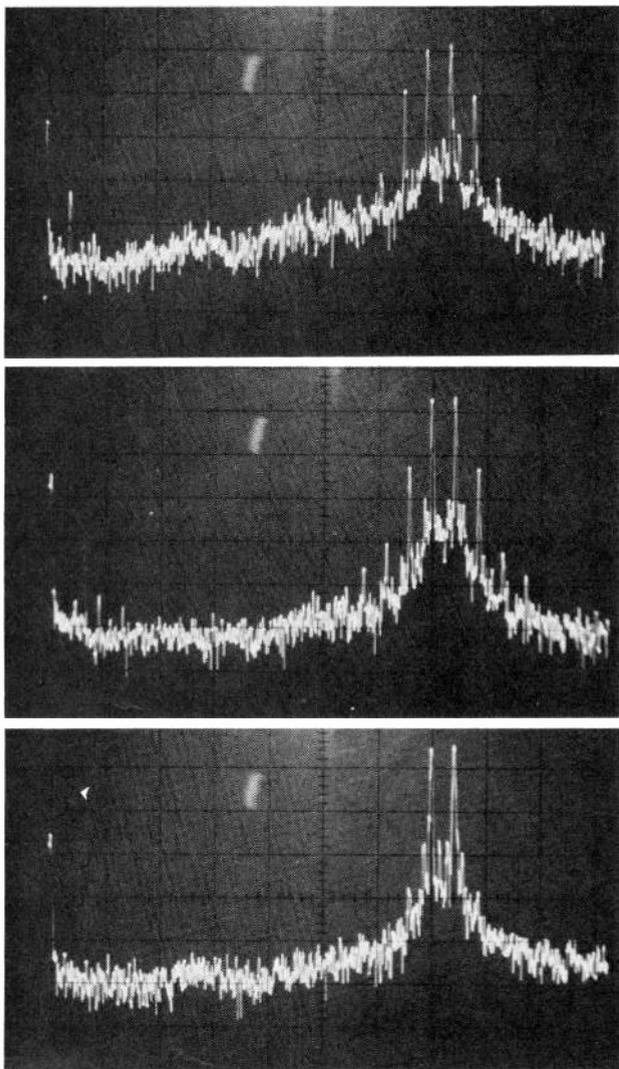
Since Hitachi's introduction of ATRS, similar systems have appeared in some competitive machines. All the others we have seen sell for more than the D-3300M, and to our knowledge, none can top its performance. This is an excellent recorder that eliminates tape characteristics from the recording equations. Essentially, the only differences between tapes with the D-3300M are minor variations in residual noise.



**Luxman K-8 Cassette Deck**

Solenoid-operated transport controls and full compatibility with *all* tape formulations are included in the two-head, single-motor K-8 cassette deck from Luxman. Among its operating conveniences are fast-responding fluorescent peak level "meters," light-touch transport control buttons, timer-controlled operation in both record and playback modes, and several automatic play/rewind functions. A highly legible three-digit fluorescent display is used for the tape counter. Microphone inputs can be substituted for, but not mixed with, the line inputs, and unwanted noises can be deleted by muting the recording temporarily without stopping the tape.

Access to the cassette well is gained by pushing a button at the upper left of the front panel. Most of the cassette, which is back-



*Spectrum-analyzer photos of two-tone IM distortion tests. Input signal consisted of equal amplitude tones at 14 and 15 kHz, each at a -16-dB level. Top to bottom are results on TDK AD, TDK SA-X, and TDK MA tapes.*

lighted, can be seen through the transparent door while in operation. If Luxman cassettes are used, it is possible to minimize azimuth error from a tape made on another machine by adjusting tape skew with a small screwdriver through a hole in the cassette door.

Transport controls are flat "feather-touch" buttons that operate solenoids through logic circuits. These enable switching from any mode to any other without use of the STOP button. The tape normally halts before changing speed or direction but does so automatically. It is possible to make a "flying start" recording while playing a tape, by holding the PLAY button and pressing RECORD simultaneously.

Each time the recorder is turned on, the counter resets to 000, unlike mechanical index counters. Manual reset can be accomplished by pressing a small button circuit, which causes the tape to stop at 000 when in the rewind mode. Arrows near the index numerically indicate tape motion.

The level indicators are a pair of blue fluorescent 12-segment horizontal lines. Each channel is calibrated from -20 to +5 dB (segments are solid below 0 dB and outlines above 0 dB). When the deck is set for metal tape, the range of the displays is extended to a top end +8 dB.

Two three-position lever switches select bias and equalization. Each has positions marked NORM CrO<sub>2</sub> and METAL. Basic bias settings can be altered by  $\pm 10\%$  via a center-detented vernier control. The switch for the Dolby noise-reduction system has an OFF and two ON positions, one of which engages an MPX filter to remove any 19-kHz pilot car-

rier that might remain in the audio from an FM tuner. Recording levels are adjusted by two concentric controls coupled by a slip clutch, and a single knob sets the playback level. Another three-position switch selects MIC or LINE inputs or a spring-loaded REC MUTE position that kills the signal to the record head. This does not remove the incoming signal from the line outputs or affect the readings of the level indicator. Front-panel microphone jacks (for medium-impedance mikes) are provided, as is a headphone jack.

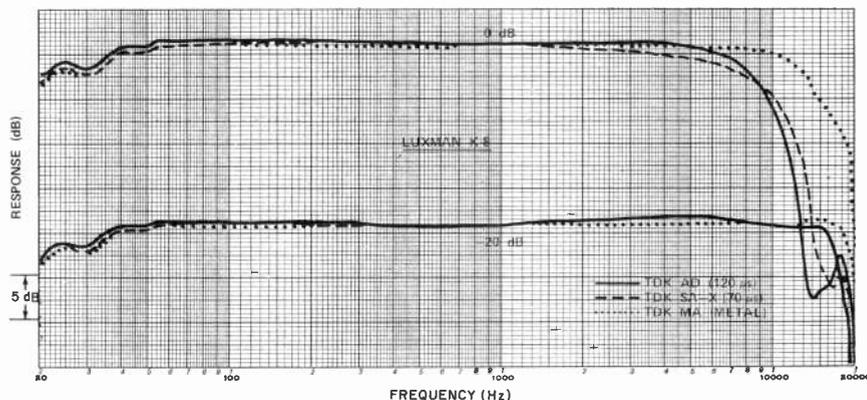
Automatic operation under timer control is possible using a small rotary switch. It chooses between normal operation, timer-controlled playback, timer-controlled recording, and three automatic modes: PLAY, REWIND, and REPEAT. Touching REWIND when PLAY has been selected causes the tape to rewind to its beginning (or to 000 if the MEMORY button is engaged) and go into play automatically. REWIND causes the tape to rewind automatically when it reaches its end, stopping at either 000 or its beginning. REPEAT is similar except that play begins again when the beginning reference point has been reached.

Sendust record/playback and erase heads are used in the K-8, along with a direct-coupled recording amplifier—an unusual touch in a cassette deck. "Analogue switches," presumably solid-state devices such as FETs, are used for various control functions. With these, the leads routed to the front-panel controls handle only dc signals and cannot degrade the audio.

Specifications for the K-8 include record/playback frequency response ( $\pm 3$  dB) from 30 Hz to either 15, 18, or 20 kHz (normal, CrO<sub>2</sub>, and metal tapes, respectively). The corresponding S/N ratios (with Dolby) are 60 to 65 dB, while the rated flutter is 0.55% weighted rms.

The Luxman K-8, with a suggested retail price of \$499.95 is housed in a wood-grain veneered cabinet with pale-colored panel and knobs. It measures 17 $\frac{1}{4}$ "W x 11 $\frac{1}{4}$ "D x 4 $\frac{1}{4}$ "H and weighs 13.2 lb. An 8-KID remote-control unit is available for \$99.95.

● **Laboratory Measurements.** Lacking specific recommendations—other than an implication that Luxman tapes (not widely available) were suitable—we measured record/playback frequency response with a number



*Frequency-response curves for three different types of tape.*

of tape formulations. For NORMAL (normal bias, 120-microsecond EQ) tape, we used TDK AD and OD, Maxell UD-XLI, and Fuji FX-I. The CrO<sub>2</sub> (high bias, 70-microsecond EQ) tapes were TDK SA-X, Maxell UD-XLII, and Fuji FX-II, and metal tapes were TDK MX, and Fuji Metal.

Although good results were obtained with all the tapes, our curves suggest that the recorder had been set up for TDK tapes, which we used for our subsequent tests. All the other tapes yielded a slightly drooping high-end response, suggestive of slight overbias. The BIAS FINE control was found to vary response above 10 kHz by about  $\pm 1$  to  $\pm 2$  dB, enough to flatten out the response curves from the Maxell and Fuji tapes. Measurements were made with this control centered.

Response with TDK AD was within  $\pm 2$  dB from 20 to 16,500 Hz at  $-20$  dB, with the 0-dB curve dropping off above 7 kHz to intersect the  $-20$ -dB curve at 12.5 kHz. OD tape was close but not quite as good at high frequencies. TDK SA-X delivered a response within  $\pm 0.5$  dB from 37 to 17,000 Hz and  $-3$  dB at 20 and 18,500 Hz. Intersection of the 0- and  $-20$ -dB curves occurred at 13.8 kHz. Metal tape (TDK MA) was almost identical in response to SA-X ( $\pm 0.5$  dB from 40 to 17,500 Hz), but its dramatically better high-frequency characteristics were demonstrated by the fact that the 0-dB curve was still 12 dB above the  $-20$ -dB curve at the frequency extreme of 20 kHz.

Playback equalization was measured with Teac 116SP (70  $\mu$ s) and TDK AC-336 (120  $\mu$ s) test tapes. Data from both lay within  $\pm 1$  dB over the full range (40 to 10,000 or 12,500 Hz, respectively). Dolby tracking was superb. From  $-20$  to  $-40$  dB, the Dolby system affected the response curves by less than 1 dB at any frequency in a record/playback measurement. The MPX filter gave a flat response to about 12 kHz, rising to  $+1.5$  dB peak at 14.5 kHz and cutting off sharply. By 17 kHz, output was down more than 25 dB and was negligible at higher frequencies.

For a 0-dB recording input a line signal of

76 millivolts or mic signal of 0.17 mV was required. Overload of the MIC inputs occurred at a rather low 16-mV input. Playback output from a 0-dB signal was between 1.14 and 1.3 volts, depending on the tape being used.

Playback distortion (third harmonic of a 1-kHz signal) at 0 dB input was about 0.8% with AD and MA and 1% with SA-X. Reference distortion of 3% required an input of  $+5$  dB with AD and MA and  $+4$  dB with SA-X. S/N relative to these levels, with CCIR/ARM weighting and Dolby on, was about 68 dB for AD and SA-X and about 65.5 dB with MA tapes.

The effect of tape type on distortion is shown in the spectrum analyzer photos from two-tone IM distortion tests. Using an input signal consisting of equal-amplitude tones at 14 and 15 kHz, each of them at a  $-16$ -dB level (so that their combined peak was equivalent to a  $-10$ -dB sine-wave input), playback output was displayed on the 0-to-20,000-Hz scan of the analyzer. TDK AD gave the lowest output from the two high-frequency tones, with the third-order IM products at 13 and 16 kHz suppressed by only 10 to 11 dB. The second-order difference component, at 1 kHz, was down 53 dB relative to the recorder's 0-dB level. TDK SA-X gave reproduced levels 3 to 4 dB higher than AD tape, and its IM products were about 16 to 17 dB below the tones. The 1-kHz distortion product was at  $-64$  dB. Although TDK MA produced playback test tones only 1 or 2 dB higher than SA-X, third-order distortion products were down a full 33 dB. The 1-kHz product was about the same as with SA-X and may well represent the distortion of the playback amplifier rather than tape nonlinearity, which normally creates only odd-order distortion products.

The level indicators responded instantaneously to program peaks or short tone bursts, and a standard Dolby-level tape gave a  $+1$ -dB indication on playback (the Dolby calibration mark was at 0 dB). Crosstalk from right to left channel at 1 kHz was  $-55$  dB, and headphone volume was excellent,

even with high-impedance phones. Tape speed was 1.8% fast, and in the fast-wind modes, a C-60 cassette was moved from end to end in 75 to 81 seconds. JIS flutter (wrms) was 0.05%, and weighted peak flutter was  $\pm 0.08\%$ . Except for a single component at 30 Hz, most of the flutter was below 15 Hz.

● *Comment.* To judge the quality of a cassette deck audibly, we record interstation hiss from an FM tuner at various levels and compare the playback to the sound of the original. Even slight high-frequency tape saturation will cause a pronounced dulling of the sound in playback so that few recorders give accurate playback when noise is recorded at 0 dB and many not even at  $-20$  dB. In our tests, the tapes used behaved just about as their measured performance would suggest. TDK AD was nearly perfect at  $-10$  dB but had noticeable dulling of the extreme highs at 0 dB. SA-X at 0 dB matched the performance of AD at  $-10$  dB, and MA was essentially perfect at 0 dB.

It must be realized that these levels were true peak readings, which gives the K-8 a tactical advantage over other machines that use slower, average-reading meters. If one were to record at a 0-dB indicated level with such meters, peaks would be considerably higher and would cause more high-frequency tape saturation.

On the basis of our listening tests, the Luxman K-8 is capable of true high-fidelity performance. Dubbed program material coming out of it sounds just like what went in, although some types of live material can exceed the recorder's capabilities or overload the microphone inputs.

In use, the deck is an unalloyed pleasure. Minor or rarely used controls are located on the front panel, but with very small knobs that avoid a cluttered appearance while preserving operational flexibility. Styling, thus, is at once tasteful and functional. Such niceties as flying-start recording, REC MUTE, and automatic and timer-operated modes help to distinguish this unit even more.



**Nakamichi 1000ZXL Cassette Deck**

THE Nakamichi 1000ZXL is certainly the most expensive and, possibly, the most sophisticated cassette deck we have yet encountered. Its \$3,800 price obviously puts it well beyond the reach of most readers, but the combination of features, design considerations, and performance embodied in it so nearly defines the current "state of the art" that it must be of considerable interest to all serious home recordists since state-of-the-art features have a tendency to filter down, with time, to less expensive units.

The Crystalloy record and playback heads of the 1000ZXL are completely separate (each has its own alignment adjustments), but they have been so miniaturized that both will fit into the standard head opening in the cassette shell. Each has an optimum "gap width" for its function, and both have been "slotted," using a photoetching process, to ensure that any head wear will remain even. Additionally, the playback head is fitted with

a device that pushes the cassette's built-in pressure pad out of the way in order to reduce modulation noise.

Four servo-controlled d.c. motors are used in the transport. One drives the dual capstans, which have slightly different diameters and flywheel masses so they do not reinforce each other's rotational wow-and-flutter frequencies. Another turns the supply and take-up hubs. The third replaces the solenoids normally used in a "full-logic-controlled" transport, while the fourth turns a cam that automatically adjusts the azimuth (perpendicularity) of the record head to match that of the playback head.

Digital logic—a microprocessor "chip"—is used extensively for control and adjustment operations in the 1000ZXL. Pressing the RUN button when entering the record mode, for example, initiates a sequence in which the record-head azimuth is adjusted, followed by individual automatic optimization for each channel of the record bias, equalization, and tape sensitivity. The tape is then rewound, and an infrasonic code is recorded to indicate the proper playback-equalization and noise-reduction settings. (Manual playback-equalization and noise-reduction switches are provided for use with cassettes recorded on other decks.) The user can store the optimized settings in any of four memories for future use with that kind of tape. We found that the entire process took between 30 and 40 seconds, but this time can be reduced considerably when using one of the four "stored" settings by pressing the AZIMUTH button (which optimizes azimuth only) instead of RUN.

In addition to the ABLE (azimuth, bias, level, equalization) sequence just described, the 1000ZXL has a sophisticated RAMM (random-access music memory) that can digitally encode the tape with up to fifteen identifying selection numbers. This can be done either automatically or manually, and the machine can then be set up to play (or repeat) the selections in any desired order—up to thirty commands. The infrasonic code is read bidirectionally, and—lest owners of d.c. amplifiers worry—it is entirely filtered from the deck's output. While the description of all this "computer" circuitry may appear complex, an illuminated display shows the action and status at each step, simplifying operation of the recorder.

To the right of the coding display is a four-digit electronic counter and a pair of fifty-six-element fluorescent record/playback level indicators calibrated from -40 to +10 dB, with the 0-dB point representing Dolby level (200 nanowebers/meter). Because of the unusually large number of elements (twelve or fourteen is customary), the resolution available is akin to that of an analog meter, though the fast response and lack of overshoot is possible only with electronic displays. AMETER switch selects either peak-reading or quasi VU-reading characteristics, and in both cases a second, brightly illuminated "cursor" is provided to show the maximum signal value being recorded.

Cassettes are inserted, openings downward, into slides behind the transparent cassette-well door, and illumination is provided to read the labels and see how much tape remains on a side.

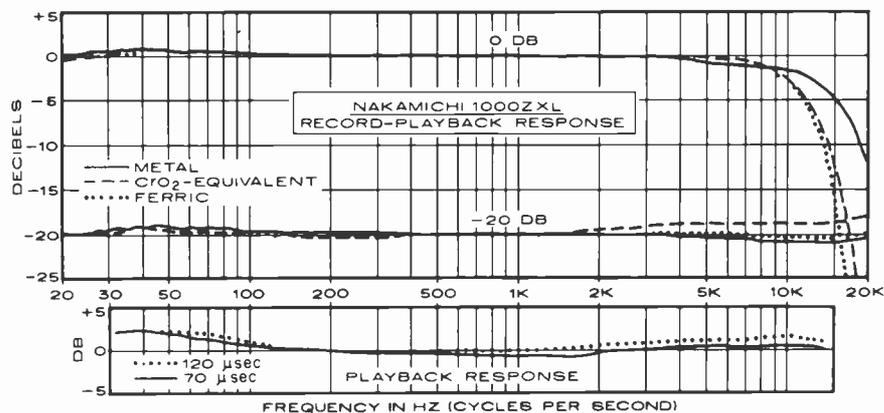
Seven level controls of the slider type are on a side.

used for separate left and right inputs and outputs and for three microphone inputs—left, right, and "blend" (center-channel). The PAUSE, RECORD, REWIND, FAST-FORWARD, and PLAY buttons are all large, lighttouch, and illuminated. Switches are provided for the external TIMER (record, off, play), MEMORY (stop, off play), FILTER (infrasonic, off, multiplex, or both infrasonic and multiplex) selection, and tape or source monitoring. Similar switches handle manual playback equalization (70 or 120 microseconds), indicator characteristics, and a Dolby-level test tone for setting recording characteristics.

Less familiar are switches that shift the entire bias range covered by the computer-controlled adjustments by an additional  $\pm 12.5$  per cent to accommodate any future tape developments and a noise-reduction switch that allows the user not only to turn the built-in Dolby-B circuit on and off but to choose an external noise-reduction system instead. There is no "tape-selector" switch, since the microprocessor automatically handles the re-

brands from TDK, Maxell, BASF, 3M, and Memorex. Since TDK AD (ferric) and BASF Professional II ( $\text{CrO}_2$ ) in general tend to show a rising high-frequency response and a slightly lower overall sensitivity, we were particularly pleased that the Nakamichi computer system produced curves from them that could not be distinguished from those of our reference tapes. And, when it came to the metal tape, we achieved not only the same response, but an actual improvement of nearly 2 dB with the new Memorex Metal IV!

Playback frequency response was checked with Teac MTT-216 (120-microsecond) and MTT-316 (70-microsecond) calibration tapes. Interestingly, while most Nakamichi decks we have tested have tended to show an appreciable (3.5 to 4.5 dB) rise at the high-end limit (14 kHz) of these test tapes, the 1000ZXL was extremely flat. (The slight bass-end rise is a characteristic of full-track test tapes when played on a stereo deck and, as the overall response curves show, not a property of the Nakamichi recorder.)



Frequency-response curves for three types of tape.

quirements of ferric,  $\text{CrO}_2$ -type, and metal formulations, but a PITCH control with a  $\pm 6$  per cent range is provided to correct tapes that are slightly off-speed.

The rear panel of the Nakamichi 1000ZXL contains twelve gold-plated phono jacks for normal inputs and outputs and for connection of an external noise-reduction system. Two DIN-type connectors are provided for accessory remote control of the transport and the RAMM circuits, and a small panel gives access to the two AA 1.5-volt cells used to keep the microprocessor memory "alive" when the deck is turned off. Overall, the deck measures  $20\frac{3}{4} \times 10\frac{1}{8} \times 12\frac{11}{16}$  inches in its rosewood case, though it can be removed for mounting in a 19-inch rack. The weight of the Nakamichi 1000ZXL is approximately 41 pounds. Retail price is \$3800.

● **Laboratory Measurements.** Our sample of the 1000ZXL was supplied with the actual tapes used in the factory setup—namely, Nakamichi EX-II (ferric), SX ( $\text{CrO}_2$ -equivalent), and ZX (metal)—so we used these as the basis for our primary evaluation. At the same time, the ease with which the ABLE system can be used encouraged experimentation with a number of different popular

At the usual measuring level (20 dB below the 0-dB indication), Nakamichi specifies a frequency-response deviation of  $\pm 0.5$  dB from 20 Hz to 20 kHz—the tightest specification we have ever seen on a cassette deck and so close to the limits of our automatic chart-recording equipment that we had to double-check using spot-frequency measurements. Our spot checks, moreover, put the -0.5-dB points at 17 Hz and 24 kHz, using the ferric EX-II, with -3-dB points at 13 Hz and 26 kHz. It is hard to conceive of any meaningful improvement on such a frequency response.

Third-harmonic distortion at an indicated 0 dB was 0.39, 0.46, and 0.38 per cent for the Nakamichi ZX (metal), SX ( $\text{CrO}_2$ -type), and EX-II (ferric tapes). The headroom (the amount of additional output required to increase the distortion to the 3 per cent point) was 8.8, 6.3, and 7.9 dB, respectively. Referred to the 3 per cent distortion level, the unweighted signal-to-noise ratios, without benefit of Dolby, were 55, 53.3, and 51 dB; adding a standard IEC A-weighting curve and Dolby-B processing improved these figures to 68.5, 67.5, and 65.6 dB. Using the Memorex Metal IV raised the A-weighted S/N (with Dolby) to 70.3 dB.

Wow and flutter measured 0.05 per cent (DIN-B) and 0.038 per cent (weighted rms) with our Teac MTT-111 test tape, increasing just slightly to 0.055 (DIN-B) and 0.042 (wrms) when measured on an overall record/rewind/replay basis. The Dolby calibration was within 0.5 dB, and overall frequency-response variations between Dolby and non-Dolby operation were inside a  $\pm 1$ -dB tolerance throughout the audio range.

A 1-kHz line-level input signal of 0.05 volt (50 millivolts) was sufficient to produce a 0-dB indication, at which point the output level was 0.95 volt. The comparable microphone

sensitivity was 0.173 millivolt. Erasure of a 100-Hz tone recorded at +10 dB on metal tape exceeded 70 dB, and at 1,000 Hz (the usual measurement point) it increased to the approximate 80-dB limit of our wave analyzer. Fast forward and rewind times for a C-60 cassette were 50 and 45 seconds.

● **Comment.** Given these outstanding measurements, it should come as no surprise that the 1000ZXL was able to make virtually perfect copies of any musical material (FM, disc, or master tape) we checked it with. Only with high-level FM interstation hiss could we hear

the high-frequency advantage of metal tape, though it would obviously be the choice for live recording. While we did not test the deck in this latter application, the outstanding quietness and high overload margins of its microphone circuitry were noted.

Any recorder with as many features and options as this one obviously takes a little getting used to, but once we learned our way around it, the 1000ZXL was remarkably easy to use. The electronic counter was exact, the tape handling gentle. Our only disappointment is that, having tested it, we must now return it to the manufacturer.



**Tandberg TCD-440A Cassette Deck**

Heading the latest line of cassette decks from Tandberg is the TCD-440A, a deluxe three-motor, three-head machine. The TCD-440A incorporates Tandberg's DYNEQ dynamic equalization system for greatly reduced high-frequency tape overload, and the Actilinear recording system that permits effective use of metal tapes without saturating of the recording amplifiers.

The transport is controlled by light-touch buttons that operate solenoids. The usual pause feature is lacking, but record can be activated by touching a single button if a separate REC. PRESET button has been previously engaged. Logic circuits make it possible to go from any speed or mode to any other. "Flying-start" recordings can be made by pressing the RECORD and PLAY buttons simultaneously while the tape is playing, and releasing PLAY before RECORD.

Other pushbutton switches control POWER, DOLBY NR, and internal equalization time constants. A DOLBY FM button, when used in conjunction with the DOLBY NR button, converts the deemphasis time constant of a received FM broadcast from 75 to 25 microseconds before decoding and recording it. Separate pushbuttons set the machine for Type I and Type II tapes. These are IEC designations for general tape classes, respectively, exemplified by ferric-oxide (normal) tapes and

either CrO<sub>2</sub> or high-bias ferricobalt equivalents. When both buttons are engaged the machine is set for Type IV (metal) tape. Another button controls tape/source monitoring. An MPX filter can be switched in to attenuate 19-kHz pilot leakage from FM broadcasts being recorded.

Above the control buttons are two illuminated level meters that read peak levels of the equalized signal. They have two scales; the upper one, for Types I and II tapes, has its 0-dB calibration corresponding to a tape flux of 250 nWb/m, while the lower, for metal tape, is set 4 dB higher (400 nWb/m).

Playback output and recording levels are controlled by dual slide-type potentiometers. A three-position toggle switch sets recording bias for Type I, II, or IV tapes. Access holes are provided for internal screwdriver adjustments that permit bias to be trimmed for any specific type of tape. This requires instruments and is not a normal user adjustment.

Also on the panel of the TCD-440A are a headphone jack, a socket for the optional remote-control accessory, and two microphone jacks, as well as the tape index counter. The cassette is hinged vertically and opens from its right side. The EJECT button operates through a solenoid, so that normally the cassette door cannot be opened unless the recorder is powered. If access is required to the

cassette with power off, there is a special mechanical ejection lever under the recorder.

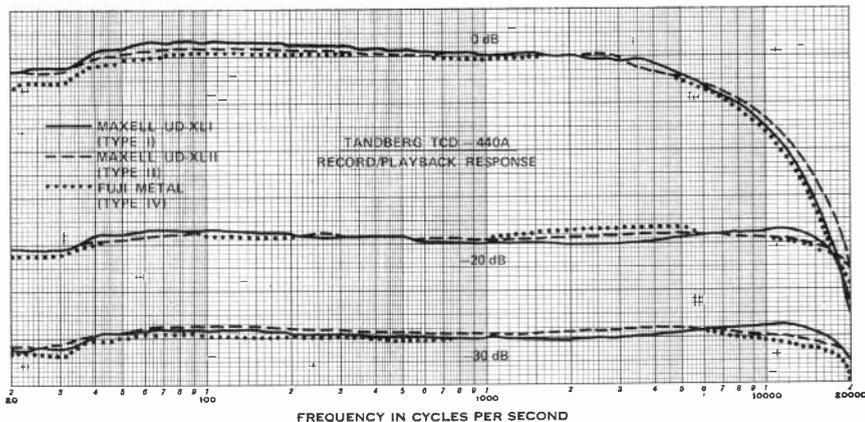
Pressing on the upper edge of a narrow metal door causes it to swing open and reveal the recording-head azimuth adjustment knob, a TEST switch, and instructions for aligning the head before making a recording. The separate record and playback heads are far enough apart for slight tape skewing within the cassette to alter the effective alignment of their gaps. The playback head is factory aligned, but before making a recording, it is necessary to adjust recording-head alignment for the particular cassette being used. An internal 10-kHz oscillator facilitates this test.

DYNEQ is Tandberg's answer to tape saturation at high frequencies. It monitors the incoming program level—particularly its high-frequency content—and uses the information to control the response of a 20-kHz resonant peaking circuit in the recording amplifier. As the high-frequency energy in the signal increases, the high-frequency boost in the amplifier is progressively reduced. This minimizes the possibility of tape saturation. High-frequency recorded flux is thus maintained constant over a wide range of input signal levels, resulting in an effective increase of high-frequency response that amounts to about 10 dB at 15 kHz. DYNEQ operates only during record and yields a tape that is fully compatible with other recorders. In addition, it provides a dramatic reduction in intermodulation distortion.

The Actilinear system isolates the recording amplifier output from the bias signal injected into the recording head, reducing still further any intermodulation between the signal and the bias oscillator. In addition, it allows the recording amplifier some 15 dB of reserve headroom, even with the high signal levels recorded on metal tape.

The Tandberg TCD-440A can be installed in a vertical or a horizontal position, with removable supporting feet supplied for vertical mounting. The all-black recorder measures 18 $\frac{1}{16}$ " W  $\times$  8 $\frac{7}{8}$ " D  $\times$  4" H and weighs 14.5 lb. Suggested list price is \$995. An optional infrared remote-control unit is \$150.

● **Laboratory Measurements.** Bias levels in the Tandberg TCD-440A had been factory adjusted for Maxell UD-XLI (Type I), Maxell UD-XLII (Type II), and Fuji Metal (Type IV) tapes, which we used in our tests. Playback equalization was first measured using TDK, Teac, and BASF test cassettes for



both 120- and 70-microsecond equalization. There were the expected minor differences between the different tapes, but playback response was typically within 2 dB from 40 Hz to the upper limit of the tape (either 10 or 12.5 kHz).

Record/playback frequency response was measured with each of the basic tapes, using levels of 0, -20, and -30 dB on the recorder's meters. The response of the TCD-440A is specified at a -30-dB level relative to 250 nWb/m, although most other cassette recorders are rated at a -20- or a -26-dB level. We found negligible differences between the -20- and -30-dB curves, and those were confined to the range above 15 kHz.

This deck is exceptionally free of the low-frequency "head bumps" that are present in the playback response of almost every cassette deck. Its response could be specified as  $\pm 1.5$  dB from 20 to 18,000 Hz with *any* of the tapes we used, at either a -20- or a -30-dB level. The 0-dB response curves began to roll off above 3 to 4 kHz, regardless of the tape. However, they did not fall to -20 dB until 18 or 20 kHz and never went below that. On most cassette decks, metal tape will give superior high-frequency response at high levels, but DYNEQ seems to extract almost identical response from any kind of tape.

The Dolby circuits tracked well, resulting in a net response change of no more than 1 dB up to 10 kHz, or 2 dB between 10 and 15 kHz, between the Dolby on and off conditions, at levels of -20, -30, and -40 dB.

Depending on the tape used, a 0-dB meter reading required a recording input of 65 to 92 millivolts at 1 kHz. The corresponding maximum line playback levels were between 1.15 and 1.82 volts. At a 0-dB recording level, playback third-harmonic distortion was 0.8%

with Type I, 0.5% with Type II, and 1.6% with Type IV tape (the last being recorded to its 0-dB reference, which is 4 dB higher than the others). The recording levels corresponding to 3% playback third-harmonic distortion were +5.4, +6, and +2.5 dB, respectively, for the three tapes.

Unweighted signal-to-noise ratios (S/N) referred to the 3% distortion signal level were 52.8, 55.7, and 56.1 dB for Type I, II, and IV tape, respectively. Using the Dolby system and CCIR/ARM weighting, these figures improved to 63.8, 67.5, and 67.3 dB. Through the microphone inputs, noise increased by 7 dB at maximum recording gain with a 1-k $\Omega$  input termination. (Gain of the microphone amplifier is a function of source impedance.) Crosstalk at 1 kHz was -60 dB.

Standard test tapes confirmed that a flux level of 250 nWb/m produced a 0-dB meter reading in playback. Dolby calibration marks are at -2 dB, corresponding to 200 nWb/m, and Dolby test tapes gave meter readings of -1 and -1.5 dB on the two channels. The meters responded very rapidly to transients, reading 100% of steady-state values on 0.3-second tone bursts.

The tape transport ran 0.5% fast. Weighted rms (JIS) flutter was 0.07%, and weighted peak (CCIR) flutter was  $\pm 0.1\%$ . On a combined record/playback measurement, these readings increased to 0.1% and 0.15%, respectively. In fast forward and rewind, a C-60 cassette was moved from end to end in the very fast times of 43 and 50 seconds, respectively. The transport slows the tape near the end of a fast wind to lessen the stress on the tape leader in sudden stops.

● **Comment.** Performance specifications of the Tandberg TCD-440A are listed in some

detail in the product literature, and in every case where we were able to make a measurement, performance of the test sample met or surpassed its ratings.

In spite of—or perhaps because of—its unconventional control and operating features, the TCD-440A is easy to use. Our only criticism of its design concerns the cassette door, which does not swing open far enough for easy loading or unloading of a cassette. In installations where access to the right side of the deck is limited, the process becomes quite clumsy, since the cassette must be moved beyond the right edge of the recorder to clear the door when loading and unloading.

A standard subjective test we apply to cassette decks is to record interstation hiss from an FM tuner and compare playback to the incoming signal. With many good recorders, the two sound almost exactly alike—except for minor midrange coloration. But this degree of accuracy can be realized only when the recording is kept below -20 dB (-10 dB on a few of the better machines).

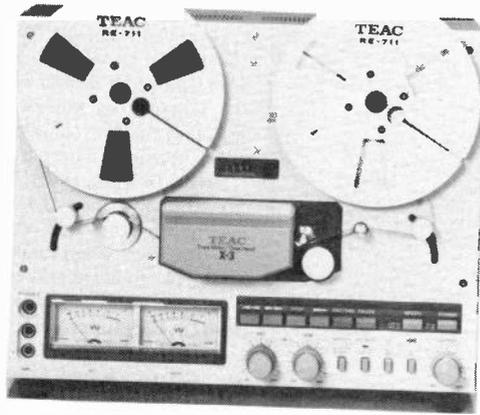
With very careful matching of the signal levels being compared, we heard no difference between our tuner hiss and the playback of the TCD-440A's recording, even at a 0-dB level! This is remarkable performance for a cassette recorder, especially since identical results were obtained with each of the basic tape formulations used.

The other aspect of the DYNEQ system—reduced intermodulation distortion and bias oscillator beats—is more difficult to verify because there is no way to compare performance of the machine with DYNEQ to that of the same machine without DYNEQ. Fortunately, Tandberg has made a demonstration cassette in its laboratories, using a TCD-440A modified so that DYNEQ can be switched in or out, that leaves no doubt about the effectiveness of the system. It contains various test signals, recorded with DYNEQ being switched on and off at a slow rate.

How much of this improvement will be apparent in recordings made on the TCD-440A depends largely on the program material. We are convinced that it is *capable* of making cleaner recordings of program material rich in high-frequency energy than most other cassette recorders. Even if that capability is not always in demand—or realized in practice—this recorder removes much of the worry from making recordings when the dynamic range is not known in advance. If meter readings do not exceed 0 dB except for brief peaks, first-rate recording is hard to avoid. Our experience suggests that metal tape is rarely necessary with this deck. A good Type II tape seems to extract virtually all the performance of which the machine is capable—and it is more than most people will ever need.

turn page for more test reports

For more information on the products whose test reports appear in this section, write directly to the manufacturers. Manufacturer addresses can be found in the Directory of Manufacturers that begins on page 4.



## Teac X-3 Open-Reel Deck

**T**HE Teac X-3 is a two-speed, quarter-track stereo open-reel deck with three motors, three heads, and a solenoid-controlled transport. Designed to operate at 7½ and 3¾ ips, it accepts reel sizes up to 7 inches in diameter and permits mic/line mixing, external timer activation, and "punch-in" recording—that is, going directly from play into record mode to replace old material with new.

The capstan of the X-3 is belt-driven by a d.c. servomotor, and a pair of induction motors are used to turn the reel hubs. Two tape lifters hold the tape away from the heads during fast winding in either direction. Spring-loaded arms on either side of the head block, each equipped with a rotating tape guide, take up the tape slack during start and stop operations, and a third rotating bearing to the left of the heads helps reduce wow and flutter.

Positive-locking (except for STOP) push-buttons with relatively long travel (¾ inch) control the REWIND, FAST FORWARD, PLAY, RECORD, and PAUSE functions as well as tape-speed selection and power on/off. Other buttons select either SOURCE (input) or TAPE (playback) monitoring, a momentary-contact RE-

CORD MUTE function, and one of two alternative settings for EQUALIZATION and BIAS. Concentric (left- and right-channel) rotary controls adjust microphone and line-level inputs and the line-level output (which also affects the volume level at the front-panel headphone jack). Front-panel phone jacks are also provided for a pair of microphones with a rated impedance of 200 ohms or higher.

The record/playback indicators are VU-type meters calibrated from -20 to +3 VU. A four-digit counter, driven by the take-up reel, indicates tape position, and the head-block cover is easily removable for access to the heads for cleaning, demagnetizing, and editing. The X-3 has mounting feet that permit either vertical or horizontal operation.

The rear panel of the X-3 contains the usual input and output phono jacks. Overall, the unit measures 16½ x 12½ x 7¼ inches (width, height, depth) and weighs a little less than 31 lbs. Retail price: \$550.

● **Laboratory Measurements.** Teac did not supply us either with test data or with the specific tape types for which our sample of the X-3

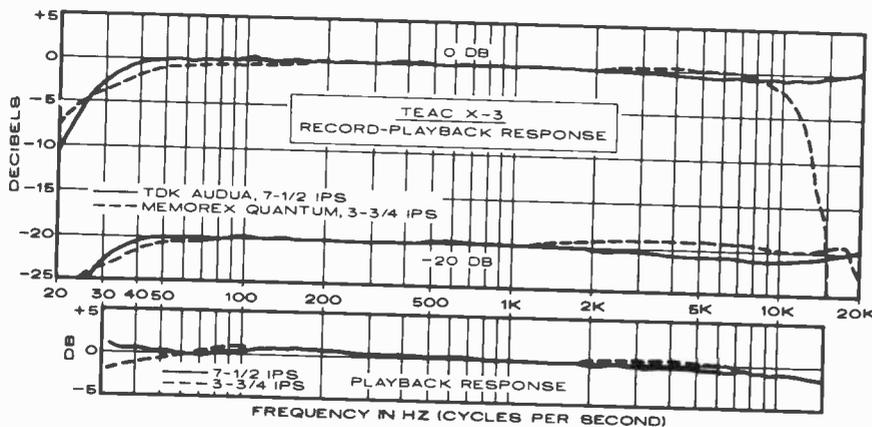
was adjusted. Playback frequency response, shown in the accompanying graph, was checked with our new MRL (Magnetic Reference Laboratory) calibrated tapes, which we believe are the most accurate available. The slight high-end roll-off (3 dB at 20 kHz and 7½ ips) was not repeated in overall record-playback tests. This, together with the fact that the 0-VU point on the meters corresponded exactly to the Ampex operating level of 185 nanowebers/meter, leads us to suspect that Teac probably used Ampex alignment tapes (which have a slightly hotter high end) in setting up the X-3. In any event, we could discern no audible degradation in high-frequency response with prerecorded tapes.

While checking overall record-playback frequency response, we found that switching from position No. 1 to position No. 2 on the equalization selector raised the response approximately 2 dB at 20 kHz—a very slight difference. The reduction in bias current caused by changing the bias switch from position No. 1 to position No. 2 had a much more profound effect on 20-kHz response, increasing it by 3.5 dB at the 7½-ips speed and by 10 dB at 3¾ ips. When using premium tapes, however, distortion increased severely in bias position No. 2; it is clearly intended for older or "second-line" tape formulations that require less bias.

Both TDK Audua and Memorex Quantum gave outstanding record-playback performance at both tape speeds. The Audua was marginally flatter at 7½ ips and the Quantum (using equalization No. 2) slightly flatter at 3¾ ips, so we used these for the graph and for signal-to-noise-ratio (S/N) measurements. (The Memorex Quantum had a slightly better S/N at both speeds.) As the graph shows, at 7½ ips there was absolutely no difference in frequency response between the 0-VU and the -20-VU curves: both were flat out to 20 kHz, and at the latter level we did not reach the -3-dB point until 28 kHz, well above the upper limit of our chart paper. Response was down 3 dB at 30 Hz, precisely confirming Teac's specification. At the slower speed, response was again impressively flat, with 30 Hz and 20 kHz marking the -3-dB points at a -20-VU input. Interestingly, with a 0-VU input level, high-end response held up very well to slightly above 10 kHz, which is slightly better than we normally obtain when using metal-particle tape on top-quality cassette decks.

Distortion at a 0-VU input level, using a 1,000-Hz tone, measured 0.42 per cent with TDK Audua (7½ ips) and 0.2 per cent with Memorex Quantum (3¾ ips). To reach the customary 3 per cent third-harmonic distortion level it was necessary to raise the levels by 7.6 and 10.2 dB, respectively. Referred to the 3 per cent distortion point, the unweighted signal-to-noise ratios were 56.8 dB (7½ ips, TDK Audua) and 57.6 dB (¾ ips, Memorex Quantum). On an IEC A-weighted basis they registered 62.1 and 63.1 dB, respectively.

On an overall record-rewind-playback basis, the wow and flutter of the X-3 measured 0.04 and 0.07 per cent using the DIN peak-weighted standard and 0.035 and 0.06 per cent weighted rms at the higher and lower speeds, respectively. A 0-VU meter indication required a line-level input of 0.059 volt (59 millivolts) or a microphone input level of 0.22 millivolt. Microphone input overload level was 66 millivolts. The microphone input impedance is rated for 200-ohm (or higher) pickups. A 0-VU meter



Frequency-response curves for two different types of tape.

indication produced a measured output level of 0.84 volt.

Fast-forward and rewind times for 1,800-foot reel were each 102 seconds, and the resulting tape pack was admirably smooth. VU-meter ballistics were slightly slower than the ASA standard (0-VU level pulses of 300 milliseconds read —4 VU instead of 0 VU). The headphone jacks produced more than adequate volume both with our 600-ohm and nominal 8-ohm phones.

● **Comment.** As its excellent measurements would imply, the performance of the Teac X-3 in our listening tests was first-rate. Even when using high-level FM interstation noise—an extremely severe test—we could detect no frequency-response losses between the original and the taped copy. Using very wide-range material we could detect a very small amount of added hiss at 7½ ips) and a little more at 2 3/4 ips), but for anyone to whom this is a problem an external Dolby-B processor—desirable in

any case if you wish to listen to prerecorded tapes—would be a completely effective answer. Tapes were handled smoothly, and the controls and pushbuttons had a positive feel. More expensive machines might bring with them additional features of interest to the semi-professional recordist (10½-inch reel capacity, a “dump-edit” mode, etc.), but for the average home user the low price and excellent performance of the Teac X-3 would be very hard to beat.



## Technics RS-M24 Cassette Deck

**T**HE Technics RS-M24 is a front-loading, two-head cassette deck that employs a single-capstan, single-d.c.-motor drive system. The record/playback head is made of “MX” permalloy, which is capable of accepting the very high bias current required by metal-alloy tape. The transport controls, though mechanical, utilize soft-touch pushbuttons that provide much of the feel and flexibility normally associated with sole noid-operated controls.

Cassettes are inserted, tape openings downward, into slides behind the transparent cassette-well door. The cassette well is not illuminated, but label and tape visibility is adequate with normal ambient light levels. The lid of the well may easily be removed, affording access to the heads and pinch roller for routine cleaning.

The FAST FORWARD and REWIND buttons are used in the RS-M24 not only for their normal functions but, in conjunction with the PLAY button, to provide facilities through which the tape can be heard during high-speed winding; they will revert immediately to the play mode when the fast-wind button is released. The RECORD-button set up is unusual in that it is used alone (not simultaneously with PLAY) to put the RS-M24 into record mode. Since the RECORD and PLAY pushbuttons are interlocked, however, it is not possible to go directly from play into record. While the deck has no memory-rewind/play feature, it can be set to rewind a tape to its beginning and then replay it automatically. Activation of either the record or play modes by an external timer switch is also possible, and the PAUSE and RECORD MUTE functions can be operated, if desired, by an optional remote-control accessory. Only the RE-

CORD button has a status-indicator light.

Record and playback levels register on a pair of eighteen-segment peak-reading fluorescent displays calibrated from —20 to +8dB. The highest reading is held for approximately 2 seconds to make setting the record level easier. The Dolby-calibration mark falls at +3 dB. Large concentric knobs are used to control the recording level, and a single smaller knob adjusts the output level both at the rear jacks and at the front-panel headphone jack.

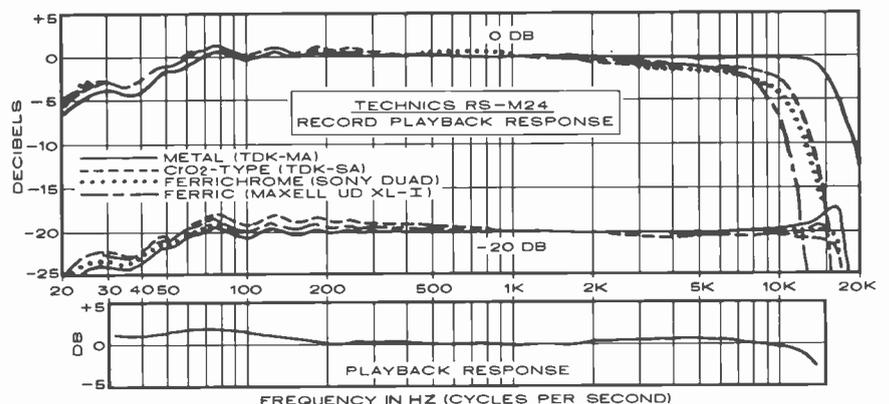
Four pushbuttons set the bias and equalization of the RS-M24 for metal, CrO<sub>2</sub>-type, ferrichrome, or ferric formulations, and similar buttons are used to turn the Dolby noise reduction on and off and to select between microphone and line-level record inputs. No

mixing facilities are provided, but there is a pushbutton-operated RECORD MUTE function. The rear panel of the RS-M24 contains the customary phonojack connectors for line-level inputs and outputs, plus a DIN-type socket for the \$15 remote-control accessory. Overall, the RS-M24 measures approximately 17 x 4½ x 10¼ inches (width, height, depth) and weighs about 11 pounds. Price: \$250.

● **Laboratory Measurements.** Our sample of the RS-M24 was supplied with the tapes used to make its factory adjustment. These were Maxell UD XL-I (ferric), Sony Duad (ferrichrome), Technics RT-60XA (CrO<sub>2</sub>-type), and Technics RT-60MX (metal). Since the two Technics tapes are not widely marketed, we used the nearest generally available equivalents: TDK SA for the CrO<sub>2</sub>-type and TDK MA for the metal-alloy tape.

Playback frequency response was checked using Teac MTT-216 (120-μsec, ferric) and MTT-316 (70-μsecm CrO<sub>2</sub>/metal/ferrichrome) test tapes. Response was within ±2 dB from the tapes' lower limit of 31.5 Hz up to the very highest tones, where it fell off slightly, being down 2.5 and 4 dB at 14,000 Hz in the 120- and 70- μsec positions. Since this high-end loss was not reflected in the overall record-playback response curves, we are inclined to believe it results from a difference in the azimuth alignment between our test tapes and those used by Technics.

Overall record-playback frequency response, measured at 20 dB below the 0-dB



Frequency-response curves for four different types of tape.

indication on the fluorescent display, showed the -3-dB points at 15.5 kHz (ferric), 17 kHz (CrO<sub>2</sub> and ferrichrome), and 18 kHz (metal). At the low-frequency end, response began to fall off gradually below approximately 50 Hz, being down by 3 dB at approximately 40 Hz but within  $\pm 3$  dB down to 20 Hz. The metal tape had a 3-dB peak at 16.5 kHz, just before its upper limit, suggesting a slight under-bias condition. The 0-dB curves, however, show the very dramatic advantage of metal tape in high frequency overload capability.

Third-harmonic distortion of a 1,000-Hz tone at the indicated 0-dB record level measured 0.8, 0.7, 1.2, and 0.6 per cent for the metal, CrO<sub>2</sub>-type, ferrichrome, and ferric tape formulations, respectively. To reach the 3-per-cent distortion level used to check signal-to-noise ratio required increasing the input signal by 7, 6.5, 5, and 9 dB for the four tape types, verifying the suggestion in the owner's manual that peak readings in the range of +3 to +6 dB are the most suitable for most recordings. On an unweighted basis, without Dolby-B noise reduction, the respective signal-to-noise ratios

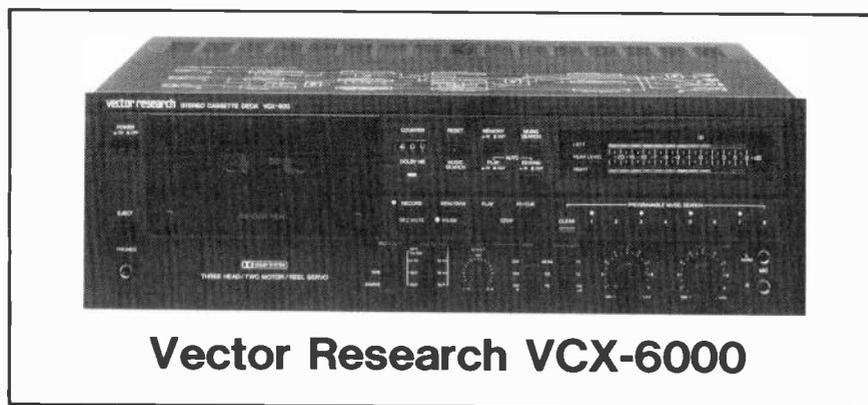
for the metal, CrO<sub>2</sub>-type, ferrichrome, and ferric tapes measured 54.2, 54.2, 55.2, and 53.6 dB. With the Dolby system and CCIR weighting, these figures improved to 65.6, 66, 67.4, and 66 dB. Wow and flutter, checked with a Teac MTT-150A test tape, was 0.05 and 0.075 per cent on a weighted-rms and DIN-B peak-weighted basis.

A 1,000-Hz line-level input of 60 millivolts (0.06 volt) produced a 0-dB indication and an output level of 0.675 volt. The corresponding microphone-input sensitivity was 0.19 millivolt, with overload occurring at 18 mV. Headphone volume was more than adequate for either nominal 8-ohm or 600-ohm headphones. Fast-forward and rewind times were both 90 seconds for a C-60 cassette, end to end.

Dolby-level calibration fell precisely at the indicated (+3 dB) point on the fluorescent indicator, as measured with a TDK AC-313 test tape; the indicator had a fast attack, with the highest peak level held for approximately two seconds as specified. Dolby tracking accuracy was within 1 dB at -20- and -30-dB recording levels up to 14 kHz, above which responses fell off very

sharply as a result of a built-in stereo-FM multiplex filter that is automatically inserted in the signal path when the Dolby circuitry is active.

● **Comment.** As its modest price suggests, the RS-M24 is not designed to compete directly with the most sophisticated decks on the market, but within its intended arena it proved to be an excellent performer. When demonstration-quality prerecorded cassettes were played through a wide-range speaker system there was a slight dulling of the highest frequencies, which was also perceptible when we made copies of the most demanding discs and master tapes. On the other hand, for most tape, disc, and FM dubbing the loss in the copy was insignificant if the recording level was kept at the levels suggested in the owner's manual. The transport controls were a joy to use, infinitely superior to the customary "piano-key" mechanical levers. For readers seeking a quality cassette deck at a moderate price, the Technics RS-M24 is certainly worth serious consideration when you're in the market for a cassette deck.



Vector Research VCX-6000

The Vector Research VCX-600 is a deluxe three-head cassette deck with a logic-controlled, two-motor transport. Among its operating conveniences is a MEMORY system for full automatic stop or replay when a tape has rewound to 000 on the index counter. Rewind can be made to occur automatically at the end of a tape, permitting automatic repetition of a tape in whole or part.

The VCX-600, which is compatible with metal tapes, has a vernier bias-adjust control for optimizing performance with different tape formulations. A programmable music search feature gives fast access to up to eight recorded selections per cassette. Recording and playback levels are indicated on parallel rows of fast-responding green LEDs from -20 to 0 dB, while red LEDs are used from 0 to +8 dB.

The door over the cassette well is opened by pushing the EJECT button. Small momentary-contact pushbuttons, whose functions can be duplicated by an optional plug-in remote-control accessory actuate the trans-

port solenoids. Lights adjoining the buttons show the recorder's operating mode. It is possible (except while recording) to go from any mode to any other mode without having to first press the STOP button.

With the recorder in play, pressing either the REW/RVW or FF/CUE button moves the tape at high speed, allowing modulation on the tape to be heard at a low level to aid in locating specific passages. When the button is released, the machine returns to the play mode. For normal fast forward or rewind, the tape is first brought to a stop and one of the fast-speed buttons is touched momentarily.

The memory system stops the tape when it is rewound to 000 on the index counter. If the AUTO PLAY button is also engaged, the machine goes immediately into play. In addition, AUTOREWIND automatically switches the machine to rewind at the end of a tape.

When MUSIC SEARCH is touched (in normal play), a warning light on the panel starts to blink. A touch of REW/RVW or FF/CUE will cause the tape to rewind to the beginning of

that selection or advance to the beginning of the next selection, respectively; the recorder then goes back into normal play.

A system called PROGRAMMABLE MUSIC SEARCH is controlled by buttons marked from 1 through 8 plus CLEAR. The user chooses selections to be played by touching the appropriate buttons before pressing PLAY. The tape advances rapidly to the first selected segment and plays it, after which it advances to the next one, and so on. The program can be erased at any time by touching CLEAR. Like MUSIC SEARCH, this feature operates by sensing the quiet intervals between recorded selections, provided these are at least 3 seconds in duration.

The LED display reads peak program levels; its 0-dB index corresponds to the standard Dolby level of 200 nWb/meter. Concentric knobs with a slip-clutch coupling set the recording levels for the two channels, and there is a separate playback-level knob. Switches select bias and equalization for FE, CO, and METAL tapes. Equalization time constants are identified as 70 or 120 microseconds, and bias levels are expressed in terms of percentages: FE = 100%; CO = 150%; METAL = 250%. A small bias vernier knob adjusts each of these over a nominal  $\pm 10\%$  range.

A single three-position switch turns on the Dolby system, with or without the 19-kHz FM stereo pilot filter. Another switch connects either the SOURCE or the TAPE playback programs to the line outputs.

The Vector VCX-600 is finished in black, with clearly contrasting white panel markings. Its overall dimensions are 17 $\frac{3}{8}$ "W  $\times$  14 $\frac{3}{4}$ " D  $\times$  5 $\frac{3}{8}$ "H, and it weighs 22 lb. Suggested retail price is \$750.

● **Laboratory Measurements.** The Vector VCX-600 is biased for TDX AS (FE), TDK SA (CO), and TDK MA-R (METAL) tapes,

which were used for our laboratory evaluation. A 0-dB recording level was obtained with a line input of 55 millivolts; the corresponding playback output was 0.575 volt, regardless of tape type. Sensitivity of the MIC input was 0.24 millivolt, with overload at a safe 53-millivolt level.

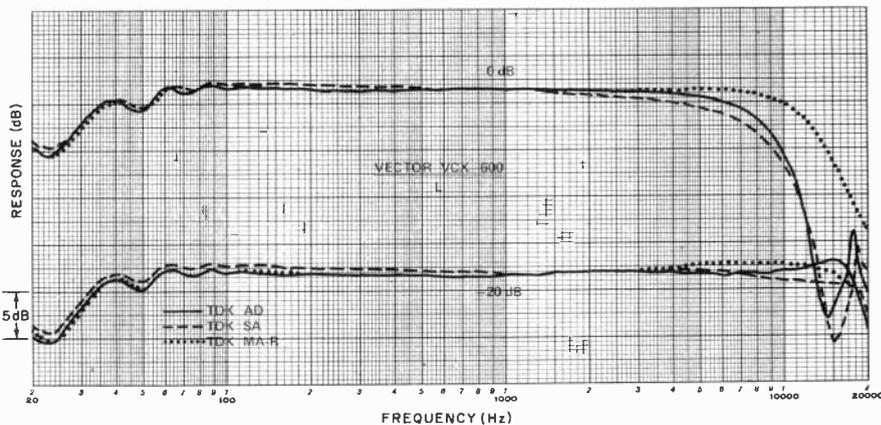
Recorded as a 0-dB level at 1-kHz, AD and SA tapes produced about 1% third-harmonic distortion, while MA-R produced 1.4%. The respective levels corresponding to 3% (reference) distortion were +4, +5, and +4.5 dB. Signal-to-noise ratio was measured unweighted, with A weighting, and using the Dolby system with CCIR/ARM weighting, for each of the tapes. AD gave readings of 50.5, 58, and 64.5 dB; SA 53.5, 59.7, and 66.5 dB; and MA-R 50, 59, and 65.5 dB. Noise increase for the MIC input at maximum gain was 3.5 dB, indicating a very quiet microphone preamp.

Erasure of a 0-dB, 1-kHz recording left a residual signal level of -66 dB on SA and unmeasurable levels on the other tapes. Crosstalk between tracks (at 1 kHz) was -58 dB with a TDK AC-352 test tape.

Transport flutter, measured with a TDK AC-342 test tape, was a very low 0.047% weighted rms (JIS) and 0.07% weighted peak (CCIR). Speed, measured on the basis of the 3-kHz tone on TDK AC-342 tape (whose accuracy is specified as 0.03%) was fast by about 0.9%. Fast forward time for a C-60 cassette was 79 seconds (86 seconds in rewind) from end to end.

Record/playback frequency response was measured for each tape with the bias adjustment control at its nominal (center) setting. At a -20-dB recording level, all three tapes gave exceptionally flat response; AD was  $\pm 1$  dB from 40 to 17,500 Hz; SA was within  $\pm 0.5/-1$  dB from 40 to 18,000 Hz, and MA-R was within  $\pm 1$  dB from 40 to 16,000 Hz. The high-frequency response of each tape could be trimmed slightly with the bias control, but the center settings were close to optimum. We made a check of the METAL setting with Scotch Metafine and found that a -10% bias gave results much like those obtained with MA-R at the nominal setting.

Substantial differences between tapes were evident at a 0-dB recording level. With AD and SA tapes, the 0-dB playback curve intersected the -20-dB curve at 12,500 to 13,000 Hz; MA-R, on the other hand, gave about 15 dB more output at 13,000 Hz than the others, and its 0-dB and -20-dB curves did not intersect within the audio range. The test results confirmed the existence of additional



Frequency response for three types of tape.

headroom in metal-alloy tapes.

Spectrum-analyzer photographs give a dramatic illustration of the difference between metal-alloy and oxide-based tapes. The input signal (lower trace in each photo) consisted of 14 and 15 kHz at equal amplitudes, with a combined peak level equal to that of a 1-kHz tone that gave a 0-dB meter reading. Frequency scan extends from 0 to 20,000 Hz, with a vertical scale of 10 dB per division. The upper trace is the playback from the recorder. Levels of the 14 and 15 kHz signals in the playback from the TDK AD and SA tapes are down by 23 and 25 dB compared to the input level. In addition, a large number of odd-order intermodulation products (up to 13th order) fills the spectrum between 8 and 20 kHz. TDK MA-R gives the two input tones a playback level 18 to 20 dB higher and produces only a few odd-order IM products (the 3rd, 5th, and 7th).

Playback equalization of the VCX-600 was measured for both the 70- and 120-microsecond time constants, using test tapes from TDK, Teac, and BASF. In general, the response was within  $\pm 1$  dB from 20 to 12,500 Hz, which was the range covered by the test tapes.

The LED readout responded very rapidly to short-duration signals, reading 100% of steady-state values on 0.3-second tone bursts used to verify the ballistic response of VU meters. A standard Dolby-level tape gave a reading of about +1 dB on the recorder's indicators. The resolution of the LED segments is about 1 dB near a 0-dB reading and from 3 to 5 dB elsewhere.

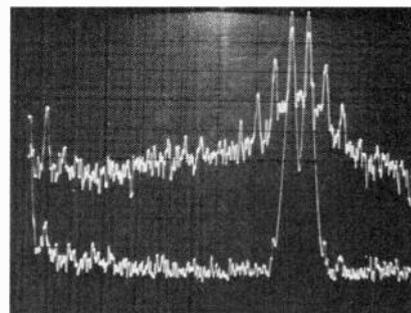
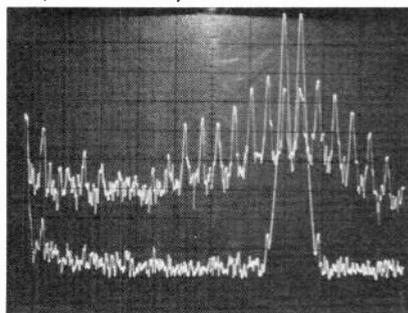
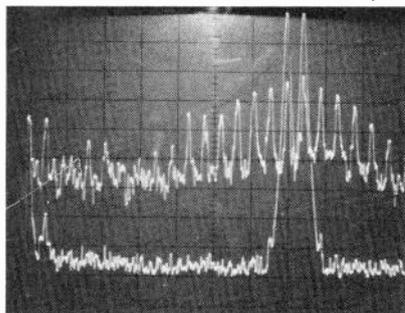
The deck's headphone output, unaffected by the volume control, is nominally specified for 8-ohm phones. We found the level inadequate to drive phones that, like most high-fidelity models, have impedances of 200 ohms or more.

● **Comment.** Although operation of the VCX-600 deck is basically straightforward, familiarization is needed in order to realize the full potential of some of its unusual features. The MUSIC SEARCH feature allows the attractive option of exploring the content of a tape containing a number of recorded selections, much as one would sample a phonograph record by cueing the pickup manually to the beginning of each band. If a few seconds of listening to a taped selection shows that it is not to one's liking, a touch of MUSIC SEARCH and FF/CUE speedily advances the tape to the next selection, which begins automatically.

Recording and playback performance of the VCX-600 was first rate. Even such demanding signals as interstation FM tuner hiss could be recorded and reproduced with no audible differences, even at rather high levels. (Such hiss makes a good test for fine adjustments of bias.)

Lower flutter readings than those of the VCX-600 are hard to find, and the S/N with Dolby is very good, with little dependence on choice of tape. The convenience features of the deck and its ability to "fine-tune" bias represent definite advantages. While the VCX-600 is not cheap, it affords excellent value for its price.

Spectra (upper traces) of playback response from combined 14- and 15-kHz tones for (l. to r.) TDK AD, SA, and MA-R tapes. Peak input level is equivalent to 0 dB at 1 kHz.



# INTRODUCING A CASSETTE DECK WITH A MIND OF ITS OWN.

AKAI proudly announces the GX-F95. The future of recorded history. A 21st century cassette deck for the audiophile who can't wait.



Add now, the 3-head performance and reliability of our exclusive Super GX Combo head, whose glass and crystal ferrite construction adds up to over 17 years of virtually

wear-free performance — guaranteed.\*\* Fantastic. Within seconds after popping in a cassette, this incredible computerized sound machine will have accurately determined bias, equalization, sensitivity tuning and more — automatically. For virtually any tape on the market.

**The latest addition to the longest all-metal cassette line around.**

You'll also find sensor light full-logic solenoid controls, and switchable 24-section/2-color bar meters with peak hold.

Remarkable as the GX-F95 is, it's only one of 11 superb AKAI cassette decks — two of which offer reversing record and playback capabilities.

And the specs on the GX-F95 are equally impressive.

All metal-capable, the line includes models from \$189.95 to \$1,195.00, with plenty of stops in between.

Frequency response with metal tape is an amazing 25-21,000 hertz. And Signal-to-Noise with metal tape is 62dB (Dolby\* on improves up to 10dB, above 5000 hertz). Harmonic Distortion, less than .06%.

So if you're in the market for a great sounding cassette deck, look no further than AKAI.

Including the brand-new GX-F95 with its computerized brain. Maybe the most intelligent thing we've ever done.

AKAI, 800 W. Artesia, Compton, CA 90224.



\*TM Dolby Labs, Inc.  
\*\*Limited Warranty

The mind boggling GX-F95 is only one of 11 superb cassette decks AKAI has to offer. All metal-capable.

# AKAI

YOU NEVER HEARD IT SO GOOD

# 1

# CASSETTE TAPE MACHINES

## AIWA

### AD-3600U Cassette Deck

Front-loading 3-head stereo cassette deck with dual capstans, Dolby HX and double Dolby noise-reduction system. Features tension-stabilized capstans; feather-touch microprocessor-controlled transport; A.D.M.S. (Automatic De-Magnetizing System); micrograin processing capstan; illuminated mode indicators; LH-bias fine adjust control; automatic repeat; 3-color, 12-LED peak signal-level display; metal-tape capability. Wow and flutter 0.029% wrms .....\$460

### 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<sub>2</sub> 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<sub>2</sub>), 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 X 17.75"W X 10.75"D .....\$450

### AD-3500U Cassette Deck

Front-loading stereo cassette deck with 3-head, soft-touch dc-servo-motor-controlled transport and double-Dolby noise-reduction system. Features Dolby B and C circuits; A.D.M.S. (Automatic De-Magnetizing System); 3 heads (DX combination record/play and double-gap Sendust erase heads); cue and review; 3-color, 12-segment LED signal-level indicators; LH-bias fine adjust control. Wow and flutter 0.035% wrms; frequency response +2/-3 dB 25-13,000 Hz LH, to 15 kHz CrO<sub>2</sub>, to 17 kHz metal tape; S/N ratio 65 dB with metal tape, Dolby B on, 75 dB with Dolby C on; 16<sup>1</sup>/<sub>16</sub>"W X 9<sup>7</sup>/<sub>16</sub>"D X 4<sup>3</sup>/<sub>16</sub>"H; 12.1 lb. ....\$395

### AD-3300 Cassette Deck

Stereo cassette deck with DX PB record head, Dolby C noise-reduction system, remaining tape time indicator, and new Auto Tune switch. Features a flywheel-assisted motorized system that automatically loads cassette into playing position; feather-touch IC-logic transport controls; MPX filter; slide-type input signal-level controls; 3-color optical peak signal level display; LH-bias fine adjust; rec mute; timer record/play standby; metal-tape capability. Wow and flutter 0.06% wrms; fre-

quency response 30-16,000 Hz CrO<sub>2</sub>, to 17 kHz metal tape; S/N ratio 74 dB with Dolby C on .....\$370

### AD-3200 Cassette Deck

Front-loading, two-head stereo cassette deck with Dolby B and C noise-reduction systems, "micro-grain" capstan, and DX record/playback head. Features Stable Tape Transport Mechanism; multi-colored LED peak-signal-level displays; LH-bias



fine control; soft-touch transport controls; cue and review; oil-damped cassette eject; LH/CrO<sub>2</sub>/metal tape bias/EQ selector. Wow and flutter 0.038% wrms; frequency response 20-18,000 Hz metal, to 17 kHz CrO<sub>2</sub> tape; S/N ratio with metal tape Dolby B/C on 62/73 dB .....\$295

### AD-3100 Cassette Deck

Stereo cassette deck with exclusive DX record/play tape head, "micro-grain" capstan, and Dolby B noise-reduction system. Features metal-tape capability; dc servo motors; 3-color optical peak signal-level display; soft-touch transport controls; 3-position tape bias/EQ selector; timer standby record/play; oil-damped cassette eject; MPX filter 4<sup>3</sup>/<sub>16</sub>"H cabinet .....\$240

## AKAI

### GX-F95 Deluxe Stereo Cassette Deck

Deck has concealed cassette well, Dolby noise reduction circuitry, digital numeric tape counter (four digits). Features Super GX combo head; tape/source monitoring; computerized Bias Equalization and Sensitivity tuning (B.E.S.T.) for all tape formulations; built-in memory; full-logic, feather-touch transport controls; 24-segment fluorescent two-color switchable peak/VU meters with peak hold; electronic tape/real time counter; record cancel; standby blinker. Wow and flutter less than 0.025% wrms; frequency response 20-21,000 Hz ±3 dB with metal tape; S/N ratio better than 72 dB A weighted with metal tape and Dolby on; distortion less than 0.6% at 1 kHz, 0 VU with metal tape; 17.3"W X 14.2"D X 6.4"H; 29.7 lb. ....\$1195

### 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; calibration tone oscillator; four-position tape selector with lighted tape selector indicator; illuminated feather-touch 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 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 X 17.3" W X 14.6"D .....\$675

**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 X 17.3" W X 13.4"D .....\$549

### GX-F60R Deluxe Bidirectional Deck

Front-loading bi-directional record/play metal-compatible stereo cassette deck with Dolby noise-reduction system and super GX twin-field records-playback head. Features quick reverse in record, play, and continuous play with LED indicators; dual fluorescent bar graph display with switchable VU/peak control; illuminated feather-touch logic solenoid controls; four-position tape selector with LED indicators; remote-controllable record mute; record and output level controls; three-digit tape counter with memory on/off and reset; timer record/play with external audio timer. Wow and flutter 0.04% wrms; frequency response 30-19,000 Hz ±3 dB with metal tape; S/N 60 dB using metal tape without Dolby; walnut vinyl cabinet; 5.9" H X 17.3" W 11.4"D .....\$570

### CS-M40R Bi-Directional Cassette Deck

Front-loading bi-directional record/play metal-compatible stereo cassette deck with Dolby noise-reduction system and sendust record/playback head. Features auto/manual reverse record/play and quick reverse continuous play; fluorescent bar graph display with peak LED; normal/CrO<sub>2</sub>/metal tape selector; record level control with mic/DIN/line input selector; output level control; rec mute; timer standby with external audio timer. Wow and flutter 0.036% wrms; frequency response 30-18,000 Hz ±3 dB with metal tape; S/N 60 dB using metal tape without Dolby; walnut vinyl cabinet; 5.9" H 17.3"W X 11.4"D .....\$400

### GX-F35 Stereo Cassette Deck

Front-loading cassette deck with Instant Program Search System (IPSS), Dolby noise reduction, two-



color, 16-segment fluorescent peak/VU meters with hold. Features twin field super GX head; 19

# 1

## CASSETTE TAPE MACHINES

program selector; sensor full-logic feather-touch transport controls; four-position tape selector (includes metal); memory rewind/auto play; auto mute; timer record/play capability; remote-control plug. Wow and flutter less than 0.04% wrms; frequency response 30-19,000 Hz  $\pm 3$  dB with metal tape; S/N ratio better than 70 dB with metal tape, Dolby on; distortion less than 0.7% at 1 kHz, 0 VU; 17.3" W  $\times$  11.2" D  $\times$  4.6" H; 15.2 lb ..... \$  
**GX-F25.** Similar to GX-F35 except has only 12-segment display; no IPSS; weighs 15.0 lb ..... \$  
**CS-FII.** Similar to GX-F25 except has only three-position tape selector (includes metal); no memory rewind/auto play, auto mute, or output volume control; frequency response 30-18,000 Hz ..... \$400

### Mini Component Series

#### UC-F5 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and twin field super GX head for metal tape; available only as part of UC-5 Mini Component Series. Features four-position tape selector; dual fluorescent peak level bar graph display; LED digital tape counter with reset and memory; auto play, stop, rewind and repeat; logic solenoid tape function controls; record and output level controls; timer start with external timer. Wow and flutter 0.035% wrms; frequency response 30-19,000 Hz  $\pm 3$  dB (metal); S/N 61 dB using metal tape without Dolby; 6.3" H  $\times$  11" W  $\times$  10.9" D ..... \$535

#### UC-M2 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and sendust head for metal tape. Features 12-segment bar graph meter display with five peak level indicators; four-position tape selector; record level control with mic/line input selector; output level control. Wow and flutter 0.06% wrms; frequency response 30-18,000 Hz  $\pm 3$  dB (metal tape); S/N 56 dB using metal tape without Dolby; 4.8" H  $\times$  11" W  $\times$  11.1" D ..... \$320

### AUDIOLOGIC by RANDIX

#### TCD27 Stereo Cassette Deck

Unique vertical stereo cassette deck with Dolby noise-reduction system. Features normal/CrO<sub>2</sub>/FeCr bias/EQ switches; LED record and Dolby indicators; illuminated VU meters; satin brushed aluminum or black brushed front panel. Wow and flutter less than 2%; frequency response 35-14,000 Hz  $\pm 3$  dB with CrO<sub>2</sub> tape; 10" H  $\times$  7<sup>3</sup>/<sub>16</sub>" D  $\times$  6<sup>7</sup>/<sub>16</sub>" W ..... \$300

#### TCD36 Mini Cassette Deck

Deluxe mini stereo cassette deck with Phillips Dynamic Noise Limiting (DNL) system; LED VU level displays, and switchable 110/220 V 50/60 Hz operation. Features front-loading transport; automatic



stop; 3-digit tape counter; bias and EQ switches for normal and CrO<sub>2</sub> tapes; Wow and flutter 0.06% nominal; 9" W  $\times$  7" D  $\times$  5<sup>1</sup>/<sub>4</sub>" H ..... \$180

#### TCD34 Mini Cassette Deck

Mini stereo cassette deck with automatic level control (ALC) and dynamic noise reducer. Measures 7<sup>1</sup>/<sub>2</sub>" W  $\times$  7" D  $\times$  5<sup>1</sup>/<sub>4</sub>" H ..... \$140

### BANG & OLUFSEN

#### Beocord 8000 Cassette Recorder

Dual-microcomputer-controlled metal-compatible top-loading cassette recorder with Dolby noise-reduction 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  $\pm 0.1\%$ ; frequency response 30-16,000 Hz  $\pm 2.5$  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<sup>1</sup>/<sub>8</sub>" H  $\times$  20<sup>7</sup>/<sub>8</sub>" W  $\times$  11<sup>7</sup>/<sub>8</sub>" D ..... \$995

#### Beocord 1700 Cassette Deck

Top-loading, metal-compatible cassette deck has built-in Dolby noise-reduction circuitry and Sendust record/play head. Features illuminated tape counter, fast acting peak LED "meters" that are active during both record and playback; memory and reset functions; automatic bias and alignment for all tape formulations plus separate manual selector for metal tapes. Tape head is automatically demagnetized after every recording to assure better signal-to-noise ratio and high-frequency response. Specifications: frequency response 30-16,000 Hz  $\pm 2.5$  dB with MPX filter for all tape formulations; wow and flutter less than 0.15%; S/N 64 to 68 dB with Dolby on, 56 to 60 dB with Dolby off; channel separation better than 35 dB; fast-forward/rewind time 90 sec for C60 cassette; 16" W  $\times$  10<sup>1</sup>/<sub>4</sub>" D  $\times$  4" H; 11 lb ..... \$495

### BENJAMIN ELECTROPRODUCTS

#### Lenco RAC 10 Cassette Changer

Automatic cassette changer plays up to 10 cassettes in succession without interruption for up to 15 hrs; four separate motors play both sides of cassettes sequentially; output impedance 25 ohms; output 350 mV; changeover time 10 sec; has track 1, track 2, auto, and single play indicator lights; 495 mm  $\times$  252 mm  $\times$  210 mm ..... \$850

### DENON

#### DR-320 Cassette Deck

Front-loading, three-head cassette deck with Dolby noise-reduction system, PLL dc servo capstan and dc reel motors, and source/tape monitoring capability. Features F-alloy heads for record and playback, double-gap ferrite head for erase; dual VU meters; instantaneous-acting LED peak level indicators; normal/FeCr/CrO<sub>2</sub>/metal tape selector;

cue forward and reverse controls; separate input and output level controls; three-digit tape counter; timer record and play buttons; provisions for optional wired remote-control accessory. Frequency response 20-22,000 Hz metal, 25-20,000 Hz L.H. tape; S/N ratio more than 67 dB with Dolby; wow and flutter less than 0.04% wrms; fast wind time 85 sec (C-60); crosstalk -65 dB at 1 kHz; power consumption 25 W at 120 V ac, 60 Hz and 220 V ac, 50/60 Hz; 17.1" W  $\times$  11.8" D  $\times$  4.6" H; 15.4 lb ..... \$425

**DR-330.** Same as DR-320 except has MPX filter, bias fine adjust control ..... \$500

### DUAL

#### C844 Cassette Deck

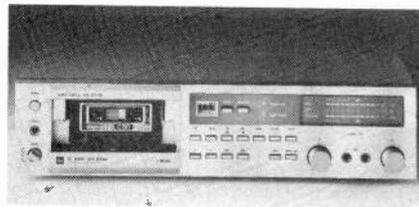
Front-loading, metal-compatible stereo cassette deck with Dolby B and C noise-reduction systems. Two-speed (1<sup>7</sup>/<sub>8</sub> and 3<sup>3</sup>/<sub>4</sub>ips), two-motor, dual-capstan closed-loop drive system. Sendust record/playback and ferrite erase heads; direct load and lock transport with photoelectric stop switches; automatic head shield; electronic fade/edit with playback monitoring; electronic 4-digit tape counter with memory set, stop, play; automatic music finder; auto spacing; auto repeat; 6-position tape selector; equalized VU meters; mic/line mixing; switchable MPX filter; provisions for optional extended timer and 12-command remote control. Specifications at 1<sup>7</sup>/<sub>8</sub> ips: frequency response 20-19,500 Hz with ferrichrome tape (20-20,000 Hz with metal tape)  $\pm 3$  dB; S/N 76 dB with ferrichrome tape and Dolby C on; harmonic distortion 0.04%; wow and flutter 0.03% wrms. Specifications at 3<sup>3</sup>/<sub>4</sub> ips: frequency response 20-20,000 Hz with ferrichrome and metal tapes; S/N 78 dB with ferrichrome and metal tapes and Dolby C on; harmonic distortion 0.3% ..... \$700

#### C830 Cassette Deck

Front-loading, metal-compatible stereo cassette deck with Dolby noise-reduction system, three heads with true monitoring capability, and direct load-and-lock transport system with four-point tape guide and automatic head protection. Logic-controlled inter-mode switching; phase-locked-loop dc servo motor with integral frequency generator; twin-belt drive system; electronic tape motion sensor/protection; switchable MPX filter; switchable limiter; two-way memory stop; mic/line mixing; headphone level controls; easy access to tape heads for cleaning. Frequency response 20-17,000 Hz  $\pm 3$  dB with ferric (normal) tapes and 18,000 Hz with CrO<sub>2</sub> tapes; wow and flutter 0.035% wrms. .... \$500

#### C828 Cassette Deck

Front-loading, metal compatible slim-line stereo cassette deck with Dolby noise-reduction system, auto-reverse in record and playback with friction resistance 4/4-track M-X head and double-gap



ferrite erase head, and two-motor, dual-capstan drive system. Direct load-and-lock tape transport with photoelectric stop switches; microcomputer-controlled drive function using solenoids and logic system; automatic head shield; switchable MPX filter; four-position tape-type selector; one-control record-ready system; equalized peak-reading record level system; three digit tape counter with memory; illuminated cassette shaft. Frequency response  $\pm 3$  dB 30-19,000 Hz with metal tape; wow and flutter 0.04% wrms ..... \$500  
**C822.** Similar to C828 except no auto reverse ..... \$375

### C814 Cassette Deck

Front-loading slim-line stereo cassette deck with Dolby noise-reduction system, direct load-and-lock transport, electronic tape-motion sensor/protector. Friction-resistant M+X record/playback head with automatic protective head guard; soft-touch drive control with direct-mode switching; switchable MPX filter; automatic tape-type switchover; automatic input selector; peak-reading equalized meters with double scales .....\$300

## EUMIG USA, INC.

### FL-1000 Cassette Deck

Front-loading microprocessor-controlled metal-compatible stereo cassette deck with Dolby noise-reduction system, three separate heads, and optoelectronic 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  $\pm 3$  dB (metal and CrO<sub>2</sub>), 30-18,000 Hz  $\pm 3$  dB (ferric); S/N 72 dB (metal), 68 dB (CrO<sub>2</sub>), and 66 dB (ferric); rack-mountable .....\$1550

## FISHER

### DD450 Cassette Deck

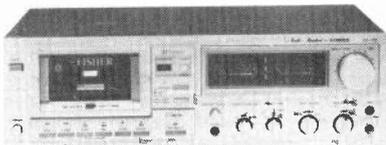
Three-head, direct-drive cassette deck with separate tape-hub motor, Dolby noise-reduction system, full-logic IC solenoid transport controls. Dolby system is dual process. Features three Sendust heads; normal/CrO<sub>2</sub>/FeCr/metal tape switching with separate fine bias control (concentric with motor pitch control); memory/auto-repeat function; fluorescent peak-level auto-hold meters. Wow and flutter 0.04% wrms; frequency response  $\pm 3$  dB 30-14,000 Hz normal, to 16 kHz CrO<sub>2</sub> and FeCr, and to 18 kHz metal tape; S/N 62 dB with Dolby on; THD at 0 VU 1.5%; fast-forward/rewind time 90 seconds for C-60 cassette; 17"W  $\times$  10 1/2"D  $\times$  4"H; 15.5 lb .....\$580

### DD350 Cassette Deck

Studio Standard direct-drive cassette deck with full-logic transport control, metal-tape compatibility, Dolby noise-reduction system, peak indicators, and timer standby. Features separate motor for tape reels; normal/CrO<sub>2</sub>/metal bias/EQ switches; MX/ferrite heads; two large dual-scale VU meters; three peak-level LED indicators; three bias/EQ switches; timer standby switch; low-impedance mic inputs. Wow and flutter 0.04% wrms; frequency response  $\pm 3$  dB 40-14,000 Hz normal, to 15 kHz CrO<sub>2</sub> and metal tapes; S/N ratio 62 dB with Dolby on; THD 1.5% at 0 VU; fast-forward/rewind time 90 sec. for C-60 cassettes; 17 1/3"W  $\times$  10 3/4"D  $\times$  4"H; 13 lb .....\$300

### DD 300 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, direct-drive dc servo capstan motor, and two MX/ferrite



heads. Features tape selector for normal, FeCr, CrO<sub>2</sub>, and metal tapes; dual VU meters with three

peak-reading LED indicators; input level control with line/mic input selector; output level control; auto repeat memory; three-digit tape counter with reset; rec mute; electronic solenoid feather-touch controls with LEDs; timer standby with external audio timer. Wow and flutter 0.04%; frequency response 30-18,000 Hz  $\pm 3$  dB (metal tape); S/N 62 dB with Dolby; 5 1/4"H  $\times$  17 3/4"W  $\times$  9 1/2"D.....\$399

**DD 280.** Similar to DD 300 minus FeCr tape position, auto repeat memory, and output level control; has separate left/right input level controls; metal tape frequency response 30-15,000 Hz  $\pm 3$  dB; optional RC 80 full-function remote control unit available; 4"H  $\times$  17 1/3"W  $\times$  10 1/2"D.....\$300

### CR150 Cassette Deck

Studio Standard three head cassette deck with dual-process Dolby noise-reduction system, power-assisted soft-touch transport controls, and bias fine-adjustment control. Features MPX filter; independent left and right input level controls; output level control; normal/CrO<sub>2</sub>/metal tape selectors; dual lighted VU meters plus peak-level LEDs; tape/source monitoring; MPX filter; Wow and flutter 0.06% wrms; frequency response  $\pm 3$  dB 40-14,000 Hz normal tape, to 16 kHz CrO<sub>2</sub> tape, to 18 kHz metal tape; S/N 62 dB, Dolby on; THD 1.5% at 0 VU; fast-forward/rewind time 90 sec. for C-60 cassette; 17 1/3"W  $\times$  10 1/2"D  $\times$  4 5/8"H; 13 lb .....\$350

### CR130 Cassette Deck

Studio Standard cassette deck with power-assisted transport controls, Dolby noise-reduction system, and dc governor-controlled motor. Features Auto Search Function (ASF); normal/CrO<sub>2</sub>/metal tape bias/EQ selectors; two large VU meters with three peak-level LEDs; hard Permalloy record/playback head; separate input level and single output level controls; full automatic stop. Wow and flutter 0.06% wrms; frequency response  $\pm 3$  dB 30-14,000 Hz normal tape, to 15 kHz CrO<sub>2</sub> and metal tape; S/N ratio 62 dB, Dolby on; THD 1.5% at 0 VU; fast-forward/rewind time 90 sec. with C-60 cassette; 17 1/3"W  $\times$  10 1/2"D  $\times$  4 5/8"H; 11 lb.....\$270

**CR125.** Similar to CR130 but less ASF, peak LEDs, output level control.....\$250

### 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<sub>2</sub>/normal bias and high/low equalization switches, two illuminated VU meters, tape selector switch. Wow and flutter 0.1% wrms (17%), 0.09% wrms (33%); frequency response  $\pm 3$  dB at 17%: 40-13,000 Hz (normal), to 14,000 Hz (CrO<sub>2</sub>), to 15,000 Hz (metal),  $\pm 3$  dB at 33%; 40-18,000 Hz (normal), to 19,000 Hz (CrO<sub>2</sub>), to 20,000 Hz (metal); S/N 50 dB (Dolby off), 60 dB (Dolby on); THD 2.2% (17%), 1.9% (33%); 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; 5 1/4"H  $\times$  17 1/3"W  $\times$  9 1/2"D.....\$230

### CR120 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc governor motor, and two hard permalloy/ferrite heads. Features play/rewind auto search; bias and equalization for normal, CrO<sub>2</sub>, and metal tapes; separate left/right input level controls with mic/line input selector; dual VU meters with three peak-reading LEDs; rec mute; full auto stop. Wow and flutter 0.08% wrms; frequency response 30-15,000 Hz  $\pm 3$  dB with metal; S/N 60 dB with Dolby; 4 3/4"H  $\times$  15 3/4"W  $\times$  8"D.....\$200

**CR 110.** Similar to CR 120 minus auto search, peak-reading LEDs, and mic/line input selector.

\$170

### CR 4013M Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, dc governor motor, metal-

tape capability, and two super permalloy/ferrite heads. Features LED record level meters; manual/CrO<sub>2</sub> tape selector; separate left/right record level controls; auto stop. Wow and flutter 0.1% wrms; frequency response 40-12,000 Hz  $\pm 3$  dB with CrO<sub>2</sub>; S/N 58 dB with Dolby; 5 1/2"H  $\times$  15 1/2"W  $\times$  9"D.....\$150

**CR 4012.** Similar to CR 4013 minus Dolby noise-reduction system; S/N 48 dB.....\$120

### CRM300 Cassette Deck

Direct-drive servo capstan motor cassette deck with Dolby noise-reduction system, full-logic solenoid transport controls, and auto repeat. Features normal/metal CrO<sub>2</sub> bias/EQ selectors; two large dual-scale VU meters; timer standby function. Wow and flutter 0.05% wrms; frequency response  $\pm 3$  dB 30-14,000 Hz normal tape, to 15,000 Hz CrO<sub>2</sub> and metal tape; S/N ratio 62 dB, Dolby on; THD 1.5% at 0 VU; 11 3/4"W  $\times$  8 1/4"D  $\times$  4"H; 11 lb. ....\$350

### CRM200 Cassette Deck

Deck offers power-assisted transport controls, Dolby noise-reduction system, and large dual-scale VU meters. Features normal/CrO<sub>2</sub>/metal bias/EQ selectors; record mute switch; timer standby function; line/mic input selector; separate left and right record level controls. Wow and flutter 0.06% wrms; frequency response  $\pm 3$  dB 40-12,500 Hz normal tape, to 14 kHz CrO<sub>2</sub> tape, to 15 kHz metal tape; S/N 60 dB, Dolby on; THD 1.5% at 0 VU; 11 3/4"W  $\times$  9 1/2"D  $\times$  4 1/3"H; 10 lb.....\$250

### CRM500 Microcassette Deck

Microcassette deck with metal-tape capability, Dolby HX noise-reduction system, and LED bargraph recording-level display and peak level readings. Features two coreless motors; Sendust heads; full-logic solenoid transport controls; metal/normal bias/EQ selectors; remote-control jack; timer standby function; dubbing control system (optional). Wow and flutter 0.07% wrms; frequency response  $\pm 3$  dB 40-8000 Hz normal, to 12 kHz metal tape; S/N ratio 56 dB, Dolby on; THD 1.6% at 0 VU; 8 2/3"W  $\times$  10 1/4"D  $\times$  2 1/4"H; 8 lb.....\$480

## 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<sub>2</sub>, 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  $\pm 3$  dB with FeCr and CrO<sub>2</sub> low-noise tapes; S/N 68 dB with Dolby, A weighted; mic impedance 600-50,000 ohms.....\$680

### 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  $\pm 3$  dB with FeCr and CrO<sub>2</sub> low-noise tape; S/N 67 dB with Dolby, A weighted; mic impedance 600-50,000 ohms.....\$480

### 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 select-

# 1

## CASSETTE TAPE MACHINES

ors 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  $\pm$  3 dB with FeCr and CrO<sub>2</sub> low-noise tape; S/N 65 dB with Dolby, A weighted; mic impedance 600-50,000 ohms .....\$350

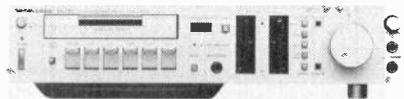
### hk 100m Cassette Deck

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  $\pm$  3 dB with low-noise CrO<sub>2</sub>; S/N 63 dB with Dolby, A weighted; mic impedance 600-50,000 ohms .....\$280

### 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<sub>2</sub>, 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  $\pm$  3 dB from 20-19,000 Hz (metal), to 18,000 Hz (CrO<sub>2</sub> and FeCr), to 17,000 Hz (LN); S/N 68 dB with Dolby, metal tape; 2.9" H X 15.2" W X 12.6" D .....\$450

## 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<sub>2</sub>, 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  $\pm$  3 dB in manual position using Hitachi tape 30-18,000 Hz (normal and FeCr), to 19,000 Hz (CrO<sub>2</sub> 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<sub>2</sub> 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; 7 $\frac{3}{8}$ " H X 17 $\frac{1}{8}$ " W X 12 $\frac{5}{8}$ " D .....\$1000

**D-3300MB.** Similar to D-5500M except has mem-

ory 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<sub>2</sub> and metal tape frequency response 30-20,000 Hz  $\pm$  3 dB; input sensitivity/impedance 85 mV/100k ohms (line), 0.5 mV/300-5000 ohms (mic); 6.5" H X 17" W X 10" D .....\$750

**D1100M.** Similar to D3300M except wow and flutter 0.038%; frequency response  $\pm$  3 dB 20-19,000 Hz normal and FeCr, to 21 kHz CrO<sub>2</sub> and metal tapes (fixed), 30-19,000 Hz normal, to 17,000 Hz FeCr, to 18,000 Hz CrO<sub>2</sub>, to 19,000 Hz metal tape (ATRS); 17 $\frac{1}{8}$ " H X 10 $\frac{1}{2}$ " D X 5 $\frac{1}{8}$ " W; 16.5 lb .....\$600

#### D-E95 Stereo Cassette Deck

Microcomputer-controlled cassette deck with metal-tape capability, close-gap metal record/play head, recording calibration and bias adjustment, auto and memory rewind play/stop, and dual 16-LED peak-hold meter displays. Features double Dolby noise-reduction system; switchable peak-hold function; dual-capstan transport with feather-touch controls; auto rec mute. Wow and flutter 0.038% wrms; frequency response  $\pm$  3 dB 30-17,000 Hz normal and FeCr, to 18 kHz CrO<sub>2</sub>, to 19 kHz metal tape; S/N ratio 69 dB Dolby on, 61 dB Dolby off; 17 $\frac{1}{8}$ " H X 10 $\frac{1}{2}$ " D X 4 $\frac{1}{4}$ " W; 13 lb 3 oz .....\$350

**D-E55.** Similar to D-E95 except SL permalloy record/play head and double-gap ferrite erase head; no recording calibration and bias adjustment; no auto and memory rewind play/stop function; includes auto rec-mute and dual 12-LED peak meters; no peak-hold, remote-control, timer-capability features; wow and flutter 0.04% wrms; frequency response  $\pm$  3 dB 30-15,000 Hz normal and FeCr, to 16 kHz CrO<sub>2</sub>, to 17 kHz metal tape; S/N ratio 59 dB Dolby off, 67 dB Dolby on; 4 $\frac{5}{8}$ " H; 10 lb 2 oz .....\$260

#### D-E25 Stereo Cassette Deck

Stereo cassette deck with metal-tape capability, soft-touch transport controls, rec mute. Features metal/CrO<sub>2</sub>/normal tape selector; dual 6-LED record-level indicators; independent left- and right-channel record level controls; full auto-stop; play and record LED indicators. Wow and flutter 0.05% wrms; frequency response  $\pm$  3 dB 30-14,000 Hz normal, to 15 kHz CrO<sub>2</sub>, to 16 kHz metal tape; S/N ratio 58 dB Dolby off, 66 dB Dolby on; 17 $\frac{1}{8}$ " H X 10 $\frac{1}{2}$ " D X 4 $\frac{1}{4}$ " W; 6 lb 3 oz .....\$180

#### D-E10 Stereo Cassette Deck

Stereo cassette deck with metal-tape compatibility, Dolby noise-reduction system, full auto-stop. Features dual VU meters; front-loading, air-damped cassette door; record level and balance controls. Wow and flutter 0.07% wrms; frequency response  $\pm$  3 dB 30-14,000 Hz normal, to 15 kHz CrO<sub>2</sub>, to 16 kHz metal tape; S/N ratio 57 dB Dolby off, 64 dB Dolby on; 17 $\frac{1}{8}$ " H X 8" D X 4 $\frac{5}{8}$ " W; 7 lb 1 oz .....\$150

## 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<sub>2</sub>, 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  $\pm$  1.0 dB accuracy),  $\pm$  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  $\pm$  1 dB with computer 40-12,500 Hz (metal, SA/chrome, and normal), at  $\pm$  3 dB 25-17,000 Hz (metal and SA/chrome), to 16,000 Hz (normal), at 0 VU 25-12,000 Hz  $\pm$  3 dB (metal), to 8000 Hz (SA/chrome); THD 1.2% at 0 VU, 1000 Hz (metal); S/N 58 dB without 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 mV/8-1k ohms (headphone); 4 $\frac{7}{8}$ " H X 17 $\frac{1}{16}$ " W X 15 $\frac{3}{8}$ " 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  $\pm$  3 dB 25-18,000 Hz (metal and SA/chrome); 4 $\frac{3}{4}$ " H X 17 $\frac{3}{4}$ " W X 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  $\pm$  3 dB; 12 $\frac{7}{8}$ " 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 4-cut Sen-Alloy record/play and two-gap Sen-Alloy erase heads. Features micro-processor-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<sub>2</sub>, 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  $\pm$  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 X 17.75" W X 12.25" D .....\$500

#### DD-9 Cassette Deck

Front-loading stereo cassette deck with ANRS, Dolby B, and Dolby C noise-reduction systems. Features B.E.S.T. tuning system that automatically sets up bias, equalization, and sensitivity for any tape to achieve a flat response; pulse-servo direct-drive transport with feather-touch controls; 3 heads (X-cut Sen-Alloy play/record and 2-gap SA erase); 2-color fluorescent displays with peak-hold function; memory stop/play; auto rewind/play; combined output/phones control; electronic input volume control with up/down buttons; digital tape index counter/clock/stopwatch display; rec mute; lockable timer standby function; optional R50-E re-



mote control. Wow and flutter 0.019% wrms; 17<sup>3</sup>/<sub>4</sub>"W × 12<sup>13</sup>/<sub>16</sub>"D × 4<sup>5</sup>/<sub>16</sub>"H.....\$900

**DD-7.** Similar to DD-9 except no B.E.S.T. system, electronic volume control, digital display .....\$600

**DD-5.** Similar to DD-7 except 2-head design. Wow and flutter 0.021%; SA Sen-Alloy record/play head; 16<sup>1</sup>/<sub>2</sub>"W × 11<sup>1</sup>/<sub>2</sub>"D × 4<sup>3</sup>/<sub>8</sub>"H.....\$390

#### KD-D4 Cassette Deck

Front-loading stereo cassette deck with Metaperm record/play tape head, Super ANRS (Automatic Noise Reduction System), and multi-function digital counter display. Features Music Scan system that operates in both fast forward and rewind; fluorescent Spectro Peak Indicator that displays record levels for 7 frequency zones; memory stop/play; cue; review; timer standby; 6<sup>1</sup>/<sub>2</sub>"W × 11<sup>1</sup>/<sub>2</sub>"D × 4<sup>3</sup>/<sub>8</sub>"H.....\$330

**KD-D3.** Similar to KD-D4 except has no digital counter display, memory stop/play, cue, or review. Features 7-LED multi-peak indicator (-20 to +9 dB); soft-touch controls; rec mute; dual-ball cassette holder to align cassettes properly.....\$215

**KD-D3.** Similar to KD-D4 except has no soft-touch controls or dual-ball cassette holder. Features separate bias and EQ switches; automatic input select switch in microphone circuit; mechanical tape counter with reset button; damped cassette door.....\$160

#### Cassette-Deck Accessories

**RM-30.** Remote-control unit for KD-A8 and KD-A77 cassette decks.....\$50

**R-50.** Remote-control unit for DD-9, DD-7, KD-A66, and DD-5 cassette decks.....\$50

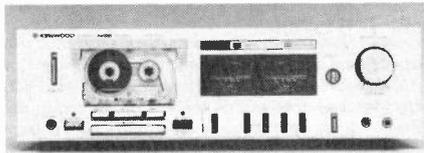
### KENWOOD

#### 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; full auto shut-off; lever tape function controls with LEDs; timer standby. 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" × 17<sup>5</sup>/<sub>16</sub>"W × 14<sup>7</sup>/<sub>8</sub>"D.....\$450

#### KX-600 Cassette Deck

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



cally-controlled dc motor, and Sendust Guard record/play and ferrite erase heads. Features tape selector buttons for normal, FeCr, CrO<sub>2</sub>, 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<sub>2</sub>, FeCr, and metal); S/N with Dolby 62 dB (normal), 64 dB (CrO<sub>2</sub>, FeCr, and metal); input sensitivity/impedance 77.5 mV/50k ohms (line), 0.1 mV/k ohms (DIN), 0.2 mV/10k ohms (mic); 5<sup>1</sup>/<sub>4</sub>"H × 17<sup>5</sup>/<sub>16</sub>"W × 11<sup>1</sup>/<sub>4</sub>"D.....\$285

#### 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<sub>2</sub>, 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<sub>2</sub>, FeCr, and metal); S/N with Dolby 62 dB (normal), 64 dB (CrO<sub>2</sub>, 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); 5<sup>1</sup>/<sub>2</sub>"H × 15<sup>3</sup>/<sub>4</sub>"W × 11<sup>1</sup>/<sub>16</sub>"D.....\$255

#### KX-40 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, normal and metal tape capability. Features hard Permalloy record/playback head, ferrite erase head; electronically controlled dc motor; full auto-off mechanism in all modes; 7-LED peak level meters (-20 to +6 dB); timer standby mechanism; 3-digit tape counter. Wow and flutter 0.06% wrms; frequency response ±3 dB 40-13,000 Hz normal, to 15 kHz metal; S/N ratio 60 dB normal, 62 dB metal with Dolby on; fast wind time 85 seconds with C-60 cassette; 17<sup>5</sup>/<sub>16</sub>"W × 9<sup>7</sup>/<sub>16</sub>"D × 4<sup>1</sup>/<sub>16</sub>"H; 9.5 lb. Comes with head-cleaning set.....\$184

**KX-50.** Similar to KX-40 except has permalloy record/playback head; CrO<sub>2</sub> capability; -15 to +5 dB LED peak meters; frequency response ±3 dB 35-15,000 Hz with all tape formulations; wow and flutter 0.05% wrms; S/N 67 dB normal and CrO<sub>2</sub>, 68 dB metal with Dolby on; fast wind time 105 sec.....\$225

#### KX-70 Cassette Deck

Front-loading deck with Dolby noise-reduction system, DPSS (Direct Program Search System) for full repeat and one music repeat and one music repeat, electronically controlled dc capstan and dc reel motors. Features normal/CrO<sub>2</sub>/metal bias/EQ selector; 7-LED peak level meter; full shut-off mechanism in all modes; amorphous alloy record/playback and double-gap ferrite erase heads. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-16k Hz normal and CrO<sub>2</sub>, to 17 kHz metal tape; S/N ratio 67 dB normal and CrO<sub>2</sub>, 68 dB metal tapes with Dolby on; harmonic distortion less than 1.0% at 1 kHz, 0 VU with metal tape; fast wind time 90 sec with C-60 tape; 17<sup>1</sup>/<sub>16</sub>"W × 10<sup>3</sup>/<sub>4</sub>"D × 4<sup>5</sup>/<sub>16</sub>"H; 11.5 lb. Comes with head-cleaning set and audio connection cord.....\$349

### 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<sub>2</sub>, 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<sub>2</sub>), 65 dB (LH); frequency response 30-18,000 Hz (CrO<sub>2</sub>), 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 (DIV); output level 580 mV; headphone output 1 mW into 8 ohms; 5<sup>3</sup>/<sub>16</sub>"H × 17<sup>13</sup>/<sub>32</sub>"W × 14<sup>1</sup>/<sub>4</sub>"D.....\$2000

#### K15 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby-HX/noise-reduction system, dc servo capstan and dc reel motors, three sendust heads, and two dc direct-coupled amplifiers for recording and playback. Features fluoroscan peak-reading meters with peak hold; three-position bias and equalization for LH, CrO<sub>2</sub>, and metal tapes with bias fine adjust; LED digital tape counter display with automatic program repeat on/preset controls and auto play and rewind; logic solenoid tape function controls; rec mute; mic/line mixing; tape/source monitor switch; output level control; timer rec/play with external audio timer. Wow and flutter 0.04% wrms; frequency response ±3 dB 30-16,000 Hz (LH), to 17,000 Hz (CrO<sub>2</sub>), to 18,000 Hz (metal); S/N 65 dB with metal, Dolby on; rosewood vinyl cabinet; 4<sup>9</sup>/<sub>16</sub>"H × 17<sup>1</sup>/<sub>4</sub>"W × 14<sup>9</sup>/<sub>16</sub>"D.....\$900

#### 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<sub>2</sub>, 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<sub>2</sub>), 63 dB (LH); frequency response ±3 dB from 30-20,000 Hz (metal) to 18,000 Hz (CrO<sub>2</sub>), and to 16,000 Hz 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 in 8 ohms (headphone); 4<sup>3</sup>/<sub>32</sub>"H × 17<sup>1</sup>/<sub>4</sub>"W × 14<sup>9</sup>/<sub>16</sub>"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<sub>2</sub>, 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; 5<sup>7</sup>/<sub>16</sub>"H × 18<sup>1</sup>/<sub>4</sub>"W × 11<sup>1</sup>/<sub>2</sub>"D.....\$500

**K5A.** Similar to K8 without auto rewind/replay and LED digital counter display; wow and flutter 0.06%

# 1

## CASSETTE TAPE MACHINES

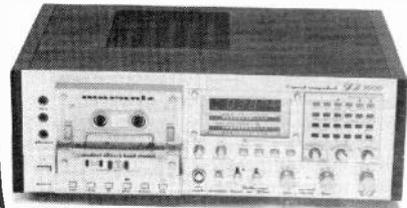
wrms; frequency response 30-20,000 Hz with metal; 5<sup>9</sup>/<sub>32</sub>"H × 17<sup>1</sup>/<sub>4</sub>"W × 10<sup>3</sup>/<sub>8</sub>"D.....\$400

**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) .....\$250

### MARANTZ

#### SD9000 Stereo Cassette Deck

Two-speed (1<sup>7</sup>/<sub>8</sub> and 3<sup>3</sup>/<sub>4</sub> ips), three-head Compu-deck stereo cassette deck with total programmability. Features Sendust-alloy tape heads; double-Dolby noise-reduction system; metal-tape capability; 24-karat gold plated input and output jacks; LED peak level display meters; soft-touch electronic transport controls; Electronic tape-mode controls; automatic bias and EQ control; fine bias control; digital-numeric timer/tape counter/time-of-day display; MPX filter; microprocessor programming and selection circuitry for direct keyboard entry of up to 19 music selections; tape/source monitor switch; separate mic and line controls for each channel; timer-set / counter / program / clock / clock-set switch; repeat/single/off program mode switch;



timer rec/off/play switch. Wow and flutter 0.03 wrms at 3<sup>3</sup>/<sub>4</sub> ips, 0.05% at 1<sup>7</sup>/<sub>8</sub> ips; frequency response at 3<sup>3</sup>/<sub>4</sub> ips ±3 dB 25-23,000 Hz metal, to 22 kHz FeCr, to 20 kHz CrO<sub>2</sub>, to 20 kHz normal; frequency response at 1<sup>7</sup>/<sub>8</sub> ips 25-23,000 Hz metal, to 18 kHz FeCr, to 17 kHz CrO<sub>2</sub>, to 20 kHz normal; frequency response at 1<sup>7</sup>/<sub>8</sub> ips 25-23,000 Hz metal, to 18 kHz FeCr, to 17 kHz CrO<sub>2</sub>, to 16 kHz normal; S/N ratio at 3<sup>3</sup>/<sub>4</sub> ips 62 dB Dolby off, 72 dB beyond 5 kHz Dolby on; S/N ratio at 1<sup>7</sup>/<sub>8</sub> ips 59 dB Dolby off, 72 dB beyond 5 kHz Dolby on; 16<sup>3</sup>/<sub>8</sub>"W × 11<sup>5</sup>/<sub>8</sub>"D × 5<sup>3</sup>/<sub>4</sub>"H; 22 lb 1 oz. ....\$830

#### SD5010 Stereo Cassette Deck

Slim-line front-loading cassette deck with motorized linear-skating cassette drawer mechanism. Features metal-tape capability; 24-karat gold plated input and output connectors; LED peak level meters; Dolby B noise-reduction system; soft-touch electronic control transport system; electronic tape mode controls; super-hard metal-alloy heads. Wow and flutter 0.05% wrms; frequency response ±3 dB 35-18,000 Hz metal, to 16 kHz FeCr, to 17 kHz CrO<sub>2</sub>, to 15 kHz normal tape; S/N ratio 54 dB Dolby off, 64 dB beyond 5 kHz Dolby on; 16<sup>3</sup>/<sub>8</sub>"W × 12<sup>1</sup>/<sub>2</sub>"D × 2<sup>7</sup>/<sub>8</sub>"H; 13 lb 4 oz. ....\$450

#### SD3030 Stereo Cassette Deck

Stereo cassette deck with both Dolby B and C noise-reduction systems and super-hard metal-alloy tape heads. Features metal-tape capability; LED peak level display meters; soft-touch electronic transport controls; 24-karat gold plated input and output connectors; electronic tape-mode controls. Wow and flutter 0.05% wrms; frequency response ±3 dB 35-18,000 Hz metal, to 16 kHz FeCr, to 17 kHz CrO<sub>2</sub>, to 15 kHz normal tape; S/N ratio 54 dB

Dolby off, 74 dB Dolby C on; 16<sup>3</sup>/<sub>8</sub>"W × 11<sup>7</sup>/<sub>8</sub>"D × 4<sup>5</sup>/<sub>8</sub>"H; 13 lb 4 oz. ....\$395

#### SD2030 Stereo Cassette Deck

Front-loading stereo cassette deck with Dolby B noise-reduction system, metal-tape capability, and super-hard metal-alloy heads. Features 24-karat gold plated input and output connectors; soft-touch electronic transport controls; electronic tape-mode controls; dual VU meters; fine bias control; total shut-off mechanism. Wow and flutter 0.07% wrms; frequency response ±3 dB 35-17,000 Hz metal, to 15 kHz FeCr, to 16 kHz CrO<sub>2</sub>, to 14 kHz normal tape; S/N ratio 54 dB Dolby off, 64 dB beyond 5 kHz Dolby on; 16<sup>3</sup>/<sub>8</sub>"W × 11<sup>7</sup>/<sub>8</sub>"D × 4<sup>5</sup>/<sub>8</sub>"H; 13 lb 4 oz. ....\$275

#### SD1015 Stereo Cassette Deck

Front-loading stereo cassette deck with Dolby B noise-reduction system and super-hard metal-alloy tape heads. Features metal-tape capability; 24-karat gold plated input and output connectors; dual VU meters; total mechanism shutoff. Wow and flutter 0.08% wrms; frequency response ±3 dB 35-17,000 Hz metal, to 15 kHz FeCr, to 16 kHz CrO<sub>2</sub>, to 14 kHz normal tape; S/N 53 dB Dolby off, 63 dB beyond 5 kHz Dolby on; 16<sup>3</sup>/<sub>8</sub>"W × 9<sup>9</sup>/<sub>16</sub>"D × 5<sup>3</sup>/<sub>4</sub>"H; 12 lb 2 oz. ....\$200

### MITSUBISHI

#### DT-40 Cassette Deck

Front-loading dual-speed (1<sup>7</sup>/<sub>8</sub> and 3<sup>3</sup>/<sub>4</sub> 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/Sandust erase heads. Features bias and equalization sector 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 (1<sup>7</sup>/<sub>8</sub> ips), 0.04% wrms (3<sup>3</sup>/<sub>4</sub> ips); frequency response 3 dB at 1<sup>7</sup>/<sub>8</sub> ips; 40-15,000 Hz (normal), to 17,000 Hz (special), to 18,000 Hz (FeCr), to 20,000 Hz (metal), 3 dB at 3<sup>3</sup>/<sub>4</sub> 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; 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; 5<sup>1</sup>/<sub>2</sub>"H × 10<sup>5</sup>/<sub>8</sub>"W × 9<sup>5</sup>/<sub>8</sub>"D .....\$560

#### DT-7 Cassette Deck

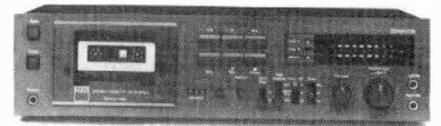
Front-loading metal-compatible stereo cassette

deck with Dolby noise-reduction system and dc servo capstan motor. Features tape selector switch for normal, FeCr, and separate metal/special tapes; separate left/right record level controls; rec mute; dual VU meters; soft-touch transport controls; timer standby with external audio timer; fast forward/rewind time 105 sec (C-60). Wow and flutter 0.07% wrms; frequency response 40-14,000 Hz (normal), to 16,000 Hz (FeCr, special, metal); S/N 66 dB with Dolby (weighted at 3% THD, 400 Hz, metal tape); input sensitivity/impedance 0.3 mV/1.8k ohms (mic), 90 mV/50k ohms (line); 6<sup>5</sup>/<sub>8</sub>"H × 16<sup>3</sup>/<sub>4</sub>"W × 14<sup>7</sup>/<sub>8</sub>"D .....\$260

### NAD (USA)

#### 6150C Cassette Deck

Front-loading, metal-compatible stereo cassette deck with Dolby C noise-reduction system, dc servo capstan motor, Sendust record/play and ferrite erase heads. Features dual LED peak level bar graph display; bias and EQ for normal, CrO<sub>2</sub>, metal tapes and user-adjustable fine bias control; record and playback level controls; solenoid transport



controls; 3-digit tape counter with memory rewind; timer start switch for automatic play and record when power is applied. Fast wind time 70 sec for C-60 cassette; wow and flutter 0.045% wrms; JIS frequency response ±3 dB 35-15,000 Hz with normal, to 17 kHz with CrO<sub>2</sub>, to 18 kHz with metal tapes; S/N 70 dB with Dolby C, metal tape (A weighted); input sensitivity/impedance 0.6 mV/10 kohms mic, 90 mV/50 kohms line, 0.16 mV/25 kohms DIN; 16<sup>1</sup>/<sub>2</sub>"W × 11"D × 4<sup>1</sup>/<sub>2</sub>"H .....\$469

#### 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<sub>2</sub>, and metal tapes; record and output level controls; three-digit tape counter with memory rewind; fast-winding time 100 sec (C-60). Wow and flutter 0.07% wrms; frequency response 20-18,000 Hz ±3 dB (CrO<sub>2</sub>, FeCr, and metal); S/N 64.5 dB with Dolby, metal tape (CCIR weighted); input sensitivity/impedance 0.2 mV/2k ohms (mic), 60 mV/50k ohms (line), 3 mV/15k ohms (DIN); 4.5"H x 16.5"W x 9"D .....\$2.79

### NAKAMICHI

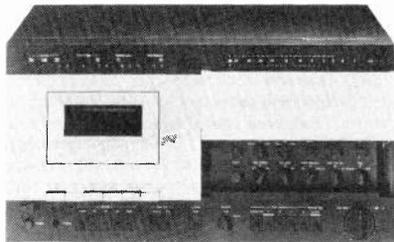
#### 1000ZXL Computing Cassette Deck

Front-loading computer-controlled discrete stereo cassette deck with Dolby noise-reduction system, double-capstan transport, and three heads. Micro-computer automatically calibrates azimuth, bias, level and equalization of any quality tape; features-four tape memories for recording conditions obtained by computer; 15 program RAMM with 30 command memories via high-speed bi-directional search; LED status indicators. Additional features include 70/120-μsec equalization selector; under/normal/over bias set selector; 400-Hz test tone oscillator; quartz-controlled bias oscillator; multiplex and subsonic filter switches; dual fluorescent recording level bar graph display with peak hold and-VU/peak switch; two-channel mic, line input, and output level vertical slide controls; tape/source-monitoring; LED four-digit tape counter readout with memory stop/play; pitch control; timer record/play with external audio timer; C-MOS logic function controls powered by motor-driven cam; direct-coupled recording and playback amplifiers and double NF equalizer circuitry; three microphone inputs for tri-mic recording and mic/line mix-

ing; provision for external noise-reduction system. Wow and flutter 0.04% wrms; frequency response 10-25,000 Hz  $\pm$  3 dB; THD 0.8% with metal tape; S/N 66 dB at 3.0% THD 400 Hz, with Dolby; EIA rack-mounting; 10 $\frac{1}{8}$ " H  $\times$  20 $\frac{3}{4}$ " W  $\times$  12 $\frac{1}{16}$ " D. ....\$3800

### 700ZX Cassette Deck

Front-loading auto-tuning stereo cassette deck with automatic calibration of azimuth, bias, and level for each cassette and a RAMM (automated playback) system that counts silent sections between programs. Features 3-head, dual-capstan, CMOS-logic-controlled transport; 4-digit LED digital tape counter; LED bargraph signal-level meters ( $-40$  to  $+10$  dB) with peak-hold function; 3 microphone inputs (left, right, center "blend") that can be mixed with line inputs; subsonic filter; 400-Hz, 0-dB test tone to calibrate noise-reduction system; direct-coupled record and playback amplifiers; timer re-



cord/playback function; high-output headphone jack; Dolby B noise-reduction system plus facilities for switching in and out an external NR system; alarm indicator; 70/120- $\mu$ s EQ selector; fine bias adjust control; pitch control; memory stop/play and MPS on/off switches; sealed secondary-control panel. Wow and flutter less than 0.08% wrms; frequency response 20-20,000 Hz  $\pm$  2 dB with Nakamichi EX, EXII, SX, ZX tapes; S/N ratio better than 66 dB at 3% THD, Dolby B on; THD less than 0.8% ZX tape, 1.0% SX, EXII tape; separation better than 37 dB at 1 kHz, 0 dB; crosstalk better than 60 dB at 1 kHz, 0 dB; power consumption 50 W; 19 $\frac{1}{16}$ " W  $\times$  10 $\frac{5}{16}$ " H  $\times$  9 $\frac{27}{32}$ " D; 30 lb 4 oz. ....\$3000

**700ZXL.** Similar to 700ZX except less sophisticated automatic-calibration system. ....\$2400

### RM-300 Remote-Control Unit

Wired remote-control unit for ZX-Series (above) cassette decks. Controls record, playback, fast forward, rewind, and stop and features cueing and muting, all RAMM operations, and four-digit LED tape counter with reset buttons. ....\$190

### 680ZX Cassette Deck

Front-loading two-speed (1 $\frac{7}{8}$  and 1 $\frac{5}{16}$  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  $\pm$  3 dB at 1 $\frac{7}{8}$  ips 10-22,000 Hz, at 1 $\frac{5}{16}$  ips 10-15,000 Hz; THD with metal tape 0.8% at 1 $\frac{7}{8}$  ips, 1.5% at 1 $\frac{5}{16}$  ips; S/N with Dolby at 400 Hz, 3.0% THD 66 dB at 1 $\frac{7}{8}$  ips, 60 dB at 1 $\frac{5}{16}$  ips; EIA 19-in rack mount; 5 $\frac{5}{8}$ " H  $\times$  19" W  $\times$  13 $\frac{3}{8}$ " D. ....\$1550

### 680 Cassette Deck

Front-loading two-speed (1 $\frac{7}{8}$  and 1 $\frac{5}{16}$  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 (1 $\frac{7}{8}$  ips), 0.08% wrms (1 $\frac{5}{16}$  ips); frequency response  $\pm$  3 dB, at 1 $\frac{7}{8}$  ips 10-22,000 Hz, at 1 $\frac{5}{16}$  ips 10-15,000 Hz; THD with metal tape 0.8% at 1 $\frac{7}{8}$  ips, 1.5% at 1 $\frac{5}{16}$  ips; S/N with Dolby at 400 Hz, 3% THD 66 dB at 1 $\frac{7}{8}$  ips, 60 dB at 1 $\frac{5}{16}$  ips; 4 $\frac{7}{8}$ " H  $\times$  19" W  $\times$  12 $\frac{3}{4}$ " D. ....\$1350

### RM-200 Remote-Control Unit

Wired remote-control unit duplicates control systems of 680 and 680ZX cassette decks, including record, two-speed cueing, and RAMM function. Comes with 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 systems, three motors, and Sen-alloy heads; vertical or horizontal operation. Features tape selector switch for normal, ferric oxide, CrO<sub>2</sub>, 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  $\pm$  1/-3 dB 35-14,000 Hz (normal), to 15,000 Hz (FeCr, CrO<sub>2</sub>, and metal); S/N with Dolby HX and B on 66 dB (normal and special); input sensitivity/impedance 300  $\mu$ V/2k ohms (mic), 80 mV/200k ohms (high-level line), 3 mV/10k ohms (low-level line); silver or black suede finishes; 8.9" H  $\times$  17.5" W  $\times$  6.1" D. ....\$1195

## NIKKO

### ND-990 Stereo Cassette Deck

Metal-compatible stereo cassette deck with 15-step LED recording-level indicators. Features self-illuminating, soft-touch transport controls; separate input level controls for each channel; output level control; 4-position tape bias/EQ selector and fine-bias adjust control; switchable FM MPX filter; Dolby noise-reduction system; automatic memory-stop and memory-play; remote-control jack for optional controller. Wow and flutter 0.045% wrms; frequency response  $\pm$  3 dB 30-21,000 Hz metal, to 19 kHz FeCr and CrO<sub>2</sub>, to 15 kHz normal; S/N ratio 72 dB above 5 kHz, Dolby on; Sendust hyperbolic record/play head and 4-gap ferrite erase head; 16 $\frac{1}{2}$ " W  $\times$  10 $\frac{7}{8}$ "  $\times$  4 $\frac{3}{4}$ " H; 13 lb 5 oz. ....\$440

## 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 times; 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 82 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); 6 $\frac{5}{16}$ " H  $\times$  17 $\frac{1}{4}$ " W  $\times$  14 $\frac{3}{8}$ " D. ....\$800

### TA-2060 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby HX and noise-reduction system, two direct-drive motors, and sendust alloy record/play and double-gap ferrite erase heads. Features normal, high, and metal tape selectors with LED indicators and Accubias adjust for any tape type; Dolby NR/HX selector with LED HX indicator; peak-hold meters; fade out control; tape/source monitoring; input and output level controls; rec mute; full logic tape function controls; three-digit tape counter with memory play/stop; timer record/play with external audio timer. Wow and flutter 0.04% wrms; frequency response 20-19,000 Hz 3 dB with metal tape; S/N 60 dB without Dolby. ....\$450

### 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; 4 $\frac{3}{4}$ " H  $\times$  16 $\frac{7}{16}$ " W  $\times$  13" D. ....\$370

**RC-5.** Remote control unit for TA-2040. ....\$50

### TA-630DM Cassette Deck

Front-loading stereo cassette deck with dual-Dolby circuitry, PLL dc servomotor in two-belt drive transport, hyperbolic S&S Sendust head, and metal-tape capability. Features "Accu-Bias" with built-in 400- and 10,000-Hz oscillators with Accu bias adjust; three-position bias and equalization for CrO<sub>2</sub>, 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<sub>2</sub>); to 19 kHz (metal); 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; 8 $\frac{1}{4}$ " H  $\times$  18 $\frac{1}{2}$ " W  $\times$  12" D. ....\$350

### TA-2050 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex 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 "Accu-Bias" 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-

# 1

## CASSETTE TAPE MACHINES

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  $\pm 3$  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  $\times$  16.5" W  $\times$  10.63" D .....\$300

### 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  $\pm 3$  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  $\times$  16.5" W  $\times$  10.625" D .....\$225

### TA-1900 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and hard permalloy record/play and ferrite erase heads. Features bias and equalization selectors for normal, high, and metal tapes; separate left/right input level controls; two VU meters. Wow and flutter 0.07% wrms; frequency response 30-14,000 Hz  $\pm 3$  dB with metal tape; S/N 56 dB without Dolby .....\$190

## 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<sub>2</sub>, and metal tapes with sen-

sitivity and bias recording fine adjust and sensitivity/bias 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-6405 Stereo Cassette Deck

Direct-drive, two-motor stereo cassette deck with Dolby noise-reduction system, microprocessor full-logic solenoid transport controls, and opto peak level displays with peak-hold. Features FeCr/CrO<sub>2</sub>/normal/metal bias and EQ selector; APSS (Automatic Program Search System); automatic spacing pause control; soft eject cassette holder with detachable cover; timer recording standby



system; output level control; LED indicators for record, playback, pause/auto-spacing, Dolby on; MPX filter; Sendust record/play head, double-gap ferrite head. Wow and flutter 0.038% wrms; frequency response  $\pm 3$  dB 30-15,000 Hz normal, to 17 kHz CrO<sub>2</sub>, to 18 kHz FeCr and metal tapes; S/N 67 dB with CrO<sub>2</sub> tape, Dolby on; 17" W  $\times$  12 5/8" D  $\times$  3 3/4" H; 13.2 lb .....\$380

**RT-6207.** Similar to RT-6405 except not direct drive; wow and flutter 0.055% wrms; frequency response to 14 kHz normal, 16 kHz CrO<sub>2</sub>, 17 kHz FeCr and metal; hard Permalloy head .....\$330

### RT-6605 Two Transport Deck

Front-loading stereo cassette deck with two transports, each with its own FG servo dc motor, for dubbing from one to another tape. Features dual Dolby noise-reduction system; opto peak level display with peak hold; direct dubbing; MPX filter; FeCr/CrO<sub>2</sub>/normal/metal bias and EQ selector with separate bias-adjust control; APSS (Automatic Program Search System); individualized editing; soft-touch controls for Tape 1 and 2; LED function indicators; one-touch start; narrow-gap Sendust head for record/playback in both transports, double-gap ferrite head in Tape 2 for erase (Tape 1 is playback only, Tape 2 record/playback). Wow and flutter 0.045% wrms; frequency response 30-16,000 Hz normal, to 18 kHz CrO<sub>2</sub>, to 19 kHz FeCr, to 20 kHz metal tapes; S/N 70 dB with Dolby on; 16 1/8" W  $\times$  12 1/8" D  $\times$  4 1/2" H; 16.5 lb .....\$550

## 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  $\times$  2 7/8" W  $\times$  5 6/8" D .....\$260

## PEARLCORDER by OLYMPUS

### S802 Microcassette Recorder/Player

Two-hour two-speed pocket microcassette recorder with capstan drive. Features built-in electret condenser microphone; side-mounted rewind, stop, and play switches; top-mounted volume, fast forward/cue slider, and record button controls; tape eject; auto off; LED battery check/recording indicator; digital tape counter. Tape speeds 1.2 cm/sec for 120 min, 2.4 cm/sec for 60 min; frequency response 300-5000 Hz; max. output 150 mW at 2.4 cm/sec; silver finish; 9 oz; 4.8" H  $\times$  2.6" W  $\times$  1" D .....\$150

**S801.** Similar to S802 except has built-in LCD digital tape counter and count-down memory functions; two-speed rewind; smaller size (4.3" H  $\times$  2.5" W  $\times$  0.9" D). Count-down memory can be preset to locate any tape section in seconds....\$190

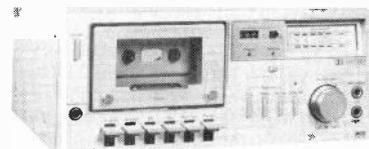
## JC PENNEY

### 3575 Cassette Deck

Stereo cassette deck with front-loading cassette well, Dolby noise-reduction system, metal-tape capability. Features hard permalloy record/play head with Sendust guard; MPX filter; peak signal level LED indicators ( $-30$  to  $+6$  dB). Wow and flutter 0.04% wrms; frequency response 40-18,000 Hz  $\pm 3$  dB; THD 1.2% at 200 nWb; fast-forward/rewind time 90 sec (C-60) .....\$300

### 3530 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system and metal-tape capability. Features hard permalloy record/play tape head with Sendust guard; memory auto stop; soft eject



mechanism; direct function change; input selector switch; peak signal level LED indicators ( $-15$  to  $+5$  dB). Wow and flutter 0.05% wrms; frequency response 40-14,000 Hz  $\pm 3$  dB S/N ratio Dolby in/out 64/58 dB; THD 1.2% at 200 nWb; fast-forward/rewind time 100 sec (C-60) .....\$250

### 3554 Cassette Deck

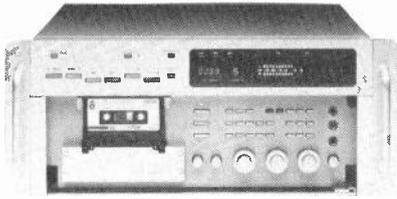
Front-loading cassette deck with Dolby noise-reduction system. Features hard permalloy record/play tape head with Sendust guard; soft-touch transport controls; soft cassette eject; direct function change; input selector switch; large VU meters; metal-tape capability. Wow and flutter 0.05% wrms; frequency response 40-14,000 Hz  $\pm 3$  dB; S/N ratio Dolby in/out 63/57 dB; THD 1.2% at 200 nWb; fast-forward/rewind time 95 sec (C-60) .....\$190

## 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 Micro-Scan 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<sub>2</sub>, 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  $\pm 3$  dB 25-16,000 Hz (standard), to 18,000 Hz (FeCr and CrO<sub>2</sub>) to 19,000 Hz (metal); S/N 70 dB with Dolby; THD 1.0%; input sensitivity/

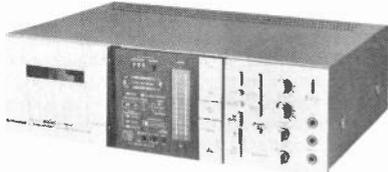


impedance 0.3 mV/10k ohms (mic), 60 mV/100k ohms (line); fast winding time 75 sec (C-60). All controls, except tape transport and LED readout and VU meter displays, behind front panel; 12 1/2" H x 20 3/4" W x 29 1/4" D .....\$999

## PIONEER

### CR-9R Stereo Cassette Deck

Computer-controlled stereo cassette deck with 3-motor, direct-drive transport and Dolby B/C/auto noise reduction. Features digital-electronic real-time tape counter (indicates in minutes and seconds, even in fast forward and rewind); automatic bias, level, ED adjustment; Blank Search/Index



Scan system that runs transport in fast forward until unrecorded portion of tape is located and leaves 5-second blank space after each recording; Music Search/Repeat; Blank Skit that operates transport in fast forward between program selections to eliminate blanks during playback. Wow and flutter 0.03% wrms; frequency response 20-22,000 Hz with metal tape recorded at -20-dB level; S/N ratio 80 dB with Dolby C on, at 5 kHz; 16 1/8" W x 12 5/8" D x 5 1/8" H; 14 lb 5 oz. ....\$675

**CT-8R.** Similar to CT-9R except standard mechanical index counter; wow and flutter 0.035% .....\$575

**CT-7R.** Similar to CT-8R except auto-reverse operates in record and playback; no auto Dolby; wow and flutter 0.04%; frequency response to 20 kHz; S/N 79 dB; 3 7/8" H; 12 lb 2 oz. ....\$450

**CT-6R.** Similar to CT-7R except auto-reverse in playback only. ....\$350

### CT-5 Stereo Cassette Deck

Stereo cassette deck with Dolby B/C noise reduction and IC full-logic transport control system, and dc-servo motor. Wow and flutter 0.05% wrms; frequency response 20-18,000 Hz with metal tape at -20 dB; S/N ratio 78 dB at 5 kHz with Dolby C on; 16 9/16" W x 9 9/16" D x 3 1/8" H; 9 lb 11 oz. ....\$280

**CT-4.** Similar to CT-5 except no full-logic control system; frequency response to 17 kHz; 9 5/8" D x 4 3/4" H. ....\$200

### JT-216 Wired Remote Controller

Wired remote controller for CT-9R, CT-8R, CT-7R, and CT-6R computer-controlled cassette decks. ....\$50

## REALISTIC

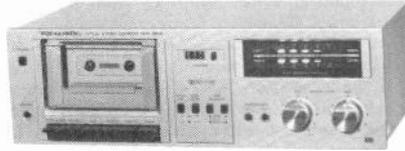
### SCT-22 Cassette Deck

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<sub>2</sub>, 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  $\pm 3$  dB 30-13,000 Hz (ferric), to 14,000 Hz (CrO<sub>2</sub>), to 15,000 Hz (metal); S/N 65 dB with metal tape, Dolby on (3.0% THD, CCIR weighted) .....\$220

### SCT-24 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with switchable multiplex filter. Features dual LED peak

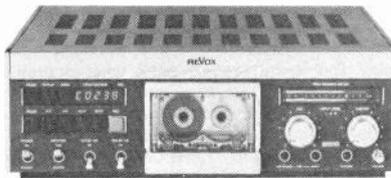


metering; auto stop; tape selector buttons for ferric, CrO<sub>2</sub>, and metal tapes; digital tape counter. Wow and flutter 0.15% wrms; frequency response  $\pm 3$  dB 30-12,000 Hz (ferric and CrO<sub>2</sub>), to 14,000 Hz (metal); S/N 64 dB with metal tape, Dolby on (3.0% THD, CCIR weighted) .....\$150

## REVOX

### B7 10 Cassette Deck

Three-head, four-motor, front-loading deck has microprocessor-activated controls and counter display. Features dual direct-drive, crystal-controlled capstan and separate servo-controlled reel motors; constant-speed fast-forward/rewind with electrical braking; pneumatically damped solenoid-controlled head assembly; four-digit electronic counter with run-up button and real-time clock with internal timer switching for both B7 10 and external



equipment; automatic bias/equalization sensing for metal, CrO<sub>2</sub>, ferrichrome, and ferric tape formulations, with manual override; mic/line mixing; separate playback level control; peak-reading LED record/playback level displays with 1-dB resolution from -10 to +6 dB and 2-dB intervals from -30 to -10 dB; full plug-in modular construction with optional rack-mounting adaptors. Wow and flutter 0.08% DIN, 0.035% wrms; frequency response +2-3 dB 22-22,000 Hz metal, 22-16,000 Hz ferric; S/N 68 dB at 3% THD, 1 kHz, A weighted, Dolby on (60 dB at 0 dB VU, 1 kHz, Dolby on; 17.8" W x 13.85" D x 6" H .....\$1899

## ROTEL

### RD-1001 Cassette Deck

Front-loading, metal-compatible stereo cassette deck with Dolby noise reduction, Sendust record/play and ferrite/Permalloy erase heads. Features solenoid transport controls; bar-graph peak level displays; separate tape-formulation selector buttons; bias-adjust control; output level control; three-digit tape counter; memory function. Frequency response 30-14,000 to 30-17,000 Hz  $\pm 3$  dB, depending on tape type used; S/N 65 dB, Dolby in; wow and flutter 0.05% wrms; 16 1/8" W x 11 7/16" D x 4 17/32" H; 11.4 lb .....\$360

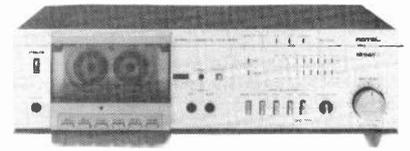
**RD-1010.** Same as RD-1001 except has automatic rewind and repeat, memory functions; monitor, MPX filter, rec mute pushbuttons; timer standby switch; 17 to 19 kHz high-end response, depending

on tape used; wow and flutter 0.045% wrms; 16 1/8" W x 11 9/16" D x 4 17/32" H; 13.6 lb ....\$500

## 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  $\pm 3$  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); 22 3/32" H x 16 1/8" W x 10 9/16" D .....\$320

**RD-550.** Same as RD-500 except has discrete-indicator displays instead of VU meters; record



and pause indicators; memory function; Sendust record/playback head; frequency response 30-15,000 Hz  $\pm 3$  dB on normal; 16 1/8" W x 11 9/16" D x 4 17/32" H; 11.4 lb .....\$350

## 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  $\pm 2.5$  dB. ....\$599

### 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<sub>2</sub> 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  $\pm 3$  dB; S/N 64 dB with Dolby; 5.3" H x 17.4" W x 14" D ...\$400

## SANSUI

### D-550M Cassette Deck

"Direct-O-Matic" front-loading three-head cassette deck with Tension Servo Mechanism for constant tape tension and Dyna-Scrape Filter to mini-



mize modulation noise. Features full IC-logic transport controls; double-Dolby noise reduction; FG servo direct-drive capstan and electronically-controlled dc reel motors; 16-segment peak-reading

# 1

## CASSETTE TAPE MACHINES

LED record/playback indicators; metal/CrO<sub>2</sub>/ferric selector with ±20% bias-adjust control; memory rewind with automatic play/replay modes; external timer activation; switchable MPX filter; "Tape Lead-In" to bypass leader; separate playback level control; provisions for optional remote controller. Wow and flutter 0.035% wrms; frequency response ±3 dB 25-21,000 Hz with metal, 25-17,000 Hz with CrO<sub>2</sub>, 25-16,000 Hz with ferric tapes; S/N 70 dB with metal tape, Dolby on; black (rack mount) or silver finish; 16<sup>15</sup>/<sub>16</sub>" W × 11<sup>1</sup>/<sub>8</sub>" D × 5<sup>1</sup>/<sub>16</sub>" H.....\$520

**D-350M.** Similar to D-550 M, except has only two heads, no output level control. Frequency response goes to 18 kHz (metal), 16 kHz (CrO<sub>2</sub>), 15 kHz (ferric); S/N 69 dB .....\$420

### D-300M Cassette Deck

Front-loading cassette deck with Automatic Music Program Search for easy selection of recorded segments. Features electronically-controlled dc motor and full IC-logic transport controls; 24-segment peak-reading LED record/playback indicators; separate bias/EQ switches for metal, CrO<sub>2</sub>, and ferric tapes; external timer or optional remote-control operation; Hi-B permalloy record/playback head and double-gap ferrite erase head; black or silver finish. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-17,000 Hz with metal, to 16,000 Hz with CrO<sub>2</sub>, and to 14,000 Hz with ferric tapes; S/N 68 dB with metal tape, Dolby on; 16<sup>15</sup>/<sub>16</sub>" W × 9<sup>3</sup>/<sub>8</sub>" D × 5<sup>1</sup>/<sub>4</sub>" H.....\$320

### D-95M Cassette Deck

Metal-compatible, front-loading cassette deck with 18-segment peak-reading LED record/playback indicators. Features direct-change transport mode controls with single-button record activation; separate bias/EQ switches for metal/CrO<sub>2</sub>/ferric tapes; separate channel record-level controls; Hi-B permalloy record/playback and double-gap ferrite erase heads; black or silver finish. Wow and flutter 0.07% wrms; frequency response ±3 dB 30-15,000 Hz with metal and CrO<sub>2</sub>, 30-14,000 Hz with ferric tapes; S/N 68 dB with metal tape, Dolby on; 16<sup>15</sup>/<sub>16</sub>" W × 9<sup>3</sup>/<sub>8</sub>" D × 5<sup>1</sup>/<sub>4</sub>" H.....\$200

## SANYO

### RD10 Stereo Cassette Deck

Front-loading cassette deck with metal-tape capability and Dolby noise-reduction system. Features dc governor motor; LED signal-level meters; auto-stop at end of play; damped cassette door; illuminated record-mode indicator; digital tape counter; 2 patch cords. Frequency response with metal tape 30-14,000 Hz ±3 dB .....\$100

**RD8.** Similar to RD10 except no Dolby noise reduction; CrO<sub>2</sub> and normal tape capability. Frequency response 30-12,500 Hz normal, to 14 kHz ±3 dB metal tape .....\$85

### Plus Series

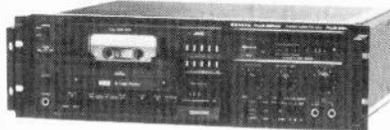
### D65 Cassette Deck

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<sub>2</sub>, 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 ar-

rows; 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<sub>2</sub> and FeCr), to 13,000 Hz (normal); S/N with Dolby 70 dB (metal), 69 dB (FeCr), 67 dB (CrO<sub>2</sub>), and 66 dB (normal); THD 0.8% (metal), 1.5% (CrO<sub>2</sub>); input sensitivity/impedance 0.3 mV/400-10,000 ohms (mic), 50 mV/50 ohms (line); line output level/load 0.53 V/7k ohms; channel separation 42 dB; crosstalk -70 dB; 5<sup>1</sup>/<sub>4</sub>" H × 16<sup>1</sup>/<sub>2</sub>" W × 10<sup>5</sup>/<sub>8</sub>" D .....\$330

### D64 Stereo Cassette Deck

Front-loading stereo cassette deck with metal-tape capability, built-in Dolby noise-reduction system, and Programmable Automatic Music Select System (AMSS). Features Sendust-alloy record/play head; auxiliary noise-reduction switching and connectors; mic/line mixing; output level controls; fluorescent peak-hold meters; defeatable FM MPX filter; rec mute control; full-logic transport control;



dc servo capstan drive; mechanical tape tension servo; auto-stop system; timer standby; removable damped cassette door; optional rack mounting. Wow and flutter 0.04% wrms; frequency response ±3 dB 20-20,000 Hz metal, to 17 kHz FeCr and CrO<sub>2</sub>, to 14 kHz normal tape; S/N ratio (Dolby on/off) 70/62 dB metal, 67/59 dB CrO<sub>2</sub>, 69/61 dB FeCr, 66/58 dB normal tape; THD CrO<sub>2</sub>/metal tape 1.5%/0.8%; separation 42 dB; crosstalk -70 dB; 17<sup>5</sup>/<sub>8</sub>" W × 11<sup>3</sup>/<sub>8</sub>" D × 5<sup>1</sup>/<sub>4</sub>" H .....\$300

### D56 Stereo Cassette Deck

Front-loading stereo cassette deck with metal-tape capability, Automatic Music Select System (AMSS), IC-logic transport controls, and built-in Dolby noise-reduction system. Features 2-color, 12-segment peak level meters; permalloy record/play and ferrite erase heads; timer operation in both record and playback modes; normal/CrO<sub>2</sub>/metal tape selector switches. Wow and flutter 0.05% wrms; frequency response ±3 dB 30-19,000 Hz metal, to 17 kHz CrO<sub>2</sub>, to 14 kHz normal tape; S/N ratio (Dolby on/off) 67/59 dB metal, 65/57 dB CrO<sub>2</sub>, 63/55 dB normal tape; THD metal/CrO<sub>2</sub> tape 0.8/1.5%; separation 40 dB; crosstalk -70 dB; 17<sup>3</sup>/<sub>8</sub>" W × 10<sup>5</sup>/<sub>8</sub>" D × 4" H

\$280

## H.H. SCOTT

### 675DM Cassette Deck

Slimline front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG dc servomotor, and super B permalloy record/playback and dual-gap ferrite erase heads. Features bias and equalization for normal, CrO<sub>2</sub>, and metal tapes; dual fluorescent peak level indicator display; full logic feather-touch tape function controls; rec mute; separate left/right record level controls with mic/line input selector; three-digit tape counter with memory rewind; optional full-function remote control unit available; fast forward/re-

wind time 80 sec (C-60). Wow and flutter 0.045% wrms; frequency response ±3 dB 25-16,000 Hz (normal), to 17,000 Hz (CrO<sub>2</sub>), to 18,000 Hz (metal); S/N 66 dB with Dolby, metal tape; input sensitivity 3 mV (mic), 100 mV (line); optional 19-in rack mount; 4" H × 17" W × 10" D.....\$350

**665DM.** Similar to 675DM minus memory rewind and dual fluorescent peak level display; has dual VU meters; wow and flutter 0.05% wrms .....\$300

## SHARP

### RT-1199 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and permalloy-plus record/play and double-gap ferrite erase heads. 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<sub>2</sub>, 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<sub>2</sub> and FeCr), to 18,000 Hz (metal); S/N 67 dB with Dolby 5<sup>1</sup>/<sub>16</sub>" H × 16<sup>1</sup>/<sub>16</sub>" W × 10<sup>3</sup>/<sub>8</sub>" D. ....\$280

### RT-1178 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system. Features three-position bias and equalization for normal, CrO<sub>2</sub>, and FeCr tapes plus metal tape selector; 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<sub>2</sub> and FeCr), to 18,000 Hz (metal); S/N 67 dB with Dolby .....\$220

### RT-32 Stereo Cassette Deck

Stereo cassette deck with Dolby noise-reduction system, soft-touch controls, 9-position Auto Program Locate Device (APLD) and indicators. Fea-



tures normal/CrO<sub>2</sub>/metal tape capability; Sharpscan 16-LED, two-color peak level display; dual-concentric record-level controls; full automatic stop; damped eject; mic/line input selector; hard Permalloy record and triple-gap erase heads; digital tape counter; 16<sup>15</sup>/<sub>16</sub>" W × 8<sup>5</sup>/<sub>8</sub>" D × 4<sup>1</sup>/<sub>2</sub>" H. ....\$210

**RT-31.** Similar to RT-32 but with Auto Program Search System instead of APLD .....\$190

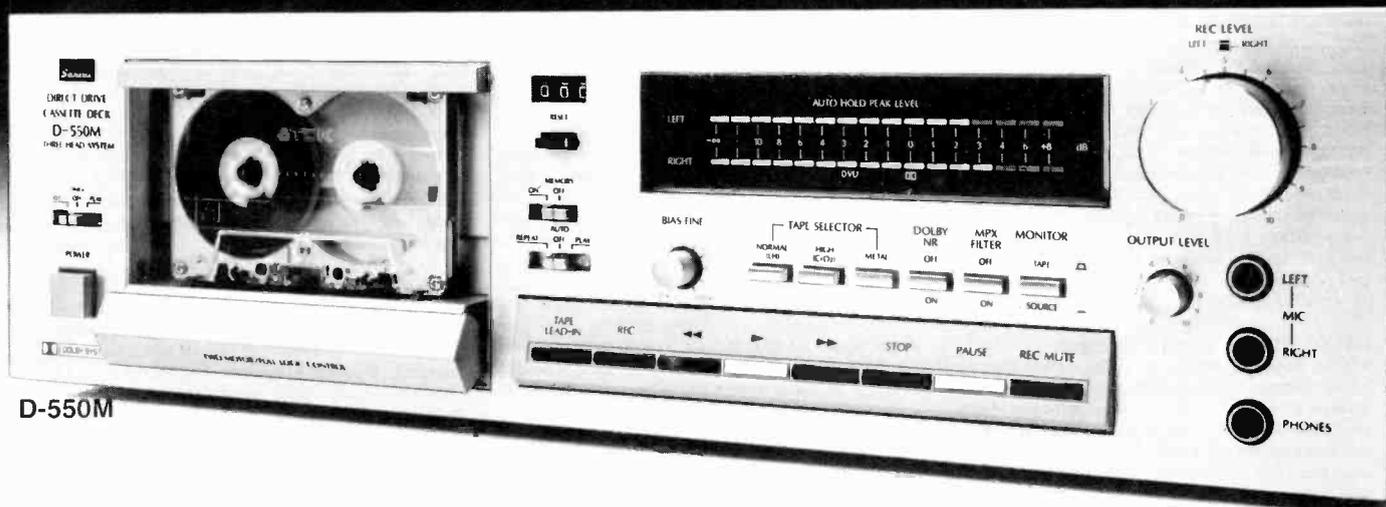
### RT-30 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and hard permalloy record/play and ferrite erase heads. Features auto program search system in fast forward or rewind; Sharpscan peak-level display; bias and equaliza-

## 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.

# MORE MUSIC. LESS NOISE. MORE MACHINE. SANSUI.



D-550M

When you record your favorite music on a cassette, you want only the music — not the added noise, distortion, or loss of musical nuances that rob you of the musical quality you deserve. Sansui's full line of fine cassette decks is designed and engineered to give you just that, pure music. Thanks to a host of new design innovations.

Take the question of tape noise. We've reduced it to inaudible levels. All Sansui decks use Dolby® for a ten-to-one reduction of the annoying hiss you hear on so many tapes.

But we've also reduced other forms of noise — in particular, modulation noise which makes the music sound gritty whether the sound is loud or soft. Sansui's exclusive Dyna-Scrape Filter (patent pending) on the new D-550M cassette deck reduces this kind of noise by as much as ten-to-one, too.

Take the question of wow and flutter which on a cassette deck creates distortion of the music. Sansui's special 2-motor drive reduces wow and flutter on the D-550M and the D-350M to a miniscule 0.035% (WRMS), once again, inaudible.

Both decks have easy-to-use controls that optimize recording characteristics for any tape you choose to use, insuring flattest musical response, widest dynamic range and lowest distortion, so that you hear all of the music that's in the grooves or coming off the air. And, of course, all of Sansui's cassette decks can handle the new metal tape for your most critical recording needs.

More music, less noise. More machine. Better value. That's what Sansui cassette decks are all about. Come see and hear the full line now at your local Sansui dealer.

## SANSUI CASSETTE DECKS

### D-550M

Uncompromised performance, our best deck.

### D-350M

Top specifications for recording accuracy.

### D-300M

Quality sound, convenient to use, mid-priced.

### D-150M

Ease of operation, reasonably priced.

### D-95M

Sansui quality to fit any budget.

All Sansui cassette decks are metal tape compatible and available in either black (rack-mountable) or silver.

D-95M



D-300M

**Sansui**

**SANSUI ELECTRONICS CORP.**

Lyndhurst, New Jersey 07071

Gardena, Ca. 90248

Sansui Electric Co., Ltd., Tokyo, Japan

\*Dolby is a trademark of Dolby Laboratories.

CIRCLE NO. 16 ON READER SERVICE CARD

# 1

## CASSETTE TAPE MACHINES

tion for normal, CrO<sub>2</sub>, 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<sub>2</sub> and FeCr), to 17,000 Hz (metal) S/N 66 dB with Dolby; 5 1/2" H X 16 1/2" W X 9 1/8" D.....\$190

### RT-20 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and hard permalloy record/play and three-gap ferrite erase heads. 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<sub>2</sub>, and metal tapes; pushbutton tape time remaining counter for C-90, C-60, and C-48 tapes with 3-min warning; timer alarm; 50/60-Hz ac frequency selector; mic/line input selector; auto stop. Wow and flutter 0.09% wrms; frequency response 30-14,000 Hz (normal), to 17,000 Hz (metal); S/N 64 dB with Dolby; 5" H X 15 3/8" D X 8 7/8" D.....\$190

### RT-12 Stereo Cassette Deck

Stereo cassette deck with Dolby noise-reduction system, metal-tape capability, and Auto Program Search System (APSS). Features soft-touch transport controls; Sharpscan 10-LED peak level indicator; independent left/right record level controls; full auto stop; line/mic selector; hard Permalloy record and triple-gap ferrite erase heads; damped eject; tape counter; 15 3/8" W X 8" D X 4 1/2" H.....\$160

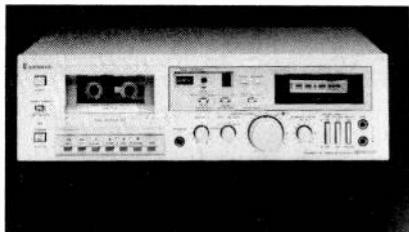
### RT-10 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and hard permalloy record/play and ferrite erase heads. Features LED peak level display; tape selector for normal, CrO<sub>2</sub>, and metal 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; 5" H X 15 3/8" W X 8 7/8" D.....\$130

## SHERWOOD

### S-5000CP Cassette Deck

Microprocessor-controlled front-loading stereo cassette deck with Dolby noise-reduction system, super-hard alloy Sendust heads, and record/play timer function. Features soft-touch controls; air-damped cassette door with backlighting; very



smooth electronically governed dc motor; LED indicators for play, record, and pause; dual-function, two-color fluorescent display with peak-hold/average signal level indication; metal/chrome/ferrichrome/normal tape EQ selector with separate

bias fine adjust control; MPX filter; separate line output and headphones-level controls. Wow and flutter 0.05% wrms; frequency response +1/-3 dB at -20-dB record level 25-16,500 Hz normal, to 17.5 kHz chrome, to 19 kHz metal tapes, 30-13,000 Hz ± 3 dB at 0-dB rec level with metal tape; S/N ratio with chrome tape Dolby on/off 63/56 dB; THD 1% at 1 kHz with metal tape.....\$350

### S-300CP Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, metal/chrome/normal capability, and alloy Sendust head. Features electronically governed dc motor; 12-segment, 2-color LED peak-level signal display; memory rewind; air-damped cassette door with backlighting; automatic audio muting during rewind and fast forward; pause control; automatic shut off at end of play; memory rewind. Wow and flutter 0.06% wrms; frequency response +1/-3 dB at -20-dB rec level 25-16,500 Hz normal, to 17 kHz chrome, to 19 kHz metal tapes, 30-13,000 Hz ± 3 dB at 0-dB rec level; S/N ratio with chrome tape Dolby on/off 63/54 dB; THD 1% at 1 kHz with metal tape.....\$250

### S-100CP Cassette Deck

Front-loading, metal-compatible stereo cassette deck with Dolby noise-reduction system, super-hard Dynalloy record/play head, and memory rewind. Features fully automatic tape transport; auto shut off; metal/chrome/normal tape selector; record and Dolby LEDs; cassette backlighting; pause control. Wow and flutter 0.06% wrms; frequency response +1/-3 dB at -20-dB rec level 25-15,000 Hz normal, to 15.5 kHz chrome, to 17 kHz metal tapes, 30-10,000 Hz ± 3 dB at 0-dB rec level with metal tape; S/N ratio Dolby on/off 63/54 dB; THD 1% at 1 kHz with metal tape.....\$200

## SONY

### TC-K77 Stereo Cassette Deck

Reference Standard three-head deck with Sendust and ferrite Independent Suspension record and play heads and ferrite erase head. Metal-tape capable; quartz-locked direct-drive closed-loop dual-capstan transport; feather-touch solenoid transport controls; fine tuning controls for bias and level trim with built-in test-tone generators; electronic metering system for professional-grade display of recording levels; automatic/manual peak reset; digital linear "real-time" tape counter for accurate count even in fast-forward and reverse modes. Wow and flutter 0.025% wrms; frequency response ± 3 dB 20-20,000 Hz types III and IV, to 18 kHz types I and II; S/N 60 dB A weighted with Dolby off; 17" W X 15 3/8" D X 4 1/4" H.....\$950

RM-50. Wired remote control.....\$55

RM-80. Wireless infrared remote control.....\$120

RM-65. Recording synchronizer for use with selected Sony turntables.....\$25

MX-1000. Low-noise microphone amplifier/mixer for mixing four channels down to two.....\$300

### 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<sub>2</sub>, 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; autospace 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<sub>2</sub>), to 15,000 Hz (normal); S/N 59 dB with FeCr tape, Dolby off (IHF A weighted); 6 1/8" H X 17" W X 12 3/4" D.....\$600

### TC-K81 Stereo Cassette Deck

Three-head, front-loading, metal-compatible stereo cassette deck with Dolby noise-reduction system, BSL servo capstan, and dc reel motors. Features separate independent-suspension Sendust/ferrite record and play heads; four-gap ferrite-and-ferrite erase head; separate bias and EQ slide controls for normal, FeCr, CrO<sub>2</sub>, and metal tapes with bias and separate left/right record calibration (8kHz/400 Hz) controls for all tape types; dual 16-segment peak-reading bargraph display with manual/auto peak-hold reset buttons and bias/rec-level calibration switch; auto play after fast forward/rewind or memory rewind; IC logic transport controls; auto space rec mute; line/out phones level control; timer record/play with external timer. Wow and flutter 0.04% wrms; frequency response ± 3 dB 20-18,000 Hz FeCr and metal, to 17 kHz CrO<sub>2</sub>, to 15 kHz normal; S/N 60 dB A weighted with FeCr tape, Dolby off; fast-forward/rewind time 80 sec with C-60 cassette; 17" W X 11 3/8" D X 5 1/8" H.....\$580

TC-K71 Same as TC-K81 but without built-in test oscillators; features bias fine adjust for type I tape.....\$450

### TC-FX7 Slimline Cassette Deck

Ultralim design nearly the height of a standard cassette tape with new direct-drive quartz-locked magnedisc servo system. Features BSL two-motor transport; Sendust-and-ferrite record play head; metal-type compatibility; linear "real-time" counter that indicates actual tape time even in fast forward and rewind; peak program meters with hold capability; rewind-auto-play; memory rewind; timer operation. Wow and flutter 0.05% wrms; frequency response ± 3 dB 30-14,000 Hz type I; S/N 59 dB with type III and IV tape, Dolby off; 17" W X 13 3/8" D X 3 1/8" H.....\$550

### TC-FX6C Stereo Cassette Deck

Cassette deck with Sendust-and-ferrite record/play head, new Dolby C and B noise-reduction system, BSL transport with two motors. Features metal-tape capability, feather-touch solenoid-logic



transport controls; auto space rec mute; timer standby operation; linear "real-time" tape counter; playback with memory function; AMS; repeat play; auto play; switchable FM MPX filter; headphone level control; peak program meters with hold capability; full-function RM-50 and RM-80 remote-control option and turntable sync RM-65 option; 17" W X 10 7/8" D X 4 1/4" H.....\$420

TC-FX6. Similar to TC-FX6C except only Dolby B noise-reduction system.....\$380

### TC-FX5C Stereo Cassette Deck

Stereo cassette deck with Sendust-and-ferrite record/play head, new Dolby B and C noise-reduction system. Features two-motor dc-servo transport; metal-tape compatibility; feather-touch solenoid-logic transport controls; auto play; switchable FM MPX filter; RM-50 and RM-80 remote-control and RM-65 turntable sync options; 17" W X 10 7/8" D X 4 1/4" H.....\$350

### TC-FX4 Stereo Cassette Deck

Two-motor dc-servo transport recorder with Sen-

Timer operated Record?

dust record/play head, Dolby B noise-reduction system, and metal-tape capability. Features feather-touch solenoid-logic transport controls; auto-space rec mute; timer standby operation; peak program meters with hold capability; 17"W x 9 7/8"D x 4 1/4"H .....\$250

**TC-FX2 Stereo Cassette Deck**

Stereo deck with SD record/play head, two-motor dc-servo transport, Dolby B noise-reduction system, and metal-tape capability. Features four-position tape selector; soft-touch transport controls; timer standby operation; twin VU meters with LED peak indicator; 17"W x 9 7/8"D x 4 1/4"H .....\$190

**TC-D5M Portable Cassette Deck**

lightweight, metal-compatible stereo cassette deck specially designed for high-quality field recording with anti-roll transport for stable recording on the run. Features Dolby noise-reduction system; coreless motor with FG servo control and dc-to-dc converter power supply; Sendust-ferrite record/play head; dual VU meters with LED peak indicator; switchable limiter; monitor level control; low-impedance microphone input; line inputs and outputs; stereo headphone jack with level control; 4-hour operation on two D cells; 9 3/8"W x 6 5/8"D x 1 7/8"H; 13 lb 2 oz .....\$780

**AC-61.** Ac adaptor .....\$35

**LC-D5.** Carrying case .....\$30

**DR-M5.** Fold-up high-efficiency headphones. \$65

**Limited-Edition  
Audio Lab Series**

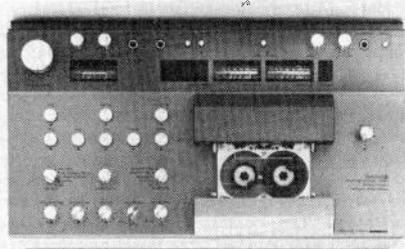
**TC-K88B Stereo Cassette Deck**

Power-loading, metal-compatible stereo cassette deck with Dolby B 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 four-position tape selector; auto music sensor system; LCD peak-reading meter display with auto/manual peak-hold reset buttons; auto stop, play; auto-space rec mute; feather-touch transport controls; punch-in recording; tape-remaining scale; optional remote-control provision; dc head/playback amplifier. Wow and flutter 0.003% wrms; frequency response ±3 dB 30-17,000 metal and FeCr, to 16 kHz CrO<sub>2</sub>, to 15 kHz normal; S/N 60 dB with FeCr, Dolby off; fast forward/rewind time 60 sec with C-60 cassette; 18 7/8"W x 15 1/4"D x 3 1/8"H.....\$1200

**TANDBERG**

**TCD 3004 Cassette Deck**

Microprocessor-controlled metal-compatible vertical front-loading stereo cassette deck with dual Dolby, four motors, and three heads. Features PROM-brain logic microprocessor function controls with LED indicators; recording preset; DYNEQ® record equalization and ACTILINEAR® recording systems; four-position bias/record and 70/120-µsec playback equalization controls with bias fine adjust; calibration selector for off, azimuth, bias fine adjust, and left and right record levels with calibra-



tion meter; separate left/right record level and mic level controls with master control; source/tape monitor switch; headphones volume control; LED digital counter readout with memory and reset; dual peak-reading meters; error detection digital read-

out; winding speed control; azimuth control. Frequency response 20-20,000 Hz ±3 dB; S/N 70 dB.....\$2800

**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<sub>2</sub>, and metal tapes with set of left/right LEDs; separate left and right 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 20-20,000 Hz ±3 dB; S/N 70 dB ("A" weighted); anodized matte black finish; 4"H x 18 5/16"W x 8 7/8"D.....\$995

**TCD3034 Stereo Cassette Deck**

Two-motor, logic-controlled transport. Features cue and record mute; peak-reading equalized meters; Dyneq® and Actilinear® headroom extension systems; instant-access loading. Dust cover for cassette compartment optional. Accommodates metal tape. Frequency response 10-20,000 Hz ±3 dB.....\$600

**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

**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 (IECA); 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 x 18 5/16"W x 8 7/8"D.....\$850

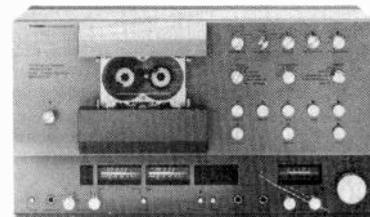
**TEAC**

**C-1 MkII 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;

**THE EUROPEAN ALTERNATIVE**

When performance is the only criteria



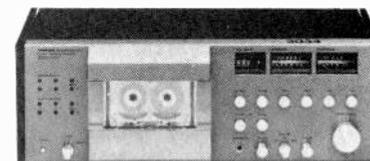
TCD3004

The first truly professional quality cassette recorder. Dyneq and Actilinear headroom extension systems. Four motor micro-processor transport. Cue/review with wind speed adjustment. Built-in calibration oscillators and metering system. Peak reading equalized meters.



TCD20ASE

The breakthrough\* in reel-to-reel design. Compatible with EE tapes yet capable of 80dB S/N ratio with standard tape in SE position



TCD3034

Dyneq and Actilinear headroom extension systems, coupled with a unique new logic controlled transport designed for simplicity and dependability. Superb sound quality and specifications.

\*Recommendation presented to A.E.S. 1978 dealing with Special Equalization in Reel-to-Reel Recording

**TANDBERG** OF AMERICA INC.

CIRCLE NO. 20 ON READER SERVICE CARD

# 1

## CASSETTE TAPE MACHINES

pitch control to vary tape speed up to 4%; double-attack input controls; two peak program VU meters; three-position bias and equalization switch; optional interchangeable bias/equalization card, CX-B; 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  $\pm$  3 dB (CrO<sub>2</sub>), 31.5-16,000 Hz  $\pm$  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  $\times$  19" W  $\times$  13 7/8" D .....\$1350

### 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 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<sub>2</sub>, 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 .....\$690

### AA-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<sub>2</sub>, 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; S/N 59 dB without Dolby (3% THD, weighted); 4 1/16" H  $\times$  17" W  $\times$  11 7/8" D .....\$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

### CX-400 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, dc servomotor, and three heads. Features bias and equalization selectors for normal, CrO<sub>2</sub>, 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 0.05% (NAB weighted); frequency response 30-20,000 Hz with metal tape; overall S/N 58 dB at 3.0% THD, weighted; 5 9/16" H  $\times$  16 1/8" W  $\times$  11 13/16" D .....\$340

**CX-350**. Similar to CX-400 minus bar graph metering display and tape/source monitoring; has combination record/playback and erase heads, electronic servomotor, and two VU meters; metal tape frequency response 30-19,000 Hz; 5 9/16" H .....\$230

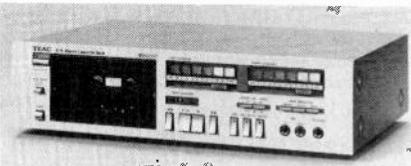
**CX-310**. Similar to CX-350 minus rec mute, memory stop, and output level control; wow and flutter 0.06%; 5 9/16" H .....\$200

### 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<sub>2</sub> 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<sub>2</sub>); 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  $\times$  16 1/8" W  $\times$  11 1/2" D .....\$450

### V-9 Cassette Deck

Front-loading deck has Electroload head loading system that smoothly and gently loads and retracts the heads using a dedicated motor everytime transport controls are touched. Three-head deck features pushbutton selection of normal, CrO<sub>2</sub>, metal bias and equalization; Dolby noise-reduction system; separate left- and right-channel peak-



reading incandescent-type VU "Spectro-Meters" that are color coded to indicate recording and playback levels; logic-controlled transport; full-view cassette window; rec mute; timer control. Wow and flutter 0.04% wrms; frequency response 30-20,000 Hz metal, to 19 kHz CrO<sub>2</sub>, and to 17 kHz normal tape; S/N ratio 59 dB weighted with metal tape, Dolby out; fast-wind time for C-60 cassette 90, seconds; 16 1/8" W  $\times$  10 7/16" D  $\times$  4 3/8" H; 12 lb 2 oz .....\$399

## TECHNICS

### RS-M270X Cassette Deck

Stereo cassette deck with dbx and Dolby noise-reduction systems built in, direct-drive capstan, and soft-touch solenoid transport controls. Features peak-hold fluorescent level displays; rec mute, metal/FeCr/CrO<sub>2</sub>/normal tape selector, and mic/line switches; timer-assisted record/playback; rewind auto play; cue and review; output level control; full auto-stop transport; oil-damped cassette loading/unloading; removable cassette well; Sendust record/play head. Wow and flutter 0.035% wrms; frequency response  $\pm$  3 dB 30-17,000 Hz metal, to 16 kHz FeCr and CrO<sub>2</sub>, to 15 kHz normal tape; S/N ratio 92 dB dbx in, 68 dB beyond 5 kHz Dolby in, 58 dB Dolby out (all peak A

weighted using CrO<sub>2</sub> tape); dynamic range 110 dB at 1 kHz using dbx; fast-forward/rewind time 85 sec (C-60); power consumption 40 W; 16 7/8" W  $\times$  13 3/4" D  $\times$  3 7/8" H; 15 lb 7 oz .....\$500

**RS-M240X**. Similar to RS-M270X except S/N 91 dB with dbx, 67 dB with Dolby; wow and flutter 0.048%; frequency response to 18 kHz metal and CrO<sub>2</sub>, to 17 kHz normal tape; no remote-control option; no output level control; 9 11/16" D  $\times$  4 3/4" H; 10 lb 2 oz .....\$350

### 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<sub>2</sub>, 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  $\pm$  3 dB 30-16,000 Hz (metal, CrO<sub>2</sub>, and FeCr), to 15,000 Hz (normal); S/N 67 dB with Dolby; 11.9 cm H  $\times$  43 cm W  $\times$  27 cm D .....\$420

### RS-M260 Cassette Deck

Stereo cassette deck with Dolby noise-reduction system, 3-head, soft-touch transport, and single-motor, 3-belt drive. Features peak-hold fluorescent meters; metal/FeCr/CrO<sub>2</sub>/normal tape selector; rewind auto play; timer control; output level control; cue and review; full auto stop; rec mute; single-touch recording; tape/source monitor switch; removable cassette-well door; front cassette loading. Wow and flutter 0.05% wrms; frequency response  $\pm$  3 dB 25-19,000 Hz metal, to 18 kHz FeCr and CrO<sub>2</sub>, to 16 kHz normal tape; S/N ratio 67 dB Dolby on, 57 dB Dolby off; fast-forward/rewind time 90 sec (C-90); SX (Sendust Xtra) record and play and Sendust/ferrite double-gap erase heads; power consumption 16 W; 16 7/8" W  $\times$  11 1/2" D  $\times$  4 3/4" H; 11 lb 3 oz .....\$380

### RS-M250 Cassette Deck

Microprocessor-controlled stereo cassette deck with digital tape counter, logic-controlled transport, and fluorescent peak-hold meters. Features Dolby in/out, MPX filter, line/mic input, and counter-reset switches; metal/FeCr/CrO<sub>2</sub>/normal tape selector; 2-motor transport; dual-concentric input-level controls; full auto stop; oil-damped soft loading and ejection; illuminated cassette compartment. Wow and flutter 0.04% wrms; frequency response  $\pm$  3 dB 30-17,000 Hz metal, to 16 kHz FeCr and CrO<sub>2</sub>, to 15 kHz normal tape; S/N ratio 67 dB Dolby on, 57 dB Dolby off; fast-forward/rewind time 80 sec (C-60); SX (Sendust Xtra) record/play and double-gap ferrite erase heads; power consumption 20 W; 16 7/8" W  $\times$  11 1/2" D  $\times$  4 3/4" H; 11 lb 3 oz .....\$350

### 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<sub>2</sub>, 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  $\pm$  3 dB 30-17,000 Hz (metal), to 16,000 Hz (CrO<sub>2</sub> 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); 3<sup>7</sup>/<sub>16</sub>" H x 16<sup>1</sup>/<sub>16</sub>" W x 13<sup>5</sup>/<sub>16</sub>" D. ....\$375

### RS-M225 Cassette Deck

Spectra Series soft-touch auto-tape select front-loading stereo cassette deck with Dolby noise-reduction system. Features music select and auto-tape selector; peak-hold fluorescent level meters; single-touch recording; timer-assisted record/playback; cue and review; mic/line and rec mute switches; output-level and dual-concentric input-level controls; oil-damped cassette loading/unloading; removable cassette-well door; MX record/play and double-gap ferrite erase heads. Wow and flutter 0.048% wrms; frequency response ±3 dB 20-18,000 Hz metal and CrO<sub>2</sub>, to 17 kHz normal tape; S/N ratio 67 dB Dolby on, 57 dB Dolby off; fast-forward/rewind time 90 sec (C-60); power consumption 28 W; 16<sup>7</sup>/<sub>16</sub>" W x 9<sup>1</sup>/<sub>16</sub>" D x 4<sup>1</sup>/<sub>16</sub>" H; 9 lb 8 oz. ....\$260

### RS-M218 Cassette Deck

Stereo cassette deck with Dolby noise-reduction system, peak-hold metering, and auto tape select. Features soft-touch transport controls; fluorescent level meters; MX record/play and double-gap erase heads; separate left and right input level controls; mic/line switch; single-touch recording; timer-assisted record/play; full auto stop; oil-damped cassette load/unload; removable cassette-well door. Wow and flutter 0.05% wrms; frequency response 20-17,000 Hz metal, to 16 kHz CrO<sub>2</sub>, to 15 kHz normal; S/N ratio 66 dB Dolby on, 56 dB Dolby off; fast-forward/rewind time 90 sec (C-60); power consumption 12 W; 16<sup>7</sup>/<sub>16</sub>" W x 8<sup>1</sup>/<sub>16</sub>" D x 4<sup>1</sup>/<sub>16</sub>" H; 8 lb 13 oz. ....\$200

### RS-M205 Cassette Deck

Spectra Series stereo cassette deck with metal-tape compatibility, soft-touch transport controls, and dual analog VU meters. Features built-in Dolby noise-reduction system; separate left and right input level controls; mic/line switch; oil-damped soft loading and unloading of cassette; removable cassette-well door. Wow and flutter 0.05% wrms; frequency response 20-17,000 Hz metal, to 16 kHz CrO<sub>2</sub>, to 15 kHz normal tape; S/N ratio 66 dB Dolby on, 56 dB Dolby off; fast-forward/rewind time 90 sec (C-60); MX record/play and double-gap ferrite erase heads; power consumption 10 W; 16<sup>7</sup>/<sub>16</sub>" W x 8<sup>1</sup>/<sub>16</sub>" D x 4<sup>1</sup>/<sub>16</sub>" H. ....\$165

## 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<sub>2</sub>, 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. ....\$1400

## 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<sub>2</sub>, 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<sub>2</sub> 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); 3<sup>7</sup>/<sub>16</sub>" H x 11<sup>3</sup>/<sub>4</sub>" W x 9<sup>1</sup>/<sub>16</sub>" D. ....\$750

### 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 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 60 sec (C-60); frequency response 30-16,000 Hz ±3 dB (CrO<sub>2</sub> and FeCr tape), 30-14,000 Hz ±3 dB (normal tape); S/N 59 dB (Dolby off), 69 dB (above 5 kHz, Dolby on); mic input sensitivity 0.25 mV; mic impedance 400-10,000 ohms; 3<sup>7</sup>/<sub>16</sub>" H x 19<sup>1</sup>/<sub>16</sub>" W x 15<sup>7</sup>/<sub>16</sub>" D. ....\$520

### 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<sub>2</sub>, 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<sub>2</sub>, and FeCr), to 14,000 Hz (normal); S/N 67 dB with Dolby; 12.2 cm H x 29.7 cm W x 23.2 cm D. ....\$330

### RS-M07 Cassette Deck

Soft-touch, auto-tape-select stereo cassette deck with Dolby noise-reduction system and analog-type signal-level meters. Features MX record/playback and double-gap ferrite erase heads; automatic mic/line selection; precision-calibrated VU meters; separate left and right input-level controls; single-touch recording; full auto stop; oil-damped soft load/unloading; removable cassette-well door. Wow and flutter 0.048%; frequency response 20-18,000 Hz metal and CrO<sub>2</sub>, to 17 kHz normal tape; S/N ratio 67 dB Dolby on, 57 dB Dolby off; fast-forward/rewind time 90 sec (C-90); power consumption 10 W; 11<sup>1</sup>/<sub>16</sub>" W x 9<sup>1</sup>/<sub>16</sub>" D x 4<sup>7</sup>/<sub>16</sub>" H; 7 lb 11 oz. ....\$250

## Remote Control Series

### RS-M45 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, FG servo direct-drive motor, and Sendust Extra record/play and double-gap sendust/ferrite erase heads. Features tape selector for normal, FeCr, CrO<sub>2</sub>, and metal tapes; dual fluorescent peak-reading meter display with peak hold; IC logic tape function controls with LED indicators; rec mute; input level control with line/mic selector; output level control; three-digit tape counter with auto reset; timer record with external timer; optional SH-R808 or RP-9645 remote control units available; 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<sub>2</sub> and FeCr), to 15,000 Hz (normal); S/N 68 dB with Dolby, FeCr and CrO<sub>2</sub> tape; input sensitivity/impedance 0.25 mV/100k ohms (mic), 60 mV/47k ohms (line); 3<sup>7</sup>/<sub>16</sub>" H x 16<sup>7</sup>/<sub>16</sub>" W x 13<sup>5</sup>/<sub>16</sub>" D. ....\$375

**SH-R808.** Infrared wireless remote control unit with separate receiver section; has pushbutton record, rewind, play, fast forward, rec mute, pause,

and stop controls; see Receiver and Turntable sections for other series components. ....\$290

**RP-9645.** Wired remote control unit for RS-M45; has full-function tape transport controls. ....\$35

## TOSHIBA

### PC-X60 Cassette Deck

Front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system with multiplex 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<sub>2</sub>, 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 panel; 4<sup>3</sup>/<sub>4</sub>" H x 16<sup>9</sup>/<sub>16</sub>" W x 11<sup>1</sup>/<sub>16</sub>" 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; metal frequency response 25-18,000 Hz ±3 dB; S/N 60 dB (metal, Dolby off); 16<sup>9</sup>/<sub>16</sub>" W x 11<sup>1</sup>/<sub>16</sub>" 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); 4<sup>1</sup>/<sub>3</sub>" H x 16<sup>9</sup>/<sub>16</sub>" W x 11<sup>1</sup>/<sub>16</sub>" 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<sub>2</sub>, 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; 5<sup>9</sup>/<sub>16</sub>" H x 16<sup>9</sup>/<sub>16</sub>" W x 10<sup>1</sup>/<sub>16</sub>" D. ....\$199

**PC-X12B.** PC-X12 in matte black. ....\$210

### PC-X15 Cassette Deck

Front-loading, metal-compatible stereo cassette deck with Dolby noise-reduction system and multiplex filter. Features include twin 11-segment peak-reading LED "meters," dual concentric level controls, cue/review tape transport, dc servo motor, super-hard Aurex permalloy and Aurex ferrite heads, and three-position tape-select switch. Wow and flutter 0.05% wrms; frequency response 25-18,000 Hz with metal tape; S/N 68 dB with Dolby on; THD 0.09% with metal tape at 400 Hz, 0 dB; input level/impedance 0.25 mV/600 ohms mic, 70 mV/50 kohms line; 16<sup>9</sup>/<sub>16</sub>" W x 10<sup>1</sup>/<sub>16</sub>" D x 4<sup>1</sup>/<sub>3</sub>" H. ....\$200

# 1

## CASSETTE TAPE MACHINES

### 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  $\pm 3$  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); 5 $\frac{1}{16}$ "H  $\times$  16 $\frac{3}{16}$ "W  $\times$  8 $\frac{1}{4}$ "D...\$170

### Micro Series

#### PC-D 12 Cassette Deck

Direct front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system, two motors, and superhard permalloy heads. Features IC logic solenoid function controls; LED peak-reading meter display; four-position tape selector; three-digit tape counter with memory stop/play; timer record/play with external timer; optional remote control available. Wow and flutter 0.045% wrms; metal frequency response 20-20,000 Hz  $\pm 3$  dB; S/N 68 dB with Dolby, metal tape; 4.2"H  $\times$  10"W  $\times$  8.4"D .....\$450

#### PC-D10 Cassette Deck

Direct front-loading metal-compatible stereo cassette deck with Dolby noise-reduction system and super hard permalloy heads. Features LED peak-reading meter display; three-position bias and equalization; separate left/right input level controls; output level control; cue/review. Wow and flutter 0.05% wrms; metal frequency response 35-18,000 Hz  $\pm 3$  dB; S/N 60 dB without Dolby, metal tape; 4.2"H  $\times$  10"W  $\times$  8.4"D .....\$270

**PC-D10B.** Matte black version of PC-D10...\$280

### 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<sub>2</sub> and FeCr), 65 dB (Dolby on, Fe<sub>2</sub>O<sub>3</sub>); 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; 9 $\frac{1}{4}$ "  $\times$  2 $\frac{1}{2}$ "  $\times$  7 $\frac{1}{4}$ " .....\$1489

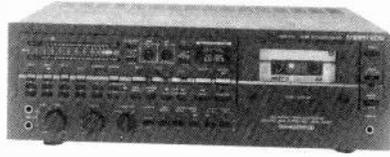
**CR-240AV.** Audio-visual version of CR-240 .....\$1576

### VECTOR RESEARCH

#### VCX-800 Cassette Deck

Front-loading cassette deck with 3 heads, 2 mo-

tors, and dual capstans. Features dbx II, Dolby B and C, and Dolby FM noise-reduction and Dolby HX headroom-extension systems; microprocessor-controlled Compu-counter that automatically selects tape length, shows remaining time in min and sec, and searches for any location on a tape;



sweep oscillator that allows adjustment for flattest response; two memory circuits; auto rewind/play; rec mute; feather-touch transport controls. Wow and flutter 0.04%; frequency response  $\pm 3$  dB 30-19,000 Hz normal, to 20 kHz CrO<sub>2</sub>, to 21 kHz metal tapes; S/N ratio no NR/Dolby B on/Dolby C on 56/65/75 dB; 17 $\frac{3}{8}$ "W  $\times$  14 $\frac{1}{2}$ "D  $\times$  5 $\frac{9}{16}$ "H .....\$1000

#### 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  $\pm 3$  dB 30-16,000 Hz (normal), to 18,000 Hz (Co/CrO<sub>2</sub>), 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; 5 $\frac{9}{16}$ "H  $\times$  17 $\frac{3}{8}$ "W  $\times$  14 $\frac{3}{4}$ "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  $\pm 3$  dB 30-15,000 Hz (normal), to 17,000 Hz (Co/CrO<sub>2</sub>), to 19,000 Hz (metal). ....\$400

**VRC-2.** Wired remote control for VCX-500/600. ....\$75

### YAMAHA

#### K-960 Cassette Deck

High-end deck contains both Dolby and dbx noise-reduction systems (providing up to 30 dB of noise suppression with dbx system). Features Sendust record/playback and double-gap ferrite erase heads; two-motor transport with IC logic control; fluorescent bar-graph meter; continuously adjustable bias control; timer recording switch; subsonic and MPX filters; low-noise equalizer preamp; focus switch to extend high-end frequency response. Wow and flutter rated at 0.028% wrms .....\$495

#### 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<sub>2</sub>, 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<sub>2</sub>, 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  $\pm 3$  dB 30-17,000 Hz (LH), to 19,000 Hz (CrO<sub>2</sub>), to 22,000 Hz (metal); S/N 60 dB with CrO<sub>2</sub>, 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); black cabinet; 5.5"H  $\times$  17.5"W  $\times$  12"D .....\$490

#### 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<sub>2</sub>, and metal tape selection with auto switching between LH and CrO<sub>2</sub> 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 shutoff; 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  $\pm 3$  dB 30-16,000 Hz (LH), to 18,000 Hz (CrO<sub>2</sub>), to 19,000 Hz (metal); S/N 60 dB with CrO<sub>2</sub>, Dolby off (JIS weighted); input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/100k ohms (line); silver faceplate and wood cabinet; 5 $\frac{9}{16}$ "H  $\times$  17 $\frac{3}{4}$ "W  $\times$  12 $\frac{3}{4}$ "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<sub>2</sub>, 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  $\pm 3$  dB 40-14,000 Hz (LH), to 15,000 Hz (CrO<sub>2</sub>), to 18,000 Hz (metal); S/N 57 dB with CrO<sub>2</sub>, Dolby off; input sensitivity/impedance 0.3 mV/5k ohms (mic), 50 mV/80k ohms (line); silver faceplate and wood cabinet; 5 $\frac{9}{32}$ "H  $\times$  17 $\frac{1}{8}$ "W  $\times$  10 $\frac{1}{2}$ "D .....\$240

### ZENITH

#### MC9070 Cassette Deck

Front-loading stereo cassette deck with Dolby noise-reduction system, electronically-controlled dc motor, and recording/playback and erase heads. Features two VU meters with LED peak indicators; bias and equalization for normal, FeCr, and CrO<sub>2</sub> tapes; left/right record level control; piano-key tape function controls; three-digit tape counter. Wow and flutter 0.08% wrms (JIS); frequency response  $\pm 3$  dB 40-13,000 Hz (normal), to 14,000 Hz (CrO<sub>2</sub>), to 15,000 Hz (FeCr); HD 1.5%; S/N with Dolby 62 dB using normal tape over 5000 Hz, 66.5 dB using CrO<sub>2</sub> tape over 5000 Hz; fast-winding time 85 sec (C-60); 5.96"H  $\times$  18.77"W  $\times$  9.33"D .....\$250

# Dolby® C-type Noise Reduction

 DOLBY B-C NR

 DOLBY C NR

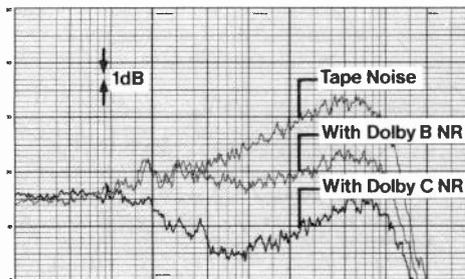


Figure 1: Noise from biased cassette tape (70  $\mu$ s equalization), measured with a constant-bandwidth wave analyzer, and weighted (CCIR/ARM) to reflect the ear's sensitivity to noise and to noise reduction effects.

## What Dolby C-type NR is

Dolby C is a new noise reduction system developed by Dolby Laboratories for consumer tape recording. It provides 20 dB of noise reduction above about 1 kHz, compared to the standard Dolby B-type system's 10 dB of noise reduction above about 4 kHz. Like the original system, the new Dolby C-type system operates without side effects on virtually all kinds of program material. It does not replace the standard Dolby B system, but will supplement it in a number of new high-performance cassette decks appearing in 1981.

## How Dolby C-works: dual-level processing

In some respects, Dolby C-type noise reduction operates like Dolby B. When a recording is made, the middle and higher frequencies of low-level signals are selectively boosted, while loud signals are essentially untouched. On playback, the previously-boosted signals are attenuated

to where they were in the original program material, thus restoring proper musical balance while simultaneously effecting noise reduction. With Dolby C, signals are boosted and attenuated more than with Dolby B. In addition, Dolby C operates down to a lower frequency to maintain subjectively uniform noise reduction across the audible range.

Dolby C-type noise reduction is based upon a new and unique dual-level processing scheme. Two sliding-band processors operate in tandem at different levels to solve the problem of achieving 20 dB of compression and expansion without introducing undesirable side effects. Dolby C also incorporates several other new developments which reduce the effects of high-frequency tape saturation and minimize encode-decode errors, so that the new system puts no special demands on the user and requires no special recorder adjustments.

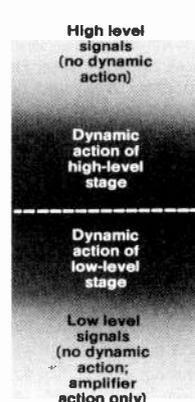


Figure 2: Dolby C-type noise reduction features dual-level processing, whereby two sliding-band processors operate in tandem at different levels. Like Dolby B, companding action is restricted to part of the dynamic range, above which there is essentially no action, and below which the system acts as a fixed-gain amplifier. Minimizing the system's dynamic action minimizes the possibility of side-effects on the signal being recorded.

Dolby C-type noise reduction has been designed so that recorders incorporating it can also provide the Dolby B characteristic at the push of a switch. This means that existing cassette recordings encoded with Dolby B-type noise reduction will be properly reproduced on the new models featuring Dolby C. In addition, most listeners are likely to find that Dolby C recordings are enjoyable on machines equipped only with Dolby B, or on portable and automobile players without any noise reduction circuitry.

## Availability

More than 30 product models equipped with Dolby C, including cassette decks and add-on noise reduction units, are either here or have been announced by the following companies (and many other models are being developed):

Aiwa	Nakamichi
Dual	Onkyo
Hitachi	Pioneer
JVC	Rotel
Marantz	H. H. Scott
Mitsubishi	Sony
NAD	Vector Research

## What Dolby C means to cassette recording

Combined with good tape formulations and a well-engineered cassette deck, Dolby C reduces tape noise to a level below the noise of virtually any program source available now or likely to be available in the foreseeable future. In fact, even at high listening levels, tape noise is lower than the ambient noise in many listening rooms. Thus for all intents and purposes, with Dolby C-type noise reduction, tape noise in cassette recording will no longer be of any practical consequence.

For further information, including technical details and the first independent review of Dolby C, please write us at the address below.

 **Dolby**®

Dolby Laboratories Licensing Corp.,  
731 Sansome St., San Francisco, CA 94111,  
Telephone (415) 392-0300. Telex 34409.

"Dolby" and the double-D symbol are the registered trademarks of Dolby Laboratories for its A-type, B-type, and C-type noise reduction systems. S81/3285/3287

# 2

# OPEN-REEL TAPE MACHINES

## AKAI

### GX-625 Stereo Tape Deck

Two-speed (3 $\frac{3}{4}$  and 7 $\frac{1}{2}$  ips)  $\frac{1}{4}$ -track two-channel stereo tape deck with ac servo direct-drive capstan and two eddy-current reel motors and two GX heads for record and playback and one erase head; max. reel capacity 10 $\frac{1}{2}$  in. Features auto repeat, play, and stop; illuminated logic solenoid tape function controls with LED standby indicator; LED digital timer/tape counter readout; two-deck tape monitoring; mic/line mixing/output level control/variable pitch control; mono/stereo recording; timer record/playback with external timer; computerized electronic braking system. Wow and flutter 0.03% rms at 7 $\frac{1}{2}$  ips; frequency response 30-26,000 Hz  $\pm$  3 dB at 7 $\frac{1}{2}$  ips; S/N 62 dB weighted, with low-noise tape and peak recording level at 3% THD; 17.6" H  $\times$  17.3" W  $\times$  9.5" D .....\$850

### GX-4000 Compact Tape Deck

Contains GX record and playback and separate erase heads and accommodates reels up to 7-in. dia. Features tape/source monitoring; mic/line mixing; sound-on-sound and sound-with-sound;



track selector; auto-stop; output level control; VU meters. Tape speeds 7 $\frac{1}{2}$  and 3 $\frac{3}{4}$  ips; wow and flutter less than 0.08% rms at 7 ips; frequency response 30-24,000 Hz  $\pm$  3 dB at 7 $\frac{1}{2}$  ips; S/N ratio better than 60 dB weighted at wide range tape setting with peak level at 3% THD; distortion less than 1% at 1 kHz, 0 VU; 17.3" W  $\times$  12.4" H  $\times$  9.1" D; 29 lb .....\$450

### 1722II Stereo Tape Deck

Two-speed (7 $\frac{1}{2}$  and 3 $\frac{3}{4}$  ips),  $\frac{1}{4}$ -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  $\times$  7-in speakers with

speaker jacks; line and DIN in and out connections; two VU meters. Wow and flutter 0.14% rms (7 $\frac{1}{2}$  ips), 0.18% rms (3 $\frac{3}{4}$  ips); frequency response  $\pm$  3 dB at 7 $\frac{1}{2}$  ips 30-21,000 Hz (wide-range tape), to 18,000 Hz (low-noise), at 3 $\frac{3}{4}$  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  $\times$  14" W  $\times$  9.8" D .....\$000

## NEAL-FERROGRAPH (USA)

### SP7 Tape Recorder

Three-speed (choice of 15, 7 $\frac{1}{2}$ , and 3 $\frac{3}{4}$  high, 7 $\frac{1}{2}$ , 3 $\frac{3}{4}$  and 1 $\frac{7}{8}$  medium, or 3 $\frac{3}{4}$ , 1 $\frac{7}{8}$ , and 1 $\frac{5}{16}$  low ips) tape recorder with three motors, 250- $\mu$  in record, 80- $\mu$  in replay, and erase heads; choice of mono full-track or half-track or stereo half-track or quarter-track heads; max. reel capacity 10 $\frac{1}{2}$  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% (7 $\frac{1}{2}$ ), 0.17% (3 $\frac{3}{4}$ ), at medium speed 0.08% (7 $\frac{1}{2}$ ), 0.15% (3 $\frac{3}{4}$ ), 0.2% (7 $\frac{7}{8}$ ), at low speed 0.15% (3 $\frac{3}{4}$ ), 0.2% (1 $\frac{7}{8}$ ), 0.4% (1 $\frac{5}{16}$ ); frequency response 30-20,000 Hz  $\pm$  2 dB (15), 30-17,000 Hz  $\pm$  2 dB (7 $\frac{1}{2}$ ), 40-14,000 Hz  $\pm$  3 dB (3 $\frac{3}{4}$ ), 50-7000 Hz  $\pm$  3 dB (1 $\frac{7}{8}$ ), 60-3000 Hz  $\pm$  3 dB (1 $\frac{5}{16}$ ); S/N 60 dB (1 $\frac{1}{2}$  track, Dolby out), 58 dB (1/4 track, Dolby out); 16 $\frac{7}{8}$ " H  $\times$  18 $\frac{3}{4}$ " W  $\times$  10" D.

SP7A1. Mono line in/line out .....\$1707  
 SP7A3. Mono line in/line out with mic .....\$1993  
 SP7A2. Stereo line in/line out .....\$1850  
 SP7A4. Stereo line in/line out with mic .....\$2279  
 Balanced lines (per channel) .....\$357  
 Power amp and speaker (per channel) .....\$214  
 Cannon XLR sockets (per channel) .....\$71  
 Rack-mounting brackets .....\$214

## OTARI

### MX-5050-B Stereo Tape Recorder

Two-channel  $\frac{1}{2}$ -track (1/4-track reproduce) three-speed (internally switchable pairs of 15 and 7 $\frac{1}{2}$  ips or 7 $\frac{1}{2}$  and 3 $\frac{3}{4}$  ips) compact professional tape recorder with variable three-speed ( $\pm$  7%) dc servo capstan and two induction torque reel motors and four plug-in rugged Permalloy head stacks (1/2 track erase, record and reproduce and 1/4-track reproduce); handles 10 $\frac{1}{2}$ -in EIA or NAB reels and 5-

or 7-in plastic reels; 1/4-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 locator memory that recues machine to zero setting; cue control; selective reproduce; TTL-IC edit control; 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% (7 $\frac{1}{2}$  ips), 0.01% (3 $\frac{3}{4}$ ips); frequency response  $\pm$  2 dB 30-22,000 Hz (15 ips at 0 VU), 25-20,000 Hz (7 $\frac{1}{2}$  ips at -10 VU), 30-12,000 Hz (3 $\frac{3}{4}$  ips at -10 VU); dist. 1.0% at 1000 Hz, 250 nWb/m; S/N (weighted) 65 dB (15 and 7 $\frac{1}{2}$  ips), 64 dB (3 $\frac{3}{4}$  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, before clipping, headroom +24 dBm load impedance 600 ohms balanced, output impedance 50 ohms balanced; headphone jack -24 dBm, 8-ohm impedance; standard 3-pin XLR connector. Includes 10 $\frac{1}{2}$ -in NAB reel, precision hold down knob, and NAB reel shims; vinyl wooden cabinet; vertical or horizontal operating position; 21 $\frac{7}{8}$ " H  $\times$  21 $\frac{1}{2}$ " W  $\times$  8 $\frac{1}{8}$ " D .....\$2295

## 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 7 1/2 ips; three four-track heads in line stacks for erase, record, reproduce; wow and flutter 0.05% at 15 ips, 0.06% at 7 1/2 ips; frequency response 50-20,000 Hz  $\pm$  2 dB, 35-25,000 Hz  $\pm$  3 dB (15 ips at O VU), 50-18,000 Hz  $\pm$  2 dB, 40-20,000 Hz  $\pm$  3 dB (7 1/2 ips at -10 dB); 600-ohm balanced output; 10 1/2 in NAB reels; 1/2-in tape, 0.075-in track width; 25 1/4" X 19" standard rack mount.....\$3895

**Two-Channel.** Same as Mark II but uses 1/4-in tape; will handle 5- and 7-in plastic reels or 10 1/2-in EIA or NAB; 21 1/4" X 19" standard rack mount.....\$2495

### OF5050BQ Series II Recorder

Four-channel, 1/4-in. recorder has motion-sensing control logic, variable-speed dc capstan servo motor, built-in test and cue oscillator, and plug-in head assembly. Features 15 and 7 1/2 ips speeds; selective reproduce; easily accessible electronics adjustments; proprietary microprocessor to govern transport logic; electronic real-time counter with numeric LED display; automatic monitor switching; selectable 20-dB mic input attenuator; selectable track headphone monitoring; peak-reading indicators on each channel; separate mic/line mixing on each channel.....\$2995

## PIONEER

### RT-909 Stereo Tape Deck

Two-speed (3 3/4 and 7 1/2 ips), 1/4-track, three-motor, four-head stereo tape deck; FG dc servo dual-capstan motor and two six-pole inner rotor reel motors; accepts both 10 1/2- and 7-in reels. Features two-step bias and equalization selector with variable bias; Fluorescan 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 in-put level controls; output level control. Wow and flutter 0.04% at 7 1/2 ips, 0.08% at 3 3/4 ips; frequency response 20-28,000 Hz  $\pm$  3 dB (7 1/2 ips), 20-18,000 Hz  $\pm$  3 dB (3 3/4 ips); S/N 60 dB (7 1/2 ips), 55 dB (3 3/4 ips); 13 3/8" H X 18 7/8" W X 12 1/4" D.....\$895

### RT-707 Stereo Tape Deck

Auto-reverse playback stereo reel to reel tape deck; two speed (3 3/4 and 7 1/2 ips); speed accuracy  $\pm$  0.5%; three-motor, four-head, 1/4-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 (7 1/2 ips), 0.08% wrms (3 3/4 ips); S/N 58 dB; dist. 1% max. (7 1/2 ips); fast rewind 100 sec (7-in reel); frequency response 30-24,000 Hz  $\pm$  3 dB (7 1/2 ips), 30-16,000 Hz  $\pm$  3 dB (3 3/4 ips); crosstalk -50 dB; channel separation 50 dB; pitch control  $\pm$  6% (playback only); 9 1/8" H X 18 3/32" W X 14 1/32" D.....\$695

## SONY

### TC-766-2 Open-Reel Deck

Half-track stereo record/playback with 1/4-track playback option. Features Ferrite-and-Ferrite discrete 4-head design; patented dc head/playback FET amplifier; 3-motor ac servo closed-loop, dual-capstan tape drive system; 15 and 7 1/2 ips tape speeds with electronic speed change and tension regulation system; feather-touch IC logic transport controls; punch-in recording; 10 1/2" reel capability; RM-30 remote-control unit. 20 5/8" H X 17 1/2" W X 9 1/4" D; 85 lb 7 oz.....\$1350

### TC-765 Open-Reel Deck

Quarter-track stereo record playback deck with Ferrite-and-Ferrite tape heads and 7 1/2- and 3 3/4-ips speeds. Features discrete 3-motor ac servo closed-loop, dual-capstan tape drive system; electronic speed change and tension regulation system; feather-touch IC logic transport controls; punch-in recording; 10 1/2" reel capacity. RM-30 remote-control unit optional. 20 5/8" H X 17 1/2" W X 9 1/4" D; 58 lb 7 oz.....\$1250

### TC-399 Open-Reel Deck

Quarter-track stereo record/playback deck with Ferrite-and-Ferrite heads in three-head design and head/playback amplifier. Features ac induction motor drive system; 7 1/2, 3 3/4, and 1 7/8 ips tape speeds; servo back-tension device; scrape flutter filter; all-mode automatic stop; 7" reel capacity. 17 1/4" H X 16 3/8" W X 7 1/2" D; 27 lb 13 oz.....\$520

## STUDER/REVOX

### B67 Mark II Stereo Tape Recorder

Three-speed (choice of 3 3/4, 7 1/2, and 15 ips or 7 1/2, 15, and 30 ips) two-channel tape recorder with three servo-controlled ac 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 .06% at 15 ips (weighted peak); frequency response 30-18,000 Hz  $\pm$  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 X 19" W X 10.5" D.....from \$3910

### B77 Stereo Tape Recorder

Two-speed (choice of 3 3/4 and 7 1/2 ips, 7 1/2 and 15 ips, 1 7/8 and 1 7/8 ips, or 1 7/8 and 3 3/4 ips) stereo tape recorder with three motors; reel capacity 10 1/2 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) 0.06% (15 ips), 0.08% (7 1/2 ips), 0.1% (3 3/4 ips); frequency response +2/-3 dB 30-22,000 Hz (15 ips), to 20,000 Hz (7 1/2 ips), to 16,000 Hz (3 3/4 ips); S/N on 1/4-track 63 dB (15 ips and 7 1/2 ips), 60 dB (3 3/4 ips), on 1/2-track 67 dB (15 and 7 1/2 ips), 64 dB (3 3/4 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 X 17.8" W X 8.14" D.....\$1649

**B77 Self Sync.** Same as B77; available in 3 3/4 and 7 1/2 ips or 7 1/2 and 15 ips speeds with playback possibility from record head.....\$1749

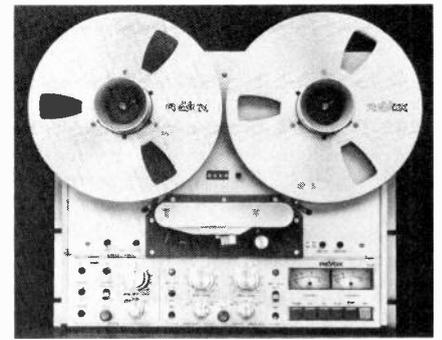
**B77 Autostart.** Same as B77 except with VOX control.....\$1899

**B77 Slide Sync.** Same as B77 except with additional head for slide projector control.....\$1799

### PR99 Stereo Tape Deck

Two-speed (15/7 1/2 or 7 1/2/3 3/4 ips) half-track stereo recorder with direct-drive, servo-controlled capstan and electrically-controlled reel motors; 10 1/2-in. reel capacity. Features balanced (XLR) line-in/out and switched cal/uncal level settings; high- or low-impedance microphone input (balanced, XLR option); 2-way Self-Sync with complete tape editing facilities including tape dump; logic-controlled

transport; true VU meters with LED peak indicators; tape/source monitoring; safe/ready record switches; 4-digit tape counter; manual/remote-

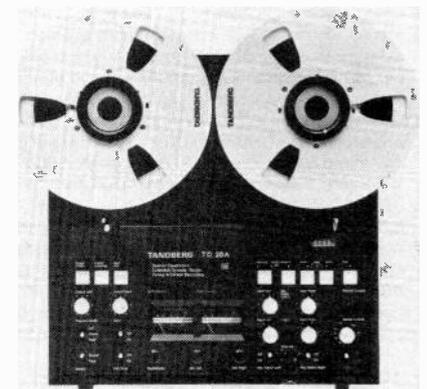


control/fader-start operation. Wow and flutter (DIN) 0.06% at 15 ips, 0.08% at 7 1/2 ips, 0.1% at 3 3/4 ips; frequency response +2/-3 dB 30-22,000 Hz at 15 ips, 30-20,000 Hz at 7 1/2 ips, 30-16,000 Hz at 3 3/4 ips; S/N 66 dB at 15 and 7 1/2 ips, 63 dB at 3 3/4 ips; case or 19-in. rack mount; 19" W X 15.7" H X 7.9" D.....\$2095

## TANDBERG

### TD 20A "Baron" Open-Reel Deck

Features Actilinear recording system; active trans-conductance 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:

7 1/2 and 3 3/4 ips; 1/4-track.....\$1295  
15 and 7 1/2 ips; 1/4-track.....\$1295  
15 and 7 1/2 ips; 1/2-track.....\$1295

**TD20A SE.** Similar to TD20A except black-on-black styling; new record equalization curves allow 80-dB or better S/N without noise reduction system (EQ switchable to NAB standard); DynEQ® and Actilinear® headroom extension systems; phase corrected circuitry for pinpoint imaging.....

### Series 15 Open-Reel Recorder

Three-speed (7 1/2, 3 3/4, 1 7/8 ips) mono record/play open-reel recorder; wow and flutter 0.1% at 7 1/2 ips; frequency response 40-18,000 Hz  $\pm$  2 dB at 7 1/2 ips; S + N/N 55 dB at max. record level; 5 W/channel continuous, both channels driven;

# 2

## OPEN-REEL TAPE MACHINES

preamp output 0.75 V; low-Z mic; high- and low-level inputs; 6<sup>3</sup>/<sub>4</sub>" H × 13<sup>3</sup>/<sub>8</sub>" W × 11<sup>7</sup>/<sub>8</sub>" D.

**1521F.** 1/4-track or 1/2-track; includes foot control .....\$750

**1521.** 1521F without foot control .....\$650

### TASCAM by TEAC

#### 80-8 Recorder/Reproducer

1/2-in, 8-tracks; will take up to 10 1/2-in reels NAB hub only; 15 ips and 7 1/2 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 × 17 1/4" W × 12" D .....\$3900

#### (35-2B Studio Series Recorder

Half-track 1/4" recorder with 10 1/2" reel capacity, capable of playing back 1/4-track tapes with optional head. Has built-in dbx<sup>®</sup> Type I noise-reduction system. Features dc-servo controlled capstan and induction reel motors; touch-button logic control system with motion-sensing direct mode changes; four high-density Permaflux heads; ±6% range speed pitch control; punch-in recording; cueing and editing functions; flip-up head cover; six-step bias selector and variable EQ control; source/cal/output monitor switch; independent left and right input and output level controls; wide-excursion VU meters with peak LED indicators; separate transport and electronics packages. Tape speeds/accuracy 15 ips/0.05%, 7 1/2 ips/0.08% peak IEC/ANSI weighted; frequency response 40-22,000 Hz ± 3 dB at 15 ips, 0 VU (40-20,000 Hz at 7 1/2 ips); THD 0.8% at 0 VU, 1 kHz, 185 nWb/m; S/N ratio 92 dB A weighted (NAB) with dbx on at both speeds; record/playback amplifier headroom better than 23 dB above 0 VU; 18 1/2" H × 16 1/2" W × 10 1/2" D transport, 18 1/2" H × 9 5/8" W × 5 1/8" D; 86 lb combined weight .....\$1990

#### 40-4 Recorder/Reproducer

Four-track, 1/4-in recorder/reproducer; will take up to 10 1/2-in reels NAB hub only; 15 and 7 1/2 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 (7 1/2 ips); S/N 63 dB weighted, 58 dB unweighted at 15 ips, 65 dB weighted, 60 dB unweighted at 7 1/2 ips; overall dist. 1% at 400 Hz, 0 VU at 9 dB; crosstalk greater than 50 dB at 400 Hz; 21" H × 17 1/4" W × 12" D .....\$2100

### Creative Series

#### 32-2B Recorder/Reproducer

Two-speed (15 and 7 1/2 ips) two-track two-channel 1/4-in recorder/reproducer with FG servo capstan and two dc slotless reel motors and three heads; 10 1/2-in reel capacity; optional DX-2B plug-in dbx noise-reduction module available. Features select-

able equalization for IEC and NAB; two-position record bias and equalization; separate mic and line level controls; -20-dB mic attenuation; output level control; left/right tape/source monitoring; left and right record mode selectors; dual VU meters; punch-in record and rec mute; cueing; touch-button logic-controlled function controls with direct-mode switching; ±6% pitch control; four-digit tape counter. Wow and flutter (NAB weighted) 0.02% (15 ips), 0.04% (7 1/2 ips); frequency response ± 3 dB at 0 VU 40-20,000 Hz (15 ips), to 18,000 Hz (7 1/2 ips); S/N ref. 3.0% THD at 1000 Hz, 15 ips, 63 dB (NAB EQ, A weighted), 65 dB (IEC EQ weighted); crosstalk 50 dB at 1000 Hz; 17 1/2" H × 17" W × 10 1/8" D .....\$1300

#### 22-4 Recorder/Reproducer

Four-channel system offers 7" reel capacity and 15 and 7 1/2 ips recording/playback capability. Features mixer interface; function and output select; punch-in recording; removable head housing; logic-controlled transport functions; headphone monitor selectors; expanded-scale VU meters; independent level controls; memory stop function; pitch control (±6% range); manual cueing. dbx<sup>®</sup> Type I interface optional. Tape format 1/4"; tape speeds 15 and 7 1/2 ips ± 0.5%; frequency response 40-22,000 Hz at 15 ips, 40-16,000 Hz at 7 1/2 ips, both ± 3 dB at 0 VU; THD 1.0% at 0 VU, 1 kHz, 185 nWb/m; S/N ratio 61 dB at 15 ips, 60 dB at 7 1/2 ips A weighted (NAB) (increases to 88 dB in both cases with dbx); headroom for recording/playback amplifiers 23 dB above 0 VU; 16 3/8" W × 16 1/8" H × 10 1/4" D; 40 lb .....\$1425

#### 22-2 Half-Track Recorder/Reproducer

Three-motor, three-head 1/4" tape recorder/reproducer that accepts 7 1/2" reels and operates at 15 or 7 1/2 ips. Features expanded-scale -2 to +5 dB VU meters; independent monitor and record ready controls for each channel; mic/line mixing; detachable head housing; precision moulded reel tables and spring-loaded reel holders. Fully independent electronics permit source or tape monitoring and record or reproduce mode to be selected independently for either track. Wow and flutter 0.07% peak DIN/IEC/ANSI weighted at 15 ips, 0.04% rms JIS/NAB weighted at 15 ips (0.09% and 0.05%, respectively, at 7 1/2 ips); frequency response 40-22,000 Hz ± 3 dB at 0 VU and 15 ips, 40-18,000 Hz at 7 1/2 ips; THD 1.0% at 0 VU, 1 kHz, 185 nWb/m; S/N ratio 66 dB NAB A weighted at 15 ips, 64 dB at 7 1/2 ips; headroom better than 26 dB above 0 VU at 1 kHz for recording amplifier, 38 dB for playback amplifier; 16 1/8" W × 12 7/8" H × 9 1/8" D; 30.8 lb .....\$775

### TEAC

#### A-6600 Stereo Tape Deck

Two speed (7 1/2 and 3 3/4 ips), 1/4-track, two-channel deck; will handle reels up to 10 1/2-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 (7 1/2 ips) and 8 VU (3 3/4 ips); remote control with optional RC-80 .....\$1575

#### A-3300SX-2T Tape Deck

Two-speed (15, 7 1/2 ips), 1/2-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 10 1/2-in reels. Wow and flutter 0.04% (15 ips), 0.06% (7 1/2 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 7 1/2 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 5/8" H × 17 5/8" W × 8 5/8" D .....\$1050

### Audio Specialist Series

#### X-10 Stereo Tape Deck

Two-speed (7 1/2 and 3 3/4 ips) 1/4-track two-channel tape recorder with three dc motors in closed-loop dual-capstan drive system and erase, record, and playback heads; 10 1/2-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% (7 1/2 ips), 0.04% (3 3/4 ips); frequency response 30-28,000 Hz (7 1/2 ips), to 20,000 Hz (3 3/4 ips); S/N 63 dB; 17 1/8" H × 17" W × 10 5/8" D .....\$1050

**X-10R.** Same as X-10 except bi-directional record/playback with six heads (two each erase, record, and playback) .....\$1200

#### X-7 Stereo Tape Deck

Two-speed (7 1/2 and 3 3/4 ips) 1/4-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/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% (7 1/2 ips), 0.04% (3 3/4 ips); frequency response 30-28,000 Hz (7 1/2 ips), to 20,000 Hz (3 3/4 ips); S/N 63 dB; 14 5/8" H × 17" W × 10 5/8" D .....\$750

**X-7R.** Same as X-7 except has bi-directional record/playback and auto repeat .....\$850

#### X-3 Stereo Tape Deck

Two-speed (7 1/2 and 3 3/4 ips) 1/4-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 with LED; tape/source monitor switch; dual VU meters; four-digit tape counter; fast-acting spring-loaded reel holders; detachable head housing. Wow and flutter (NAB weighted) 0.04% at 7 1/2 ips, 0.06% at 3 3/4 ips; overall frequency response 30-28,000 Hz (7 1/2 ips), to 20,000 Hz (3 3/4 ips); overall S/N 58 dB at 3.0% THD, weighted; 12 1/8" H × 16 1/8" W × 9 5/8" D .....\$580

### 4-Channel

#### A-3440 4-Channel Tape Deck

Two-speed (15 and 7 1/2 ips) 1/4-track four-channel Simul-Sync tape deck with erase, record, sync and playback heads and three motors; 10 1/2-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% (7 1/2 ips); frequency response ± 3 dB 40-22,000 Hz at 0 VU (15 ips), to 20,000 Hz at -10 VU (7 1/2 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; 20 1/2" H × 17 1/2" W × 9 1/4" D .....\$1700

### A-2340SX Tape Deck

Two-speed (7 1/2 and 3 3/4 ips) 1/4-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% (7 1/2 ips), 0.10% (3 3/4 ips); frequency response  $\pm 3$  dB 40-18,000 Hz (7 1/2 ips), to 10,000 Hz (3 3/4 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); 17 3/8"H  $\times$  13 3/4"W  $\times$  8 3/4"D ..... \$1175

## TECHNICS

### RS-1520US Open-Reel Deck

Compact professional tape deck; 1/2-track, two-channel recording/playback and 1/4-track, two channel playback; four head system; three speeds (15, 7 1/2, 3 3/4 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 equalization controls; left and right VU meters; built-in stroboscope. Wow and flutter 0.018% wrms (15 ips), 0.3% wrms 7 1/2 ips; fast-winning time 150 sec with 2500-ft tape; frequency response 30-30,000 Hz  $\pm 3$  dB (15 ips), 30-25,000 Hz  $\pm 3$  dB (7 1/2 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; 17 1/2"H  $\times$  18"W  $\times$  10 1/8"D ..... \$2000

**RS-1506US.** Similar to RS-1520US except 1/4-track, two-channel recording/playback and 1/2-track, two-channel playback ..... \$1500

**RS-1700US** Similar to RS-1506US except autorverse in both recording and playback modes; 1/4-track, two-channel recording/playback modes; 1/4-track, two-channel recording/playback with six-head system ..... \$2100

### RS-1500US Open-Reel Deck

Three-speed (15, 7 1/2, and 3 3/4 ips) 1/2-track two-channel record, playback, and erase and 1/4-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, 1/2-and 1/4-track playback, and erasure; max. reel capacity 10 1/2 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  $\pm 3$  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 time 150 sec (2500-ft, 1.5-mil tape). Wow and flutter 0.018% wrms (15 ips), 0.03% wrms (7 1/2 ips); frequency response  $\pm 3$  dB 30-30,000 Hz (15 ips), 20-25,000 Hz (7 1/2 ips), 20-15,000 Hz (3 3/4 ips); S/N (NAB weighted) 60 dB 15 and 7 1/2 ips, 58 dB (3 3/4 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; 17 1/2"H  $\times$  19 3/8"W  $\times$  10 1/8"D ..... \$1600

**RS-1506US.** Similar to RS-1500US except 4-track 2-channel playback/record and 2-track 2-channel playback ..... \$1600

**RS-1700.** Similar to RS-1506US except automatic reversing 4-track 2-channel record/playback, no 2-track 2-channel playback ..... \$1600

## TELEX

### Telex/Magnecord 1400 Series

Three-speed (15, 7 1/2, 3 3/4, 1 7/8 ips) open-reel tape recorder. Accepts reel sizes up to 8 1/4". Available with a variety of head configurations for single-, two-, or four-track operation. Features brushless dc servo ball-bearing drive system. Wow and flutter 0.35% at 3 3/4 ips, 0.24% at 7 1/2 ips, 0.17% at 15 ips, all DIN weighted, or 0.25% at 3 3/4 ips, 0.17% at 7 1/2 ips, 0.12% at 15 ips, all unweighted rms; S/N ratio 60 dB NAB weighted; frequency response 30-10,000 Hz  $\pm 3$  dB at 3 3/4 ips, to 18 kHz at 7 1/2 ips; 35-22,000 Hz at 15 ips (two-track); crosstalk 50 dB at kHz (two-track head); inputs 150-ohm microphone, balanced bridge, unbalanced bridge, mixing bridge, aux bridge; outputs 150/600 ohms balanced, +4 dBm aux A and B unbalanced. Features VU meters; separate microphone and line-input controls; master gain control; catenary head block design; hyperbolic heads to ensure intimate tape-head contact: 110/130 volts ac, 50/60 Hz; 180 Watts ..... from \$2500

### Telex/Magnecord 3000 Series

Professional-style three-motor 1/4" system that offers option of purchasing transport, electronics package, and accessories separately or as a package and choice of speeds and head formats. Accepts up to 10 1/2" reels with NAB Type A or B hubs and fits 19" racks. Features transformer-isolated CMOS-logic transport controls; automation capability; Automatic Cue Release (AQR) switch; interchangeable head blocks for variety of head configurations; snap-on head cover with mu-metal



shield; heavy-gauge head assembly plate that accommodates up to four heads and contains tape guides, head selector switch, and optical infrared sensor. Wow and flutter 0.22% DIN, 0.15% wrms at 3 3/4 ips to 0.15% DIN, 0.1% wrms at 15 ips; speeds 3 3/4 and 7 1/2 ips or 7 1/2 and 15 ips; record/play frequency response  $\pm 3$  dB 50-20,000 Hz at 15 ips, 30-18,000 Hz at 7 1/2 ips, 20-12,000 Hz 3 3/4 ips with adjustments optimized for 3M 176 tape; S/N 60 dB or better NAB weighted with half-track head, 3M 176 tape; record/play THD at 1 kHz 1% or less at 0 dB with 600-ohm line output termination; equalization adjustable for most standard or high-output, low-noise tapes; crosstalk rejection 50 dB or better at 1 kHz; fast-forward/rewind times 90 sec or less

for 10 1/2" 2400-ft tape, 80 sec for 7" 1200-ft tape. Transport: 19"W  $\times$  12 1/4"H  $\times$  10"D; 46 lb. Record/play electronics: 19"W  $\times$  5 5/8"D  $\times$  3 1/2"H; 5.5 lb ..... \$1990-\$2470

## UHER by WALTER ODEMER

### SG-631 Logic Open-Reel Deck

Three-speed (7 1/2, 3 3/4, 1 7/8 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 (7 1/2 ips), to 16,000 Hz (3 3/4 ips), to 12,500 Hz (1 7/8 ips); S/N 65 dB (two-track at 7 1/2 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; 10 1/2-in reel, max ..... \$2357

### SG 561 Royal Open-Reel Deck

Four speed (7 1/2, 3 3/4, 1 7/8, 1 5/8 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% (7 1/2 ips), 0.1% (3 3/4 ips), 0.2% (1 7/8 ips); frequency response 20-20,000 Hz (7 1/2 ips), to 15,000 Hz (3 3/4 ips), to 9000 Hz (1 7/8 ips); S/N (weighted, DIN 45500) on two-track 67 dB (7 1/2 ips), 66 dB (3 3/4 ips), 65 dB (1 7/8 ips), on four-track 65 dB (7 1/2 ips), 64 dB (3 3/4 ips), 61 dB (1 7/8 ips); crosstalk -60 dB (mono), -45 dB (stereo); 13.9"H  $\times$  18"W  $\times$  7.5"D ..... \$1785

### 4200 Report Monitor Recorder

Four-speed (7 1/2, 3 3/4, 1 7/8, 1 5/8 ips) two-track three-head 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; master level control with separate left/right record controls; dual peak-reading level meters; 5-in. max. reel size; ac, single-cell, car, or rechargeable battery operation. Wow and flutter 0.15% (7 1/2), 0.2% (3 3/4), 0.25% (1 7/8); S/N 62 dB (rms A curve); frequency response (DIN 45500) 20-25,000 Hz (7 1/2), 20-16,000 Hz (3 3/4), 25-13,000 Hz (1 7/8), 25-5000 Hz (1 5/8); input range 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  
**4000AV.** Two-track mono version of 4200; has three heads ..... \$1190

## 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.

# 3

## BLANK TAPE

### AMPEX

**MPT (Metal Particle Tape) Cassette**  
Pure iron microparticles; metal bias; 70- $\mu$ sec equalization.  
367-C60. 60 min ..... \$9.99

**GMI (Grand Master II) Series Cassettes**  
Cobalt-modified gamma ferric oxide; high bias; 70- $\mu$ sec equalization.  
366-C80. 60 min ..... \$4.79  
366-C90. 90 min ..... \$5.89

**GMI (Grand Master I) Series Cassettes**  
Premium gamma ferric oxide; normal bias; 120- $\mu$ sec 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- $\mu$ sec 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- $\mu$ sec 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. 2400-ft, 10 $\frac{1}{2}$ -in NAB reel, 1.5 mil ..... \$26.99  
357-1731JA. 3600-ft, 10 $\frac{1}{2}$ -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 ..... \$1.89

### Videocassette 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

### ARISTA

**Cassettes**  
C60. 60 min ..... \$1.49  
C90. 90 min ..... \$2.19  
M30. Mini cassette ..... \$3.30

### AVANTI PRODUCTS

**Hi Energy Alpha Cassettes**  
Normal bias, 120- $\mu$ sec equalization; packed in hard Philips box; also available on blister display card (HEB designated).  
HEC-60. 60 min ..... \$1.49  
HEB-60. 60 min ..... \$1.65  
HEC-90. 90 min ..... \$1.95  
HEB-90. 90 min ..... \$2.10  
Philips box in polybag.  
HEC2/C-90. Two 90 min ..... \$3.95  
HEC3/C-60. Three 60 min ..... \$4.15  
HEC3/C-90. Three 90 min ..... \$5.55

**Ultra Low Noise Cassettes**  
Low-noise cassettes packed in hard Philips box; 5-screw assembled shell; precision pins and lubricated rollers; bronze spring and pressure pad; reversible index card; also available on blister card (LNB designated).  
LNC-40. 40 min ..... \$0.90  
LNB-40. 40 min ..... \$1.10  
LNC-60. 60 min ..... \$1.10  
LNB-60. 60 min ..... \$1.25  
LNC-90. 90 min ..... \$1.50  
LNB-90. 90 min ..... \$1.85  
LNC-120. 120 min ..... \$1.89  
LNB-120. 120 min ..... \$1.65  
In polybags; no boxes.  
LNC2/C-90. Two 90 min ..... \$1.99  
LNC3/C-60. Three 60 min ..... \$1.99  
LNC3/C-90. Three 90 min ..... \$2.99

**8-Track Cartridges**  
High output, low noise; rubber idler rollers; nonskid guide posts; pressure pad.  
BT-45. 45 min ..... \$1.75  
BT-90. 90 min ..... \$2.49

**CC6/C-60 Carrying Case with Cassettes**  
High-impact dark blue plastic cassette carrying case with translucent lid; holds up to 10 cassettes; includes six 60-min. cassettes ..... \$6.75

### BASF

**Metal IV Cassette**  
60 min ..... \$9.79

**Professional I Series Cassettes**  
Ferric-oxide formulation matched for Type I/normal/ferric positions.  
60 min ..... \$3.99  
90 min ..... \$5.49

**Professional II Series Cassettes**  
Pure chromium-dioxide formulation for Type II/chrome/high-bias position.  
60 min ..... \$4.49  
90 min ..... \$5.99

**Professional III Series Cassettes**  
Ferrichrome for FeCr/Type III position.  
60 min ..... \$4.29  
90 min ..... \$5.79

**Performance Series Cassettes**  
Normal/Type I/ferric position.  
60 min ..... \$2.79  
90 min ..... \$3.99

**Ferro Series Open-Reel Tape**  
Low-noise/high-output formulation exceeds professional recording studio requirements. Complete with sleeve and dust-proof box.  
1800-ft, 7-in. reel ..... \$12.99  
2400-ft, 7-in. reel ..... \$16.99

**Music Box**  
Black plastic storage cabinet holds up to 40 cassettes; can be mounted on wall or set on shelf ..... \$15.00

### Videocassette Tape

**Betamax Format**  
Chrome formulation  
L-500. 1-2 hrs ..... \$21.95

**VHS Format**  
Chrome formulation.  
T-120. 2-4 hours ..... \$29.95

### CERTRON

**Ferex I Cassettes**  
Premium tape.  
F-60 FE.60 min ..... \$3.00

# TDK CREATES SA-X.

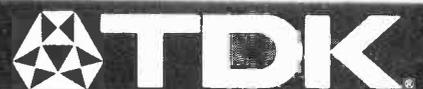
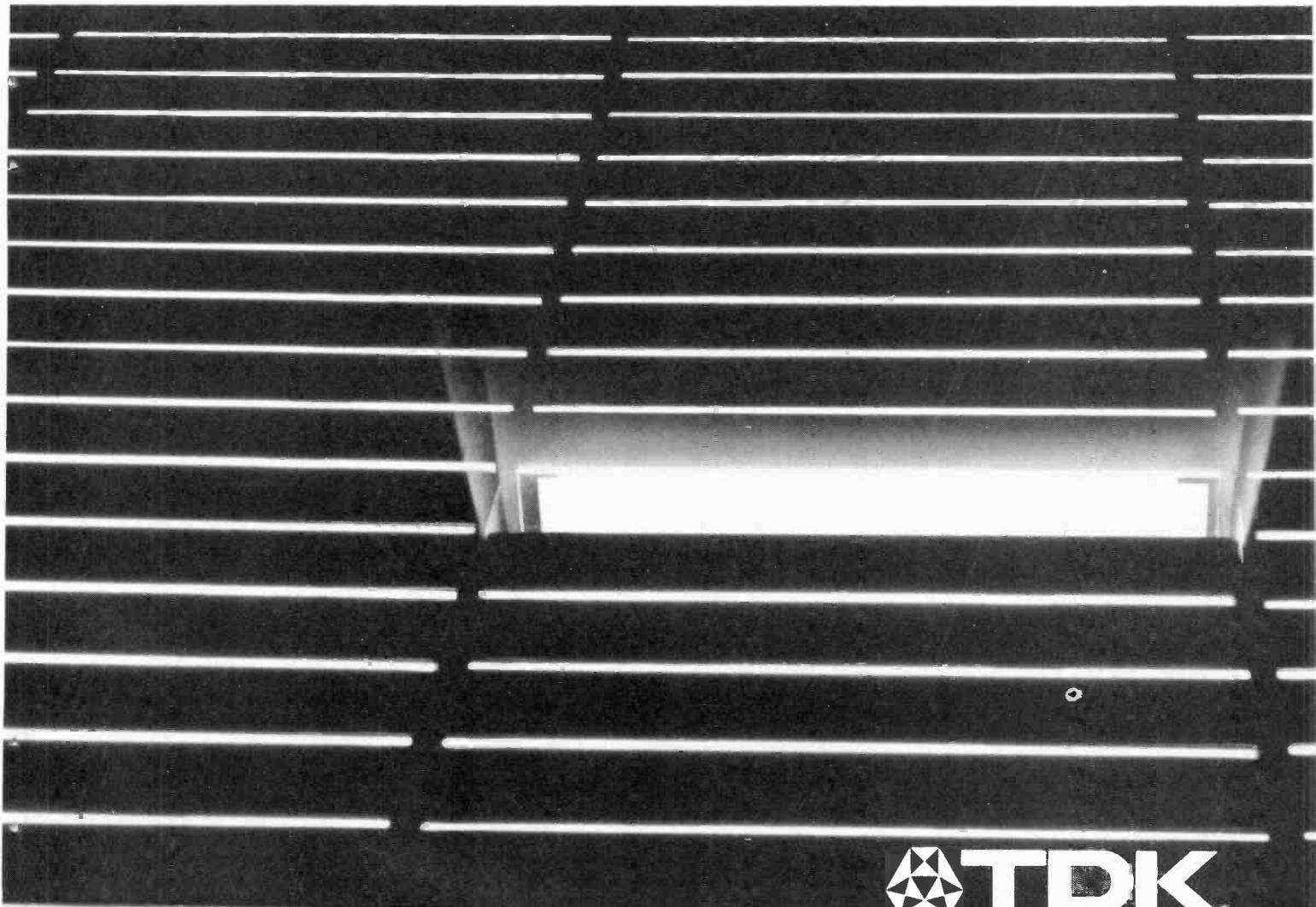
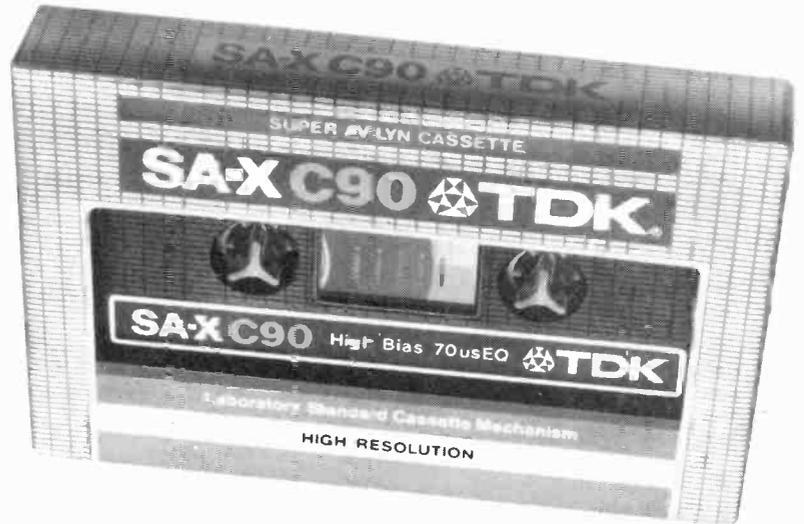
## Now you can explore the far reaches of high bias.

TDK has added a new dimension to high bias recording. It's called SA-X.

SA-X emerges from the Super Avilyn technology that has set the reference standard for high bias cassettes. Beyond that, TDK engineers saw new worlds of high bias to explore. By taking two layers of Super Avilyn with different coercivities and optimally matching them, TDK creates a formulation that raises high bias to a higher level. One that approaches the sound quality of metal.

You will hear rock and jazz soar to new heights. Classical, with more of its wide dynamic range. A clarity that even the best bias couldn't give you before. With every kind of music, SA-X brings you closer to the richness of a live performance. And it will keep you there, with its flawless mechanical construction. TDK has given SA-X the Laboratory Standard Mechanism for optimal interfacing with cassette deck heads. You'll hear its consistently superior performance for years to come.

SA-X performs like no other cassette. Expect it to cost a bit more. You can also expect it to take you further into high bias than you've ever been.



The Amazing Music Machine  
CIRCLE NO. 21 ON READER SERVICE CARD

# 3

## BLANK TAPE

F-90 FE:90 min .....\$3.99

### High Energy Gamma Cassettes

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 Cassettes

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 Cassettes

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

For Lanier, Olympus, and Panasonic capstan-drive machines

M60. 60 min .....\$3.99

### Dictation Cassettes

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 .....\$1.99  
 8T-90. 90 min .....\$2.49

### Tape Accessories

CHC. Cassette head cleaner .....\$0.99  
 8T-HC. 8-track head cleaner .....\$1.19

## DENON

### DXM Metal Cassette

Designed exclusively for music; features improved MOL in low and medium frequency range and SOL in high frequency range, wide dynamic range at high-frequency end, and stable and smooth magnetic coating with low drop-out; high-precision cassette shells and matrix sheets; 70- $\mu$ sec equalization.

C60. 60 min .....\$8.60

### DX-7 Series Cassettes

Chrome-position double-coated cobalt-doped tape for music programs; 70- $\mu$ sec equalization; high saturation output level in high frequencies and wide dynamic range; precision shell half.

C60. 60 min .....\$5.00  
 C90. 90 min .....\$7.00

### DX-5 Series Cassettes

Double-coated FeCr-type music tape; broad bias curve and +8-dB increase in maximum output level; bias setting of 70- $\mu$ sec; compatible with variety of cassette decks and program sources; ferrichrome position.

FC-60. 60 min .....\$5.00  
 FC-90. 90 min .....\$7.00

### DX-3 Series Cassettes

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

Metal coating with polyester base and pre-stressed polyester backing; very high output, ultra-low noise, 7-12 dB higher MOL than chrome; metal bias; 70  $\mu$ sec equalization; packaged in hinged plastic box.

C46. 46 min .....\$8.30  
 C60. 60 min .....\$9.10  
 C90. 90 min .....\$12.00

### FX-1 Premium Cassette Series

Pure Ferric coating with polyester base and backing; normal bias; 120  $\mu$ sec equalization; packaged in hinged plastic box.

C46FX-I. 46 min .....\$4.25  
 C60FX-I. 60 min .....\$4.89  
 C90FX-I. 90 min .....\$6.70

### FX-II Premium Cassette Series

Beridox coating with polyester base and backing; high bias; 70  $\mu$ sec equalization; packaged in hinged plastic box.

C46FX-II. 46 min .....\$4.40  
 C60FX-II. 60 min .....\$5.10  
 C90FX-II. 90 min .....\$6.95

### FL Low-Noise Cassettes

Ferric coating with pre-stressed polyester backing; packaged in hinged plastic box.

C46FL. 46 min .....\$3.00  
 C60FL. 60 min .....\$3.45  
 C90FL. 90 min .....\$4.70  
 C120FL. 120 min .....\$6.50

### Videocassette Tape

#### VHS Format

Fine-grain Beridox; high-impact ABS housing.

T-120. 2-6 hr .....\$29.65  
 T-90. 1 1/2-4 1/2 hr .....\$26.70  
 T-60. 1-3 hr .....\$21.65  
 T-30. 1/2-1 1/2 hr .....\$19.45

#### Beta Format

Fine-grain Beridox; high-impact ABS housing.

L-750. 1 1/2-4 1/2 hr .....\$26.95  
 L-500. 1-2 hr .....\$21.60  
 L-370. 3/4-1 3/4 hr .....\$18.10  
 L-250. 1/2-1 hr .....\$15.45  
 L-125. 1/4-1/2 hr .....\$14.00

### Video Head-Cleaning Cassettes

Non-abrasive head cleaner cleans heads in 10 seconds

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  
 ME-90. 90 min .....\$12.45

### 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 polybag.  
 261-C60-3PA-HK. 60 min; 3/bag .....\$3.30  
 261-C90-3PA-HK. 90 min; 3/bag .....\$4.50

In flip-top plastic box.  
 2000-C30. 30 min .....\$1.50  
 2000-C60. 60 min .....\$1.75  
 2000-C90. 90 min .....\$2.15

In flip-top plastic box and polybag.  
 2000-C60B. 60 min .....\$1.90  
 2000-C90B. 90 min .....\$2.30

### Low-Noise, Extended-Range Cassettes

Flip-top plastic box.  
 700 C-60. 60 min .....\$2.10  
 700 C-90. 90 min .....\$2.70

### 8-Track Cartridges

In dustcover.  
 8T45 DC. 45 min .....\$3.40  
 8T60 DC. 60 min .....\$3.65  
 8T90 DC. 90 min .....\$4.70

### Two 8-Track Cartridges in Box

2X42. Two 42 min .....\$4.00  
 2X84. Two 84 min .....\$4.75

### 270 Series Tape

Low-noise, high-output, back coated.  
 276-151. 1200-ft, 7-in reel .....\$12.15  
 277-151. 1800-ft, 7-in reel .....\$15.25

### 200 Series Professional Tape

Standard, 1 1/2-mil, polyester base, 1/4-in.  
 231-151. 1200-ft., 7-in reel .....\$8.95  
 Extra-length, 1-mil, polyester base, 1/4-in.  
 241-151. 1800-ft., 7-in reel .....\$11.25  
 Double-length, 1/2-mil, polyester tensilized base.  
 251-151. 2400-ft., 7-in reel .....\$17.40

### Videocassette Tape

#### Betamax Videocassettes

L250-10X. 1/2-1 hr .....\$15.95  
 L500-10X. 1-2 hr .....\$19.95

#### VHS Videocassettes

T-60. 1-2 hr .....\$17.95  
 T-120. 2-4 hr .....\$24.49

## JVC

### ME Metal Tape

Metal-particle-formulation cassette designed for the serious amateur recordist requires high bias and 70- $\mu$ sec EQ and delivers 4500-gauss flux density.

ME-46. 46 min .....\$9.50  
 ME-60. 60 min .....\$11.00

### ME-P Metal Cassette

Metal-particle-formulation cassette designed for the advanced audiophile requires high bias and 70- $\mu$ sec EQ and delivers 4800-gauss flux density.

ME-P-46. 46 min .....\$11.50  
 ME-P-60. 60 min .....\$13.00

### Videocassette Tape

#### VHS Format

T-30. 1/2-1 hr .....\$15.00  
 T-60. 1-2 hr .....\$17.00  
 T-120. 2-4-6 hr .....\$26.00

## KENWOOD

### MD Series Cassettes

Designed for metal bias/70- $\mu$ sec equalization.  
C-90. 90 min ..... \$15.00  
C-60. 60 min ..... \$12.00

### CD Series Cassettes

Cobalt-absorbed gamma ferric oxide formulation designed for high bias/70- $\mu$ sec equalization.  
C-90. 90 min ..... \$7.50  
C-60. 60 min ..... \$5.50

### ND Series Cassettes

Premium ferric-oxide formulation designed for normal bias/120- $\mu$ sec equalization. Particle shape, size, uniformity, and dispersion are controlled to yield maximum output level and low noise across frequency spectrum. High frequency response is 4 to 7 dB over conventional normal-bias tapes. Recommended for portable and car-stereo tape players.  
C-90. 90 min ..... \$6.50  
C-60. 60 min ..... \$4.50

### N Series Cassettes

High-grained ferric-oxide formulation with a high-frequency sensitivity of up to 4 dB over conventional low-noise/high-output tapes; designed for low-noise and low distortion on equipment with or without bias/equalization controls.  
C-90. 90 min ..... \$4.50  
C-60. 60 min ..... \$3.50

## LORANGER

### Loran Ferric-Oxide Cassettes

Designed for normal bias, 120- $\mu$ sec equalization settings.  
C-46. 46 min. .... \$4.55  
C-60. 60 min. .... \$5.55  
C-90. 90 min. .... \$7.65

### Loran Chrome Cassettes

Chromium-dioxide formulation designed for use with CrO<sub>2</sub> settings.  
C-60. 60 min. .... \$5.75  
C-90. 90 min. .... \$7.95

## LUX

### XM-IV Metal-Particle Tape

Premium tape for metal bias, 70- $\mu$ sec equalization.  
C-90. 90 min. .... \$14.95

## 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

### XL II-S Epitaxial Cassettes

High-level bias; 70- $\mu$ sec equalization.  
XL II-S 60. 60 min ..... \$6.40  
XL II-S 90. 90 min ..... \$8.65

### XL I-S Epitaxial Cassettes

Normal bias; 120- $\mu$ sec equalization.  
XL I-S 60. 60 min ..... \$6.40  
XL I-S 90. 90 min ..... \$8.65

### UD-XL-I Epitaxial Cassettes

Normal bias; 120  $\mu$ sec equalization.  
C-60. 60 min ..... \$5.49  
C-90. 90 min ..... \$7.59

### UD-XL-II Epitaxial Cassettes

Chrome type; high-level bias; 70  $\mu$ sec equalization.  
C-60. 60 min ..... \$5.49  
C-90. 90 min ..... \$7.59

# WHEN WE WERE BREAKING NEW GROUND IN CASSETTE SOUND, OTHERS WERE STILL BREAKING GLASS.



With the introduction of Metafine<sup>®</sup>, the world's first metal tape, Scotch<sup>®</sup> Cassettes brought cassette recording to the ultimate of true, pure sound.

But then, that's what you get with *every* Scotch Cassette: true, pure sound.

So if, for *any* reason, you're not perfectly satisfied with a Scotch Cassette, just send it back to us. We'll replace it free. And that's a lifetime warranty.



**SCOTCH<sup>®</sup> CASSETTES. THE TRUTH COMES OUT.**

# 3M

# 3

## BLANK TAPE

### Ultra-Dynamic Cassettes

Normal bias.	
UD-46. 46 min .....	\$3.89
UD-60. 60 min .....	\$4.19
UD-90. 90 min .....	\$6.19
UD-120. 120 min .....	\$8.29

### Low-Noise Cassettes

Normal bias.	
LN-46. 46 min .....	\$2.59
LN-60. 60 min .....	\$2.85
LN-90. 90 min .....	\$4.29
LN-120. 120 min .....	\$5.59

### 8-Track Cartridges

Normal bias; low noise.	
LN8T-46. 46 min .....	\$4.15
LN8T-60. 60 min .....	\$4.59
LN8T-90. 90 min .....	\$5.19

### Ultra-Dynamic Open-Reel Tape

Ultra-dynamic, high-energy type, normal bias.	
1.5-mil polyester	
UD50-60. 1200-ft, 7-in reel .....	\$10.75
UD50-120. 2500-ft, 10 1/2-in reel .....	\$30.55
1-mil polyester	
UD35-90. 1800-ft, 7-in reel .....	\$13.45
UD35-160. 3600-ft, 10 1/2-in reel .....	\$34.45

### 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 .....	\$13.45
UD-XL 50-120B. 2500-ft, 10 1/2-in reel .....	\$36.45
1-mil polyester	
UD-XL 35-90B. 1800-ft, 7-in reel .....	\$15.10
UD-XL 35-160B. 3600-ft, 10 1/2-in reel .....	\$41.60

### Microcassettes

MC-60 (three per card) .....	\$17.50
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### Tape Accessories

7-in plastic reel .....	\$4.75
7-in precision metal reel .....	\$10.99
10.5-in precision metal reel .....	\$17.29
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
Wand demagnetizer (WMD-110) .....	16.95
Cassette demagnetizer (HE-44) .....	\$29.95

### Videocassette Tape

### VHS Epitaxial Videocassettes

Cobalt-ferric oxide formulation; 1/2 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

1/2-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

1/2-inch.	
L-250 .....	\$15.40

L-500 .....	\$20.50
L-750 .....	\$25.10

### MEMOREX

#### METAL IV Cassettes

State-of-the-art metal formulation for metal bias (Type IV) and 70- $\mu$ sec equalization settings; low and midrange S/N ratio at +6 dB above conventional premium tapes; unique dustproof Memorex album locks open or closed, accepts cassettes in either direction.

METAL IV C-60. 60 min .....	\$7.99
METAL IV C-90. 90 min .....	\$9.99

#### HIGH BIAS II Cassettes

New superline uniform ferrite crystal oxide formulation for high-bias (CrO<sub>2</sub>, Type II) setting and 70- $\mu$ sec equalization; delivers flat frequency response at preferred record levels (0 dB) and 4 to 5 dB lower noise; unique dustproof Memorex album locks open or closed, accepts cassettes in either direction.

HIGH BIAS II C-60. 60 min .....	\$4.39
HIGH BIAS II C-90. 90 min .....	\$5.99

#### MRX I Cassettes

New unique ferric-oxide formulation for normal bias, 120- $\mu$ sec equalization settings; improved dynamic range across full sound spectrum; unique dustproof Memorex album locks open or closed, accepts cassettes in either direction.

MRX I C-30. 30 min .....	\$2.99
MRX I C-45. 45 min .....	\$3.19
MRX I C-60. 60 min .....	\$3.39
MRX I C-90. 90 min .....	\$4.99
MRX I C-120. 120 min .....	\$6.79

#### 8-Track Cartridges

45 min .....	\$3.49
60 min .....	\$3.79
90 min .....	\$4.09

#### Accessories

8-track head/capstan cleaner .....	\$3.59
cassette cleaning kit .....	\$3.19
8-track head cleaner .....	\$1.99
Cassette head cleaner .....	\$1.99

### Videocassette Tape

#### VHS Videocassettes

High Chroma, high r-f output for brilliant life-like color, excellent picture clarity and stability; features dustproof plastic storage case.

T-60. 1-2-3 hrs .....	\$16.99
T-90. 1 1/2-3-4 1/2 hrs .....	\$18.99
T-120. 2-4-6 hrs .....	\$24.99

#### Betamax Premium Videocassettes

High Chroma, high r-f output for brilliant life-like color, excellent picture quality and stability.

L-250 .....	\$12.45
L-500 .....	\$16.95
L-750 .....	\$20.95

### 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  $\mu$ sec equalization.

C60 .....	\$9.75
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#### SX Cassette Tapes

Single-coated; ionized cobalt and ferric oxide formulation; high coercivity permits use of CrO<sub>2</sub> bias and equalization (70  $\mu$ sec) 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  $\mu$ sec) as EX tape; extra-low noise, high output.

C60 .....	\$6.00
C90 .....	\$7.60

#### EX Cassette Tapes

Specially formulated ferrocystal 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

### OSAWA

#### MX Metal-Particle Cassettes

Metal-particle Professional Series cassettes; require metal bias, 70  $\mu$ sec EQ.

MX 46. 46 min .....	\$9.95
MX-60. 60 min .....	\$11.49

#### CR High-Bias Cassettes

Dual-coat high-bias Professional Series chrome-type ferri-cobalt cassettes; require high bias, 70  $\mu$ sec EQ.

CR 60. 60 min .....	\$4.49
CR 90. 90 min .....	\$6.99

#### FC Ferri-Chrome Cassettes

Dual-layer ferri-chrome Professional Series cassettes; require high bias, 70- $\mu$ sec EQ.

FC 60. 60 min .....	\$4.99
FC 90. 90 min .....	\$6.99

### PANASONIC

#### Videocassette Tape

#### VHS Videocassettes

NV-T60. 1-2-3 hr .....	\$17.95
NV-T120. 2-4-6 hr .....	\$24.95

### QUASAR

#### Videocassette Tape

#### VHS-Format

VC-T160. 1-2-3 hrs .....	\$14.50
VC-T120. 2-4-6 hrs .....	\$19.95

### REALISTIC

#### Supertape Metal Cassette

44-960. 60 min .....	\$9.95
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#### 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

44-801. 30 min .....	\$1.49
44-802. 60 min .....	\$1.89
44-803. 90 min .....	\$2.59
44-804. 120 min .....	\$3.19

#### Concertape Cassettes

44-605. 60 min .....	\$0.88
44-620. 90 min .....	\$1.25

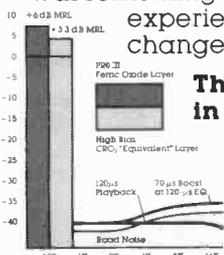
#### Concertape 3-Pack Cassettes

44-606. 30 min .....	\$1.99
44-607. 60 min .....	\$2.59
44-613. 90 min .....	\$3.59

# Professional III. "The only one for the road."



Today's more sophisticated car tape systems are every bit as good as many home sound systems — until you start your engine. Then engine noise, wind, tire whine and car vibration all begin to compete with the sound of your stereo. Until now, the listening environment was something less than a moving experience. PRO III has changed all that.



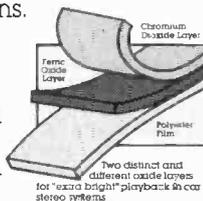
PRO III provides a higher maximum recording level (MRL) than high bias tapes, and effectively boosts the highs to overcome road and car noise.

### There's an "extra" in every cassette.

Since the playback equalization of most car stereos is 120μs, we designed PRO III at 70μs. This gives you

an "extra brightness" during playback, and it gives your high frequencies an added boost that stand out dramatically above ambient car noise.

PRO III also features two separate tape layers for peak performance, even under the most difficult listening conditions. 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.

Get the most out of your car's stereo system — get the new PRO III from BASF — it's the only one for the road.

### "The guarantee of a lifetime."

All BASF tape cassettes come with a lifetime guarantee. Should any BASF cassette ever fail — except for abuse or mishandling — simply return it to BASF for a free replacement.

**GUARANTEE OF A LIFETIME**



# BASF

For the best recordings you'll ever make.

# 3

## BLANK TAPE

### 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
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### Low-Noise Tape

44-733. 300-ft, 2 <sup>3</sup> / <sub>8</sub> -in reel, 0.5 mil.....	\$1.19
44-734. 225-ft, 3-in reel, 1.0 mil.....	\$1.19
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

44-843. 90 min.....	\$3.89
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### Low-Noise 8-Track Tape

44-840. 40 min.....	\$1.99
44-841. 80 min.....	\$2.59

## RCA

### VHS-Format Videocassettes

VK125. 3 hr.....	\$13.95
VK250. 6 hr.....	\$18.95

## 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

### Ultrachrome Cassettes

Chromium dioxide formulation; chrome (high) bias; 70- $\mu$ sec equalization; housed in five-screw polystyrene shell with chrome notch.

C-60. 60 min.....	\$4.49
C-90. 90 min.....	\$5.99

### Broadcast I Cassettes

Ferric formulation; normal bias; 120  $\mu$ sec equalization; housed in five-screw polystyrene shell.

C-60. 60 min.....	\$3.99
C-90. 90 min.....	\$5.49

### Xtra Dynamic Cassettes

Ferric bias; for home recording.

C-45. 45 min.....	\$2.49
C-60. 60 min.....	\$2.99
C-90. 90 min.....	\$3.99

### Videocassette Tape

### ColorChrome Videocassettes

Beta and VHS formats; packaging features dust-protector sleeve and color-coded filing system for home storage.

L-250. 1/2-1 1/2 hrs.....	\$12.95
L-500. 1-3 hrs.....	\$16.95

L-750. 1 1/2-4 1/2 hrs.....	\$20.95
T-60. 1-2 hrs.....	\$17.95
T-120. 2-4 hrs.....	\$24.95
T-180. 3-6 hrs.....	\$29.95

## SANYO

### Videocassette Tape

### Betacord videocassettes

L250.....	\$10.95
L500.....	\$13.95
L750.....	\$16.95
L830.....	\$22.95

## 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  $\mu$ sec 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 for use with recorders operating in the CrO<sub>2</sub> or 70  $\mu$ sec equalization position; improved cassette shell for critical mechanical performance and three-head recorder equipment; 3-dB S/N improvement over current CrO<sub>2</sub> 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 Tapes

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 7 1/2 ips, 1 mil.....	\$13.39
10 1/2-in metal reel, 120 min at 7 1/2 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 7 1/2 ips, 1.5 mil..	\$7.99
207. 7-in reel, 90 min at 7 1/2 ips, 1.0 mil..	\$9.99

### Dynarange Open-Reel Tapes

Provides high-fidelity recording even at 3<sup>3</sup>/<sub>4</sub> 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 7 1/2 ips, 1.5 mil.....	\$4.09
7-in reel, 60 min.....	\$6.29
212. 5-in reel, 45 min at 7 1/2 ips, 1.0 mil..	\$4.89
90 min, 7-in reel.....	\$8.39
213. 7-in reel, 120 min at 7 1/2 ips, 0.5 mil tensilized.....	\$12.59
214. 5-in reel, 90 min at 7 1/2 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 7 1/2 ips, 1.5 mil..	\$5.49
229. 7-in reel, 90 min at 7 1/2 ips, 1.0 mil..	\$7.59

### Videocassette Tape

### VHS-Format Videocassettes

T-30. 1/2-1-hr.....	\$18.45
T-60. 1-2 hrs.....	\$21.75
T-120. 2-4 hrs.....	\$27.95

### Beta-Format Videocassettes

L-250. 1/2-1 hr.....	\$14.95
L-500. 1-2 hrs.....	\$18.95
L-750. 1 1/2-3 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- $\mu$ sec metal equalization.

Metallic 48. 48 min.....	\$8.00
Metallic 60. 60 min.....	\$10.00
Metallic 90. 90 min.....	\$13.00

### FeCr Series Cassettes

Normal or FeCr bias; 70- $\mu$ sec FeCr equalization.

FeCr-48. 48 min.....	\$4.35
FeCr-60. 60 min.....	\$4.75
FeCr-90. 90 min.....	\$6.10

# 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

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# 3

## BLANK TAPE

### EHF Series Cassettes

Cobalt-adsorbed magnetic tape; high bias; 70µsec 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. 80 min .....	\$3.80
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### Eicassets

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

### Videocassette 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 .....	\$12.45
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

#### 631 Magnetic Tape

New Revox tape with improved maximum output

level at low frequencies. For 3% distortion, flux on tape reaches 1200 nWb/m, representing an S/N of 78 dB. Bias adjustment compatible with 621 tape.....\$36

D-C60. 60 min .....	\$3.39
D-C90. 90 min .....	\$3.99
D-C120. 120 min .....	\$3.99
D-C180. 180 min .....	\$5.59

### TAPE 5

#### Wide-Latitude Cassettes

Small-particle highly-polished gamma ferric oxide mastering cassette tape; normal bias and equalization; wide tolerance for differing bias settings of various cassette decks; S/N 64.4 dB; 5-stainless-steel-screw cassette shell; Norelco-type outer case with overlapping lid.

C-46. 46 min .....	\$2.99
C-60. 60 min .....	\$3.49
C-90. 90 min .....	\$4.49
C-120. 120 min .....	\$5.99

### TDK

#### "MA-R" (Metal Alloy-reference)

##### Cassettes

Metal bias; 70-µsec equalization; housed in reference standard diecast metal shell; high-frequency MOL and high coercivity for improved sensitivity and extra recording headroom.

MA-R C60. 60 min .....	\$11.89
MA-R C90. 90 min .....	\$15.99

#### "MA" (Metal Alloy) Cassettes

Metal bias; 70-µsec equalization; housed in precision molded plastic shell housing and laboratory standard mechanism.

MA-C60. 60 min .....	\$8.49
MA-C90. 90 min .....	\$11.49

#### "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 .....	\$4.99
SA-X C90. 90 min .....	\$6.99

#### "SA" (Super Avilyn) Cassettes

Cobalt-ferric formulation; high bias; 70-µsec equalization; extended frequency response and low noise; super precision mechanism.

SA-C60. 60 min .....	\$4.39
SA-C90. 90 min .....	\$6.19

#### "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; super precision mechanism.

OD-C60. 60 min .....	\$3.99
OD-C90. 90 min .....	\$5.49

#### "AD" (Acoustic Dynamic) Cassettes

Linear ferric oxide particle formulation for normal bias; 120-µsec equalization; high-end response and output level; for home and car decks.

AD-C60. 60 min .....	\$3.09
AD-C90. 90 min .....	\$4.49

#### "D" (Dynamic) Cassettes

Normal bias; 120-µsec equalization; precision mechanism.

D-C30. 30 min .....	\$2.09
D-C46. 46 min .....	\$2.29

### "EC" (Endless) Cassettes

Endless-loop design permits continuous repeating of recorded material; back coated; available with or without foil strip for machines with automatic shutoff sensor.

EC-20S(F). 20 sec .....	\$4.19
EC-30S(F). 30 sec .....	\$4.29
EC-1M(F). 1 min .....	\$4.39
EC-3M(F). 3 min .....	\$4.49
EC-6M(F). 6 min .....	\$4.99
EC-12M(F). 12 min .....	\$5.99

### GX Open-Reel Tape

Extremely high output level, extended range, low noise, low distortion tape for mastering and all critical recording applications. Back treated for smooth running and stable winding. Available in 35- and 50-micron thicknesses.

GX35-90B. 1800 ft, 7" plastic reel .....	\$12.95
GX35-180BM. 3600 ft, 10 1/2" metal reel .....	\$34.95
GX50-60B. 1200 ft, 7" plastic reel .....	\$10.95
GX50-120BM. 2500 ft, 10 1/2" metal reel .....	\$29.95

### LX Open-Reel Tape

High output level, extended range, low noise, low distortion tape for professional and all critical recording applications. Available in 35- and 50-micron thicknesses. Back treated (except for LX 35-90 and LX35-180M).

LX35-90. 1800 ft, 7" plastic reel .....	\$9.95
LX35-90B. 1800 ft, 7" plastic reel .....	\$10.95
LX35-180M. 3600 ft, 10 1/2" metal reel .....	\$27.95
LX35-180BM. 3600 ft, 10 1/2" metal reel .....	\$30.95
LX50-60B. 1200 ft, 7" plastic reel .....	\$9.95
LX50-120BM. 2500 ft, 10 1/2" metal reel .....	\$27.95

### Microcassettes

#### MA-MC60B Microcassettes

Same metal-alloy tape formulation as standard-size cassettes. High-MOL, high-coercivity tape for critical music recording in metal-compatible micro-cassette recorders.

MA-MC60B. 60 min .....	\$8.99
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#### AD-MC60B2 Microcassettes

Same acoustical dynamic formulation as standard-size cassettes. High-output, extended-range, low-noise tape for music and speech recording. Packed in twos.

AD-MC60B3. 60 min each .....	\$9.99
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#### D-MC60B3 Microcassettes

Same dynamic formulation as standard-size cassettes. Has flat response and low noise figure for speech recording. Packed in threes.

D-MC60B3. 60 min each .....	\$11.99
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### Videocassette Tapes

#### Super Avilyn HG VHS

High-grade formulation for higher output than standard videocassettes, 3-dB better color S/N level, and improved performance at all speeds, especially in 6-hr mode.

VAT-120HG. 2-4-6 hr .....	\$31.50
VAT-60HG. 1-2-3 hr .....	\$23.00

#### Super Avilyn VHS Videocassettes

VAT-120. 2-4-6 hr .....	\$26.00
VAT-90. 1 1/2-3-4 1/2 hr .....	\$22.00
VAT-60. 1-2-3 hr .....	\$19.00
VAT-30. 1/2-1-1 1/2 hr .....	\$17.00

#### Super Avilyn Beta Videocassettes

Special formula designed to give crisp, clear picture and brilliant color.

BAL-500. 1-2-3 hr .....	\$19.00
BAL-250. 1/2-1-1 1/2 hr .....	\$13.50
BAL-750. 1 1/2-3-4 1/2 hr .....	\$24.50

### NEED MORE INFORMATION?

Write directly to the manufacturer or distributor. A list of names and addresses starts on page 4.

# 4

## VIDEO CASSETTE RECORDERS

### AKAI

#### VPF-7350 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 x 11.5" W x 11.9" D .....\$1695

### GENERAL ELECTRIC

#### IVCR2014W Videocassette Recorder

VHS six-hour computer-programmable color videocassette recorder. Features electronic memory bank with eight 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); 14-channel pushbutton electronic tuning for any combination of VHF/UHF channels; three-digit tape counter with memory and program search; 12-function infra-red wireless remote control; pause control; standard standard/long/extended play tape speed selector; special video effects including slow and quick motion, freeze frame, frame advance; tracking control; includes 75-ohm coaxial cable, two 300 ohm UHF leads, 300/75 ohm transformer, 75/300 ohm transformer, and terminal block; high impact plastic construction with woodgrain finish. 18" W x 5 1/2" H x 14" D.....\$1439

#### 1VCR2002X Videocassette Recorder

VHS two or six hour video cassette recorder. Features built-in 24-hr digital clock/timer display with preselected auto start/stop; extended/stand-

ard play recording selector; built-in VHF/UHF tuner; tape counter with memory switch and program search; remote pause control for use within 16 feet; tracking control; audio dubbing; 17" W x 5 1/2" H x 14" D.....\$989

#### 1VCR1006X Videocassette Recorder

Six hour three-speed VHS color video cassette recorder. Features built-in digital clock timer for 10-day advance programming, built-in 12-channel electronic tuner; standard/long/extended play recording selector; 10X normal speed video scan in forward and reverse; tracking control; audio dubbing; remote pause control for use within 16 feet; 17 1/8" W x 5 1/2" H x 13" D.....\$1049

#### 1CVP2020X Portable VCR System

VHS six-hour computer-programmable color video cassette recorder; tuner/timer unit and portable deck with battery; tuner features electronic memory bank with eight program select LED indicators, auto start, stop and channel change, repeat program button; 9X normal speed video scan in extended play mode; 4-function remote control for use within 16 feet; audio dubbing; tracking control; portable deck for use with VCR color video camera. Features include built-in rechargeable battery for 1 hour of recording before recharging. Includes 75 ohm coaxial cable, 300 ohm lead cable, 75/300-ohm matching box, 300/75 ohm antenna adapter, line adapter, battery connection cord. Deck: 12" W x 4 1/2" H x 9 1/16" D. Tuner: 11 7/16" W x 4 1/2" H x 9 1/16" D.....\$1399

#### 1VC2030E Color Video Camera

Compact, lightweight (6.2 lbs) color video camera. Features include F1.4/6:1 power zoom lens, macro focus to two inches, adjustable electronic viewfinder with right or left side capability, automatic/manual iris control, telescoping boom microphone, automatic white balance check system, fade control, 6-ft cable with optional extensions, adjustable shoulder mount.....\$1019

### 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

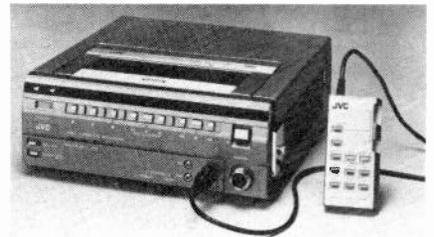
eject. Horizontal resolution 240 lines; input 0.5-2 V p-p/75 ohms unbalanced (video), -67 dBs/10k ohms unbalanced (mic), -20 dBs/50k ohms unbalanced (line); S/N 45 dB (video), 40 dB (audio); audio frequency response 50-10,000 Hz. Supplied with remote control unit with 16-ft cord, videocassette, dustcover, channel number film, antenna cable, two matching transformers, and power cord; 5 13/16" H x 18 1/2" W x 13 3/4" D.....\$1350

#### VF-C509U Electronic Viewfinder

Electronic viewfinder with black-and-white screen and monitoring capability; attaches to either side of camera and can be positioned at 180-degree angle; 1.5-in high-definition picture tube; 6 3/4" H x 2 15/16" W x 4 3/8" D.....\$110

#### HR-2200U Videocassette Recorder

Portable VHS VCR microprocessor that provides full-logic control over tape operations and solenoid-operated pushbuttons for the transport. Features ESC (Edit Start Control) that automatically aligns start of segment being recorded with end of previous recorded segment; Shuttle Search (X10) in forward and reverse; slow-motion playback (variable from 1/8 to 1/30 normal speed); freeze capability; single-frame advance; quartz-controlled brushless direct-drive drum motor; servo-controlled cap-



stan motor; reel motor; loading motor; lightweight glass-fiber reinforced plastic chassis; low-power-consumption LCD (liquid-crystal display) electronic tape counter with memory function; LED displays indicate tape running, battery warning, moisture condensation. Power consumption 9.6 watts. Can be run on ac, car battery, or optional battery pack. 11 5/16" W x 10 9/16" D x 4 1/16" H; 11.4 lb ....\$1100  
**TU-22U.** TV tuner/ac adaptor/battery charger/timer for HR-2200M VCR. Features 12-channel pre-tunable electronic tuner; timer facility for preset up to 10 days in advance; quick recharging of optional NiCd battery pack **NB-PI.** Stacks under HR-2200U.....\$320  
**AA-P22U.** Ac power adaptor/battery charger for HR-2200 VCR. Recharges self-contained NB-PI battery pack in about 1.5 hrs, 2 NB-PIs in series in 3 hrs.....\$160  
**NB-PI.** Rechargeable NiCd battery pack.....\$78  
**CB-P22BU.** Carrying bag for HR-2200 (brown or silver).....\$70

# 4

## VIDEO CASSETTE RECORDERS

**SC-P2U.** Shoulder cart for HR-2200 ..... \$160  
**AP-P2U.** Car battery cord for HR-2200 ..... \$13

### Video Cameras

#### GX-88U Color Camera

Color video/sound camera features 1 1/2" CRT electronic viewfinder; TTL (through-the-lens) viewfinder; 1-hr recording with NP-B1 rechargeable battery pack; 6X power-zoom lens that can be controlled manually or via 2 zoom buttons; close-up and wide-angle shooting as near as 4.3 ft; macro capability; built-in color-conversion filter; automatic iris control; shoulder-reat attachment; jacks for earphone and microphone; accessory shoe for mike or lighting device. Power consumption 5.8 W when used with HR-2200 and HR-6700U VCRs. 11 1/4"D x 9 1/8"H x 4 1/4"W; 14.7 lb ..... \$1050

#### GX-66U Color Camera

Vidstar color/sound camera with 6X zoom lens. Features 2 3/4" color vidicon with built-in color-stripe filter; single carrier frequency (3.6 MHz) multiplex color system; automatic iris control; through-the-lens (TTL) optical viewfinder; under- and over exposure indicators in viewfinder; three-position switch for adjusting white balance; condenser microphone with wind screen; 10-ft cable. Scanning system 525 lines, 2:1 interlaced NTSC output; viewfinder TTL optical with split-image focusing and diopter adjustment; video output -20 dB, low impedance video S/N ratio 45 dB; min. practical illumination 100 11 3/16"D x 4 3/4"H x 3 1/16"W without handgrip; 3.3 lb ..... \$850

**GX-33U.** Similar to GX-66U except has 3X zoom lens; measures 10 5/8"D and weighs 3.1 lb. .... \$750

**VF-P30U.** 1 1/2" CRT B&W electronic viewfinder for GX-66U/33U cameras. Features adjustable eyepiece and body angles; indicators for underexposure, recording/tape running, battery power, playback monitoring of audio and video with HR-2200. Shoulder rest and camera mount included ..... \$180

#### GS-100AU B&W Camera

Black-and-white camera with 2:1 zoom lens; TTL optical viewfinder; built-in microphone; F-stop adjustment wheel; VCR stop/start trigger with automatic shutter feature; ac adaptor; 2.6-lb weight ..... \$375

### MITSUBISHI

#### HS-3000 Video Cassette Recorder

Programmable six-hour two-speed VHS color video cassette recorder with five computer-controlled direct-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 1/3- 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; 6 1/4"H x 19 3/8"W x 13 1/2"D ..... \$1350  
 Remote control unit for HS-3000 ..... \$100

### PANASONIC

#### Omnivision Series

##### PV-1750 Videocassette Recorder

Six-hour programmable three-speed VHS color video cassette recorder with ddc and direct-drive capstan motors and two hot-pressed-ferrite video heads; can program up to eight different shows over two-week period. Features picture search in SP, LP, and SLP modes; soft touch controls; built-in programmable clock/timer with LED digital readout; built-in electronic UHF/VHF tuning with 14-pushbutton channel selection; auto rewind in record/play at end of tape; special motion features in SP and SLP mode via remote control; full-function remote control unit included; audio dubbing; four-digit counter with memory; one-hour battery-backup for clock; simulated wood grain finish ..... \$1495

#### Portable/Home VCRs

##### PV-4500 Videocassette Recorder

Lightweight portable/home 6-hour Super Long Play (SLP) VHS videocassette recorder with Omnisearch, switchable to long play (LP) 4-hr and standard play (SP) 2-hr recording/playback. Features still frame with frame advance in SLP mode; power-source operation ac, dc (via rechargeable battery pack), car battery; soft-touch transport operation (activates dc motor drives instead of solenoids); hot pressed ferrite video heads; direct-drive video head cylinder; built-in digital clock with time on, days of week, and time limiter for recording up to 8 different programs over 14-day period; audio dubbing capability; small built-in vhf/uhf tuner/timer; tracking control, complete with remote pause control; digital memory counter for automatic stop during rewind; dew detector that shuts off VCR under damp conditions; super lightweight annealed aluminum chassis; remote-control capability via optional color camera. Battery operation time 1 hr on LCR-1812P battery when using optional color camera; dc power consumption 8.4W. Supplied with accessories to hook up to all TV receivers and antennas; black NV-T60 videocassette ..... \$1400  
**PV-4100.** Similar to PV-4500 except no built-in digital clock or tuner/timer ..... \$1195  
**PV-A35P.** Optional tuner/timer for PV-4100 VCR features built-in digital clock and vhf/uhf tuner ..... \$395

**PV-A40.** Ac adaptor for PV-4000 series VCRs features multivoltage capability (100-240 V ac, 50-60 Hz) and battery charger for LCR-3012 VB and LCR-1812P batteries ..... \$145

**PK-R70.** VTR remote control unit. Controls camera/VTH switch, Omnisearch play, frame advance functions through color-camera cable when camera is attached to VCR; controls all necessary functions of VCR for spot editing that be viewed through electronic viewfinder of color camera; for use with PK-751, PK-771, and PK-801 color cameras ..... \$40

### PHILCO/GTE

##### V1011 Videocassette Recorder

Table-model VHS-format videocassette recorder with 2-knob vhf/uhf tuner. Features electronic functions; limited on-only timer; wired remote-control pause switch; 75/300-ohm balun antenna connectors. 19"W x 14 1/2"D x 5 1/2"H; 21 lb ..... \$849

##### V1441 Videocassette Recorder

Table-model VHS-format videocassette recorder with 24 hour timer. Features all-electronic functions; scan 4/6 hr; 6-hour record capability; wired still/channel-change/scan remote controller; 75/300-ohm balun antenna connectors. Comes with T-60 videocassette and wired 4-mode remote controller. 19"W x 14"D x 5 1/2"H; 26.5 lb ..... \$1049

##### V1551 Videocassette Recorder

Table-model VHS-format videocassette recorder

with 14-day timer. Features all-electronic operation; scan 4/7 hr; 6-hour record capability; simplified still; wired remote still/channel-change/scan/mid and super band controller; 75/300-ohm balun antenna connectors. Comes with T-60 videocassette and 4-mode remote controller. 19"W x 14"D x 5 1/2"H; 26 1/2 lb ..... \$1199

##### V1720 Videocassette Recorder

Two-piece portable VHS-format videocassette recorder with 24-hour timer. Features all-electronic operation; scan 6 hr; still 6 hr; frame advance 6 hr; wired still/frame-advance/scan remote controller; 75/300-ohm balun antenna connectors; earphone; shoulder strap; battery; connectors for ac adaptor, microphone plug, and battery cable. Comes with T-60 videocassette and wired remote controller. VCR deck 12"W x 9 3/4"D x 4 1/2"H; 14 lb. Tuner 11 1/2"W x 9 3/4"D x 4 1/2"H; 10 lb ..... \$1349

##### VCA105 Color Camera

Color-video/audio camera with 2-speed 6:1 power-zoom lens. Features side-mounted electronic viewfinder; automatic/manual iris; automatic white balance control; f/1.6 lens with macro capability; tally lamp; fade in/out; 6-dB sensitivity switch; hand grip; shoulder rest; viewfinder extension cable. 16 1/2"W x 6 3/4"D x 8"H; 6.75 lb ..... \$995

### QUASAR

##### VH5610 Videocassette Recorder

6-hr table-model videocassette recorder with 105-channel vhf/uhf tuning capability. Features 13-



function wireless remote controller; 4 heads; 8-program/14-day programmable timer; picture search function ..... \$1885  
**VH5310.** Similar to VH5610 but wired or wireless remote-control unit optional ..... \$1325  
**VH5210.** Similar to VH5310 except 1-program/24-hour programmability ..... \$1140

##### VH5410 Portable VCR

Portable 6-hour VHS-format videocassette recorder with picture-search capability. Features slow motion; still frame; frame advance; camera remote-control capability that allows VCR to functions to be controlled directly by optional camera ..... \$1075

##### VH5300 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-mh 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 x 11.5"W x 9.75" D ..... \$1000

**VA512.** 14-pushbutton varactor tuner for VH5300SE; has LED digital electronic clock/timer

display and auto fine tuning .....\$250  
**VAS20.** 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

**VH5011 Videocassette Recorder**  
 VHS-format videocassette recorder with mechanical tuner. Features synchro-touch controls and 1-program/24-hour programmable timer.....\$850

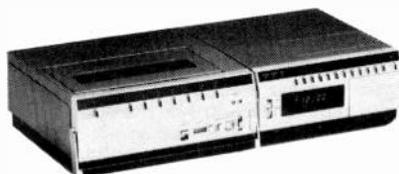
**Color Cameras**

**VK731.** Color-video/sound camera with 2-speed power zoom f/1.6 "fast" lens; macro capability; light shoe .....\$1120  
**VK726.** Similar to VK731 except zoom lens has lesser range.....\$1060

**RCA**

**VFP170 Portable VCR**

Six-hour, three-speed portable VHS VCR with direct-drive capstan and head-wheel motors; powered by built-in battery for 1 1/2 hrs recording time,



cigarette lighter socket with optional dc power cord, or ac line power. Includes microprocessor-controlled tuner/timer module that can be programmed to record up to 5 different programs on different channels over 7-day period. Features soft-touch transport controls; audio dubbing; three-digit tape counter with memory button; LED battery monitors; power saver that switches recorder automatically to standby after 5-min pause; air-damped cassette insert/eject; tracking control. Tuner/timer module features LED digital timer/clock display; electronic touchbutton tuning for channels 2-83; built-in ac power adaptor and battery charger. VCR output 1.0 V p-p  $\pm 0.2$  V; input 1.0 V p-p  $\pm 0.5$  V; r-f output level 1.5 3 mV. Module output 1.0 V p-p  $\pm 0.5$  V. VCR measures 11 3/8" D  $\times$  10 1/4" W  $\times$  4 5/8" H, weighs 15 lb.....\$1400  
**PDP500.** AC adaptor/battery charger for VFP 170 VCR; recharges built-in battery from ac house current, plays videocassettes on ac, or can be used for in-home camera recording; 11" D  $\times$  4 3/4" W  $\times$  4 1/2" H.....\$150

**VFT450 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 (9X normal speed) in fast forward or rewind (LP or SLP modes); electronic touchbutton tuning of VHF/UHF channels 14-82; can be programmed for up to 35 CATV channels; 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; 5 1/4" H  $\times$  18 5/8" W  $\times$  14" D.....\$1200  
**VET250.** Similar to VET450 except has built-in 24-hr electronic clock/timer with auto stop.\$1075

**VET650 Videocassette Recorder**

VHS VCR with up to 6 hrs recording time, picture search and variable-speed special effects, and automatic TV/VCR switching. Features full-function

remote control (pause, picture search, special effects, channel change); touch-button electronic VHF/UHF tuning; tape rewind; tape counter with memory switch; soft-touch transport controls; 14-day electronic programmer; LP/SP/SLP selector; scene transition stabilizer; audio dub; double-speed, slow-motion, stop-action capability; single-frame advance. Video recording system 4-head helical scan; antennas 75-ohm VHF, 300-ohm UHF; fast-forward rewind time 4 min. with VK250 (6-hr cassette); power consumption 62 W at 110-130 V ac, 60 Hz; 19" W  $\times$  14 3/4" D  $\times$  6 3/8" H; 33 lb.....\$1400

**CC006Color Video Camera**

Lightweight color VHS video camera with f1.8 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

**CC010 Color Video Camera**

Color video camera with f/1.8 lens with two-speed 8:1 power zoom. Features electronic viewfinder; automatic fade control; boom microphone; auto/manual iris; automatic white balance system; on-camera recording/pause control. Scanning 525 lines, 60 fields, 30 frames; video output level 1.0 V p-p composite into 75 ohms; audio output level -20 dB at 1k ohm; minimum illumination required 10 footcandles (100 lux); camera tube 2 3/3" striped vidicon; 9-ft 10-in. cable; camera mount 1/4"  $\times$  20 threaded hole; 16" D  $\times$  8 3/8" H  $\times$  8" W; 5.8 lb.....\$1050.

**SANYO**

**VCR Videocassette Recorder**

Programmable five-hour two-speed Betacord color video cassette recorder with three solenoid-actuated motors; can program one show over 24-hr period. Features high speed (15X normal speed) forward or reverse scan; freeze frame with single-frame advance; built-in electronic timer/clock with LED digital readout; sleep switch; one-touch recording; auto rewind at end of tape; four-digit tape counter with memory; includes six-function handheld remote control unit, vinyl dustcover, L500 videocassette, and connector cables and input transformers; 6.3" H  $\times$  17.6" W  $\times$  14.6" D.....\$995

**VTC9100A Videocassette 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  $\times$  19.5" W  $\times$  14.6" D.....\$895

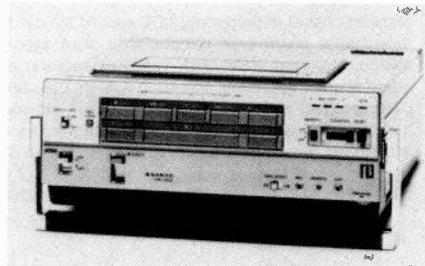
**VCR4200 Videocassette Recorder**

Beta-format table-model VCR with 3-day programmable recording, 2-speed operation, and remote pause control. Features 3-motor quartz-locked tape drive; fluorescent display that gives time of day when VCR is not being programed; advanced noise-cancelling circuitry; miniaturized all-electronic Varactor tuner; 12 channel-selector buttons for any combination of vhf and uhf stations; LED tuned-channel display; automatic rewind at conclusion of automatic record; sleep function that automatically shuts off entire unit; automatic fine tuning (aft); digital tape counter with memory; microphone input jack; audio and video inputs for optional camera or second VCR; audio and video output jacks; single F-type antenna connector; extra-compact design; TV system NTSC standard; video chrominance/luminance S/N ratio 35/43 dB; audio S/N ratio 42 dB; wow and flutter 0.2% wrms (Beta II); power consumption 40 W; 18 5/8" W  $\times$  13 3/4" D  $\times$  5 1/4" H; 22 lb.....\$895

**VCR4300.** Similar to VCR4200 except has 7-day programmability; full remote-control facilities; high-speed Betascan search; instant freeze frame; power consumption 33 W.....\$995

**Mini Components**

**VPR4800.** Portable Beta-format videocassette recorder with NiCd battery that recharges in only 1 hr. Features Betascan high-speed search; feather-



touch controls; 2-speed operation; moisture sensor and heater; audio dubbing; remote pause control; digital tape counter with memory; soft eject; 2-head, 3-motor transport. Power consumption 9.6 W at 120 V ac, 60 Hz; 10 3/4" W  $\times$  10 1/2" D  $\times$  4" H; 8.75 lb.....\$1045

**VTT481.** Tuner/timer with 12-switch all-electronic Varactor vhf/uhf tuner and 7-day programmability. Features fluorescent display of program timing and time of day; LED power-on, charging, channel-selected displays; clock and timer set buttons; automatic fine tuning (aft); TV/VCR switch; audio and video inputs and outputs; antenna inputs and outputs. Power consumption 60 W at 120 V ac, 60 Hz; F-type antenna in/out; 10 3/4" W  $\times$  10 1/2" D  $\times$  4" H; 16 1/2 lb.....\$350

**VSC450** Color-video/sound camera with VCR transport controls, electronic viewfinder with 1 1/2" monitor, and 6:1 f/1.4 2-speed power zoom lens. Features 12.5-mm wide-angle to 75-mm telephoto with macro capability lens; built-in telescoping-boom microphone; low-battery, pause, record, and immediate exposure status indicators in viewfinder. Connects directly to VPR4800 VCR but requires VCA adaptor for other VCRs. Scanning system EIA standard; 2 3/3" vidicon color-imaging system; horizontal resolution 250 lines; scene brightness 10-20,000 FC; video S/N ratio 45 dB; minimum focus 7.5 mm, macro mode; 13 1/2" D  $\times$  10 1/2" W  $\times$  3 3/8" H; 4.4 lb.....\$1195

**Video Cameras**

**VCC545P Color Camera**

Color-video/sound camera with electronic viewfinder with 1 1/2" monitor, tri-electrode color system, and 6:1 zoom lens. Features 4-position color temperature selector; built-in microphone; videocassette recorder stop/start trigger; 17.5-105-mm f/1.8 lens with 6X zoom. Scanning system EIA standard; 1" tri-electrode imaging system; horizontal resolution 250 lines, center; scene brightness 10-10,000 FC, automatically compensated; video S/N ratio 43 dB; power consumption 30 W at 117 V ac, 60 Hz; cable length 16 ft; 16.4" D  $\times$  11.2" W  $\times$  7.9" H; 7.7 lb.....\$995

**VCC524P Color Camera**

Color-video/sound camera with optical viewfinder, tri-electrode color system, and 25-mm f/2.0 lens. Features automatic light compensation; simplified color setting; LED aperture and hue indicators; remote stop/start trigger switch for VCR; auxiliary stop/start button; standard video and audio connectors; ac adaptor and 16-ft cable. Scanning system EIA standard; horizontal resolution 250 lines, center; scene brightness 10-10,000 FC; video S/N ratio 43 dB power consumption 30 W at 117 V ac, 60 Hz; 13.9" D  $\times$  11.2" H  $\times$  7.9" W; 5.7 lb.....\$695

**VC1400 B&W Camera**

Black-and-white video/sound camera with 16-mm f/1.6 lens and optical viewfinder. Features flip-up viewfinder; automatic light compensation; built-in

# 4

## VIDEO CASSETTE RECORDERS

omnidirectional microphone; LED record indicator; detachable pistol grip; remote stop/start trigger switch; standard video and audio connectors; ac adaptor and 20-ft cable. Scanning system EIA standard; imaging system 2/3" separate mesh vidicon; horizontal resolution 500 lines; scene brightness 1-10,000 FC with automatic compensation; video S/N ratio 42 dB; power consumption 7 W at 117 V ac, 60 Hz; 17.9"D × 5.9"H × 2.5"W; 2 lb...\$200

### SEARS

#### 5360 Portable VCR

Portable 4-head Beta-format videocassette recorder with 5-hr Beta II/III record capability, 91-channel vhf/uhf tuner, and 8-program/14-day programmable timer. Features micro-touch controls; audio dub; soft eject; clean edit; dew-protection sensor; tape counter; TV/VCR selector; audio and video outputs; tuning LED; 2-speed BetaScan; time on/off presets; fluorescent timer display; LED-type channel display. Includes wired 11-function remote-control unit for BetaScan forward/reverse at 5X normal speed; slow-motion playback at 1/3 to 1/30 normal speed; frame-by-frame advance; pause/still functions. Power consumption 13.2 W on battery; 10.9"W × 10.4"D × 4.5"H.....\$1195

#### 5322 Videocassette Recorder

Sears-Best table-model Beta-format videocassette recorder with Beta II/III 5-hr record time, 91 channel vhf/uhf tuner, and 8-program/14-day programmable timer. Features micro-touch controls; audio dub; soft eject; TV/VCR selector; clean edit; automatic program search; automatic rewind; dew-protection sensor; tape counter; audio and video outputs; automatic input selector; tuning LED; 2-speed BetaScan; frame-by-frame advance; stop motion; time on/off preset; fluorescent time/timer display; LED channel display; 11-function wired remote-control unit; standard and slow-motion playback; pause/still control. Power consumption 53 W; 18.3"W × 14.2"D × 6"H; 30.4 lb.....\$995

#### 5314 Videocassette Recorder

Beta-format videocassette recorder with 82-channel vhf/uhf tuning capability, using locking pushbuttons. Features up to 5 hours recording time; select-



able Beta II/III; audio dub; soft eject; automatic rewind at end of play; dew-protection sensor; tape counter; TV/VCR selector; audio and video outputs; automatic input selector; tuning LED; 1-program/3-day programmable timer; timer on/off presets; fluorescent timer display; LED channel display; remote pause. Power consumption 19.2"W × 14"D × 5.4"H.....\$785

#### 5310 Videocassette Recorder

Beta-format videocassette recorder with Beta II/III 5-hour recording capability and 82-channel vhf/uhf tuner. Features micro-touch controls; soft eject; dew-protection sensor; tape counter; TV/VCR selector; tuning LED; audio and video outputs; automatic input selector; 1-event/24-hour program-

mable timer; time-on preset; fluorescent timer display; LED channel display; remote pause. Power consumption 40 W; 19.2"W × 14"D × 5.4"H; 22.2 lb.....\$685

### Color Cameras

**53812.** Color-video/sound camera with 6X 16-84-mm zoom lens with macro setting and manual focus, electronic viewfinder, and built-in front/rear microphone on telescoping boom. Features VCR start, low-light, battery warning, and 2-light white balance LEDs in viewfinder and f/1.6 zoom lens. Horizontal resolution 250 lines; video S/N ratio 45 dB; sensitivity 75 LUX; 1 1/2" video tube in viewfinder; operating/standby power consumption 7/1 W; 4.18 lb. Separate ac power adaptor available.....\$945

**53802.** Similar to 53812 color camera except has 3.6X 14.5-52-mm f/1.8 manual zoom lens, no rear microphone.....\$795

### SHARP

#### VC-2250 2-Hour Portable Videocassette Recorder

One-piece ac/dc home portable VHS videocassette recorder with built-in timer/tuner and self-contained ac power pack. Features visual search at 5X normal speed forward; still-frame stop ac-



tion; built-in 24-hour one event programmable timer; vertical front-loaded air-damped cassette system; built-in vhf/uhf 12-position tuner/timer; MPU-controlled solenoid soft-touch transport; 2-hour record/play capability on battery; conventional 10-pin camera jack; built-in carrying handle and shoulder strap included; audio dubbing; 3-digit tape counter; dew warning light; dew prevention heater. Video signal system EIA standard, NTSC color; tape speed 1.31 ips; record/play time 120 min with T-120 tape; rewind/fast-forward time less than 5 minutes with T-120 tape; output channel 3 or 4; 75-ohm unbalanced vhf, 300-ohm balanced uhf antenna impedance; audio input -20 dB, 50k ohm balanced; mic input -70 dB, 2.2k ohm unbalanced; video output 1.0-V p-p, 1k ohms unbalanced; horizontal resolution 240 lines; video S/N ratio 46 dB; audio frequency response 50-10,000 Hz; S/N ratio 40 dB; 15 7/16"W × 11 1/2"H × 6 3/16"D; 19.8 lb. with ac adaptor.....\$1000

**BT-3200.** Optional rechargeable battery pack for VC-2250 VCR.....\$43

#### VC-7400 Videocassette Recorder

Front-loading programmable six-hour two-speed VHS color video cassette recorder programs one show over 24-hr period. Features built-in clock/timer with LED digital readout; built-in electronic VHF/UHF tuner with 12-pushbutton electronic tuning, illuminated channel indicators, and switchable automatic fine tuning; soft-touch solenoid function controls; tape remaining LED indicator; four-digit tape counter; one-touch recording; includes hand-

held remote pause control operable within 20-ft radius.....\$795

#### QC-35 Portable Color Camera

Portable color video camera with tri-electrode 1-in single vidicon tube, standard C mount 6:1 zoom lens, auto iris with manual override, 1.5-in electronic viewfinder/monitor, and built-in electret-condenser microphone.....\$1095

#### QC-30 Portable Color Camera

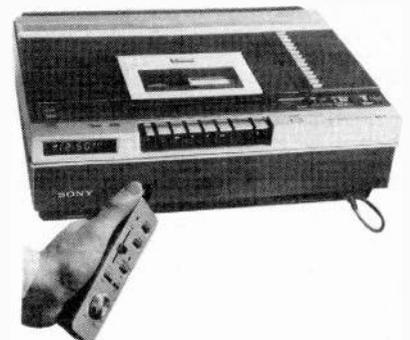
Portable color camera for use with VCRs with 2/3" Vidicon tube, zoom lens, hand grip, and viewfinder. Video signal system EIA standard, NTSC color; video output 1.0 V p-p composite; audio output level -20 dB, 1k ohm; horizontal resolution 240 lines; video S/N ratio 45 dB; minimum illumination 100 LUX; power consumption 8.5 W at 12 V dc; 10 2/32"D × 8 13/16"H × 3 11/16"W; 3.08 lb including zoom lens, hand grip, and camera cable.....\$600

**AA-126U.** Optional ac adaptor for QC-30 camera.....\$85

### SONY

#### SL-5800 Video Cassette Recorder

Five-hour programmable Betamax color video cassette recorder with double-azimuth video head. Features 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); 3X normal speed fast play; stop—1/3 normal speed variable slow motion; freeze-frame and frame-by-frame viewing; auto tab market (automat-



ically marks electronic signal on beginning of each recorded program on tape) with memory; 14 push-button VHF/UHF tuning; logic-controlled transport controls; audio dubbing; VTR/TV switch; B-I play, B-II record/play, variable slow motion, freeze-frame, frame-by-frame viewing, and cue/review in fast forward and rewind.....\$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. \$350

#### 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 backup system (automatically advances clock and keeps programming instructions for 10 minutes during power outage); BetaScan (searches in fast forward or reverse up to 13X normal speed); tab-marker electronic signal on beginning of each recorded program on tape); microprocessor direct mode-to-mode tape transport controls; 14-push-button UHF/VHF express tuning; 3X fast play; freeze frame with 15-ft cord; 6 1/2"H × 19 1/2"W × 14 7/8"D.....\$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; 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 X 296 mm W X 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

**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 X 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; 6 1/2" H X 19 3/4" W X 15" D .....\$1250

**Color Cameras**

For Betamax video cassette recorders.

**HVC-2000.** Video camera with Canon 6:1 motor-driven zoom and macro-lenses, electronic viewfinder with 1 1/2-in picture tube, automatic fade-in/out, and remote control capability.....\$1250

**HVC-2010.** Video cameras with 2:1 two-position lens (normal and telephoto settings) and direct optical viewfinder .....\$800

**HVC-2200.** Color video camera with built-in record-review function that automatically rewinds the last 2 seconds of the recorded tape in certain Sony VCRs to eliminate "jump cuts." Features electronic viewfinder with 1.5" video monitor that lets viewer review exactly what the camera lens sees; new timing phase circuit that assures clean picture edits without noise or distortion .....\$1300

**TOSHIBA**

**V-9035 Beta Videocassette Recorder**  
5-hour portable VCR in Beta format. Features two speeds for up to five hours recording time; quad track-4 head for super, still, variable slow motion forward and reverse; frame-by-frame slow motion with no electronic noise; programmability for up to 8 programs over a 2-week period; touch reference solenoid logic controls; wired remote control; Comput-R-Tune electronic tuning; visual cue and review picture search with Beta scan and 2X scanning. ....\$1545

**V8500 Videocassette Recorder**

Programmable 5-hour Beta-format VCR. Features dual-speed recording; quad track-4 head for super still, variable slow motion, frame-by-frame slow motion with no electronic noise; programmability for eight programs over two-week period; solenoid logic controls; audio dubbing; wired remote control;

Comput-R-Tune electronic touch tuning; visual cue and review; put on search with Beta scan; super scan; 2X scanning.....\$1495

**V8035 Portable VCR**

Two-speed portable Beta-format VCR offers up to 5 hours of recording time. Features visual cue and review Beta scan; touch reference control; audio dubbing; remote pause; memory counter; direct hook-up for Toshiba color cameras; tuner/timer with charge function and programmable one program per day.....\$1345

**Color Cameras**

**IK 1850AF.** Portable auto-focus color video camera with F/1.4 zoom lens with a range of 11-70 mm; manual override of auto focusing; electronic viewfinder and auto iris; built-in microphone; 2/3" univicon-2 vidicon tube; magnesium body. ..\$1395

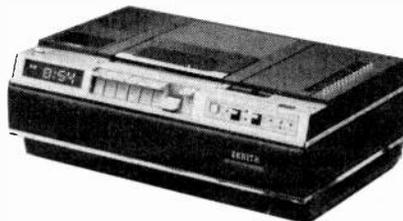
**IK 185AFS.** Same as IK 1850AF but with high-performance external microphone. ....\$1433

**IK 1850.** Same as IK 1850AF but with manual zoom lens instead of auto-focus lens. ....\$1450

**ZENITH**

**VR9750J Video Director VCR**

Beta-format videocassette recorder offers noise-free and jitter-free frame and variable-speed slow motion. An extra tape head repeats half of the picture image to eliminate jitter. Features speed search in forward and reverse at 10X normal speed; pause/stop action (still frame); two speeds



to provide up to five hours of recording and playing time; audio dub; electronic timer that can be set to record up to four different programs on four different channels over a 14-day period; daily or weekly repeat; automatic rewind at end of tape; frame-by-frame advance; Remote Video Action control. ....\$1350

**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

**VC1600.** Color video/sound camera with combined zoom lens (f/1.4, 11-70 mm fl) and macro lens; automatic/manual iris control; 2/3" single color tube; signal system EIA standards, NTSC color; maximum illumination 40 lux (4 fc) at f/1.4; automatic light control range 40-100,000 lux (4-10,000 fc); K-type 14-pin VCR connector; mini-jack microphone input suitable for low-impedance microphones (-60 dB); electronic viewfinder (supplied) with 1 1/2" monochrome picture tube; power requirements 12 V dc at 8.3 W for both camera and viewfinder (supplied from portable VCR or optional ac adapter); 13 7/8" D X 8 7/8" W X 7 7/8" H, including zoom lens, viewfinder, and grip. ....\$1150

**NEED MORE INFORMATION?**

Write directly to the manufacturer or distributor. A list of names and addresses starts on page 4.

**illinois audio**



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**SAVE** : time  
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on name brands

**CASSETTE TAPES**

SONY EHF-90 HIGH BIAS TAPE.....	28.00/10
SONY FER-90 HIGH BIAS PREMIUM ....	28.00/10
TDK MA-C90 METAL CASSETTE TAPE ...	\$64.00/10
TDK SAK-C-90 NEW PREMIUM TAPE ...	44.00/10
TDK OD-C-90 OPTIMUM STD. BIAS ....	35.00/10
TDK SA-C90 SUPER AVALIN TAPE ....	29.50/10
TDK SA-C80 SUPER AVALIN TAPE ....	22.50/10
TDK C-90AD NEW ALDUA TAPE .....	22.00/10
BASF C-90 PROFESSIONAL TYPE I .....	\$26.50/10
BASF PRO II OR III C-90 SPECIFY ..	29.00/10
MAXELL C-90 LN LOW NOISE TAPE ....	\$23.50/12
MAXELL C-60UD ULTRA DYNAMIC .....	23.00/12
MAXELL C-90UD ULTRA DYNAMIC .....	29.50/12
MAXELL UD-KL-C60 TYPE I OR II .....	29.50/12
MAXELL UD-KL C-90 TYPE I OR II ...	39.50/12
SCOTCH C-90 MASTER TYPE 2 OR 3 ...	31.50/10

**REEL TO REEL TAPE**

TDK LX-35-90M NEW 7IN. ....	\$60.00/10
TDK LX-35-180M NEW 10 1/2 IN .....	170.00/10
MAXELL UD-35-90 ULTRA DYNAMIC 7" ..	57.50/10
MAXELL UD-35-180 SAME ON 10 1/2" ..	153.00/10
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SCOTCH 207R-90 POLY-POSITRAX ...	55.00/10
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SCOTCH L-750 BETA TAPE .....	130.00/10
SCOTCH T-120 VHS TYPE .....	140.00/10

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MODEL 140-LC 60.00		681-EEES 60.50	
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SHURE 9095ED \$20 WITH TURNTABLE PURCHASE !!!			

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TS-695 6x9 3-WAY SPKR. SYSTEMS ....	82.00
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JENSEN J-1033 6x9 TRIAX® II SPKRS ..	79.00
JENSEN J-1037 6x9 CO-AX II® SPKRS ..	60.00
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# 5

# CAR STEREO EQUIPMENT

## ALPINE

### 7308 AM/FM-Stereo Receiver/Cassette Player

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<sub>2</sub>/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 watts per channel continuous; 2" H X 7<sup>1</sup>/<sub>16</sub>" W X 6<sup>1</sup>/<sub>4</sub>" D.....\$800

### 7136 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with PLL frequency synthesizer, digital tuned-frequency display, 10-station preset capability, and auto-reverse cassette deck. Features SCC tape head; auto reverse at end of play, fast forward, or rewind; ignition-key-off eject; metal/stereo dual-function switch; balance control; local/dis-



tant switch; preamp fader control; Tone Tenor control; automatic loudness adjustment; Dolby noise-reduction system; built-in engine noise suppressor; locking fast forward/rewind; power antenna lead; tape-direction indicators. Amplifier output 6 watts at 1 kHz, 8% THD; speaker impedance 4 ohms. Wow and flutter 0.1% wrms; frequency response ±3 dB 40-16,000 Hz metal, FeCr, and CrO<sub>2</sub>, to 13 kHz normal tape; S/N ratio 65 dB Dolby on, 55 dB Dolby off; separation 40 dB. FM usable sensitivity 16.3 dBf; alternate-channel selectivity 80 dB; S/N ratio 70 dB Dolby on, 60 dB Dolby off; capture ratio 2 dB; 6<sup>1</sup>/<sub>4</sub>" W X 5<sup>1</sup>/<sub>16</sub>" D X 2<sup>1</sup>/<sub>8</sub>" H.....\$450

### 7206 AM/FM-Stereo Receiver/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<sub>2</sub>/FeCr tape selector; auto replay at end of re-

wind 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.....\$430  
**7205.** Similar to 7206 without CrO<sub>2</sub>/FeCr switch and music sensor.....\$380  
**7204.** Similar to 7205 without four-way fader/balance control.....\$330

### 7307 Preamplifier/Tuner/Cassette Player

In-dash AM-stereo FM tuner/preamplifier/stereo cassette deck. Cassette deck features Dolby noise-reduction system, CrO<sub>2</sub>/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 65 dB (Dolby on). Radio features five-station pushbutton preset, noise eliminator switch, separate bass and treble controls, mute switch, loudness contour, DIN connector, and tone-bypass switch; FM usable sensitivity 1.4 μV; FM S/N 72 dB (Dolby on); FM capture ratio 1.5 dB.....\$400

### 7138 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with PLL frequency synthesizer, digital tuned-frequency display, and 10-station preset capability. Features SCC head; memory logic electronics; Dolby noise-reduction system; auto seek; metal/stereo dual-function switch; stereo indicator; Tone Tenor control; automatic loudness adjust; built-in engine noise suppressor; local/distant switch; digital clock; manual up/down tuning; locking fast forward/rewind; Cassette Glide loading system; tape-direction indicators; program switch; power antenna lead. Amplifier output 6 watts at 1 kHz, 8% THD; speaker impedance 4 ohms. Wow and flutter 0.1% wrms; frequency response ±3 dB 40-16,000 Hz metal, FeCr, CrO<sub>2</sub> and to 13 kHz normal tape; S/N ratio 65 dB Dolby on, 55 dB Dolby off; separation 40 dB. FM usable sensitivity 16.3 dBf; alternate-channel selectivity 80 dB; capture ratio 2 dB; 7<sup>1</sup>/<sub>16</sub>" W X 5<sup>1</sup>/<sub>4</sub>" D X 2<sup>1</sup>/<sub>8</sub>" H.....\$350

### 7202 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with Dolby noise-reduction system. Features electronic-glide cassette eject; automatic replay at end of rewind; auto eject at end of play/fast forward; separate bass and treble controls; mute switch; loudness contour. Amplifier output 8 watts continuous; speaker impedance 4 ohms. Wow and flutter 0.13% wrms; frequency re-

sponse 40-12,000 Hz; S/N ratio 65 dB Dolby on. FM usable sensitivity 1.4 μV; S/N ratio 72 dB Dolby on; capture ratio 1.5 dB.....\$330

**7201.** Similar to 7202 but without Dolby noise reduction and four-way variable fader/balance control.....\$280

### 7123 AM/FM-Stereo Receiver/Cassette Player

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<sub>2</sub>/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<sup>1</sup>/<sub>8</sub>" H X 7<sup>1</sup>/<sub>16</sub>" W X 5<sup>3</sup>/<sub>4</sub>" D.....\$330

### 7128 AM/FM-Stereo Receiver/Cassette Player

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<sup>1</sup>/<sub>8</sub>" H X 7<sup>1</sup>/<sub>16</sub>" W X 5.25<sup>1</sup>/<sub>8</sub>" D.....\$300

### 7327 AM/FM-Stereo Tuner/Cassette Player

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 without 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.....\$300

**7121 AM/FM-Stereo Receiver/Cassette Player**

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; 2"H × 7"W × 5.25"D.....\$280

**7120.** Similar to 7121 without cassette Dolby noise-reduction system and key-off eject; tape S/N 55 dB.....\$230

**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.....\$230

**7100 AM/FM-Stereo Tuner/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

**5400 Cassette Player/Power Amplifier/Equalizer**

Under-dash system with auto-reverse cassette deck, power amplifier, graphic equalizer, and Dolby noise-reduction system. Features 12-dB, 5-band graphic equalizer with slide controls, SCC tape head; locking fast forward/rewind; metal-CrO<sub>2</sub> switch; output power level indicators; Automatic Cassette Glide (automatically loads cassette into transport); auto reverse at end of play, fast forward, and rewind; ignition-key-off eject; loudness contour; tape-direction indicators; program switch; balance control; volume-control detent. Amplifier output 8 W/channel at 0.8% THD; frequency range 40-20,000 Hz. EQ center frequencies 60, 250, 1k, 3.5k, 10k Hz. Wow and flutter 0.1% wrms; frequency response ± 3 dB 40-13,000 Hz normal, to 16 kHz metal, FeCr, and CrO<sub>2</sub> tape; S/N ratio 65 dB Dolby on, 55 dB Dolby off; separation 40 dB; 6"W × 5.34"D × 2.14"H.....\$300

**AUDIOVOX**

**AVX-950 AM/FM-Stereo Receiver/Cassette Player**

In-dash modular AM/FM stereo radio with auto reverse cassette player; DIN-specified for imported 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; pushbutton 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 1% THD; FM stereo separation 25 dB; 2"H × 7 1/8"W × 6"D.....\$442

**IM-SPC AM/FM-Stereo Receiver/Cassette Player**

Pushbutton tuning AM/FM-stereo radio with auto-reverse cassette deck and built-in power amplifier. Features DIN-specified size for imported cars; AudioloK FM tuning circuit; locking fast forward/rewind; pushbutton eject; FM muting; separate bass and treble controls.....\$350

**AVX-680 AM/FM-Stereo Receiver/Cassette Player**

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.....\$320

**IM-CXP AM-FM/Cassette Deck**

In-dash DIN-specified pushbutton AM-stereo FM radio with new AudioloK FM tuner and cassette player. Unit features locking fast forward and rewind, stereo/mono, and four-way balancing..\$290

**AVX-900 AM/FM-Stereo Radio/Cassette Player**

Digital AM/FM-stereo radio with quartz lock and stereo cassette player. Features tuned frequency and quartz-regulated time displayed on LED panel display; 4-way balance control; locking fast forward; eject button; AM/FM and local/distant switches.....\$260

**AVX-685 AM/FM-Stereo Receiver/Cassette Player/Equalizer**

In-dash unit combines AM-stereo FM radio with new AudioloK FM tuner and stereo cassette deck with five-band graphic equalizer. Cassette features locking fast forward/eject control. Radio features front-to-rear fader; FM mute; mono/stereo; balance. Equalizer center frequencies set at 60, 250, 1000, 3500, and 10,000 Hz ± 10 dB boost or cut. Max output 20 W/ch, 16 W/ch with 10 THD; frequency response 50-10,000 Hz; FM sensitivity 5 μV at 30 dB S/N; FM separation 25 dB; 2"H × 7"W × 5 1/8"D.....\$270

**HCC-1026 AM/FM-Stereo Receiver/Cassette Player**

In-dash unit combines AM-stereo FM radio and auto-reverse stereo cassette deck with Dolby noise reduction. Cassette features locking fast forward and rewind; side-load cassette mechanism; tape program select; manual eject; tape equalization switch for 70 and 120 μsec; wow and flutter 0.25% wrms; frequency response 30-15,000 Hz; S/N 50 dB (Dolby off), 59 dB (Dolby on). Radio features pre-amp output jacks; AM/FM, FM mute, loudness pushbuttons; front-to-rear fader; separate bass and treble, tuning, volume, and balance controls; 10 W/ch with 1% THD; frequency response 40-15,000 Hz - 3 dB; S/N 62 dB (Dolby off), 65 (Dolby on); FM image rejection 65 dB; FM i-f rejection 80 dB; stereo separation 35 dB; supplied with 105-mm nosepiece.....\$390

**HCM-003 AM/FM-Stereo Radio/Cassette Player**

In-dash DIN specification AM-stereo FM radio and auto reverse, metal compatible cassette deck with Dolby noise-reduction system. Unit features locking fast forward and rewind; four-way balance; separate bass and treble, stereo hi blend, loudness.....\$350

**HCC-565 AM/FM-Stereo Radio/Cassette Player**

In-dash DIN specification AM-stereo FM radio and auto reverse cassette deck features locking fast forward and rewind; four-way balance; separate bass and treble; stereo hi blend.....\$370

**HCC-551 AM/FM-Stereo Receiver/Cassette Player**

In-dash unit combines AM-stereo FM radio and

stereo cassette deck; DIN-spec nosepiece designed for domestic and imported cars. Cassette features auto reverse, locking fast forward and rewind, pushbutton eject, and tape program indicators; radio features AM/FM, loudness, 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.....\$240

**HCC-500 AM/FM-Stereo Receiver/Cassette Player**

In-dash AM-stereo FM/cassette deck designed for imported cars. Cassette features locking fast forward/eject control; wow and flutter 0.35% wrms. Radio features dual ceramic filters; PLL multiplex demodulator; preamp output jacks; local/distant balance; LED stereo indicator; AM/FM selector; tone and volume; 5 W/ch continuous with 10 THD; frequency response 50-10,000 Hz; FM sensitivity 5 μV for 30 dB S/N; stereo separation 25 dB; 1 1/4"H × 6 1/4"W × 4 1/2"D.....\$150

**AVX 730 AM/FM-Stereo Receiver/Cassette Player**

Pushbutton AM FM-stereo radio with cassette player designed for import X-body, Citation, and full-sized cars. Features new AudioloK FM tuning; complete "Superflex" installation features; 5 pushbutton tuning; 4-way balance; locking fast forward; AM/FM and mono/stereo switches; super-compact chassis. Wow and flutter 0.3% wrms; frequency range 50-10,000 Hz; amplifier output 6 W maximum; FM stereo separation 20 dB; 12-V dc negative ground; 7 1/8"W × 6"D × 2 3/4"H.....\$190

**AVX 605A AM/FM-Stereo Receiver/Cassette Player**

In-dash unit combines AM-stereo FM radio and stereo cassette deck; designed for imported, X-body and Citation cars. Cassette features compact 4 1/2"D chassis; side-load cassette mechanism; locking fast forward/eject control; wow and flutter 0.35 wrms. Radio features local/distant, tone and balance controls, and AM/FM; LED stereo indicator; 4.5 W/ch power amplifier; frequency response 50-10,000 Hz; FM-sensitivity 5 μV at 30 dB S/N; supplied with two nosepieces for vertical or horizontal use; three-way trimplate; compact chassis; fully adjustable shafts; 1 3/4"H × 6 1/4"W × 4 1/2"D.....\$164

**HI-COMP Line**

**HCM-006 AM/FM-Stereo Radio/Cassette Player**

In-dash modular 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 metal 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; preamp output.....\$600

**HCC-1200 AM/FM-Stereo Radio/Cassette Player**

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, mono/stereo, local/distant, and AM/FM controls, and preamp output jacks; frequency response 50-12,000 Hz; speaker impedance 4 ohms.....\$650

**BLAUPUNKT**

**"Berlin" 8000 AM/FM Stereo/Cassette Player**

In-dash Am/FM-stereo/SW/LW receiver with

# 5

## CAR STEREO EQUIPMENT

unique remote control and metal-compatible auto-reversing cassette player and Dolby noise-reduction system. Features electronic scan tuning with seven station presets; Sound Ambient Level Sensor (SALS) automatic adjustment of volume rela-



tive to ambient noise; ASU circuitry to suppress FM noise. Power output 20 watts/ch.; frequency response on tape 30-15,000 Hz  $\pm$  3 dB; S/N 56 dB with Dolby on; FM sensitivity 1.5  $\mu$ V .....\$1395

### CR-3001 AM/FM-Stereo/Cassette Player

In-dash receiver with frequency-synthesized and digitally displayed tuning and metal-compatible automatic-reversing cassette player with Dolby noise reduction. Features 12 station presets; ASU circuitry to suppress FM noise; switchable EQ for ferric, CrO<sub>2</sub>/metal tapes. Power output 15 watts/ch.; tape response 63-14,000 Hz; wow and flutter 0.15%; FM sensitivity 2.5  $\mu$ V .....\$630

### CR-2001 AM/FM-Stereo/Cassette Player

In-dash receiver offers five AM/FM pushbutton tuning presets and auto-reverse deck with Dolby noise-reduction system. Features ASU circuit to suppress FM noise; switchable loudness contour. Power output 5 watts/ch.; tape response 35-14,000 Hz; wow and flutter 0.15%; FM sensitivity 1.8  $\mu$ V .....\$350

### CR-5100 AM/FM-Stereo/Cassette Player

In-dash receiver with digital clock, five AM/FM preset buttons, and Dolbyized metal-compatible auto-reversing cassette deck. Features ASU circuitry to suppress FM noise; switchable EQ for ferric and CrO<sub>2</sub>/metal tapes; separate bass and treble controls; switchable loudness compensation; local/distant switch; automatic night illumination of controls. Power output 5 watts/ch.; tape response 40-14,000 Hz; wow and flutter 0.15%; FM sensitivity 2.5  $\mu$ V .....\$344

### CR-2000 AM/FM-Stereo/Cassette Player

In-dash receiver with ASU circuitry to suppress FM noise and automatic-reversing cassette deck. Features locking fast-forward/rewind; powered cassette eject; variable tone and balance controls; local/distant switch. Output power 5 watts/ch.; tape frequency response 35-10,000 Hz; wow and flutter 0.15%; FM sensitivity 1.8  $\mu$ V .....\$275

## CLARION

### PE959A AM/FM-Stereo Radio/Cassette Player

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 equalization selector for metal and CrO<sub>2</sub> tapes, auto reverse, locking fast forward and rewind, and



pushbutton eject. Programmable tuner features five-station AM/FM pushbutton memory preset with electronic scanning; signal actuated stereo control circuit (SASC); Dolby B circuitry (FM and cassette) with LED; pushbutton local/distant; separate electronically controlled bass and treble controls; stereo/mono; loudness and program cancel switches; electronic balance control; designed to fit all domestic and imported cars; DIN output jacks and nosepiece, optional hi-power fader; 2"H  $\times$  7"W  $\times$  5 3/4"D .....\$900

### PE958A AM/FM-Stereo Radio/Cassette Player

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<sub>2</sub> 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 tuning with seek and scan, Dolby B with LED, pushbutton local/distant, and separate bass and treble controls; 2.75"H  $\times$  6"W  $\times$  5.5"D .....\$460

### PE956B AM/FM-Stereo Radio/Cassette Player

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, loudness, local/distant, and stereo/mono switches; LED station indicators; 1.75"H  $\times$  5.75"W  $\times$  7"D .....\$500

### PE840A Stereo Cassette Deck

Under-dash cassette playback/amplifier (4 W/ch). Features end loading; locking fast forward; eject button; end-of-tape stop; tone control; slide-type balance control; 5 7/8"H  $\times$  5 1/2"D  $\times$  17 5/8"H; 3 1/2 lb. ....\$69

### PE838A Stereo Cassette Player

Under-dash auto-reverse cassette player with 4 W/ch amplifier. Features tone control; program indicator light; end loading; eject button; left/right balance control; locking fast forward/rewind; 5 7/8"H  $\times$  5 1/2"D  $\times$  17 5/8"H; 6 1/4 lb. ....\$130

### PE 828A Cassette Player

Underdash stereo auto-reverse cassette player features 4 W/ch continuous power amplifier; locking fast forward and rewind; eject pushbutton; program indicator light; 1 7/8"H  $\times$  5 1/2"W  $\times$  5 7/8"D .....\$127

### PE768A AM/FM-Stereo Receiver/Cassette Player

Deluxe auto-reverse cassette deck with pushbutton-tune AM/FM-stereo receiver. Features 5-button tuning; Magi-Tune FM; 4 W rms/ch; FET front end; program indicator lights; local/distant, program-selector, and CrO<sub>2</sub> switches; stereo indicator light; line output; 4-way balance control; locking fast forward/rewind; eject button; power antenna lead; ultra-thin chassis design; 7"W  $\times$  6"D  $\times$  1 3/4"H; 4 1/2 lb. ....\$273

### PE765A AM/FM-Stereo Receiver/Cassette Player

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 and stereo lights, program selector, and balance control; output 4 W/ch continuous; adjustable shafts; power antenna lead; 2"H  $\times$  5.5"W  $\times$  7"D .....\$255

### PE758 AM/FM-Stereo Receiver/Cassette Player

In-dash unit combines AM-stereo FM radio and 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  $\times$  6"W  $\times$  7"D .....\$273

### PE751B AM/FM-Stereo Receiver/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 over 90% of U.S. and foreign cars. Tape wow and flutter 0.13% wrms and frequency response 30-15,000 Hz; 2"H  $\times$  7"W  $\times$  6.25"D .....\$350

### PE751C AM/FM-Stereo Receiver/Cassette Deck

In-dash Hi-Way Fidelity Series high-power AM/FM-stereo pushbutton receiver and auto-reverse cassette deck. Features 5 station pushbuttons; adjustable shaft; 10 W output power at less than 1% THD per channel; Dolby noise-reduction system on FM and cassette; Magi-Tune FM; stereo and Dolby indicator lights; Sendust tape heads; local/distant switch; locking fast forward/rewind; CrO<sub>2</sub> equalization switch; bass, treble, left/right balance, front/rear fader controls; tape jamming protection system; Z connector; line output; equalizer jack; power antenna lead; 7"W  $\times$  6 1/4"D  $\times$  2"H; 6 1/2 lb. ....\$350

### PE683 AM/FM-Stereo Receiver/Cassette Player

In-dash cassette player with AM/FM-stereo receiver. Features auto-stop at end of play; adjustable shafts; 4 watts rms/channel output power; FET front end; stereo indicator light; end loading; fast forward/eject; tone and left/right balance controls; local/distant switch; bass-boost circuitry; 7 1/2"W  $\times$  5 1/2"D  $\times$  2"H; 4 1/4 lb. ....\$120

### PE624A AM/FM-Stereo Receiver/8-Track Cartridge Player

In-dash 8-track player with AM-FM-stereo receiver. Features adjustable shafts; FET front end; vertical head tracking; 4 program indicator lights; automatic stereo/mono switching; stereo light; tone and balance controls; local/distant switch; dial-in-door; AM/FM slide switch; amplifier output 4 W rms/channel; 7 1/8"W  $\times$  5 1/4"D  $\times$  2"H; 3 lb. ....\$120

### PE572A AM/FM-Stereo Receiver/Cassette Player

Deluxe auto-reverse cassette deck with AM/FM-stereo radio. Features SASC FM; program and stereo indicator lights; local/distant and CrO<sub>2</sub> switches; 4-way balance; locking fast forward/rewind; tone control; power antenna lead; ultra-thin chassis design; amplifier output 4 W rms/channel; 7"W  $\times$  6 1/4"D  $\times$  1 3/4"H; 4 1/2 lb. ....\$225

## PE560A AM/FM-Stereo Receivers

### Cassette Player

In-dash unit combines AM-stereo FM radio and stereo cassette deck. Cassette: features auto reverse, locking fast forward/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, auto stereo/mono and balance controls; stereo indicator light; 4 W/ch continuous; adjustable shafts; 2" H × 7.125" W × 5.5" D. ....\$216

**PE559A.** Similar to PE-560A without tape auto reverse and direction indicators and auto stereo/mono switching; has auto eject. ....\$185

## PE554A AM/FM-Stereo Receiver/Cassette Player

In-dash unit combines AM-stereo FM radio and stereo cassette deck; compact chassis for imports. Cassette features locking fast forward. Radio features FET front end tuner; local/distant; 3.5 W/ch continuous; 1 3/4" H × 6 1/4" W × 4 3/4" D. ....\$135

## PE550A AM/FM-Stereo Receiver/Cassette Player

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, balance, and LED Dolby and stereo indicators; 4 W/ch continuous; adjustable shafts; 2" H × 6.25" W × 7" D. ....\$255

## CRAIG

## T687 AM/FM-Stereo Receiver/Cassette Player

In-dash entertainment center with scanning electronic tuning and presets for up to five each AM and FM stations. Power Play 4-channel amplifier, and Dolby noise reduction for tape and FM. Features auto-reverse transport; Sendust-alloy tape head; digital display of time and tuned station; separate bass and treble and front and back balance controls; metal/CrO<sub>2</sub> EQ switch; locking fast forward/rewind; loudness control. Power output 12.5 W/ch into 4 ohms 35-20,000 Hz at 1.0% THD; wow and flutter 0.2% wrms; FM usable sensitivity 20.9 dBf; FM alternate-channel selectivity 60 dB; capture ratio 2 dB. ....\$550

**T693.** Similar to T687 but with 6 each FM and AM station presets; 2-channel amplifier (12 W/ch); sensitivity 20.2 dBf; selectivity 50 dB; capture ratio 1.5 dB; wow and flutter 0.15%. ....\$400

## T690 AM/FM-Stereo Receiver/Cassette Player

In-dash receiver/player with five station presets, auto-reverse tape deck, and Dolby noise reduction. Features Sendust-alloy tape head; metal/CrO<sub>2</sub> EQ; separate bass, treble, balance, fader controls; local (mute)/distant and stereo/mono pushbuttons; loudness control; automatic power antenna switching; dial-light dimming; line-level output jacks. Power output 12 W/ch into 4 ohms 120-20,000 Hz at 5% THD; wow and flutter 0.15% wrms; FM usable sensitivity 17.6 dBf; FM alternate-channel selectivity 65 dB; capture ratio 1.7 dB. ....\$260

**T692.** Similar to T690 except no station presets; no Sendust-alloy tape head; no metal/CrO<sub>2</sub> switch; FM sensitivity 20 dBf; capture ratio 1.5 dB. ....\$220

**T691.** Similar to T692 except no Dolby NR; no auto-reverse tape deck. ....\$170

## T619 AM/FM-Stereo Receiver/Cassette Player

In-dash receiver/cassette player with auto-reverse

transport, Electronic Search and Play (ESP), and Dolby noise reduction. Features Sendust-alloy tape head; metal/CrO<sub>2</sub> tape EQ switch; locking fast forward/rewind; illuminated tape-direction indicators; separate bass, treble, balance and fader controls; separate local/distant and stereo/mono buttons; FM muting; loudness control; power-off eject; automatic power antenna switching; line-level output jacks. Power output 12 W/ch into 4 ohms 80-20,000 Hz at 5% THD; wow and flutter 0.18% wrms; FM usable sensitivity 18.8 dBf; FM alternate-channel selectivity 65 dB; capture ratio 2.0 dB. ....\$250

## T641 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with 5 preset tuning pushbuttons, auto-reverse tape deck, and power-off eject. Features separate bass and treble controls; loudness control; balance and fader controls; power antenna switching; line-level output jacks. Power output 12 W/ch into 4 ohms 100-20,000 Hz at 5% THD; wow and flutter 0.15% wrms; FM usable sensitivity 21.3 dBf; FM alternate-channel selectivity 60 dB; capture ratio 2.0 dB. ....\$200

**T618.** Similar to T641 except no present tuning; wow and flutter 0.1%; FM sensitivity 21.8 dBf; capture ratio 2.4 dB. ....\$170

**T614.** Similar to T618 except no auto-reverse tape deck; no bass and treble controls; power output 4 W/ch; FM sensitivity 22.7 dBf; capture ratio 1.8 dB; wow and flutter 0.12%. ....\$140

## T640 AM/FM-Stereo Receiver/Cassette Player

In-dash system with auto-reverse tape deck, preset tuning, power-off eject. Features locking fast forward/rewind; separate bass and treble controls; separate local/distant and stereo/mono switches. Power output 4 W/ch into 4 ohms 200-20,000 Hz at 5% THD; wow and flutter 0.15%; FM usable sensitivity 18.3 dBf; FM alternate-channel selectivity 60 dB; capture ratio 0.15% wrms. ....\$170

## T617 AM/FM-Stereo Receiver/Cassette Player

In-dash player with auto-reverse tape deck, precision power loading for cassettes, and reverse pushbutton. Features locking fast forward/reverse; separate balance and fader controls; separate local/distant and stereo/mono switches; power-off eject. Power output 4 W/ch into 4 ohms 100-20,000 Hz at 5% THD; wow and flutter 0.12% wrms; FM usable sensitivity 23.4 dBf; FM alternate-channel selectivity 60 dB; capture ratio 0.12% wrms. ....\$150

**T610.** Similar to T617 except no reversing tape deck; no precision power loading; no balance and fader controls; no reverse button; no mono/stereo switch; has separate stereo and matrix buttons; wow and flutter 0.15% wrms; FM sensitivity 25.2 dBf; capture ratio 2.7 dB. ....\$100

## T560 AM/FM-Stereo Receiver/Cassette Player

Designed especially for most import and X-body cars; unit has auto-reverse tape deck, Dolby noise reduction, and Electronic Search and Play (ESP). Features Sendust-alloy tape head; metal/CrO<sub>2</sub> tape EQ; separate bass, treble, balance, and fader controls; locking fast forward/rewind; loudness control; power-off eject; automatic power antenna switching; line-level output jacks. Power output 4 W/ch into 4 ohms 100-20,000 Hz at 5% THD; wow and flutter 0.15% wrms; FM usable sensitivity 17.8 dBf; FM alternate-channel selectivity 65 dB; capture ratio 2.5 dB. ....\$250

**T530.** Similar to T560 except no ESP. Has preset buttons for 5 AM or FM stations; no bass and treble controls; nonautomatic power antenna switching. FM sensitivity 18.0 dBf; capture ratio. ....\$190

## T150 AM/FM-Stereo Receiver/Cassette Player

Designed especially for most import and X-body

cars. Features auto-reverse tape deck; locking fast forward/rewind; local/distant and mono/stereo switches; AFC (automatic frequency control); LED stereo indicator; power-off eject. Power output 4 W/ch into 4 ohms 200-10,000 Hz at 5% THD; wow and flutter 0.17% wrms; FM usable sensitivity 19.9 dBf; FM alternate-channel selectivity 60 dB; capture ratio 1.5 dB. ....\$130

**T500.** Similar to T501 except no auto-reverse tape deck, mono/stereo switch; power output 3.5 W/ch; wow and flutter 0.20%; FM sensitivity 24.3 dBf; FM selectivity 80 dB; capture ratio 2.5 dB. ....\$100

## R230 AM/FM-Stereo Tuner/Cassette Player

In-dash tuner/player with preset tuning, auto-reverse transport, and Dolby noise reduction. Features Sendust-alloy tape head; metal/CrO<sub>2</sub> tape EQ; precision power loading of cassette; locking fast forward/rewind; illuminated tape-direction indicators; separate bass, treble, and loudness controls; FM muting; local/distant and mono/stereo switches; dial-light dimming; power-off eject; power antenna switching. Wow and flutter 0.24% wrms; frequency range 30-25,000 Hz; FM usable sensitivity 28.8 dBf; FM alternate-channel selectivity 70 dB; capture ratio 2.5 dB. ....\$260

**R200.** Similar to R230 except no FM muting; FM sensitivity 20.8 dBf; capture ratio 2.8 dB. ....\$250

## S611 AM/FM-Stereo Receiver/8-Track Player

In-dash unit features separate local/distant and mono/stereo switches; auto/manual program change; illuminated stereo and program indicators. Power output 4 W/ch into 4 ohms 200-15,000 Hz at 5% THD; wow and flutter 0.15% wrms; FM usable sensitivity 19.9 dBf; FM alternate-channel selectivity 50 dB; capture ratio 0.15% wrms. ....\$90

## T130 Stereo Cassette Player

Under-dash stereo cassette player/power amplifier with auto-reversing tape deck. Features separate bass and treble controls; locking fast forward/rewind; balance control; eject button. Power output 4 W/ch into 4 ohms 150-20,000 Hz at 5% THD; wow and flutter 0.15% wrms; frequency response 45-10,000 Hz ± 3 dB; S/N ratio 50 dB. ....\$110

## 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. Radio features FM noise blanker, FM muting, and four-way fader control. Frequency response 40-14,000 Hz. ....\$600

## CR-1130 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with 5-button preset tuning (3 FM, 2 AM) and auto-reverse cassette player. Features



separate bass and treble controls; high-cut filter; normal and CrO<sub>2</sub>/metal tape capability; locking

# 5

## CAR STEREO EQUIPMENT

fast forward/rewind; FM muting; Automatic Separation Control (ASC) on FM; dual-gate MOSFET front end with agc action; ceramic filters for FM selectivity; loudness switch; FM stereo and tape direction indicators. Amplifier output 16 W/ch minimum into 4 ohms at 10% THD; frequency response 40-20,000 Hz  $\pm 3$  dB; S/N ratio 70 dB A weighted. FM usable sensitivity 20 dBf; frequency response 30-15,000 Hz  $\pm 3$  dB; alternate-channel selectivity 60 dB; stereo separation 35 dB at 1 kHz; capture ratio 3 dB. Wow and flutter 0.09% wrms; frequency response 40-14,000 Hz  $\pm 3$  dB; S/N ratio 53 dB A weighted. 7" W  $\times$  5 45/64" D  $\times$  1 11/16" H; 3.8 lb.....\$300

**CR-1030.** Similar to CR-1130 except has no separate bass and treble controls or fader control. Tape frequency response 40-14,000 Hz; amplifier output 4 W/ch.....\$240

### GP-7881 AM/FM-Stereo/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.....\$250

**DP-7872.** Similar to GP-7881 without Dolby system; adjustable shafts for American cars.....\$175

**DP-7874.** Similar to GP 7881 except without Dolby noise reduction and four separate amps..\$170

### DP-644 AM/FM-Stereo Receiver/Cassette Player

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  $\pm 3$  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  $\pm 3$  dB; 14 7/64" W  $\times$  7" H  $\times$  5 2 1/64" D.....\$220

**DP-640S4.** Similar to DP-644 except has only 4 W/ch amplifier output.....\$185

### DP-646 AM/Fm-Stereo Receiver/Cassette Player

Extra-powerful in-dash DIN-concept system with autoreverse cassette player and DSS (Direct Sound System) switch. Features LTM tape head; normal and CrO<sub>2</sub>/metal tape selector; separate bass, treble, volume, and tune controls; anti-roll system to reduce wow and flutter due to car motion; automatic-start tape mechanism; ASC (Automatic Separation Control) on FM; soft mute; noise blanker. Amplifier output 16 W/ch into 4 ohms at 10% THD; frequency response 30-15,000 Hz  $\pm 3$  dB; S/N ratio 70 dB A weighted. FM usable sensitivity 20 dBf; frequency response 30-15,000 Hz  $\pm 3$  dB; alternate-channel selectivity 56 dB; image/i-f response ratio 70/90 dB; stereo separation 35 dB at 1 kHz; capture ratio 3 dB. Wow and flutter 0.2% wrms; frequency response 40-10,000 Hz  $\pm 3$  dB; S/N ratio 55 dB A weighted; separation 43 dB. 7" W  $\times$  5 5/16" D  $\times$  1 11/64" H.....\$250

### DP-1006 AM/FM-Stereo Receiver/Cassette Player

In-dash miniature AM-stereo FM/cassette deck. Cassette player features locking fast forward/eject; chrome tape compatibility; tape and indicator light; wow and flutter 0.15% wrms; frequency response 60-12,500 Hz  $\pm 3$  dB; S/N 50 dB. Radio features 5 W/ch into 4 ohms from 30-20,000 Hz with 10.0% THD; frequency response 30-10,000 Hz  $\pm 3$  dB; dial-in-the-door; separate bass and treble controls, loudness; local/distant switch; FM muting; LED stereo indicator light; FM 50 dB quieting sensitivity 23 dBf; image rejection 70 dB; FM i-f rejection 65 dB; stereo separation 35 dB. Adjustable shafts fit most Asian, European, and American cars. 13 3/4" H  $\times$  6 1/4" W  $\times$  4 1/2" D.....\$165

### DP-620 AM/FM-Stereo Receiver/Cassette Player

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  $\pm 3$  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 50-dB quieting 24 dBf, selectivity 64 dB at 400 kHz, stereo separation 30 dB, and frequency response 30-15,000 Hz  $\pm 3$  dB; 14 7/64" H  $\times$  7" W  $\times$  5 2 1/64" D.....\$150

### GP-1010 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with 5-button preset tuning and illuminated dial in cassette door. Features multi-color AM, FM, stereo, tape-end, and tape-run LEDs; soft-touch local/distant and mono/stereo switches; locking fast-forward/eject switch; FM noise blanker; AM/FM selector behind tuning control and high/low tone switch behind volume/balance control. Amplifier output 4 W/ch into 4 ohms at 10% THD; frequency response 63-20,000 Hz  $\pm 3$  dB. FM usable sensitivity 26 dBf; frequency response 30-15,000 Hz  $\pm 3$  dB; alternate-channel selectivity 70 dB; stereo separation 30 dB at 1 kHz; image/i-f response ratio 56/82 dB; capture ratio 6 dB. Wow and flutter 0.15% wrms; frequency response 63-14,000 Hz  $\pm 3$  dB; S/N ratio 53 dB A weighted; separation 34 dB. 6 11/16" W  $\times$  4 23/32" D  $\times$  1 2 1/32" H; 3.1 lb.....\$190

### Component Series

**SP-711.** 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. \$171

**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, 100, 3500, and 15,000 Hz,  $\pm 10$  dB; frequency response 20-40,000 Hz; THD 0.1%; S/N 60 dB.....\$120

## JENSEN

### RE518 AM/FM-Stereo Receiver/Cassette Player

Car system with digital electronic scanning tuner, PLL (phase-locked loop) frequency synthesizer,



and auto-reverse cassette deck with Dolby noise-reduction system. Features 5 each AM and FM station preset tuning; quartz synthesizer for clock and

tuned frequency display; CrO<sub>2</sub>/normal equalization; loudness control; separate fader/balance and bass/treble controls; feather-touch cassette transport control. Wow and flutter 0.12% wrms; frequency range 30-15,000 Hz; S/N ratio 50 dB A weighted; amplifier output 10 watts; 7 1/16" W  $\times$  4 3/4" D  $\times$  1 3/4" H.....\$400

### R425 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with auto-reverse cassette deck, Dolby noise-reduction system, preamp outputs, and Syntex tape heads. Features solenoid-operated tape-direction selector; 5 pushbutton presets; loudness compensation; locking fast forward/rewind; automatic high blend; pushbutton eject; separate bass/treble and balance/fader controls. Wow and flutter 0.12% wrms; frequency range 30-15,000 Hz; S/N ratio 55 dB Dolby off, 62 dB Dolby on; separation 30 dB; amplifier output 10 watts; 7 1/16" W  $\times$  5 5/16" D  $\times$  1 5/16" H.....\$380

### T415 AM/FM-Stereo Tuner/Cassette Player

In-dash unit combines AM-stereo FM radio and auto reverse metal-compatible stereo cassette deck with Dolby noise reduction. Cassette features Syntox<sup>®</sup> ceramic tape heads; locking fast forward and rewind; eject and program buttons; wow and flutter 0.15% wrms; frequency response 50-10,000 Hz  $\pm 1.5$  dB. Radio features five-button AM/FM preset tuning; high blend circuitry; separate bass and treble controls; mono/stereo, loudness, Dolby on/off, and rotary balance and fader controls; usable sensitivity 15 dBf; 50-dB quieting sensitivity 19 dBf, capture ratio 1.5 dB; requires separate power amplifier.....\$300

**R406.** Similar to T415 without Dolby; has 10-W power amplifier; wow and flutter 0.23% wrms; tape response 50-12,000 Hz; FM usable sensitivity 14.8 dBf (1.5  $\mu$ V); overall frequency response 30-15,000 Hz.....\$290

## KENWOOD

### KRC-711 AM/FM-Stereo 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. 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 30-16,000 Hz; amplifier boosting 4 W/ch continuous to front-mounted speakers and 15 W/ch continuous to reardeck speakers.....\$499

**KRC-721.** Same as KRC-711 without built-in power amplifier.....\$449

**KRC-511.** Similar to KRC-711 without bi-directional tape advance; amp output 4 W/ch.....\$439

**KRC-411.** Similar to KRC-511 except local/distant switch and metal compatibility replace loudness, key off eject, Dolby, and separate bass and treble; X-body size; 13 3/4" H  $\times$  7 1/8" W  $\times$  4 7/8" D.....\$399

### 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 4 W/ch continuous; 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.....\$279

**KRC-312 AM/FM-Stereo Receiver/Cassette Deck**

In-dash 20-watt/channel (into 4 ohms) AM/FM stereo receiver with auto-reversing cassette deck. Features 5-channel preset and manual tuning; local/distance switch; ANRC; hard Permalloy tape head; bass/treble controls; balance control; AM/FM switch; fader control. FM tuner sensitivity 15.8 dBf; S/N 68 dB mono. Cassette deck wow and flutter 0.15% wrms; frequency response  $\pm 3$  dB 63-12,500 Hz; stereo separation 35 dB; S/N 60 dB A weighted with Dolby on.....\$330

**KRC-322.** Similar to KRC-312 except can handle normal, CrO<sub>2</sub>, metal tapes .....\$369

**KRC-722 AM/FM-Stereo Tuner/Cassette Deck**

In-dash unit with PLL synthesized tuning, digital numeric frequency display, auto-reverse cassette deck, and Dolby noise-reduction system. Features Automatic Broadcast Sensor System (ABSS); automatic noise reduction system (ANRS); auto-scanning; 5 AM, 5 FM station preselect plus manual tuning; key-off eject; bass and treble controls; mono/stereo switch; local/distance switch; muting; normal, CrO<sub>2</sub>, and metal tape capability; hard Permalloy head. FM tuner sensitivity 14.8 dBf; frequency response 30-15,000 Hz  $\pm 2$  dB; S/N 70 dB mono. Cassette deck wow and flutter 0.12% wrms; frequency response 30-16,000 Hz  $\pm 3$  dB; stereo separation 35 dB; S/N 63 dB A weighted with Dolby on .....\$499

**KRC-922.** Similar to KRC-722 except has automatic seeking as well as automatic scanning; ceramic tape head; tape advance; FM tuner S/N 70 dB mono .....\$549

**KRC-1022 AM/FM-Stereo Tuner/Cassette Deck**

PLL synthesized tuner with manual and 12-channel preset tuning, automatic-reversing cassette deck, designed for European car body size installation.



Features ANRC; mono/stereo switch; ABSS; muting switch; noise killer; balance control; ARI (audio mute); seek tuning; key-off cassette eject; Dolby noise-reduction system; tape-advance control; fader control; bass/treble controls; local/distance switch; loudness control; digital numeric frequency display; display dimmer .....\$650

**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- $\mu$ sec equalization (accepts 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; 2 $\frac{1}{8}$ "H  $\times$  6 $\frac{1}{16}$ "W  $\times$  6 $\frac{1}{2}$ "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; bass and tre-

ble controls; output for powered antenna. FM section: S/N 70 dB; separation 40 dB; 2 $\frac{1}{8}$ "H  $\times$  6 $\frac{1}{16}$ "W  $\times$  6 $\frac{1}{2}$ "D .....\$299

**KZC-657 Cassette Deck/Amplifier**

Auto-reversing cassette deck/20-watt-per-channel (into 4 ohms) amplifier combo. Features Dolby tape noise reduction system; preamp output; metal-tape capability; key-off eject; soft-touch eject button; preamp output level control; bass and treble controls' loudness switch' concentric volume and balance controls. Tape section wow and flutter 0.12% wrms; frequency range 30-16,000 Hz; S/N 60 dB with Dolby on; fast-wind time 90 sec for C-60 cassette.....\$300

**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

**KGE-801 Radio/Tape Player/EQ/Amplifier**

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

**KGE-800.** Same as KGE-801 except with 8-track player and without weather band .....\$200

**KHP-1087 Designer Series Dashmaster**

AM/FM/MPX auto-reverse tape player with 12 watts rms per channel with less than 1% THD and Dolby noise reduction. Features pushbutton preselect of up to four each AM and FM stations; automatic high blend (high-end signal boost); Sendust tape head; separate bass and treble controls; mute; locking fast forward and rewind; custom designer kit that includes four reversible face plates .....\$280

**KID-597 Designer Series Dashmaster**

Pushbutton AM/FM/MPX radio with auto-reverse cassette tape player. Features automatic high blend (high-end signal boost); five preselect pushbuttons; mute; fader control; local/distance switch; locking fast forward and rewind .....\$240

**KID-58 AM-Stereo FM/Cassette Player**

In-dash AM-stereo FM radio/automatic reverse cassette player. Cassette features fast forward and rewind, manual tape eject, tape program selector switch, LED tape play and tape direction indicators. Radio features stereo balance and tone controls, local/distance switch, mute on/off, and LED stereo FM, AM, and FM indicators.....\$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; balance and fader controls .....\$176

**KID-575A AM-Stereo FM/8-Track Player**

In-/underdash unit combines AM-stereo FM radio and stereo 8-track player. Unit features channel selector; AM, FM, and channel indicator LEDs; sliding balance; AM/FM; local/distant; variable fader; five pushbutton AM/FM preset tuning; rotary volume and tone .....\$170

**KXI-87 Dashmaster Radio/Tape Player**

AM/FM/MPX pushbutton radio with auto-stop cassette player. Designed for imported cars, compact X-body, and Citation in-dash installation. Features five pushbuttons for tuning; fader control; local/distance switch; locking fast forward; auto-stop at end of tape. Comes with nosepieces for all models and in-dash installation hardware .....\$170

**MARANTZ**

**CAR-427 CompuTuner/Cassette Player**

In-dash unit incorporates stereo Compu Tuner/pre-amplifier/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  $\mu$ V, 75 ohms; stereo separation 30 dB at 1000 Hz; 2 $\frac{9}{16}$ "H  $\times$  7 $\frac{1}{8}$ "W  $\times$  5 $\frac{1}{8}$ "D; nose piece 2" H  $\times$  4 $\frac{1}{8}$ " W .....\$625

**CAR-410 CompuTuner 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 4W/ch continuous into 4 ohms with 0.9% THD; FM sensitivity 1.1  $\mu$ V at 75 ohms (12 dB); 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; 1 $\frac{3}{4}$ "H  $\times$  7 $\frac{1}{8}$ "W  $\times$  5 $\frac{7}{8}$ "D; nose dimensions 1 $\frac{5}{8}$ "H  $\times$  4 $\frac{1}{8}$ "W (DIN standard).....\$390

**CAR-400 CompuTuner/Cassette Player**

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-sta-

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## CAR STEREO EQUIPMENT

tion 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  $\mu$ V into 75 ohms; stereo separation 30 dB at 1000 Hz; 2 $\frac{1}{8}$ " H  $\times$  7 $\frac{1}{8}$ " H  $\times$  5 $\frac{1}{8}$ " D; nose piece 2" H  $\times$  4 $\frac{1}{8}$ " W.....\$500

### CAR-340 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with tape Dolby noise-reduction system, automatic-reverse cassette deck, and 5-station preset tuning. Features I.M.S. (Interference Management System) that minimizes FM multipath and fading problems; FM muting; separate bass and treble controls; metal-tape capability; preamp outputs; speaker fader control; locking fast-forward and rewind switches; C.M.S. (Continuous Music System) that automatically switches to FM when cassette is being operated in fast forward or rewind; Sendust tape head; automatic antenna power lead; dial-scale dimmer lead. Amplifier power 4 W/ch at 0.9% THD, kHz. FM usable sensitivity 14.77 dBf; frequency response 40-14,000 Hz  $\pm$  3 dB; S/N ratio 60 dB; selectivity 70 dB; stereo separation 34 dB at 1 kHz, selectivity 70 dB; Wow and flutter 0.15% wrms; frequency response 40-13,000 Hz  $\pm$  3 dB; S/N ratio 2dB Dolby in/out 60/52 dB. Preamp output level/impedance 500 mV/3k ohms. Chassis 7 $\frac{1}{8}$ " W  $\times$  5 $\frac{1}{8}$ " D  $\times$  1 $\frac{5}{8}$ " H  $\times$  1 $\frac{5}{8}$ " H; nosepiece 4 $\frac{1}{8}$ " W  $\times$  1 $\frac{5}{8}$ " H.....\$250

### CAR-330 AM/FM-Stereo Tuner/Amplifier/Cassette Player

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 16W. FM tuner section: usable sensitivity 1.8  $\mu$ V at 75 ohms; 50-dB stereo quieting 50V at 75 ohms; capture ratio 2dB at 65 dBf; selectivity 65 dB  $\pm$  400 kHz; stereo separation 30 dB at 1000 Hz; frequency response 40-14,000 Hz  $\pm$  3 dB; S/N 60 dB.....\$250

### CAR-322 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with Dolby noise-reduction system and auto-reverse cassette deck. Features Sendust tape head; I.M.S. (see CAR-340 above); FM soft muting; separate bass and treble controls; metal-tape capability; speaker fader control; locking fast-forward and rewind buttons; automatic antenna power and dial-dimmer leads. Amplifier output 4 W/ch at 0.9% THD. FM usable sensitivity 14.77 dBf; frequency response 40-14,000 Hz  $\pm$  dB; selectivity 70 dB; S/N ratio 60 dB; stereo separation 34 dB at 1 kHz; capture ratio 2 dB. wow and flutter 0.15% wrms; frequency response 40-13,000 Hz  $\pm$  3 dB; S/N ratio Dolby in/out 60/52 dB. Chassis 6 $\frac{3}{4}$ " W  $\times$  4 $\frac{3}{4}$ " D  $\times$  1 $\frac{3}{4}$ " H; nosepiece 4 $\frac{1}{8}$ " W  $\times$  1 $\frac{5}{8}$ " H.....\$290

### CAR-310 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with 5-station preset tuning and C.M.S. (see CAR-340 above); Features FM noise suppression (stereo/mono method); FM muting; separate bass and treble controls; automatic eject at end of

play; locking fast-forward and rewind buttons; automatic antenna power lead. Amplifier output 4 W/ch at 0.9% THD. FM usable sensitivity 16.36 dBf; frequency response 40-14,000 Hz  $\pm$  3 dB; S/N ratio 60 dB; selectivity 30 dB; stereo separation 30 dB at 1 kHz; capture ratio 2 dB. Wow and flutter 0.15% wrms; frequency response 40-13,000 Hz  $\pm$  3 dB S/N ratio 48 dB. Chassis 7 $\frac{1}{8}$ " W  $\times$  5 $\frac{3}{8}$ " D  $\times$  2 $\frac{5}{8}$ " H; nosepiece 4 $\frac{1}{8}$ " W  $\times$  1 $\frac{3}{4}$ " H.....\$000

### CAR-302 AM/-FM-Stereo Receiver/Cassette Player

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  $\mu$ V; 2 $\frac{3}{4}$ " H  $\times$  7 $\frac{1}{8}$ " W  $\times$  4 $\frac{3}{4}$ " D; nose piece 1 $\frac{3}{4}$ " H  $\times$  4 $\frac{1}{8}$ " W.....\$300

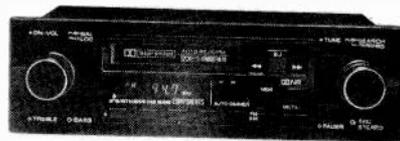
### CAR-301 AM/FM-Stereo Tuner/Amplifier/Cassette Player

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; LED FM stereo indicator; preamp front-to-rear speaker fader.....\$270

## MITSUBISHI CAR AUDIO

### CZ-747 AM-Stereo FM/Cassette Deck

Auto Module\* in-dash component 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  $\mu$ V 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  $\times$  7 $\frac{1}{8}$ " W  $\times$  4 $\frac{3}{4}$ " D.....\$500

### CZ-692 AM/FM-Stereo Cassette Deck

Auto Module\* in-dash component designed for most domestic cars. Features auto-reverse cassette deck with Dolby noise-reduction system; Sendust head; switch for normal/ferrichrome/chrome tape; fast-forward and rewind buttons; eject button; Dolby tape indicator; five pushbutton AM/FM tuning; bass and treble controls; fader and balance controls; distant/local switch; FM ignition

noise killer. Tape wow and flutter 0.15% wrms; frequency range 40-15,000 Hz with metal tape; S/N ratio 57 dB with Dolby on; separation 40 dB. FM S/N 64 dB; selectivity 80 dB; frequency range 30-15,000 Hz at 3 dB; capture ratio 2 dB; stereo separation 35 dB at 10 kHz. AM S/N ratio 53 dB.....\$300

### CZ-725 AM/FM-Stereo Cassette Deck

Auto Module\* in-dash component features super compact chassis to fit almost any domestic or foreign car. Features auto-reverse deck; locking fast forward/rewind; eject button; program selector switch; Dolby noise-reduction system; normal/chrome/ferrichrome selector switch; Dolby tape indicator; manual radio tuning; separate bass, treble, fader, and balance controls; separate AM/FM dial illumination; distant/local switch; loudness control; low-level output for separate power amplifier; optional nose piece for vertical installation. Tape wow and flutter 0.15% wrms; frequency range 50-12,500 Hz; S/N ratio 57 dB with Dolby on; 35 dB stereo separation. FM S/N 64 dB; selectivity 80 dB; frequency response 30-15,000 Hz at 3 dB; stereo separation 35 dB at 1 kHz; capture ratio 2 dB. AM S/N 47 dB. 6 $\frac{5}{8}$ " W  $\times$  4 $\frac{3}{4}$ " D  $\times$  1 $\frac{3}{32}$ " H.....\$270

### 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-791 AM/FM-Stereo Cassette Deck

In-dash high-power unit with 10 watts/ch output at 1% THD, DIN chassis to fit most imported cars. Features auto-reverse deck; locking fast forward/rewind; eject button; program selector switch; Dolby noise-reduction system and tape indicator; cassette door illumination; five pushbutton AM/FM tuning; separate bass, treble, fader, and balance controls; FM ignition noise killer; separate AM/FM dial illumination; Stereo Reception Control (SRC); adjustable shafts and power antenna lead. Tape wow and flutter 0.15% wrms; frequency range 50-12,500 Hz at 3 dB; S/N ratio 57 dB with Dolby on; stereo separation 40 dB. FM S/N ratio 64 dB; selectivity 86 dB; frequency range 30-15,000 Hz; stereo separation 35 dB at 1 kHz; capture ratio 3 dB. AM S/N ratio 54 dB. 7" W  $\times$  5 $\frac{7}{8}$ " D  $\times$  1 $\frac{13}{32}$ " H.....\$290

### RX-752 AM/FM-Stereo/Cassette Deck

In-dash DIN unit designed to fit most imported cars. Features auto-reverse cassette deck; locking fast forward/rewind; eject button; program selector; pinch-off tape mechanism at tape end or power off; five-station AM/FM pushbutton tuning; FM ignition noise killer; two-color AM/FM dial; Advanced Stereo Reception Control (SRC); power antenna lead; built-in 8-watt/ch amplifier. Tape wow and flutter 0.15% wrms; S/N ratio 50 dB; frequency range 50-10,000 Hz. FM selectivity 86 dB; frequency response 30-15,000 Hz at 2 dB; capture ratio 3 dB. AM S/N ratio 54 dB at 1  $\mu$ V. 7" W  $\times$  6" D  $\times$  2" H.....\$260

### RX-723 AM/FM-Stereo Cassette Deck

Super-compact in-dash unit with loudness control and built-in 7-watt/ch amplifier. Features autostop deck; tape-end indicator; locking fast forward; eject button; manual radio tuning; local/distance switch; mono/stereo switch; fader and balance controls; nose piece for vertical installations; adjustable shafts; power antenna lead. Tape wow and flutter 0.15% wrms; frequency response at 3 dB 50-15,000 Hz; S/N ratio 50 dB. FM S/N ratio 62 dB; selectivity 68 dB; frequency response 30-

15,000 Hz at 5 dB; capture ratio 2 dB. AM S/N 49 dB. 6 1/4"W X 4 1/2"D X 1 3/4"H .....\$160

**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; 2.75"H X 7.5"W X 4.75"D .....\$270

**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 .....\$290

**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 .....\$170

**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 .....\$170

**GX-102 Cassette Deck**

Underdash auto-reverse cassette deck features locking fast forward and rewind; tape program selector; hard permalloy head; separate bass and treble; low-level DIN connector output; metal chrome equalization; 7 W/ch at 4 ohms. ....\$170

**GX-101.** Similar to GX-102 except without separate bass and treble or automatic reverse ...\$100

**Car Stereo Components**

**CV-21.** 20 W/ch power amplifier with balanced transformerless circuit; loudness control; separate bass and treble controls; 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

**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

**MIDLAND**

**67-350 AM/FM-Stereo Receiver/Cassette Player**

In-dash unit with auto-reverse cassette player, mini-outboard amplifier. Features fast wind control; program reverse switch that instantly reverses

tape deck; local/distant switch; illuminated dial scale with dimming; automatic antenna control. Output power 9.6 W rms maximum; wow and flutter 0.35% wrms; S/N ratio 50 dB at 333 Hz; FM usable sensitivity 6 µV; FM S/N ratio 65 dB; FM i-f and image rejection ratios 65 dB; FM selectivity 45 dB. ....\$150

**67-548 AM/FM-Stereo Receiver/Cassette Player**

In-dash unit with auto-reverse cassette player. Features FM muting, local/distant, and stereo/mono switches; illuminated AM/FM dial; tone control; balance and fader controls; rubber nosepiece gasket, trim plate, and mounting hardware. Power



output 9.6 W rms maximum; wow and flutter 0.32% rms; S/N 45 dB at 333 Hz; FM usable sensitivity 5 µV; FM S/N ratio 40 dB; FM i-f rejection ratio 70 dB, image-rejection ratio 55 dB; FM selectivity 45 dB FM stereo separation 30 dB. ....\$150

**67-456 AM/FM-Stereo Receiver/Cassette Player**

In-dash compact unit. Features separate bass and treble controls; auto-stop cassette deck; front/rear fader; back-lighted AM/FM dial; local/distant and AM/FM switches. Power output 9.6 W rms maximum; wow and flutter 0.35% rms; S/N 50 dB at 333 Hz; FM usable sensitivity 6 µV; FM S/N ratio 65 dB; FM i-f rejection ratio 65 dB, image-rejection ratio 70 dB; FM selectivity 45 dB; FM stereo separation 30 dB. ....\$120

**67-434 AM/FM-Stereo Receiver/Cassette Player**

In-dash unit with auto-stop stereo cassette deck. Features auto-start when cassette is inserted into tape deck; back-lighted AM/FM dial; pushbutton AM/FM and local/distant switches; locking fast-forward/eject pushbutton. Wow and flutter 0.35% rms; S/N 50 dB at 333 Hz; Power output 9.6 watts rms maximum; FM usable sensitivity 6 µV; FM S/N ratio 65 dB; FM i-f rejection ratio 65 dB, image-rejection ratio 70 dB; FM selectivity 45 dB; FM stereo separation 30 dB. ....\$100

**PANASONIC**

**CQ-8700 AM/FM-Stereo Radio/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

**CQ-7600 AM/FM-Stereo Radio/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-4600 AM/FM-Stereo Radio/8-Track Cartridge Player**

Compact in-dash 8-track player with pushbutton AM/FM-stereo tuning. Features compact nose-piece and chassis; switchable INQ circuit for noise reduction; front-rear fader control; program and stereo indicators; local/distant switch; balance control; automatic frequency control (afc) on FM; front-mounted antenna trimmer; adjustable shafts; adjustable trim plate. Output power 4 W/channel at 5% THD. ....\$240

**Supreme Series**

**CQ-S900 AM/FM-Stereo Radio/Cassette Player**

Compact in-dash pushbutton AM-stereo FM radio and metal compatible auto-reverse cassette deck with Dolby noise reduction system and hard permalloy heads. Cassette deck features locking fast forward and rewind; metal/CrO<sub>2</sub> tape selector; wow and flutter 0.18% wrms; frequency response 40-12,500 Hz ± 3 dB; S/N 50 dB (Dolby off), 60 dB (Dolby on). Radio features seek/scan electronic tuning with six AM and six FM preset pushbuttons and digital time/frequency display; FM optimizer circuit; INQ circuit designed to suppress impulse noise on FM band; local/distant; fader; separate bass and treble; pre-amp output leads 1.0V at 2000 ohms; 4 W/ch continuous at 400 Hz, both channels driven into 4-ohms with 1.0% THD; usable sensitivity 19 dB; frequency response 30-15,000 Hz ± 3 dB; i-f rejection 80 dB; stereo separation 35 dB at 1000 Hz; 2 1/16"H X 7"W X 5 3/16"D. ....\$450

**CQ-S820.** Similar to CQ-S900 without Dolby; repeat track instead of auto reverse; seek only; five station present electronic tuning; single tone control. ....\$350

**CQ-S780 AM/FM-Stereo Radio/Cassette Player**

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<sub>2</sub> 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 push-button 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. ....\$310

**CQ-S740.** Similar to CQ-S780 minus Sendust alloy magnetic tape head and LED metal/CrO<sub>2</sub> indicator. ....\$270

**CQ-S710.** Similar to CQ-S740 minus pushbutton tuning. ....\$240

**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. ....\$220

**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. ....\$200

**CQ-S585 AM/FM-Stereo Radio/Cassette Player**

In-dash Repeatrack cassette player with pushbutton

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## CAR STEREO EQUIPMENT

AM/FM-stereo radio. Features locking fast forward/rewind; hard permalloy head; FM optimizer switch; impulse-noise quieting switch; balance and fader controls; loudness-compensated tone control; antenna relay control lead; compact chassis. ....\$200

### CQ-S661 AM/FM-Stereo Radio / Cassette Player

Repeatrack cassette player with manual AM/FM-stereo radio. Features locking fast forward/rewind; Dolby noise-reduction system and HX (headroom extender); metal/CrO<sub>2</sub>/normal switch; radio monitor; hard permalloy tape head; FM optimizer switch; impulse-noise quieting switch; balance control; motor antenna relay control lead; compact chassis. ....\$200

### CQ-S646 AM/FM-Stereo Radio / Cassette Player

Repeatrack cassette player with manual AM/FM-stereo radio. Features locking fast forward/rewind; radio monitor; hard permalloy tape head; FM optimizer switch; impulse-noise quieting switch; motor antenna relay control lead; compact chassis. ....\$170

### Overhead Cockpit Series

#### RM-610 AM/FM-Stereo Receiver / Cassette Player

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<sub>2</sub> 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; 1 1/2" X 7 3/4" X 9 1/8". ....\$1000

#### RM-310 AM/FM-Stereo Receiver / Cassette Player

Ceiling-mount car hi-fi system with Repeatrack cassette player. Features locking fast forward/rewind; key-off eject; high-filter switch; AM/FM-stereo tuner with 3 station reference guides; FM stereo-auto/mono switch; LED tuning indicators; mute; distant/local switch; impulse-noise quieting (INQ) circuit; balance and fader controls with center detent; built-in 3-band graphic EQ; loudness switch; built-in stereo power amplifier; audio power indicators; 4-position dome light. Amplifier output 10 W/ch min. into 4 ohms at 1% THD 30-20,000 Hz. Wow and flutter 0.15% wrms; frequency response 45-12,000 Hz ± 3 dB; S/N ratio 55 dB A weighted; separation 40 dB. FM usable sensitivity 16 dBf; S/N ratio 73 dB A weighted; image rejection 60 dB; frequency response 30-15,000 Hz ± 3 dB; separation 35 dB. ....\$600

#### RM-710 AM/FM-Stereo Tuner / Preamp / Cassette Player

Overhead console-type hi-fi car audio system with auto-reverse cassette player, Dolby noise-reduction system, AM/FM-stereo tuner, and preamplifier. Features locking fast forward/rewind; key-off cassette eject; normal/CrO<sub>2</sub> tape bias/EQ selector; tape program sensor; AM/FM-stereo tuner with 5-way electronic soft-touch tuning; programmable preset memory for 6 each AM and FM stations; preset scan button; seek and scan buttons; push-button manual tuning; tuning indicators (LED); distant/local switch; impulse-noise quieting (INQ) circuit; quartz-controlled digital time and tuned frequency display; 5-band graphic equalizer; electronic volume control with LED level indicators; sound attenuator switch; joystick balance and fader controls; loudness and dimmer switches; built-in stereo power amplifier; 4-position dome light. Preamp fre-



quency response 20-50,000 Hz ± 3 dB; THD 0.02% at 1 kHz. Wow and flutter 0.13% wrms; frequency response 30-14,000 Hz ± 3 dB; S/N ratio Dolby on/off 63/55 dB; separation 40 dB. FM usable sensitivity 16 dBf; THD 0.15%; S/N ratio 72 dB; image rejection 65 dB; frequency response 20-15,000 Hz ± 3 dB; stereo separation 40 dB at 1 kHz. ....\$1400

### PIONEER

#### KE-5000 AM/FM-Stereo Receiver / Cassette Player

In-dash unit combines AM/FM-stereo Supertuner with stereo cassette player. Features auto replay/eject; locking fast forward/rewind; MOSFET tuner front end; presets for up to 5 each AM and FM stations; feather-touch instant-recall of preset stations plus scan/stop and seek station-selector buttons; FM Dolby; stereo/mono switch; local/distant switch; fader control. Amplifier output 2.7 W/ch continuous 50-15,000 Hz; wow and flutter 0.28%; tape frequency response 50-12,000 Hz ± 3 dB; S/N 53 dB Dolby on; FM usable sensitivity 12 dBf; selectivity 65 dB; capture ratio 3 dB. ....\$350  
**KE-3000.** Similar to KE-5000 but without muting. ....\$300  
**KE-2100.** Similar to KE-3000 but without PNS noise suppression, PLL synthesizer, and scan tuning; has electronic pointer display and AM local/distant switch. ....\$250

#### KEX-20 AM/FM-Stereo Tuner / Cassette Player

In-dash AM-stereo FM/cassette deck with Dolby noise reduction. Cassette features locking fast forward and rewind; auto eject at end of tape; auto replay at end of rewind; metal/chrome selector. Supertuner II electronic tuner features 15 station (5 AM, 10 FM) electronic feather-touch preset tuning; LED station indicator; loudness; PNS noise suppressor; automatic stereo/mono; auto muting on FM stereo; separate bass and treble; balance. Tape response 30-15,000 Hz; S/N 60 dB (Dolby on), 52 dB (Dolby off); FM sensitivity 19.2 dBf for 50 dB quieting; FM selectivity 74 dB; requires separate amplifier; 2" H X 7 1/8" W X 7 1/8" D. ....\$300

#### KE-5100 AM/FM-Stereo Receiver / Cassette Player

In-dash unit with electronically tuned AM/FM-stereo Supertuner II, digital time/frequency display, and PNS noise suppression. Features auto scan/seek; preset of up to 5 AM and 10 FM stations; quartz PLL synthesizer tuning system; FM auto/mono switch; auto replay/eject; locking fast forward/rewind; loudness control; parallel fader control that allows control over two booster amps; activates any automatic power antenna. Amplifier output 2.9 W/ch into 4 ohms 50-15,000 Hz at 5% THD; Wow and flutter 0.15% wrms; S/N ratio 52 dB; tape frequency response 50-12,000 Hz ± 3 dB; FM usable sensitivity 16.8 dBf (mono); selectivity 70 dB; 7 1/8" W X 6" D X 2" H. ....\$300

#### KP-7500 AM-Stereo FM / Cassette Player

In-dash AM-stereo FM Supertuner and auto-reverse cassette player with permalloy head and Dolby noise reduction. Cassette features metal/chrome selector; locking fast forward and rewind; automatic tape slack canceller. Radio features PNS noise suppression; automatic muting; loudness; auto stereo/mono; balance, volume, tone, and fader controls; playback response 50-12,000 Hz; S/N 53 dB (Dolby on), 45 dB (Dolby off); 2.9 W/ch continuous, both channels driven into 4 ohms from 50-15,000 Hz with 5.0% THD; FM sensitivity 19.2 dBf for 50 dB quieting; FM selectivity 74 dB; 2" H X 7 1/8" W X 7 1/8" D. ....\$260

**KP-6500.** Similar to KP-7500 except without Dolby and auto reverse; five-station preset tuning; auto eject and replay. ....\$220

**KP-5500.** Similar to KP-6500 except without auto muting, fader, and built-in PNS; muting switch; FM sensitivity 14.3 dBf for 50 dB quieting. ....\$180

**KP-4500.** Similar to KP-5500 except without auto eject, stereo/mono, and station preset buttons; has auto reverse and auto muting; 3.2 W/ch continuous; FM sensitivity 19.2 dBf for 50 dB quieting; FM selectivity 50 dB. ....\$160

**KP-2500.** Similar to KP-4500 less automatic tape slack canceller, loudness, auto reverse, and auto muting; has auto eject and stereo/mono. ....\$140

**KP-1500.** Similar to KP-2500 except designed for Japanese imports and X-body cars; mini chassis; FM muting; locking fast forward; 2.5 W/ch continuous; FM sensitivity 20.7 dBf for 50 dB quieting; 1 3/4" H X 6 3/8" W X 5 3/4" D. ....\$120

#### UKP-5600 AM/FM-Stereo Receiver / Cassette Player

Mini receiver/cassette system designed for sub-compact and imported cars. Features mini cassette deck; AM/FM-stereo Supertuner II; music search; automatic tape-slack canceller; separate bass, treble, and loudness controls; PNS noise suppression; 5-station preset tuning; FM auto/mono switch; auto replay/eject; locking fast forward/rewind; hard permalloy tape head; key-off pinchroller release; activates any fully automatic power antenna. Amplifier output 3.2 W/ch into 4 ohms 50-15,000 Hz at 5% THD; wow and flutter 0.15% wrms; S/N ratio 52 dB; tape frequency response 50-12,000 Hz ± 3 dB; FM usable sensitivity 16.9 dBf (mono); selectivity 70 dB; 7 1/8" W X 3 5/8" D X 2" H. ....\$250

**UPK-7200.** Similar to UKP-5600 except has auto-reverse cassette deck; no Supertuner II, bass/treble controls, PNS noise suppression, auto replay/eject. Wow and flutter 0.13%; FM sensitivity 20.8 dBf; selectivity 50 dB. ....\$240

#### KPX-9500 AM-Stereo FM / Cassette

In-dash AM-stereo FM PLL 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, auto muting, 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  $\mu$ V into 75 ohms (12 dB) mono; FM 50-dB quieting sensitivity 1.4  $\mu$ V into 75 ohms (14.3 dB); selectivity 74 dB; capture ratio 1.7 dB; 3"H  $\times$  7 1/8"W  $\times$  7 1/8"D.....\$250

**KPX-9000 AM-Stereo FM/ Cassette Player**

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  $\mu$ V into 75 ohms (12 dB) mono. Tape player: fast-winding time 120 sec (C-60); wow and flutter 0.13% wrms; response 30-15,000 Hz -3 dB; S/N 52 dB; 2"H  $\times$  7 1/8"W  $\times$  7 1/8"D; nose 1 3/4"H  $\times$  4 1/8"W  $\times$  1 1/8"D.....\$220

**UPK-5200 AM/FM-Stereo Receiver/Cassette Player**

Mini in-dash unit designed for subcompact and imported cars. Features mini cassette deck; music search; automatic tape-slack canceller; 5-station preset tuning; auto replay/eject; key-off pinchroller release; loudness control; locking fast forward/rewind; stereo/mono switch; fader control; activates any fully automatic power antenna. Amplifier output 3.2 W/ch into 4 ohms 50-15,000 Hz at 5% THD; wow and flutter 0.15% wrms; S/N ratio 52 dB; tape frequency response 50-12,000 Hz  $\pm$  3 dB; FM usable sensitivity 20.8 dB; selectivity 50 dB; 7 1/8"W  $\times$  3 5/8"D  $\times$  2"H.....\$210

**UKP-4200.** Similar to UKP-5200 except has auto-reverse tape deck, tape-direction indicator, loudness switch; no preset tuning, auto replay/eject, fader control; wow and flutter 0.13%...\$190

**UKP-2200.** Similar to UKP-5200 except has loudness control, no preset tuning or fader control.....\$170

**KP-8000 AM-Stereo FM/ Cassette Player**

In-dash AM-stereo FM Supertuner and cassette player designed for European cars. Features auto-eject and replay, and locking fast forward and rewind; five-station (2 AM, 3 FM) preset tuning; volume/tone/balance controls; muting switch; stereo/mono switch; playback response 50-12,000 Hz  $\pm$  3 dB; 3 W/ch continuous from 50-15,000 Hz with 5.0% THD; S/N 45 dB; FM usable sensitivity 1.1  $\mu$ V at 75 ohms (12 dB); 50-dB quieting sensitivity 1.4  $\mu$ V at 75 ohms (14.3 dB); alternate channel selectivity 74 dB; capture ratio 1.7 dB; FET r-f amplifier; wow and flutter 0.28% wrms; 2"H  $\times$  7 1/8"W  $\times$  6 1/2"D; nose dimensions 1 5/8"H  $\times$  4 1/8"W  $\times$  3/4"D; shaft spacing 5 1/8".....\$200

**KP-707G Cassette Deck**

Underdash cassette deck with Dolby noise-reduction system, electronic governor motor, and ferrite head. Features auto eject and auto reverse with auto tape slack eliminator; metal/CrO<sub>2</sub> 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  $\pm$  3 dB; S/N 60 dB (Dolby on), 52 dB (Dolby off); 2"H  $\times$  6"W  $\times$  6 5/8"D.....\$200

**KP-4502 AM-Stereo/FM Cassette Player**

In-dash AM-stereo FM/auto-reverse cassette player designed for European cars. Cassette features locking fast forward and rewind and automatic tape slack canceller. Radio features built-in PNS noise suppressor; mono/stereo; loudness; local/distant; attenuator. Tape playback response 50-12,000 Hz; S/N 45 dB; output 3.2 W/ch continuous both channels driven into 4 ohms from 50-15,000 Hz with 5.0% THD; FM sensitivity 19.2 dBf for 50 dB quieting; FM selectivity 50 dB; 1 5/8"H  $\times$  7 1/8"W  $\times$  6 5/8"D.....\$200

**KP-8500 AM-Stereo FM/ Cassette Player**

In-dash Supertuner AM-stereo FM radio and cassette player with dual-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; S/N 53 dB (Dolby on), 45 dB (Dolby off); FM usable sensitivity 1.1  $\mu$ V into 75 ohms; 50 dB quieting sensitivity 1.4  $\mu$ V into 75 ohms; alternate channel selectivity 74 dB; 2"H  $\times$  7 1/8"W  $\times$  7 1/8"D; nose dimensions 1 3/4"H  $\times$  4 1/8"W  $\times$  1 1/8"D.....\$200

**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 6 W continuous; S/N 45 dB; FM usable sensitivity 1.1  $\mu$ V (23.2 dBf); FM 50-dB quieting sensitivity 1.4  $\mu$ V; selectivity 50 dB; capture ratio 4 dB; 2"H  $\times$  7 1/8"W  $\times$  6 3/4"D; nose dimensions 1 5/8"H  $\times$  4 1/8"W  $\times$  3/4"D.....\$180

**KP-500 FM-Stereo Receiver/ Cassette Player**

Under-dash unit with FM Supertuner, PLL MPX demodulator. Features separate bass, treble, and balance controls; FM muting; stereo/mono and loudness switches; auto eject; tape-play and stereo indicators. Amplifier output 3 W/ch into 4 ohms 50-15,000 Hz at 5% THD; wow and flutter 0.3% wrms; tape frequency response 50-10,000 Hz  $\pm$  3 dB; FM usable sensitivity 12 dBf (mono); FM selectivity 74 dB; 7 5/8"W  $\times$  7 1/2"D  $\times$  3"H.....\$190

**KPX-600 Stereo FM/ Cassette Player**

Underdash FM stereo Supertuner and stereo cassette player. Features automatic replay and eject; locking fast forward and rewind; tape-play indicator; electronic governor motor; center detented 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); FM sensitivity 14.3 dBf; FM selectivity 74 dB. 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 3/8"H  $\times$  7 7/8"W  $\times$  6 1/8"D.....\$140

**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<sub>2</sub>/metal 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  $\pm$  3 dB; S/N 52 dB; 2"H  $\times$  6"W  $\times$  6 5/8"D.....\$140

**KP-66G 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  $\pm$  3 dB; S/N 60 dB (Dolby on), 52 dB (Dolby off); 2"H  $\times$  4 7/8"W  $\times$  6 1/8"D.....\$130

**KP-202G Cassette Player**

Under-dash cassette player designed for extra low wow and flutter. Features music search; automatic tape-slack canceller; separate bass, treble, and loudness controls; illuminated cassette door;

metal/CrO<sub>2</sub> tape selector; auto replay/eject; locking fast forward/rewind; key-off pinchroller release. Wow and flutter 0.09% wrms; frequency response 30-18,000 Hz; S/N ratio 55 dB; 5 7/8"W  $\times$  5 1/4"D  $\times$  2"H.....\$140

**KP-404G.** Similar to KP-202G but with Dolby noise-reduction system.....\$160

**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 50-10,000 Hz; S/N ratio 45 dB; max. output 6 W continuous; 2"H  $\times$  6 1/8"W  $\times$  4 3/4"D.....\$130

**KP-373.** Similar to KP-575 except without auto reverse; has auto replay and slide volume control; 2"H  $\times$  4 3/4"W  $\times$  6 1/8"D.....\$115

**TP-900 FM Stereo/8-Track Player**

Under dash unit combines stereo FM Supertuner with 8-track player. 8-track features fast forward and eject buttons. Radio features FET front end circuitry; FM stereo/mono; local/distant; muting; loudness; separate bass, treble, and balance controls; frequency response 50-10,000 Hz  $\pm$  3 dB; S/N 50 dB; 3 W/ch; FM sensitivity 14.3 dBf; FM selectivity 74 dB; 3"H  $\times$  7 5/8"W  $\times$  7 1/2"D.....\$180

**TP-727.** Similar to TP-900 except without FM section; automatic and manual program change.....\$105

**TP-6006 AM-Stereo FM/8-Track**

In-dash AM-stereo FM radio and 8-track player with auto and manual program change, 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  $\times$  7 1/8"W  $\times$  7 1/2"D.....\$130

**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

**12-1892 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

**SANYO**

**FT2200 AM/FM-Stereo Tuner/ Cassette Player**

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<sub>2</sub>, 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

# 5

## CAR STEREO EQUIPMENT

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  $\pm 3$  dB; stereo separation 32 dB at 1000 Hz. Preamp 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  $\pm 3$  dB; 2" H  $\times$  6 1/4" W  $\times$  5" D.....\$280

### FT C18 AM/FM-Stereo Tuner/Cassette Player

In-dash unit with metal-tape capability, pushbutton tuning, Automatic Music Select System, and FM optimizer. Features auto-reversing cassette deck with Dolby noise-reduction system; line-level outputs; DX/LOC switch; loudness control; separate bass and treble controls; backlit function labels. Output 500 mV, 30-20,000 Hz  $\pm 3$  dB; wow and flutter 0.15% wrms; S/N ratio 50 dB A weighted; frequency response 63-14,000 Hz  $\pm 3$  dB; stereo separation 46 dB; FM usable sensitivity 19.2 dB; alternate-channel selectivity 60 dB; capture ratio 2 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$230

### FT C16 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with Dolby noise reduction, metal-tape capability, and auto-reverse cassette deck. Features line output jacks; loudness switch; separate bass and treble controls; Sendust-alloy tape head; local/distant and reverse switches. Amplifier output 3.5 W/ch into 4 ohms at 10% THD 100-20,000 Hz; frequency response 50-20,000 Hz  $\pm 3$  dB at 500 mV output. Wow and flutter 0.09% wrms; frequency response 50-14,000 Hz  $\pm 3$  dB with metal tape; S/N ratio 50 dB A weighted; separation 35 dB. FM tuner usable sensitivity 15.2 dB; alternate-channel selectivity 65 dB; capture ratio 2 dB; 6 1/4" W  $\times$  5" D  $\times$  2" H.....\$200

### FT C15 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with Automatic Music Select System, FM optimizer, and full auto-reverse cassette deck. Features pushbutton tuning; separate bass, treble, fader controls; locking fast forward and rewind. Amplifier output 4 W/ch into 4 ohms at 10% THD 100-20,000 Hz; frequency response 50-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.15% wrms; frequency response 63-12,500 Hz  $\pm 3$  dB; S/N ratio 50 dB. FM usable sensitivity 20.8 dB; alternate-channel selectivity 55 dB; capture ratio 2 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$187

### FT C13 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with full auto-reverse cassette deck, pushbutton tuning, fader control, and locking fast forward/reverse. Amplifier output 4 W/ch into 4 ohms at 10% THD 100-20,000 Hz; frequency response 50-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.15% wrms; frequency response 63-12,500 Hz  $\pm 3$  dB with normal tape; S/N ratio 45 dB A weighted; separation 40 dB. FM usable sensitivity 20.8 dB; alternate-channel selectivity 55 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$160

### FT C12 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with digital frequency and time display and full auto-reverse cassette deck. Features locking fast forward/rewind; distant/local, frequency/time, FM/AM, and reverse switches. Amplifier output 2.4 W/channel into 4 ohms at 5% THD 100-20,000 Hz; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.1% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB; S/N ratio 50 dB A

weighted; separation 35 dB. FM usable sensitivity 17.2 dB; alternate-channel selectivity 60 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$150

### FT C26 AM/FM-Stereo Receiver/Cassette Player

In-dash mini-size, high-power unit with full auto-reverse cassette deck. Features separate bass and treble controls; reverse, stereo/mono, FM/AM, local/distant switches; automatic up/down control for electric antennas. Amplifier output 9.5 W/channel into 4 ohms at 1% THD 50-20,000 Hz; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.09% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB; S/N ratio 50 dB A weighted; separation 35 dB. FM usable sensitivity 17.2 dB; alternate-channel selectivity 60 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 7/8" D  $\times$  2" H.....\$140

### FT C8 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with Automatic Music Select System and full auto-reverse cassette deck. Features vertical or horizontal mounting; separate bass, treble, and fader controls; automatic up/down control for electric antennas. Amplifier output 3.5 W/channel into 4 ohms at 10% THD 100-20,000 Hz; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.09% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 50 dB A weighted; separation 35 dB. FM sensitivity 20.8 dB; alternate-channel selectivity 55 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$140

### FT C6 AM/FM-Stereo Receiver/Cassette Player

Mini-size in-dash unit with full auto-reverse cassette deck and sensitive FM tuner. Features locking fast forward/rewind; separate bass and treble controls; reverse, FM/AM, distant/local switches; balance control; automatic up/down control for electric antennas. Amplifier output 3.5 W/channel into 4 ohms at 10% THD; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.09% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 50 dB A weighted; separation 35 dB. FM usable sensitivity 20.8 dB; alternate-channel selectivity 55 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$110

### FT C5 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with auto-reverse cassette deck and mini-size chassis. Features separate tone, balance, and volume controls; automatic stereo/mono switching; locking fast forward; automatic up/down control for electric antennas. Amplifier output 3.8 W/channel into 4 ohms at 10% THD; frequency response 100-15,000 Hz  $\pm 3$  dB. Wow and flutter 0.2% wrms; frequency response 63-8000 Hz  $\pm 3$  dB with normal tape; S/N ratio 45 dB A weighted; separation 40 dB. FM usable sensitivity 24.2 dB; alternate-channel selectivity 35 dB; capture ratio 4 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$100

### FT C4 AM/FM-Stereo Receiver/Cassette Player

In-dash unit with mini-size chassis. Features automatic eject at end of play; locking fast forward/rewind; separate tone, balance, and volume controls; automatic up/down control for electric antennas. Amplifier output 3.5 W/channel into 4 ohms at 10% THD; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.1% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 50 dB A weighted; separation 35 dB. FM usable sensitivity 20.8 dB; alternate-channel selectivity 55 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  2" H.....\$90

### FT C2 AM/FM-Stereo Receiver/Cassette Player

In-dash mini-size chassis unit. Features auto stop; local/distant, FM/AM, fast-forward, and eject switches; locking fast forward; separate balance, tone, and volume controls; standard shaft spacing

fits most compact cars. Amplifier output 3.8 W/channel into 4 ohms at 10% THD; frequency response 100-15,000 Hz  $\pm 3$  dB. Wow and flutter 0.2% wrms; frequency response 60-8000 Hz  $\pm 3$  dB with normal tape; S/N ratio 45 dB A weighted; separation 40 dB. FM usable sensitivity 24.2 dB; alternate-channel selectivity 35 dB; capture ratio 3 dB; 6 1/4" W  $\times$  4 3/4" D  $\times$  1 3/4" H.....\$80

## Under-Dash Players

### FT150 Cassette Player

Stereo cassette player with Dolby noise reduction, Automatic Music Select System, auto-reverse cassette deck, and locking fast forward/rewind. Amplifier output 3.5 W/channel into 4 ohms at 10% THD; frequency response 100-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.09% wrms; frequency response 80-10,000 Hz  $\pm 3$  dB; S/N ratio 50 dB A weighted; separation 35 dB; 6" W  $\times$  5" D  $\times$  2" H.....\$120

### FT604 Cassette Player

Stereo cassette player with Automatic Music Select System, auto-reverse deck, locking fast forward/rewind, and balance and tone controls. Amplifier output 4 W/channel into 4 ohms at 10% THD; frequency response 50-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.15% wrms; frequency response 60-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 50 dB A weighted; separation 46 dB; 6 1/2" D  $\times$  6" W  $\times$  2" H.....\$90

### FT60 Cassette Deck

Auto-reverse cassette deck with tone control; locking fast forward; lighted tape-direction indicators; mini-size chassis. Amplifier output 4 W/channel into 4 ohms at 10% THD; frequency response 50-20,000 Hz  $\pm 3$  dB. Wow and flutter 0.2% wrms; frequency response 63-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 50 dB A weighted; separation 46 dB; 6 1/4" D  $\times$  4 3/4" W  $\times$  1 3/4" H.....\$80

### FT50 Cassette Player

Mini-size stereo cassette player with locking fast forward; calibrated tone control; auto stop. Amplifier output 3.8 W/channel into 4 ohms at 10% THD; frequency response 50-15,000 Hz  $\pm 3$  dB. Wow and flutter 0.2% wrms; frequency response 63-10,000 Hz  $\pm 3$  dB with normal tape; S/N ratio 45 dB A weighted; separation 40 dB; 6 1/4" D  $\times$  4 3/4" W  $\times$  1 3/4" H.....\$60

## SPARKOMATIC

### SR-3400 AM/FM-Stereo Receiver/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; 1 3/4" H  $\times$  5 1/2" 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; 5 1/8" 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-3300.** Similar to SR-3400 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; 5 1/8" D.....\$220

### SR-340 AM/FM-Stereo Receiver/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; automatic 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; 1 $\frac{3}{4}$ " H  $\times$  7" W  $\times$  5 $\frac{1}{2}$ " 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; 5 $\frac{1}{8}$ " 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 less 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; 5 $\frac{1}{8}$ " D.....\$190

### SR-303 AM/FM-Stereo Receiver / Cassette Player

In-dash AM/FM-stereo 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 frequency response 1 $\frac{3}{4}$ " H  $\times$  6 1 $\frac{1}{16}$ " W  $\times$  4 1 $\frac{3}{16}$ " D.....\$150

### SR-302 AM/FM Stereo Receiver / 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, and LED multiplex, AM, and FM indicators; output 8 W at 1.0% THD; frequency response 60-12,000 Hz; FM sensitivity 7  $\mu$ V for 30-dB S/N; 2 $\frac{1}{8}$ " H  $\times$  7 $\frac{1}{16}$ " W  $\times$  4 $\frac{7}{8}$ " D.....\$160

**SR-202.** Same as SR-302. Same as SR-302 except has 8-track player instead of cassette. \$150

### SR-301 AM/FM-Stereo Receiver / 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; 1 $\frac{3}{4}$ " H  $\times$  6 1 $\frac{1}{16}$ " D.....\$120

**SR-201.** Same as SR-301 except has 8-track player with program selector and LEDs.....\$120

### SR-304 AM/FM-Stereo Receiver / Cassette Player

In-dash unit with interchangeable nosepieces and trim plates for Japanese, European, GM X-body,



and Citation cars. Features separate volume, tone, balance, and tuning controls; locking fast-forward/rewind button; AM/FM and stereo/mono switches; automatic stop at end of play; tape-end light; cassette end loading. Amplifier output 8 W rms at 1% THD, 75-10,000 Hz. FM usable sensitivity 8  $\mu$ V for 30 dB S/N (mono); stereo separation 24 dB at 1

kHz; i-f/image rejection ratio 45/54 dB; Wow and flutter 0.3% wrms; S/N ratio 35 dB; separation 40 dB. 6 $\frac{9}{16}$ " W  $\times$  4 $\frac{9}{16}$ " D  $\times$  1 $\frac{5}{8}$ " H.....\$120

### SR-300 AM/FM-Stereo Receiver / Cassette Player

In-dash unit with cassette end loading. Features separate volume, tone, balance, and tuning controls; locking fast-forward/eject button; AM/FM and local/distant switches; stereo and tape-end indicators. Amplifier output 7.5 W rms at 1% THD, 75-10,000 Hz. FM sensitivity 8 $\mu$ V for 30 dB S/N; stereo separation 24 dB at 1 kHz; i-f/image rejection 50/45 dB. Wow and flutter 0.3% wrms; S/N ratio 35 dB; separation 40 dB. 7" W  $\times$  4 1 $\frac{1}{16}$ " D  $\times$  1 $\frac{3}{4}$ " H.....\$90

### SR-200 AM/FM-Stereo Receiver / Cassette Player

In-dash unit. Features separate volume, tone, balance, and tuning controls; AM/FM, local/distant, and mono/stereo switches; illuminated dial in tape door; program-selector and MPX lights. Amplifier output 7.5 W rms at 1% THD, 75-10,000 Hz. FM

sensitivity 8 $\mu$ V for 30 dB S/N; stereo separation 24 dB at 1 kHz ; i-f/image rejection 50/45 dB. Wow and flutter 0.3% wrms; S/N ratio 35 dB; separation 40 dB.....\$90

### Under-Dash Players

#### SS-200 Cassette Player / Amp

Under-dash end-load cassette player with built-in amplifier. Features left and right slide-type controls; fast-forward/eject and tone high/low switches; tape play light; automatic stop at end of play. Amplifier output 3 W at 1% THD, 100-8000 HZ. Wow and flutter 0.35% wrms; S/N ratio 30 dB; separation 35 dB. 6 $\frac{1}{16}$ " W  $\times$  4 $\frac{9}{16}$ " D  $\times$  1 $\frac{3}{4}$ " H.....\$35

#### SS-100 8-Track Player / Amp

Under-dash 8-track cartridge player with built-in amplifier. Features slide-type volume, balance, and tone controls; program selector; program indicator lights. Amplifier output 3 W at 1% THD, 100-8000 Hz. Wow and flutter 0.35% wrms; S/N ratio 30 dB; separation 35 dB. 5 $\frac{3}{4}$ " W  $\times$  5 $\frac{1}{2}$ " D 2 $\frac{1}{4}$ " H.....\$35

## DIRECTORY OF MANUFACTURERS

(Continued from page 4.)

**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

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

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

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

**RUSSOUND/FMP, INC.**  
P.O. Box 2369, Woburn MA 01886

**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

**SCHNOEPS, Posthorn Recordings**  
142 W 26 St., 10th Floor New York, NY 10011

**3M SCOTCH, 3M Company**  
3M Center, St. Paul MN 55101

**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 Shawawsee Ave., Fairlawn, OH 44313

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

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

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

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

**SOUNDCRAFTSMEN INC.**  
2200 S. Ralchey, Santa Ana, CA 92705

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

**SPARKOMATIC CORP.**  
Milford, PA 18337

**SPECTRO ACOUSTICS, INC.**  
4500 150th Ave N.E. 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

**SUPERSCOPE**  
20525 Nordhoff St Chatsworth CA 91311

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

**TAPE 5 INC.**  
111 Third Ave., New York 10003

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

**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**  
17733 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

**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

**VIDAIRE ELECTRONICS MFG., INC.**  
150 Buffalo Ave., Freeport, NY 11220

**YAMAHA INTERNATIONAL CORP.**  
Box 660, Buena Park, CA 90620

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

# 6

# HEADPHONES

## AKG

### K-340 Stereo Headphones

Two-way electrostatic/dynamic headphones incorporating fixed-charge electrostatic transducer/dynamic moving-coil transducer with passive diaphragm in each earcup; connects directly to headphone jack of receiver or amplifier or across speaker output terminals. Frequency response 16-25,000 Hz; SPL 104 dB from 200-2000 Hz with 1.0% THD; nominal impedance 400 ohms each channel; max. continuous input 200 mW/ch at 117 dB SPL; includes three 9.8-ft four-conductor cables with three-conductor 1/4-in stereo phone plug; 13.5 oz less cable .....\$195

### 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  $\pm$  20% impedance over 16-20,000 Hz; max. SPL 125 dB; supplied with 9.8-ft four-conductor cable and 1/4-in phone plug; 10 oz..\$95

### 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.....\$75

### 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  $\pm$  20% impedance over 20-20,000 Hz; supplied with 9.8-ft four-conductor cable and 1/4-in phone plug; 8 oz....\$65

### 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; 4 1/2 oz .....\$29

## ARISTA

### 301 Stereo Headphones

Hi-velocity Mylar diaphragm stereophones; frequency response 20-22,000 Hz; 8-ohm impedance; 10-ft coiled cord .....\$33

### 300 Stereo Headphones

Headphones feature slide volume controls and stereo/mono switch; frequency response 25-17,500 Hz; 8-ohm impedance; 10-ft coiled cord.....\$30

### 288 Stereo Headphones

Headphones feature padded earcushions; frequen-

cy response 25-17,500 Hz; 8-ohm impedance; 10-ft coiled cord .....\$22

### 285 Open-Vented Headphones

Features individual volume controls and stereo/mono switch; frequency response 20-20,000 Hz; 8-ohm impedance; 10-ft coiled cord .....\$19

## AUDIO-TECHNICA U.S.

### ATH-7 Stereophones

Electret condenser stereophones; frequency response 20-22,000 Hz  $\pm$  2 dB; sensitivity 98 dB SPL at 1 kHz (0 dB=0.002  $\mu$ bar/V); impedance 4-16 ohms; includes impedance-matching adapter with headphone/speaker switching and normal/high-level LED indicators; 8 1/4-ft cord; adapter size 3 1/2" H X 2 3/8" W X 7" D; headset weight (less cord) 7.4 oz .....\$150

### ATH-6 Stereophones

Electret condenser stereophones; frequency response 40-22,000 Hz  $\pm$  3 dB; sensitivity 98 dB SPL at 1 kHz; impedance 4-16 ohms; includes impedance-matching adapter with headphone/speaker switching; 8 1/4-ft cord; adapter size 1 3/8" H X 3" W X 3 3/8" 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; 11 1/2-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; 11 1/2-ft cord; 7.25 oz .....\$65

### ATH-2 Stereophones

Dynamic planar moving-coil stereophones; frequency response 30-20,000 Hz; sensitivity 93dB 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; 8 1/4-ft cord; 4.75 oz .....\$30

### ATH-0.1 Stereophones

Moving-coil dynamic stereophones; frequency response 35-20,000 Hz; sensitivity 100 dB at 1 kHz, 1 mW; matching impedance 4-16 ohms; acoustical foam ear-cushions; 1.5-m cord; 1/8" plug; 1.8 oz without cord; black .....\$30

**ATH-0.3.** Same as ATH-0.1 except frequency response 30-20,000 Hz; 2.5-m cord; 1/4 plug; 1.9 oz without cord .....\$50

**ATH-0.5.** Same as ATH-0.3 except frequency re-

sponse 25-20,000 Hz; brown .....\$80

### Esximo® Stereophone Earmuffs

For cold-weather listening; quickly convert lightweight, portable stereophones to musical earmuffs or to improve fit and increase comfort indoors; fit models with 35- or 45-mm elements; nonallergenic material .....\$8

## BANG & OLUFSEN

### U-70 Headphones

Orthodynamic stereo headphones; frequency response 16-20,000 Hz; sensitivity 8 mW for 94-dB SPL; continuous load 2W; dist. 1% max.; 140-ohm impedance; 10-ft straight cord with three-conductor phone jack; 10.6 oz.....\$95

## BEYER DYNAMIC, INC.

### 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 .....\$249

**ET-1000.** Same as ET-1000-S without power supply; 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  $\pm$  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 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 finish .....\$65

#### 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

**DT-220ST.** Professional model with left and right earcups marked .....\$65

#### 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) .....\$33

#### DT-109 Moving-Coil Mic / Headphone

Lightweight moving-coil stereo headphones with 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-canceling microphone; frequency response 40-12,000 Hz; SPL 120 dB; mic rotates 180 degrees; foam-filled ear cushions and padded headband; field serviceable .....\$90

#### DT-880 Dynamic Headphones

Semi-open design permits close coupling for full bass response with hear-through external access;



frequency range 15-25,000 Hz; sensitivity 94 dB SPL with less than 1% harmonic distortion; nominal impedance 600 ohms; 6-ft coiled cord .....\$125

**DT-550.** Similar to DT-880, except frequency range 10-22,000 Hz; sensitivity 95 dB SPL .....\$80

**DT-330.** Similar to DT-550, except frequency range 15-18,000 Hz; sensitivity 90 dB SPL; nominal impedance 40 ohms .....\$43

### 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

### PML by ERCONA

#### D-42 Headphones

Dynamic stereo/mono headphones; supplied with

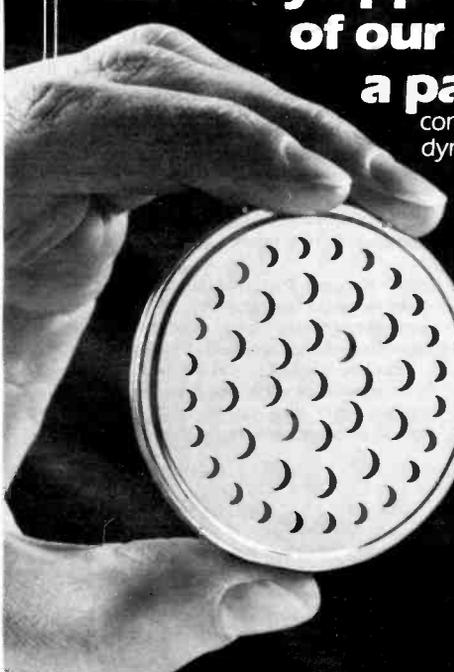
# AKG

## To fully appreciate the design advantages of our headphones simply put on a pair and listen.

The AKG K340 is truly unique. Each earpiece contains an electrostatic high frequency transducer, shown here, a moving-coil, dynamic low frequency transducer, and AKG patented passive diaphragms. This combination of components allows the full spectrum of sound to be reproduced with unequalled detail, clarity and realism.

Every AKG headphone has been designed for comfort as well as performance... and there are more than 5 models to choose from.

Your AKG dealer is ready to give you a demonstration of all the design advantages inherent in what many professionals consider to be the best sounding headphones in the world... and the most comfortable.






**AKG ACOUSTICS INC.**  
A NORTH AMERICAN PHILIPS COMPANY  
77 Selleck Street, Stamford, CT 06902  
(203) 348-2121

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# 6

## HEADPHONES

detachable, washable soft rubber ear cushions; frequency response 30-20,000 Hz; output impedance  $2 \times 200$  ohms (stereo), 100 or 400 ohms (mono); power/voltage at normal listening 0.3 mW/0.25V; 100 dB SPL with 0.3 mW input; 5 mW max. power with 2% dist.; supplied with 6-ft unterminated  $2 \times 2$  cable; 9.5 oz. ....\$45

### 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  $\pm 20\%$  (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; 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 .....\$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  $\frac{1}{4}$ -in phone plug .....\$16

### 90-102.

Similar to 90-104 except lightweight version minus tone controls; has stereo/mono switch .....\$13

## JVC

### HP-1100 Stereo Headphones

Moving-coil type stereo headphones. Sensitivity 102 dB/mW; power-handling capacity 200 mW; THD less than 0.2%; frequency range 20-20,000 Hz; nominal impedance 100 ohms .....\$80

### H-707 Moving-Coil Headphones

Moving-coil design weighs only 5.64 oz and features 46-mm dia X38-micron thick diaphragms; open-back design; double headband for added comfort. Frequency range 20-20,000 Hz; nominal impedance 63 ohms; sensitivity 104 dB/mW at 1 kHz; maximum input power 100 mW; 9.75-ft cord .....\$80

**H-505.** Similar to H-707 except 8-ohm impedance; 106-dB sensitivity; 4.58 oz .....\$40

**H-404.** Similar to H-505 except 16-ohm impedance; 102-dB sensitivity; 3.7 oz .....\$30

### 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  $\pm 2$  dB; output impedance 600 ohms; S/N 45 dB; frequency response 50-10,000 Hz  $\pm 10$  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

( $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{5}{8}$ ", PF  $\frac{1}{2}$ ",  $\frac{1}{4}$ " ); 1.32 lb .....\$100  
**HM-100E.** Binaural headphone/microphone combination .....\$70

## KENWOOD

### Ultralight Dynamic Headphones

KH series of ultralight dynamic headphones are supra-aural types but are acoustically vented. Phones feature pressure-molded polyester diaphragms, rare-earth magnets, and tiny voice coil made from extremely pure copper; snapoff foam ear cushions (extra pair provided); adjustable stainless-steel headband.

**KH-7.** Frequency range 20-23,000 Hz; max. power input 120 milliwatts/ch.; impedance 32 ohms; sen-



sitivity 98 dB; 9.8-ft cord; 1.8 oz (exclusive of cord) .....\$80

**KH-5.** Same as KH-7, except high-end response is 22 kHz .....\$50

**KH-3.** Frequency range 20-20,000 Hz; input impedance 24 ohms; sensitivity 95 dB; 6.5-ft cord; 2.1 oz (exclusive of cord) .....\$25

## KOSS

### ESP/10 Electrostatic Stereophones

Electrostatic circumaural design with energizer. Headset bandpass response 20-22,000 Hz  $\pm 2$  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 cm<sup>2</sup>/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

## 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

## 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 with volume controls; sensitivity 0.15 V rms for 100-dB SPL .....\$30

## KSP Sound Partner Stereophones

Featherweight stereophone for on-the-go radio and tape listeners. Folds to compact size to fit into denim tote bag (supplied). Frequency range 20-17,000 Hz; sensitivity 100 dB SPL pink noise at 1 volt; impedance 43 ohms; total weight 3.5 oz, including 9-ft Y cord. Comes with accessory adaptors to fit almost any sound system. ....\$35

## MURA

### HV-230 Stereo Headphones

Vented high-velocity stereo headphones with lightweight polymer film diaphragms; individual volume controls; frequency range 20-20,000 Hz; impedance 8 ohms; lightweight 10-ft coiled cord with plug .....\$40

### HV-190 Stereo Headphones

Stereo headphones with new ferrite-magnet speaker system; frequency range 20-20,000 Hz; impedance matching 8-70 ohms; maximum input

250 mW; lightweight 12-ft coiled cord with 1/4" stereo plug; 8 oz (less cord).....\$30

**HV-100 Stereo Headphones**

Lightweight vented high-velocity stereo headphones with thin Mylar diaphragms; voltage control; stereo/mono switch; frequency range 30-15,000 Hz; 10-ft coiled cord with plug.....\$23

**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 30-18,000 Hz; impedance 8 ohms; adjustable padded headband; 10-ft coiled cord with plug.....\$25

**SP-503.** Similar to SP-504 minus tone controls.....\$20

**SP-502.** Similar to SP-503 minus stereo/mono switch; as 2 1/4-in dynamic drivers.....\$18

**SP-500.** Similar to SP-502 minus volume controls; frequency response 35-15,000 Hz; 8-ft cord...\$15

**SP-294 Stereo Headphones**

Stereo headphones with 2 1/4" dynamic drivers; individual volume controls; stereo/mono switch; frequency range 40-15,000 Hz; adjustable soft leatherette-padded headband and earcups; 10-ft coiled cord.....\$17

**SP-194.** Similar to SP-294 but minus stereo/mono switch.....\$15

**SP-94 Stereo Headphones**

Lightweight dynamic stereo headphones with 2 1/4" drivers. Frequency range 40-15,000 Hz; impedance 8 ohms; oversize earcups for greater comfort; 8-ft cord with plug.....\$11

**HS Stereo Headphones**

Lightweight stereo headphone with samarium-cobalt drivers and high-velocity Mylar diaphragms. Intended as replacement or add-on for personal stereo cassette players. Frequency range 20-20,000 Hz; sensitivity 96 dB at 1 mW; maximum input 0.1 W; matching impedance 4-35 ohms; weight less cord 1.6 oz; cord length 4 ft; 3-conductor stereo plug.....\$15

**Red Set III Stereo Phones**

High-velocity stereo headphones with Mylar diaphragms and subminiature ultralightweight samarium-cobalt magnets and anoxic copper wire designed to reduce signal attenuation. Frequency range 20-20,000 Hz; sensitivity 98 dB at 1 kHz; maximum input 0.2 W; matching impedance 4-25 ohms; 6.6-ft cord with 1/4" 3-conductor stereo plug; 1.6 oz less cord.....\$30

**Red Set II Stereo phones**

Ultralightweight stereo headphones with folding headband and cable that ends in 3.5-mm mini plug and comes with 1/4" plug adaptor. Frequency range 20-20,000 Hz; sensitivity 100 dB at 1 mW; maximum input 0.1 W; matching impedance 4-35 ohms; samarium-cobalt magnets with high-velocity Mylar diaphragms; 6.6-ft cord with 0.138" 3-conductor stereo plug.....\$25

**Red Set I.** Similar to Red Set II except no folding headband; matching impedance 4-30 ohms; 1/4" stereo plug.....\$22

**PANASONIC**

**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-T5.** Similar to EAH-T70 without click stop control.....\$35

**EAH-S3 Stereo Headphones**

High-efficiency, high-velocity stereo headphones with form-fitting ear cushions. Features 7-ft straight cord with mini jack; stereo jack adapter; Y adapter for dual listening; 1.2 oz.....\$45

**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-4 Headphones**

Lightweight stereo headphones with 3/4-in. dynamic high-velocity drivers with synthetic film diaphragms and samarium cobalt magnets; frequency response 10-20,000 Hz; dist. 0.5% at 100-dB SPL, 1000 Hz; sensitivity 105 dB at 1000 Hz/ch; input impedance 40 ohms at 1000 Hz; adjustable lightweight headband with silver-dollar-sized multi-density polyurethane foam earpieces; includes adapter and 7-ft Y-type straight cord with plug; 2 oz less cord.....\$50

**OA-3A Headphones**

Lightweight open-audio design; 15 ohms ± 10% at 1 kHz; input 0.2 W/channel continuous; sensitivity

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TECHNOLOGY.**



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And imagine headphones that will simply overwhelm you with bass response and a transparency of sound unheard of except in the finest transducers.

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# 6

## HEADPHONES

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

### OA-202 Headphones

Open-audio stereo headphones with dynamic high-velocity drivers with 1-in polyester diaphragms; frequency response 10-20,000 Hz; dist. 0.5% at 110-dB SPL, 1000 Hz; sensitivity 100 dB SPL at 0.25 V in, 1000 Hz/ch; input impedance 50 ohms at 1000 Hz; max. input 0.2 W/ch continuous; adjustable padded vinyl headband with soft vinyl-covered foam earcushions; includes 7-ft Y-type straight cord with plug and special adapter plug for use with portable radios, TV sets, and tape recorders; 6 oz less cord .....\$30

### PIONEER

#### Master-1S Lightweight Phones

Lightweight headset with a sensitivity of 103 dB/mW and frequency range of 16-22,000 Hz. Features



gold-plated plug; oxygen-free copper litz cord; 10-ft connection cord; click-stop adjustable headband. Max. input 200 mW; 5.2 oz without cord. ....\$130

#### SE-L5 Headphones

Dynamic open-air super lightweight headphones. Features oxygen-free copper litz cord and 10-ft connection cord. Sensitivity 101 dB/mW; frequency range 20-22,000 Hz; max. input 200 mW; 2.5 oz without cord. ....\$50

#### SE-L7 Headphones

Variable Chamber® open-type stereo headphones with simulated-leather vinyl headband and ear pads. Frequency range 20-20,000 Hz; max. input power 200 mW; 9-ft 5-in. cord; 8 oz without cord. ....\$70

#### SE-L3 Lite-Phones

Lightweight stereo headphones. Frequency range 18-22,000 Hz; max. input power 100 mW; 9-ft 5-in; 1.8 oz without cord. ....\$35

### SE-650 Stereo Headphones

Around-the-ear stereo headphones with simulated-leather vinyl headband and ear cushions. Frequency response 20-20,000 Hz; max. input power 1 W; 9-ft 5-in. cord; 8.6 oz without cord. ....\$75

SE-550. Similar to SE-660 but weighs 8.1 oz .....\$55

SE-450. Similar to SE-550 but weighs 9.9 oz .....\$45

### SE-4 Stereo Headphones

Open-type stereo headphones with simulated-leather vinyl headband and ear cushions. Frequency range 20-20,000 Hz; max. input power 200 mW; 8-ft 2-in. cord; 7.3 oz without cord. ....\$50

SE-2. Similar to SE-4 except weighs 7.3 oz. ....\$30

### SE-205 Stereo Headphones

Around-the-ear stereo headphones with simulated-leather vinyl headband and ear cushions. Frequency range 20-20,000 Hz; max. input power 500 mW; 8-ft 2-in cord; 15 oz without cord. ....\$30

### JC-51 Y-Type Extension Cord

Two-headphone capability when plugged into standard headphone jack. ....\$10

### REALISTIC

#### PRO-IIA Stereo Headphones

Professional headphones with 12 sq in mylar diaphragm speakers and 1-in voice coils; adjustable padded headband with airfilled ear cushions; frequency response 10-22,000 Hz; comes with 10-ft coiled cord and standard 1/4-in plug; 4-16 ohms impedance; 19 oz .....\$50

#### LV-10 Stereo Headphones

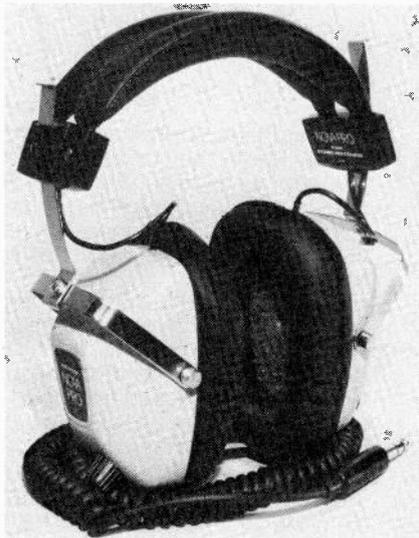
High-velocity vented back headphones with 2-in dynamic elements; frequency response 20-20,000 Hz; dist. 0.5%; 4-16 ohm impedance; acoustic foam earpieces and soft vinyl-covered headband with self-adjusting yokes; 10-ft coiled cord and plug .....\$42

#### 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

#### NOVA-40 Stereo Headphones

3 1/2-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 1/4-in plug .....\$25

### NOVA-10 Stereo Headphones

High-efficiency 2-in speakers; adjustable vinyl headband with cushioned earpads; frequency response 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-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. ....\$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

### Power Drive® Series

#### ST88 High-Velocity Stereo Phones

Stereo headphones with volume controls. Features lightweight "high-velocity" samarium-cobalt magnets; stereo/mono switch; volume and tone controls. Frequency range 15-22,000 Hz; sensitivity 102 dB at 1 kHz; impedance 30 ohms; maximum input power 0.5 watt. Comes with 10-ft cable with stereo phone plug. ....\$43

#### ST77 Ultralightweight Stereo Phones

Designed for all mini recorders and players and includes an adaptor for standard receivers. Weight is only 1.65 oz, less cable. Sensitivity 98 dB at 1 kHz; frequency range 20-25,000 Hz; impedance 25 ohms; maximum input 0.3 watt. Comes with 10-ft cable with mini plug and 1/4" stereo adapter. ....\$38

#### ST66 Ultralightweight Headphones

Designed for all mini recorders and players, stereo headphones weigh only 2.47 oz exclusive of cable. Sensitivity 98 dB at 1 kHz; frequency range 20-25,000 Hz; input impedance 25 ohms; maximum input 0.4 watt. Comes with 10-ft cable with mini plug and 1/4" stereo adapter. ....\$43

### 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

#### HD224 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 cover entire ear; includes steel-stranded detachable 3000-mm cable; 252 g. ....\$144

#### HD 430 Headphones

"Open-aire" design dynamic headphones; frequen-

cy 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  $\mu$ bar/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  $\mu$ bar/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,  
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**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  $\pm$  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  $\times$  2.4" W  $\times$  8.7" D .....\$275  
**TK33S.** Additional stereophone only for TK33 .....\$115

**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 (800 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  $\times$  3 7/8" W  $\times$  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

**DR-M5 Stereo Headphones**

Fold-up stereo headphones for live or off-the-air sound monitoring; frequency response 15-22,000 Hz; sensitivity 106 dB/mW; rated input; 10 mW; 32-ohm impedance; 2-m cord; 260 g .....\$65

**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 control; 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  $\pm$  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  $\pm$  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 tricort-covered foam ear cushions; 10-ft 4-conductor cord with no-break connector; in-

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# 6

## HEADPHONES

cludes adapter plug for use with portable radios and tape recorders; 5.5 oz./less cord.....\$60

### Micro/Wafer XII Headphones

Super-lightweight open-audio stereo headphones with 3/4-in dynamic high-velocity drivers with synthetic film diaphragms and samarium cobalt magnets; frequency response 10-20,000 Hz; dist. 0.5% at 100 dB SPL/mV at 1000 Hz; sensitivity 105 dB SPL/mV at 1000 Hz/ch; input impedance 40 ohms at 1000 Hz; max. input 0.15 W/ch continuous; adjustable lightweight headband with multi-density polyurethane foam earcushions; includes adapter plug for use with portable radios, TV sets, and tape recorders; 7-ft Y-type straight cord with plug; 2 oz less cord.....\$50

### 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. ...\$45

### Dynaphase 25 Headphones

Lightweight open-audio stereo headphones with dynamic high-velocity drivers with 1-in polyester diaphragms; frequency response 10-20,000 Hz; dist. 0.5% at 110 dB SPL, 1000 Hz; sensitivity 100 dB SPL at 0.25 V in, 100 Hz/ch; input impedance 50 ohms at 1000 Hz; max. input 0.2 W/ch continuous; adjustable padded vinyl headband with soft vinyl-covered foam earcushions; includes adapter plug for use with portable radios, TV sets, and tape recorders; 7-ft Y-type straight cord with plug. ...\$30

## 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  $\pm$  2 dB, 10-22,000 Hz  $\pm$  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" X 3 1/4" X 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  $\pm$  2 dB, 10-22,000 Hz  $\pm$  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; 2 1/2" H X 7" W X 4" D. \$90

### SM-700 Headphones

Dynamic headphones with 2 3/4-in Mylar diaphragm; 35-ohm impedance; frequency response 10-20,000

Hz  $\pm$  3 dB; sensitivity 10 mW (0.6V) 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...\$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; includes 10-ft coiled cord and 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 (0.6V) 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 2 3/4-in Mylar diaphragm; 35-ohm impedance; frequency response 15-20,000 Hz  $\pm$  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, plug; 10 oz. ....\$55

### TRL-88 Trans-Linear Headphones

Featherweight open-air stereo headphones with 1.75-in micro-Mylar transducers; frequency response 18-24,000 Hz  $\pm$  5 dB; dist 0.5%; 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  $\pm$  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. ....\$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. ....\$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; 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; 7-ft Y cord with molded plug; 9 oz (less cable).....\$20

## 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 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

Response 20-20,000 Hz; max. input 200 mW; SPL 100 dB/mW; impedance 125 ohms.....\$35

## TOSHIBA

### HR-811 Headphones

Complimentary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-30,000 Hz; 8.4 oz; adaptor.....\$75

### HR-X1 Headphones

Complimentary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-20,000 Hz; 5.6 oz; adaptor.....\$65

### HR-F1 Headphones

Complimentary back electret push-pull, full-face drive system; 2.5-micron diaphragm; frequency response 20-20,000 Hz.....\$50

## UHER by WALTER ODEMER

### W675 Featherweight Headphones

Lightweight (2.2 oz) mono/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. With five-pin plug for Uher cassette recorders.....\$84

### 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; 330g.....\$184

## 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.....\$95

### 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

# 7

# MICROPHONES

## AKG

### D-40 Stereo-Pair Microphones

Package contains two D-40 low-impedance cardioid dynamic microphones, stand adapters, cable .....\$99

### 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. X 7" L; 8oz. ....\$110

### 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. X 7" L; 9 oz. ....\$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; 7/8" dia. X 5 1/2" L; 4.5 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. X 6.25" L; 6 1/2 oz. ....\$95

**D-190ES.** Same as D-190E with integral on/off switch .....\$110

### D-200E Two-way Cardioid Microphone

Cardioid dynamic two-way microphone for the semi-professional recordist and musician; frequency range 25-16,000 Hz  $\pm$  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. X 7" L; 8 1/2 oz. ....\$150

### 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. X 7.5" L; 8.5 oz. ....\$130

**D-310.** Similar to D-310S without integral on/off switch .....\$115

### 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. X 7.5" L; 10.5 oz. ....\$150

### D-330BT Hyper Cardioid Microphone

Hyper cardioid dynamic microphone with elastomer shock-suspended plug-in field-replaceable transducer 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. X 7.25" L; 12 oz. ....\$195

### 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  $\pm$  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. X 6.25" L; 8 1/2 oz. ....\$130

### C-414EB Polydirectional Condenser Microphone

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. X 5.5" L; 12 oz. ....\$730

**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 Microphone 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 .....\$340  
C-451EB preamp .....\$360  
C-452EB preamp .....\$234  
CK-1 cardioid .....\$112  
CK-1S cardioid .....\$105  
CK-4 figure-eight .....\$290  
CK-5 cardioid .....\$205  
CK-8 short shotgun .....\$205  
CK-9 long shotgun .....\$245  
CK-22 omnidirectional .....\$119

## ARISTA

### Cardioid Microphones

**663.** Cardioid electret microphone; frequency response 40-15,000 Hz; attachable windscreen; stand adapter; 20-ft cable; 10 1/4"x7/8" dia .....\$47

**605.** Dual impedance cardioid dynamic microphone; frequency response 40-15,000 Hz; 600 and 50,000 ohm impedances; mike stand adapter; 20-ft black shielded cable; triple mesh windscreen \$39

### Omnidirectional Microphones

**666.** Ultra-miniature lavalier electret microphone; frequency response 30-16,000 Hz; 600-ohm impedance; plug assembly houses FET pre-amp; 20-ft cord .....\$44

**651.** Dynamic "night club" effect omnidirectional reverberation microphone features variable echo; frequency response 55-10,000 Hz, -74 dB output; 20 ft cord; stand included .....\$55

## 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/cm<sup>2</sup>); EIA sensitivity -150 dB; 250-ohm nominal impedance; features high-efficiency windscreen and balanced low-impedance output; includes 16.5-ft cable with XLR/A3F professional connector with 1/4-in phone plug, tapered slip-in stand clamp, and carrying case .....\$125

**AT814/XLR.** AT814 with XLR/A3M connector on output end of cable .....\$130

# 7

## MICROPHONES

- ATB13 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; input SPL 125 dB; S/N 50 dB (1 kHz, 1  $\mu$  bar); AA penlight battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector with 1/4-in phone plug, slip-in stand clamp, carrying case, and battery..... \$110
- ATB13/XLR.** ATB13 with XLR/3M connector on output end of cable ..... \$115
- ATB12 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 ..... \$97
- ATB12/XLR.** ATB12 with XLR/3M connector on output end of cable ..... \$102
- ATB11 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  $\mu$  bar); battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector with 1/4-in phone plug, slip-in stand clamp, carrying case, and battery ..... \$95
- ATB11/XLR.** ATB11 with XLR/A3M connector on output end of cable ..... \$100
- ATB03S Sub-Miniature Omni Mic**  
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, windscreens, battery, and carrying case; 16 1/2-ft cable; mic 0.4" diameter X 0.8" L ..... \$90
- ATB02 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
- ATB02/XLR.** ATB02 with XLR/A3M connector on output end of cable ..... \$85
- ATH817 Unidirectional Microphone**  
Electret condenser permanently polarized element; frequency response 50-16,000 Hz; sensitivity -52 dB; nominal impedance 60 ohms; maximum input SPL 125 dB; S/N 45 dB at 1 kHz, 1  $\mu$  bar; 1.5-V AA cell powered; 13-ft integral cable with 1/4" phone plug; snap-in stand clamp and battery ..... \$50
- ATH815 Line/Gradient Microphone**  
Electret condenser "shotgun" microphone; permanently polarized element; frequency response 40-20,000 Hz; sensitivity -50 dB; nominal impedance 600 ohms; maximum input SPL 120 dB; S/N 50 dB at 1 kHz, 1  $\mu$  bar; 1.5-V AA cell powered; 16.5-ft cable with professional XLR/A3F connector at mic end, 1/4" phone plug at equipment end; slip-in stand clamp; carrying case; windscreens; battery ..... \$200
- ATH831 Miniature Unidirectional Mic**  
Electret condenser permanently polarized element; frequency response 50-18,000 Hz; sensitivity -58 dB; nominal impedance 600 ohms; maximum input SPL 130 dB; S/N 45 dB at 1 kHz, 1  $\mu$  bar; 1.5-V N-type battery powered; balanced output via bat-

tery holder/belt clip with recessed on/off switch; includes clothing clip, musical instrument adaptor for acoustic guitar, saxophone, etc.; windscreens; battery carrying case; 0.3" diameter X 0.9" length ..... \$110

**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  $\mu$  bar); AA penlight battery powered; supplied with 16.5-ft cable with professional XLR/A3F connector, slip-in stand clamp, carrying case ..... \$80

**AT801/XLR.** AT801 with XLR/A3F connector on output end of cable ..... \$85

**AT805S Miniature Omni Mic**  
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, windscreens, belt clip, battery, carrying case, and 16 1/2-ft cable with 1/4-in phone plug; mic 0.8" diameter x 2" L ..... \$57

**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 1/4-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  $\mu$  bar; leakproof UM3 AA battery-powered; includes slip-in stand clamp and carrying case ..... \$140

**ATM41 Unidirectional Microphone**  
Cardioid microphone with moving-coil dynamic element; frequency response 50-16,000 Hz; sensitivity -56 dB; EIA sensitivity -150 dB; 250-ohm impedance; includes slip-in stand clamp and carrying case ..... \$140

**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; includes slip-in stand clamp and carrying case ..... \$125

**ATM21SM.** Same as ATM21 except supplied with shock mount and windscreens in fitted case ..... \$145

**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  $\mu$  bar; leakproof AA battery-powered; includes slip-in stand clamp and carrying case ..... \$120

**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  $\mu$  bar; leakproof UM3 AA battery-powered; includes slip-in stand clamp and carrying case ..... \$120

**ATM11 SM.** Same as ATM11 except supplied

with shock mount and windscreens in fitted case.....

**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 ..... \$105

**ATM 10SM.** Same as ATM10 except supplied with shock mount and windscreens in fitted case..... \$125

### GC/AUDIOTEX

**30-2398 Electret Microphone**  
Tubular omnidirectional microphone with built-in self-powered FET preamp, suitable for studio and home use. Features foam wind screen; on/off switch; microphone holder; aluminum housing with matte black finish; electret condenser element; 1.5-volt battery operation. Frequency range 50-16,000 Hz; impedance 600 ohms; output level -65 dB. Comes with 20-ft cable with 1/4" plug ..... \$24

**30-2388 Omnidirectional Microphone**  
Dual-impedance omnidirectional mike with built-in pop and wind screen, on/off switch, swivel holder. Frequency range 100-10,000 Hz; impedance 250 or 50k ohms; output level -78 dB at 250 ohms, -60 dB at 50k ohms. Comes with 15-ft cord with 1/4" plug ..... \$34

**30-2384 Lapel-Style Microphone**  
Ultraminiature electret microphone with tie clip. Attaches to battery power supply. Suitable for PA, broadcasting, general taping use; black plastic housing; chrome tie clip; can be unplugged from battery to conserve power. Frequency range 50-16,000 Hz; impedance 1000 ohms; output level -63 dB at 1 kHz. Comes with 13.2-ft cable with 1/4" phone plug ..... \$20

**30-2383 Omnidirectional Lavalier Microphone**  
Lightweight dynamic mike for public speakers, general taping use. Has on/off switch. Frequency range 70-12,000 Hz; impedance 30,000 ohms; output level -57  $\pm$  3 dB. Comes with 16.5-ft cable with phone plug, neck strap ..... \$16

**30-2382 Stereo Electret Microphone**  
Unique single microphone has two matched unidirectional elements to feed separate channels. Has anodized aluminum and chrome body; self-contained wind screen on which are indicated left and right channels. Frequency range 50-16,000 Hz; impedance 600 ohms; output level -68 dB at 1 kHz. Comes with 9.9-ft cable with two 1/4" plugs ..... \$37

**30-2378 Unidirectional Electret Mike**  
Tubular microphone has built-in self-powered condenser type FET preamp and operates 10,000 hours on 1.5-volt battery. Suitable for studio recording, vocal and instrumental music, etc., and has built-in wind screen for outdoor use. Gold anodized aluminum housing. Frequency range 30-16,000 Hz; impedance 600 ohms; output level -68 dB at 1 kHz. Comes with 20-ft heavy-duty cable with 1/4" plug ..... \$30

**30-2376 Low-Impedance Dynamic Microphone**  
Sturdy plastic body and chrome wind screen, appropriate for general indoor/outdoor use. Frequency range 100-13,000 Hz; impedance 500 ohms; output level -85 dB  $\pm$  4 dB at 1 kHz. Comes with holder, vinyl carrying case, 15-ft low-noise cable with 1/4" plug ..... \$37

**30-2374 High/Low-Impedance Microphone**  
Dual-impedance dynamic mike allows matching to amplifier, tape recorder, etc. Attractive chrome housing and wind screen. Frequency range 80-15,000 Hz; impedance 500 or 50k ohms; output level -72 dB at 500 ohms, -52 dB at 50k ohms at 1 kHz. Comes with mike holder, 20-ft shielded cable with 1/4" plug. Connects to cable via 4-pin screw-type connector ..... \$28

### 30-2373 Cardioid Dynamic Microphone

Cardioid response pattern minimizes sound pickup from rear and sides to reduce feedback problem. Built-in pop and wind screen, on/off switch, swivel holder. Frequency range 50-17,000 Hz; impedance 30k ohms; output level -58 dB  $\pm$  3 dB at 1 kHz. Comes with lavalier strap, 16.5-ft cable with  $\frac{1}{4}$ " plug .....\$40

### 30-2372 Low-Impedance Dynamic Microphone

Professional-quality mike constructed for reliability and long life. Attractive black housing and wind screen. Pickup pattern minimizes background noise. Frequency range 60-15,000 Hz; impedance 200 ohms; output level -75 dB at 1 kHz. Comes with vinyl storage case, holder, 20-ft shielded cable with  $\frac{1}{4}$ " phone plug and 3-pin mike connector .....\$70

### 30-2302 High-Impedance Taping Microphone

Designed to improve sound of many portable recorders. Features on/off switch. Frequency range 50-13,000 Hz; impedance 30k ohms at 1 kHz; polar pattern omnidirectional; output level -60 dB  $\pm$  3 dB at 1 kHz. Comes with 4.5-ft cable with 2.5- and 3.5-mm plugs, desk stand .....\$9.50

### 30-2308 Matched-Pair Stereo Microphones

Sensitive omnidirectional response pattern minimizes feedback. Features on/off remote-control switch, wind screen, desk stand. Frequency range 100-10,000 Hz; impedance 500 ohms at 1 kHz; output level -74 dB  $\pm$  3 dB at 1 kHz. Come with 4.3-ft cables with  $\frac{1}{4}$ " plugs .....\$20

## BEYER DYNAMIC, INC.

### 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 .....\$420

### M-160 Super Cardioid Ribbon Mic

Super-cardioid dynamic double-ribbon microphone; frequency response 40-18,000 Hz  $\pm$  2.5 dB; sensitivity -152 dBm (EIA); 200-ohm impedance; low sensitivity at 120 degrees to axis; suitable for stereo recording; Cannon XLR termination .....\$360

### M-88 Super Cardioid Moving-Coil Mic

Super-cardioid dynamic type; frequency response 30-20,000 Hz  $\pm$  2.5 dB; sensitivity -144 dBm (EIA); special transducer mounting eliminates body noise; will withstand rough handling, humidity and temperature changes; for studio work, recording artists, and instrumentalists .....\$323

### M-500 Unidirectional Ribbon Microphone

Hypercardioid dynamic ribbon microphone with professional-application tailored presence boost; frequency response 40-18,000 Hz; integral four-stage blast filter for high-level sound sources; sensitivity -152 dBm (EIA), -60 dBm (1mW/Pa); 20-dB side attenuation at 120°; matte black aluminum case; 16 $\frac{1}{2}$ -ft, 2-conductor cable with XLR-type connector; leatherette carrying case; 7.4 in. long .....\$215

### M-260-S Super Cardioid Ribbon Mic

Super-cardioid dynamic design; frequency response 50-18,000 Hz  $\pm$  2.5 dB; sensitivity -153 dBm (EIA); high-energy ribbon; 200-ohm imped-

ance; suitable for speech, music, or vocals; has on/off switch and Cannon XLR termination...\$204

### M-101 Omnidirectional Moving-Coil Mic

Omnidirectional type; frequency response 40-20,000 Hz; sensitivity -150 dBm (EIA); 200-ohm impedance; withstands pressures associated with modern music (modulated voltages up to 2 V); low handling noise; 4 $\frac{1}{2}$ " x 7 $\frac{1}{8}$ "; Cannon XLR termination .....\$199

### M-201 Hypercardioid Dynamic Microphone

Professional-application unidirectional dynamic microphone with "hum-bucking" coil construction; frequency response 40-18,000 Hz; sensitivity -149 dBm (EIA), -56 dBm (1mW/Pa); impedance 200 ohms electrical, 1 kohm or more load; more than 20 dB side attenuation at 120°; 16 $\frac{1}{2}$ -ft, 2-conductor cable and Switchcraft A3F connector; matte black brass case with windscreens, clamp, case. 6.3-in. long .....\$189

### M-111 Omnidirectional Lavalier Mic

Miniature omnidirectional dynamic 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 .....\$182

**M-112** Similar to M-111 minus chest filter; zinc-alloy diecast case .....\$160

### MCE-5 Omnidirectional Microphone

Broadcast-quality clip-on omnidirectional electret condenser 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 windscreens 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-69 Cardioid Moving-Coil Microphone

Dynamic cardioid design; frequency response 50-16,000 Hz  $\pm$  3 dB; sensitivity -144 dBm (EIA); 200-ohm impedance; for indoor/outdoor applications; unaffected by temperature, humidity....\$160

**M-69-SM.** Same as M-69 but with on/off and bass-cut switch .....\$172

### 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....\$128

**M-400S.** Same as M-400 except with on/off switch .....\$133

### M-818 Matched-Pair Microphone

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 cables with  $\frac{1}{4}$ -in phone plug, two table stands, mic clamps, stereo adaptor cable, mounting bar, and presentation case; 5.47" L .....\$150 pr.

## CALECTRO

### 30-2373 Cardioid Microphone

Cardioid microphone; frequency response 50-17,000 Hz; output -58 dB; impedance 30,000

ohms; 10-ft cord with connector and lavalier strap included .....\$34

### 30-2388 Omnidirectional Microphone

Lightweight omnidirectional 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

### 30-2308 Matched-Pair Microphones

Omnidirectional matched-pair stereo microphones for voice and stereo recording applications; on/off switch; windscreens; frequency response 100-10,000 Hz; impedance 500 ohms; sensitivity -74 dB; includes desk stand and 4-ft cord with plug .....\$17

### 30-2383 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

## CERWIN-VEGA

### Professional Series

#### UE-1 Cardioid Microphone

Uni-electret microphone for stage instruments; frequency response 80-20,000 Hz; dual 600- and 10,000-ohm impedances; sensitivity -70 dB  $\pm$  3 dB into 800 ohms (0 dB = 1 V / 1  $\mu$ bar); built-in pop filter; on-off and tone impedance switches; includes 16-ft cable with  $\frac{1}{4}$ -in three-conductor phone plug and Cannon XLR-3-11C equivalent connector; 1.930" X 7.914" .....\$125

#### UD-1 Cardioid Microphone

Unidirectional dynamic microphone for live vocal application or studio use; frequency response 70-15,000 Hz; 600-ohm impedance; sensitivity -73 dB  $\pm$  3 dB (0 dB = 1 V /  $\mu$ bar); built-in pop filter; on-off switch; includes 16-ft cable with  $\frac{1}{4}$ -in three-conductor phone plug and Cannon XLR-3-11C equiv. connector; 1.575" X 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  $\frac{1}{8}$ -in aluminum plate 5 X 6 in; wall or floor positioning or suspension above choir or orchestra .....\$350

**Low Profile.** Cantilever holding electret capsule, mounted on 2 X 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

#### PZM-31S Pressure Zone Microphone

Designed to complement the PZM 30GP to provide

# 7

## MICROPHONES

a frequency response with a deeper low end. Active element is an electret capsule mounted on a 6" X 5" plate so that it faces the boundary defined by



the plate and the surface on which the plate rests. Sound pickup pattern is hemispheric. Mike is usable with either PX-18 transformer or PA-18 active power supply. Frequency response 20-20,000 Hz; sensitivity -76 dB open circuit (0 dB = 1 V/ $\mu$ bar); normal loading impedance 1000 ohms; THD 3% at 150 dB SPL; S/N less than 25 dB SPL; electrical impedance 150 ohms with PA-18 and PX-18; cable length 5.5 ft. ....\$350

### ELECTRO-VOICE

#### 644 Cardline Microphone

Cardline 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 .....\$210

#### 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 .....\$150

#### 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 .....\$124

**1776P.** Same as 1776 but with 25-ft cable with two professional connectors .....\$131

#### 671B 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 .....\$97

#### 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 .....\$100  
**660A.** Same as 660 with gray finish .....\$100

#### 630 Omnidirectional Microphone

Omnidirectional dynamic microphone; flat response 60-11,000 Hz; -55 dB output; switchable high and low impedance; on/off switch; MC4F-type mike connector and 15-ft cable with matching connector; satin chrome finish .....\$95

#### 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 .....\$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 .....\$83

#### 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 .....\$54

### Professional Microphone Systems

#### CL42S Condenser Shotgun System

Cardline 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 .....\$660

#### 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 .....\$508

#### DL42 Cardline Microphone

Cardline 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 .....\$463

#### 667A Cardioid Microphone

Continuously Variable-D cardioid dynamic microphone; shaped response 40-10,000 Hz; -51 dB output; boom or fishpole use; low impedance; passive equalizer switch provides three LF and two HF variations; A3F-type mike connector and 15-ft cable with matching connector; supplied with integral windscreen/pop filter and shock mount; gray .....\$454

#### 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 .....\$417

#### 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 .....\$265

#### 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 .....\$261

#### 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 .....\$246

#### 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; fawn beige finish .....\$242

#### 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 .....\$250

#### 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 .....\$240

#### 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 .....\$203

#### 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 .....\$180

#### 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 .....\$168

#### 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 .....\$146

#### 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 .....\$136

### 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 .....\$135

### 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 .....\$127

### 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 .....\$86

## PML by ERCONA

### DC-63 Condenser Microphone

Condenser microphone designed for professional recording studios; features two ring switches built around four reed switches and potentiometer providing selection of 44 desired directional response patterns. Frequency response 30-20,000 Hz; sensitivity -48 dB/Pa (cardioid A), -52 dB/Pa (cardioid B, bi-directional, omnidirectional); output 4.0 mV/Pa (cardioid A), 2.5 mV/Pa (cardioid B, bi, and omnidirectional); noise 21 dB re  $2 \times 10^{-5}$  Pa (A weighted); dynamic range 126 dB (cardioid A), 130 dB (others); output impedance 200 ohms balanced; includes #3003 microphone cable and stand adaptor; +48 +6/-8-V operation; satin chrome finish; 1 1/2 oz .....\$740

### TC-4V Condenser Microphone

Features two field effect transistors and variable pattern selection; frequency response 30-20,000 Hz; sensitivity -40 dB/Pa; output 10.0 mV/Pa; noise 24 dB re  $2 \times 10^{-5}$  Pa, A weighted; dynamic range 118 dB; output impedance 200 ohms balanced; blasted chrome finish; 215 g .....\$599

### DC-21 Cardioid Microphone

Cardioid condenser microphone; SYMSI 48 powering; frequency response 30-20,000 Hz  $\pm 3$  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; satin chrome finish; supplied with stand adaptor and 33-ft cable .....\$230

**DC-20.** Similar to DC-21 but omnidirectional design; sensitivity -46 dB/Pa; output 5 mV/Pa; noise 26 dB; 124-dB dynamic range .....\$220

## JVC

### M-510 Electret Condenser Microphone

Super-directional/unidirectional pattern; frequency response 40-20,000 Hz; sensitivity -68 dB (super), -71 dB (unit); 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 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 1 1/2-V battery; frequency response 40-18,000 Hz  $\pm 3$  dB; sensitivity 51 dB  $\pm 3$  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  $\pm 3$  dB; sensitivity 58 dB  $\pm 3$  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  $\pm 3$  dB; sensitivity 61 dB  $\pm 3$  dB (high impedance), 80 dB  $\pm 3$  dB (low impedance); 10-ft heavy duty detachable cable .....\$31

### M50 Dynamic Microphone

Dynamic microphone; frequency response 60-13,000 Hz  $\pm 3$  dB; sensitivity 61 dB  $\pm 3$  dB high impedance; 10-ft heavy duty cable .....\$21

### M30 Dynamic Microphone

Dynamic microphone; frequency response 70-12,000 Hz  $\pm 3$  dB; sensitivity 56 dB high impedance; 10-ft heavy duty cable .....\$14

## MURA

### DX-109 High-Z Microphone

Type A high-impedance microphone designed as a low-cost replacement for recorders that require 50k ohms impedance mics. Sensitivity -61 dB at 1 kHz; frequency range 50-10,000 Hz; remote switch; 5-ft cable; dual plugs for audio and remote control. ....\$6

### DX-118 Cassette Microphone

Type B microphone designed to fit most cassette recorders and supplied with dual plugs for audio and remote control. Impedance 500 ohms; sensitivity -70 dB at 1 kHz; frequency range 60-12,000 Hz; remote switch; 5-ft cable. ....\$6

### DX-129 Cardioid Microphone

Ball-type dynamic microphone with built-in pop and blast filters; on/off switch; black satin and chrome finish. Frequency range 40-14,000 Hz; sensitivity -58 dB at 1 kHz; supplied with 20-ft cable and stand adaptor. ....\$50

### DX-133 Low-Z Microphone

Type D low-impedance microphone for cassette recorders with extremely low impedance (200 ohms). Comes with dual plugs for audio and remote control; remote switch; 5-ft cable. Sensitivity -70 dB at 1 kHz. ....\$6

### DX-211 Microphone

Type E single-plug microphone designed for tape recorders requiring high-quality mic with single miniature plug. Supplied with adapter to convert from miniature to standard 1/4" phone plug; on/off switch; 5-ft cable. Impedance 500 ohms; sensitivity -70 dB at 1 kHz; frequency range 60-12,000 Hz. ....\$6

### DX-235 Microphone

Omnidirectional single-impedance microphone. Comes with on/off switch; stand; styrofoam case

with sleeve; 1/4" adapter plug; 6-ft cable with attached miniature plug. Frequency range 50-15,000 Hz; sensitivity -78 dB at 1 kHz; impedance 600 ohms. ....\$28

### DX-242 Stereo Microphones

Type F matched-pair stereo microphones for stereo recorders. Supplied with adapters to convert from miniature to standard 1/4" phone plug; 5-ft cable. Impedance 500 ohms; sensitivity -70 dB at 1 kHz; frequency range 60-12,000 Hz. ....\$20

### DX-247 Microphone

Dynamic omnidirectional microphone with removable windscreen, designed for vocals and recording. Comes with on/off switch; 20-ft cable with 1/4" phone plug; black satin and chrome finish. Frequency range 50-14,000 Hz; sensitivity -57 dB at 1 kHz; impedance 600 and 50k ohms. ....\$39

### EX-279 Lapel Microphone

Omnidirectional electret condenser microphone with clothing clip, 10-ft cable, mini plug, battery. Frequency range 30-16,000 Hz; impedance 600 ohms. ....\$26

### V-100 VCR Microphone

Compatible with all videocassette recorders and tape decks with microphone inputs and with video cameras and audio dub and voice-over recordings. Comes with on/off switch; stand; adapter plug; 15-ft cable with miniature plug. Frequency range 60-12,000 Hz; sensitivity -70 dB at 1 kHz; impedance 500 ohms. ....\$8

## NAKAMICHI

### DM-1000 Dynamic Cardioid Mic

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 responses 30-20,000 Hz  $\pm 3.5$  dB; sensitivity -76 dB at 1 kHz (0 dB = 1 V/ $\mu$ bar); 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 adaptor; built-in 10-dB attenuator pad; low-cut proximity effect compensator; frequency response 30-18,000 Hz (CP-3), 30-20,000 Hz (CP-4), all  $\pm 3.5$  dB; impedance 200 ohms balanced; sensitivity -76 dB  $\pm 2.5$  dB (CP-1, CP-2, CP-4), -74 dB  $\pm 2.5$  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 Microphone

Dynamic moving-coil microphone; built-in windscreen; super cardioid polar pattern; frequency response 50-15,000 Hz  $\pm 5$  dB; impedance 250 ohms; sensitivity -73 dB,  $\pm 2.5$  dB .....\$100

# 7

## MICROPHONES

### 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.

<b>KM-83.</b> Omnidirectional.....	\$386
<b>KM-84.</b> Cardioid.....	\$386
<b>KM-85.</b> Cardioid, low-frequency roll-off.....	\$386
<b>KMS-84.</b> Pop-proof cardioid.....	\$977
<b>U-47FET</b> Cardioid.....	\$1056
<b>KMR-82</b> Shotgun.....	\$926
<b>KM-86.</b> Three-pattern, switchable.....	\$1050
<b>KM-88</b> Three-pattern.....	\$1114
<b>U-87.</b> Three-pattern.....	\$1155
<b>U-89</b> Five pattern.....	\$1285
<b>N-80</b> 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 1/4-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 connector; uses "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 .....\$48

#### 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  $\pm$  3 dB; 600-ohm impedance; requires "AA" battery ....\$40

### RECOTON

#### MM-660 Cardioid Microphone

Unidirectional electret condenser stereo microphone designed for outdoor use; 1.5-V battery-powered; sensitivity -68 dB at 1000 Hz; frequency response 50-16,000 Hz; impedance 600 ohms; includes windscreen and 3-m cord; aluminum casing; 295 g .....\$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 .....\$45

#### 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 .....\$38

#### MM-760 Ultraminiature Electret Mike

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  $\times$  5/8" long.....\$32

### SANUI

#### 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-m cord with connecting plug .....\$80

#### MS1 MultiPurpose Mic Stand

Microphone boom stand with arm for stereo pairing; mike-mount holes at both ends of adjusting boom; boom is 35 1/8-in long and rotatable over 360 degrees; supplementary bar is included to extend boom to 43 1/8-in; collapsible stand; four mike-mounting screws (5/16", 3/8", 5/8", 1/2"); matte black finish.....\$200

### SCHOEPS

#### Colette Series Microphones

Studio condenser microphones with interchangeable capsules and amplifiers. Can be 12-volt phantom or parallel powered, or 48-volt phantom powered. Transformerless construction gives low output impedance; insulated transducer and polarization voltage of 60V.

**CMC 38.** Figure-eight microphone; frequency response 40-16,000 Hz; sensitivity 1.0 V/ $\mu$ bar; S/N ratio 75 dB; 132 dB SPL at 0.5% distortion; 80 g; 5.57"  $\times$  0.79" dia.....\$780

**CMC 34-1.** Hypercardioid microphone; frequency range 40-20,000 Hz; sensitivity 1.3 mV/ $\mu$ bar; S/N 77 dB; 131 dB SPL; 80 g; 5"  $\times$  0.79" dia.....\$730

**CMC 34.** Cardioid microphone; frequency range 40-20,000 Hz; sensitivity 1.2 mV/ $\mu$ bar; S/N 76 dB; 131 dB SPL; 80 g; 5"  $\times$  0.79" dia.....\$640

**CMC 33.** Special omnidirectional microphone designed for distant field placement; frequency range 20-20,000 Hz; sensitivity 1.0 mV/ $\mu$ bar; S/N 76 dB; 132 dB SPL; 80 g; 5"  $\times$  0.79" dia.....\$640

### SENNHEISER

#### MD 441 U Super Cardioid Microphone

Super cardioid dynamic microphone; frequency response 30-20,000 Hz; sensitivity 0.2 mV/ $\mu$ bar  $\pm$  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  $\times$  1.4" W  $\times$  9.6" L.

With low-impedance cable.....\$455

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/ $\mu$ bar)  $\pm$  2.5 dB; supplied with Cannon XLR connector and cable; 1" diameter  $\times$  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/cm<sup>2</sup>; 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  $\pm$  5 dB; sensitivity 0.2 mV/ $\mu$ bar  $\pm$  3 dB at 1 kHz; EIA rating -145.8 dB; output level -53 dBm (1 mW/10 dynes/cm<sup>2</sup>); front-to-back ratio 18 dB, -2 dB; variable bass attenuator; supplied with XLR connector and cable; 7"  $\times$  1 7/8"  $\times$  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/ $\mu$ bar  $\pm$  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.....\$332

#### MD 402 Super Cardioid Microphone

Super cardioid dynamic microphone; frequency response 50-15,000 Hz; output level -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.....\$123

**ME80.** Shotgun head.....\$172

**ME88.** Spot microphone head.....\$255

### SHURE

#### 575S Omnidirectional Microphone

A dynamic microphone designed for wall/panel mount, on desk or floor stand, or lavalier or handheld use. Locking slide-to-talk switch; high impedance; frequency range 40-15,000 Hz; output power level -58 dB; black ARMO-DUR<sup>®</sup> finish with satin anodized cap and stainless-steel grille; 5 oz. Includes stand adapter, lavalier assembly; 7-ft single-conductor shielded cable .....\$34

#### 515 SAC Unidyne<sup>®</sup> B Microphone

Dynamic cardioid type for good-quality sound systems and tape recorders. Has locking on/off switch. Output level -59 dB; frequency range 80-13,000 Hz; high impedance. Comes with 15-ft cable with 1/4" phone plug, built-in shock mount. ....\$53

### 516 E-Qualdyne® Microphone

Unidirectional cardioid dynamic equalizer microphone for tape recording. Equalization and response-shaping control; four switches on mike handle provide 16 different combinations of special effects to eliminate undesirable effects or enhance various instruments. Frequency range 50-15,000 Hz; impedance 150 ohms. Comes with foam windscreen; swivel adaptor; cable; mini-plug adapter cable; carrying case .....\$118  
516 EQ-PR. Pair of 516 EQ mikes .....\$210

### 588 SAC Unisphere® B Microphone

High-impedance cardioid mike for rock vocal and music. Has pop/blast filter; on/off switch; handheld use with slip-in stand attachment; output power level -60.5 dB; frequency range 80-13,000 Hz. Comes with 15-ft cable and connector, chrome finish .....\$76

585 SAC Unisphere® A. Same as 588 SAC except output power level is -59 dB, frequency range is 50-13,000 Hz .....\$88

### Unidyne® III Series Microphones

Dynamic cardioid type for high-quality music and voice recording and reproduction. Dual impedance. Frequency range 50-15,000 Hz; power level -58.5 dB in low impedance. Supplied with 15-ft cable.

545D .....\$110

545SD Same as 545D plus on/off switch in handle .....\$113

545SH. Same as 545D but with on/off switch in permanently attached stand mount.....\$113

545SD-CN. Same as 545D plus on/off switch and 20-ft cable with three-pin professional connectors .....\$119

545L. Same as 545D but low impedance. Supplied with lavalier cord, clip, and permanently attached 20-ft cable .....\$132

### Unisphere® I Series Microphones

Dynamic cardioid type for high-quality recording and reproduction. Has built-in pop filter. Dual impedance; frequency range 50-15,000 Hz; power level -57 dB in low impedance. Comes with 15-ft cable.

565D .....\$123

565SD. Same as 565D plus on/off switch in handle .....\$126

565SH. Same as 565D but with on/off switch in permanently attached stand mount.....\$126

565SD-CN. Same as 565D plus on/off switch and 20-ft cable with three-pin professional connector .....\$132

### Professional Microphones

#### SM11 Miniature Lavalier Microphone

Dynamic omnidirectional type with lavalier, tie-bar, and tie-tack mounting options. Frequency range 50-15,000 Hz; power level -64 dB; low impedance. Weighs only 0.28 oz. Comes with 48-in. cable and mounting accessories.....\$85

SM17. Similar to SM11 but includes musical instrument mounting accessories and 10-ft cable .....\$90

#### SM57-CN Unidirectional Microphone

Dynamic type, cardioid polar pattern, suitable for instrument pickup. Frequency range 40-15,000 Hz; output power level -56.5 dB; dual impedance. Comes with 20-ft cable with three-pin professional connector .....\$141

#### SM-58CN Unidirectional Microphone

Dynamic type, cardioid polar pattern, suitable for vocal pickup. Frequency range 50-15,000 Hz; output power level -56 dB; dual low impedance; built-in pop filter. Comes with 20-ft cable with three-pin professional connector .....\$176

### Starmaker® Series Microphones

Small, lightweight, rugged dynamic cardioid type designed for stand-mount or handheld use. Fre-

quency range 50-15,000 Hz; output power level -57.5 dB; low impedance.



SM77EB. Ebony Suedecoat® .....\$120

SM77EB-CN. Same as SM77EB plus 25-ft cable with three-pin connector .....\$141

SM77TN. Tan Suedecoat® .....\$120

SM77TN-CN. Same as SM77TN plus 25-ft cable with three-pin connector .....\$141

SM78EB Ebony Suedecoat® plus pop filter \$153

SM78EB-CN. Same as SM78EB plus 25-ft cable with three-pin connector .....\$174

SM78TN. Tan Suedecoat® plus pop filter...\$153

SM78TN-CN. Same as SM78TN plus 25-ft cable with three-pin connector .....\$174

### SM81 Unidirectional Condenser Mike

Cardioid type designed for extremely low noise, low distortion. Output power level -39.5 dB; frequency range 20-20,000 Hz; low impedance; selectable 10-dB attenuator; three-position low-frequency response switch; attenuator lock; windscreen; swivel adaptor. Comes with 25-ft cable and three-pin connector.....\$290

PS1. Power supply for SM81.....\$132

## SONY

### C-48 Condenser Microphone

Professional switchable omni/uni/bidirectional condenser microphone designed for critical studio recording applications. Features dual-diaphragm capsule design; LED directivity indicator; low-noise high-gain FET preamp and transformer; 10-dB PAD switch (prevents overload at SPLs above 128 dB; low-cut switch; two-way power source (ac/dc power supply or battery operation). Frequency response 30-16,000 Hz; output impedance 150 ohms ± 20%; S/N 70 dB at 1000 Hz, 10 bar; max. SPL 138 dB; dynamic range 104 dB; XLR-3-12C type mic connector; includes carrying case, 006P battery, and screw adaptor; 9" H × 2 1/8" W × 1 9/16" D .....\$795

### 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" dia. × 8 1/16" 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 1/8" 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 adaptor; 1 3/16" diameter × 10 3/4" L .....\$295

### ECM-56F Cardioid Microphone

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 Microphone

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 Mic

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. X. 1 3/16" 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; 800-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-30 Condenser Omni Microphone

Professional omnidirectional condenser micro-

### NEED MORE INFORMATION?

Write directly to the manufacturer or distributor. A list of names and addresses starts on page 4.

# 7

## MICROPHONES

phone 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; 1 1/32" diameter X 1 9/32" L .....\$115

### ECM-23F Cardioid Mike

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 X 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" dia. X 6 1/16" 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 83 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 X 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. X 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 .....\$75

### 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 mic connector; 16-ft cable; includes mic cable, mic holder, and carrying case; 1" dia. X 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; 1 1/32" diameter X 1 9/32" 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 X 7 1/16" 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 ca-

ble with mini cable plug; includes urethane windscreen and mic holder; 3/4" diameter X 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. X 7 1/8" L .....\$50

### F-V2A Dynamic Microphone

General-purpose microphone with 1/4" phone plug that fits hi-fi tape recorders .....\$20

### F-V3T "The Mic" Dynamic Microphone

Cardioid-pattern dynamic microphone with unimatch plug that fits all home tape recorders. Frequency range 100-12,000 Hz; impedance 600 ohms .....\$30

### F-V4T "The Vocal Mic" Microphone

Cardioid-pattern dynamic microphone for vocal applications, with unimatch plug to fit all home tape recorders. Frequency range 90-13,000 Hz; output level -58.8 dBm; impedance 600 ohms .....\$40

### ECM-16T "The Tie Tac Mic"

Omnidirectional electret condenser microphone for lavalier applications, with unimatch plug to fit all home tape recorders. Frequency range 50-13,000 Hz; impedance 250 ohms .....\$40

### F-99T "The Stereo Mic"

Stereo dynamic microphone for recording purposes, with left and right unimatch plugs to fit all home tape recorders. Frequency range 80-12,000 Hz; impedance 200 ohms .....\$40

### ECM-220T "The Instrument Mic"

Back electret condenser cardioid microphone for miking instruments, with unimatch plug to fit all home recorders. Frequency range 50-14,000 Hz; impedance 200 ohms .....\$50

## 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 .....\$185

## SUPERSCOPE by MARANTZ

### EC-9P Cardioid Microphone

Cardioid electret condenser microphone; frequency response 30-17,000 Hz; output -62 dBm at 94 dB SPL; impedance 250 ohms; low-cut filter; 10-dB pad; optional power operation; standard Cannon connector .....\$110

### EC-15P Omnidirectional Microphone

Omnidirectional electret condenser tie-clasp microphone utilizing IC-FET electronics; frequency response 70-16,000 Hz; output -58 dBm at 94 dB SPL; impedance 250 ohms; optional power operation; standard Cannon connector .....\$100

### EC-33S Uni/Bidirectional Microphone

Electret condenser microphone with pull-apart design to function as one-point stereo mic or two separate mono mics; frequency response 50-15,000 Hz; output -52 dBm re 94 dB SPL; impedance 1000 ohms; remote start/stop switch .....\$66

### EC-7 Cardioid Microphone

Cardioid electret condenser microphone; frequency response 40-16,000 Hz; output -58 dBm at 94 dB SPL; impedance 250 ohms; low-cut filter and on/off switch; includes floorstand adapter .....\$64

## TECHNICS

### RP-V340 Cardioid Microphone

Dynamic cardioid microphone designed for voice recording has built-in windscreen and comes with 3/8" mic holder adaptor. Frequency range 100-10,000 Hz .....\$26

### RP-V730 Dynamic Microphone

Unidirectional dynamic microphone designed for vocal and musical instrument recording comes with 3/8" mic holder adaptor. Frequency range 40-12,000 Hz .....\$40

### RP3500E Electret Microphone

Cardioid electret-condenser microphone with high signal-handling ability for excellent dynamic range in music comes with tripod desk stand. Frequency range 50-12,000 Hz .....\$60

### RP-3210E Stereo Microphone

Cardioid electret-condenser microphone with two elements physically aligned for stereo perspective. Tripod desk stand included. Frequency range 50-12,000 Hz .....\$60

### RP-3540E Electret Microphone

Wide-response cardioid electret-condenser microphone designed for excellent detail for complex instrument ensembles. Comes with tripod desk stand. Frequency range 40-14,000 Hz .....\$70

### 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 X 227 mm .....\$70

## 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

## 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 Cardioid Microphones

Stereo-pair dynamic shot-gun-type cardioid microphones with stereobar; 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

## VIDAIRE ELECTRONICS

### 942 Dynamic Cardioid Ball Microphone

Dual impedance dynamic ball cardioid microphone; frequency response 80-15,000 Hz; switchable 600/50,000 ohm impedance; sensitivity -54 dB at 50,000 ohms. -72 dB at 600 ohms; 20 ft shielded cable .....\$48

**942A.** Same as 942 except sensitivity is -72 dB at 600 ohms, -52 dB at 50,000 ohms .....\$47

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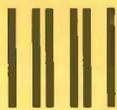
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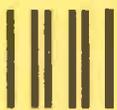
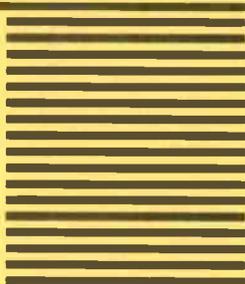
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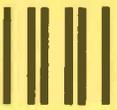
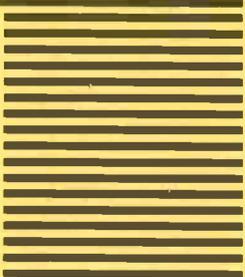
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Revised and updated!  
Stereo Review's SRT14-A  
**STEREO  
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RECORD**



THE EDITORS AND TECHNICAL STAFF OF STEREO REVIEW PRESENT THE MOST COMPREHENSIVE, ACCURATE AND EASY-TO-USE TEST RECORD EVER DEVELOPED—REVISED AND UPDATED FROM THE ORIGINAL SRT14 VERSION.

This latest version contains everything you need to get the fullest, most realistic reproduction from your stereo equipment. 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. 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

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
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- STANDARD "A"
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# 8

# MIXERS

## 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 echo buss; monitor buss); equalization controls set at 12,500, 3700, 250, and 80 Hz with  $\pm 18$  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  $\pm 1$  dB; THD 0.02%; IM dist. 0.01%; slew rate 8 V/ $\mu$ sec; S/N 80 dB; 9 1/2" H  $\times$  36 1/4" W  $\times$  31 1/2" D .....\$3695

### 6702-B Stereo Mixing Console

Stereo mixing console with six balanced inputs/ stereo outputs, two-band equalizer, pre-fader 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 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  $\pm 1$  dB; THD 0.02%; IM dist. 0.01%; slew rate 8V/ $\mu$ sec; 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 level 17 V rms into 10,000 ohms, 8 V rms into 600 ohms (unbalanced); 6" H  $\times$  19" W  $\times$  12" D .....\$595

## BOZAK

### CMA-10-2 Stereo Mixer

All-silicon solid-state ten-in/two-out stereo mixer; each input has individual level control, speech/music switch, and 10-dB input attenuator in mic mode, switchable at front panel to left or right output or both; modular design accepts variety of plug-in low- and high-level circuit cards. Output channels have separate bass and treble controls with 10 dB boost or cut, VU meter, and independent range

switch; master gain control. Gain 78 dB max. with A-1002E card and CMA-481 transformer; frequency response 20-20,000 Hz  $\pm 0.25$  dB; power output +24 dBm; input impedance 200 ohms (with mic transformer), 100k ohms (low-level direct), 47k ohms (magnetic phono), 50k ohms (high level); load impedance 600 ohms balanced (with CMA-558 transformer) or unbalanced; dist. 0.25% at +24 dBm; noise -125 dBm; 7" H  $\times$  19" W  $\times$  12" D .....\$1275

**CMA-10-1.** Similar to CMA-10-2 except has mono output; gain 90 dB with A-1002E card and CMA-481 transformer; output hum and noise -70 dB. 5 1/4" H  $\times$  19" W  $\times$  5 1/4" D .....\$875

## CERWIN-VEGA

### DM-1 Audio Mixer

For pro and semi-pro recording setups; frequency response 20-20,000 Hz  $\pm 1$  dB (RIAA phono inputs), 20-20,000 Hz  $\pm 0.5$  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  $\pm 10$  dB at 50 Hz and 5k, turnover frequency 500 Hz; Auto-fade rate variable from 2 to 20 sec typically; talkover/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; 1/2" H (less feet and knobs)  $\times$  19" W  $\times$  8" D .....\$714

## DUBIE

### CD-10 Sound Control System

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  $\times$  13 1/8" W  $\times$  5 3/4" D .....\$150

**CD-5** Similar to CD-10 except three recorder capacity; 4" H  $\times$  9 3/8" W  $\times$  4 7/8" D .....\$100

## GLI

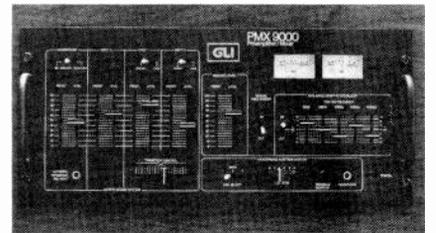
### 3990 Preamplifier/Mixer

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 capabili-

ties; two sets of stereo main outputs and mono output; frequency response 20-20,000 Hz  $\pm 0.25$  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/ $\mu$ sec (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  $\pm 0.25$  dB; bass equalization  $\pm 8$  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/ $\mu$ sec; 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/ $\mu$ sec; frequency response 20-20,000 Hz  $\pm 0.1$  dB; rack mountable 7" H  $\times$  19" W .....\$900

### 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 transi-



tion 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,  $\pm 12$  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 out-



# MIXERS

puts; preset level indicators for all inputs and main outputs; rack mountable 8 3/4" H x 19" W .....\$450

## 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 mV/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).....\$430

## LT SOUND

### MX-8 Mixing Board

8 x 2 mic/line mixer uses 8 balanced ultra-low-noise solid-state microphone preamplifiers. Designed for studio and portable recording and PA use. Features gain control; echo; cue; solo; rotary fader control; 2 main outputs. Maximum output level +22 dBV; S/N ratio greater than 85 dB; low and high boost/cut 18 dB .....\$349

## NAKAMICHI

### MX-100 Microphone Mixer

Provides three inputs (left, right, and blend) and two outputs; input 10,000 ohms for low to medium impedance mics; sensitivity 0.2 mV; overload 1 V (+74 dB); THD less than 0.05% up to 10,000 Hz; requires PS-100 Power Supply; 2 1/2" H x 3 7/8" W x 4" D .....\$110

## 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 lighted alternate action switches; four 4 1/2-in lighted VU meters for output assign channels, two 4 1/2-in lighted VU meters for stereo mixdown; four master pots; eight mono earphone

pots; eight mixdown concentric pan-gain pots; talk-back and slate pushbuttons; mike gain controls; built-in 1000 Hz oscillator; stereo record and monitor amps; external rack-mounted power supplies. Kit .....\$6400  
1204RS. Wired version .....\$9900

## SANSUI

### MA-7 Monitor Console

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 Console

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 x 16 5/16" W x 11 1/4" D .....\$300

## SHURE

### M67 Professional Mixer

Professional mixer provides four low-impedance, transformer-coupled balanced microphone inputs, one convertible to line input. Balanced 600-ohm line and mike-level outputs; illuminated VU meter calibrated for +4 and +10 dBm output; very low noise and r-f susceptibility design; 108-132 V ac, 50/60 Hz; 11 3/8" W x 7 1/2" D x 2 3/4" H .....\$330

### M267 Professional Mixer

Professional mixer for recording or broadcast use. Four low-impedance balanced inputs switchable to mike or line level; simplex (phantom) power on each input; fast-acting limiter; built-in battery supply; headphone amplifier with level control; illuminated VU meter with LED peak level indicator; low-cut filters and tone oscillator; battery check switch; mix bus jack; mic and line level outputs; master volume control; 120 V ac, 50/60 Hz, 9.5 W; battery power; 11 3/8" W x 7 1/2" D x 2 3/4" H .....\$395

### M68 Microphone Mixer

Mixer has independent volume controls and a master volume control that simultaneously adjusts gain of all inputs; three-pin audio input connectors; 120 V ac (±10%), 50/60 Hz, 3 W; 11 3/8" W x 5 1/4" D x 2 3/4" H .....\$195

M68FC. Input connections are professional three-socket connectors for 120 V ac (±10%, 50/60 Hz, 3 W .....\$195

### M268 Microphone Mixer

Five-channel mixer featuring four high/low-impedance microphone inputs and one AUX-level input; simplex (phantom) power on each mic input mix bus jack; regulated power supply; 120 V ac, 50/60 Hz, 5 W; 11 3/8" W x 7 1/2" D x 2 3/4" H .....\$225

## SONY

### MX-20 Microphone Mixer

Eight-channel in/four-channel out microphone mixer for studio or sophisticated amateur recordings. 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 x 18 5/16" W x 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 x 17 7/8" W x 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 x 17 7/8" W x 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 in-



puts for tape recorder, tuner or amplifier; two phono inputs for record player; pan pot control;

## NEED MORE INFORMATION?

Write directly to the manufacturer or distributor. A list of names and addresses starts on page 4.

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 X 13 3/4" W X 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 X 10 1/4" W X 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 X 9" W X 5 1/4" D.....\$45

### TAPCO

#### Catalina Series C-12 II 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;  $\pm 18$  dB bass,  $\pm 12$  dB midrange, and  $\pm 18$  dB treble EQs/input channel; 100-mm slide-gain controls; front-panel mounted patchbay; +48-V phantom power for high-quality condenser microphone. New input channel features four-button subgroup assign switches, mute switch, and direct-to-main switch; new pan pots and solo capability on submaster. Frequency response 20-20,000 Hz  $\pm 1$  dB; THD and IM dist. 0.02%; equiv. input noise -128 dBV; output noise -80 dBV; max. input level 0 dBm at 0.775 V rms (mic), +30 dBm at 25 V rms (line); crosstalk -70 dB; solid oak end panels optional; 7.5" H X 27" W X 26.5" D.....\$2895

**C-8E II.** Expands C-12 to 20, 28, or more inputs; self-powered with LED indicator and ac accessory receptacle.....\$1995

#### 72 Series Advanced Mixing Console

12 in/2 out stereo mixing console with transformer-less electronically-balanced input circuitry; also available with 8, 16, 24, and 32 input channels. 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  $\pm 1$  dB; slew rate 13 V/ $\mu$ sec; THD and IM dist. 0.02%; equiv. input noise -130 dBV; max. input level +6 dBm at 1.5 V rms (mic), +24 dBm at 12 V rms (line); crosstalk -70 dB; 8.5" H X 21.5" W X 16" D.....\$1495-\$3395

**7416.** Similar to 7212 except has 16 in/4 sub-group direct out/stereo and mono out format; also available with 8, 24, and 32 channels; 8.5" H X 31.5" W X 16" D.....\$2295-\$5995

### TASCAM by TEAC

#### Model 1 Studio Series 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. Line in (X8) and buss in (X2) impedance 30k ohms and nominal input level -10 dB; line out/aux. out (X2) and cue out (X8) load impedance 10k ohms and nominal output level -10 dB; headphones (X2) load impedance 8 ohms; S/N 78 dB weighted; frequency response 30-20,000 Hz  $\pm 1$  dB; crosstalk -50 at 1kHz; 0.3% THD max; 117-V ac, 60 Hz, 8W; 4 3/8" H X 17 1/4" D.....\$200

#### Model 3 Studio Series Mixer

8-in/4-out mixing console accepts up to 8 microphones, 8 line-level inputs, or 4 phono inputs, or any combination of line/mic/phono inputs. Mic input impedance/nominal level 100k ohms high, greater than 1k ohm low/-50 dB (3 mV); phono input impedance/nominal level greater than 47k ohms/-54 dB at 1 kHz; line input impedance/nominal level greater than 20k ohms/-10 dB (0.3 V); line/aux output impedance/nominal level greater than 10k ohms/-10 dB (0.3 V); monitor output impedance/nominal greater than 10k ohms/-2 dB (0.78 V); headphone impedance/power 8 ohms/1 W rear panel, 100 mW front panel; frequency response 30-20,000 Hz  $\pm 2$  dB; S/N ratio at nominal input levels weighted/unweighted greater than 60 dB with 8 mic inputs, 70 dB with 8 line inputs, 65 dB with one phono input; equalization  $\pm 15$  dB continuously variable; crosstalk greater than 60 dB at 1 kHz; THD 0.3% maximum; fader attenuation greater than 60 dB; accessory send and receive data impedance/nominal level 10k ohms/-10 dB (0.3 V); monitor input impedance/nominal level greater than 10k ohms/-2 dB (0.775 V); submix input impedance/nominal level greater than 10k ohms/-10 dB (0.3 V); power consumption 18 W; 20 1/2" D X 18 1/4" W X 6 1/4" H; 30 lb.....\$1275

### Creative Series

#### 144 Mixer/Cassette Recorder

Unit combines mixing console with portable-studio cassette recorder. Mixer: features four mic/line inputs with trim, aux. send,  $\pm 10$ -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  $\pm 1$  dB; S/N 68 dB weighted. Recorder: features two-motor logic control transport, two channel record/four-track playback,  $\pm 15\%$  pitch control, double-action pinch roller for real-time pause, and built-in full-time Dolby noise-reduction system; tape speed 3 3/4 ips; wow and flutter 0.04% weighted; frequency response 20-18,000 Hz; S/N 63 dB; crosstalk 50 dB at 1000 Hz.....\$1200

#### System 20 Mixing Console

Professional-style audio mixing console consisting of four modular assemblies.

**MM-20.** Main mixing chassis with 2 mic and 4 line inputs. Features transformer-isolated mic preamps; tape/mic (live) overdub capability; headphone monitoring; corrective EQ; XLR mic input connectors; -20-dB mic attenuator switches; trim pots; accessory send/receive jacks; W-pot pre/post fader; direct output; pan pots; buss input jacks; master monitor and headphone level controls; dc outputs for other modules. Mic input impedance/nominal level 600 ohms balanced/-60 dBV (1 mV); line input impedance/nominal level 50k ohms/-10 dBV (0.3 V); line output impedance/nominal level 3k ohms/-10 dBV (0.3 V); headphone output impedance/nominal power 8 ohms/100 mW; frequency response 30-20,000 Hz  $\pm 2$  dB; S/N ratio A weighted/unweighted mic 65 dB, line 75 dB; crosstalk greater than 60 dB at 1 kHz; THD less than 0.1% at 1 kHz; fader attenuation 60 dB or more; trim range  $\pm 10$  dB (line/mic); power consumption 15 W at 120 V ac, 60 Hz; 16.9" W X 15.8" D X 4.2" H; 9.2 lb.....\$395

**EX-20.** Expander module adds 4 transformer-isolated mic inputs to MM-20 and complete patch bay. Features 4 mixing positions; accessory patch points; direct outputs. Specifications the same as for MM-20 except power consumption 170 mA at +12 V dc (obtained from MM-20); 9.6" W; 4.4 lb.....\$325

**PE-20.** 4-input/4-output/4-channel parametric equalizer for System 20. EQ frequencies: low 60-1.5k Hz adjustable, middle 1-8 kHz adjustable, 10 kHz fixed,  $\pm 12$ -dB range; S/N ratio better than 80 dB; crosstalk better than 60 dB; THD less than 0.1% at 1 kHz; input impedance/nominal level greater than 100k ohms/-10 dBV (0.3 V); power consumption 120 mA at  $\pm 12$  V dc regulated (obtained from MM-20); 15.8" D X 9.6" W X 4.2" H; 4.62 lb.....\$350

**MU-20.** Four VU-meter assembly with peak level indicators for System 20. Features -20- to +5-VU range; peak indicator level 10 dB above 0 VU; power obtained from MM-20; 16.4" W X 3.1" H; 2.2 lb.....\$150

### TEAC

#### 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 100 Hz or 200 Hz; color-coded push-push channel assignment buttons with pan on each channel; 3 1/2" H X 13 1/8" W X 14 9/16" D.....\$495

#### Model 3 Audio Mixer

8-in, 4-out two-monitor (8 X 4 X 2) versatility in a compact mixer. Features unlimited flexibility and portability; 40-dB input attenuation; input selection mic-phono-line; 4-frequency, 2-control equalization; direct output and channel assignment; pan; monitor 4 X 2; submix 8 X 2; 20 1/2" D X 18 1/4" W X 6 1/4" H; 40 lb.....\$1275

#### M-35 Audio Mixer

8-in, 4-out, 8 monitor (8 X 4 X 8) portable audio mixer. Features modular construction; 40-dB mic attenuation; 20-dB mic/tape/line trim; cue/echo; 4-frequency, 2-control sweep-type equalization; solo-direct output buss-assignment switches; pan; buss tape monitor (X8); test tone; studio/control room monitoring; optional talk-back monitoring; 24 1/2" D X 23 1/8" W X 7 1/2" H; 62 lb.....\$2300

201C input.....\$195  
210 submaster module.....\$150  
208 master module.....\$170  
209 talkback module.....\$120  
206A power-supply module.....\$150  
207 blank panel.....\$25

M-35 EX 8-input expander for M-35, capable of total M-35 system expansion of 20 inputs; 24 1/2" D X 23 1/8" W X 7 1/2" H; 50 lb.....\$1650

#### System 20 Audio Mixer

MM-20 master module. Features 2 mic inputs, XLR, balanced; 4 line outputs, -10 dBV, unbalanced; 6 output busses; 14 15/16" W X 14" D X 3 3/4" H; 9.24 lb.....\$395

**MU-20 Meter Unit.** Permits patching of any -10-dBV (0.3-V) unbalanced signal from mixer or external units; 14 1/2" W X 2 3/4" H X 1 7/8" D; 1.1 lb.....\$150

EX-20 Expander module with 4 mic inputs (XLR, balanced) and 4 output busses: 8 1/2" W X 14" D X 3 3/4" H; 4.4 lb.....\$325

PE-20 parametric sweep-type equalizer module with 4 EQ modes; 3 frequency bands (low: 60-1500 Hz  $\pm 12$  dB; mid: 1,000-8,000 Hz  $\pm 12$  dB; high: 10 kHz fixed  $\pm 12$  dB); 14" D X 8 1/2" W X 3 3/4" H; 4.6 lb.....\$350

# 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  $\pm$  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,  $\pm$  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  $\pm$  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  $\pm$  1 dB; unity gain  $\pm$  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; 6 1/4"H  $\times$  16 3/8"W  $\times$  6 3/4"D. ....\$330

### Sound Shaper Series

#### One IC Equalizer

Five-band/channel stereo graphic equalizer with center frequencies at 60, 240, 1000, 3500, and 10k Hz. Features a bank of LEDs adjacent to each of the 10 slider controls to graphically illustrate adjusted frequency curve;  $\pm$  6 dB control range; tape monitor switch. ....\$120

#### One Ten IC Equalizer

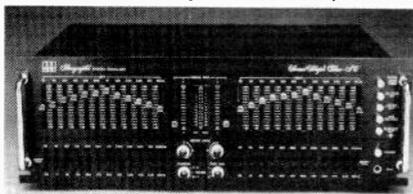
Ten-band stereo graphic equalizer has center frequencies at 31, 62, 125, 250, 500, 1k, 2k, 4k, 8k, and 16k Hz. Features a bank of LEDs alongside each slider control to dramatically indicate positions on a  $\pm$  6-dB range scale; one-way tape dubbing; line/record, bypass/equalizer, and power switches. ....\$230

#### Two IC 12-Band Equalizer

12-band equalizer with center frequencies at 32, 56, 100, 180, 320, 560, 1k, 1.8k, 3.2k, 5.6k, 10k, and 18k Hz. Features slider controls with adjacent LED indicators to dramatically illustrate altered response curve; two-way tape dubbing; subsonic filter with 15-Hz cutoff point; LED-type vertical meters (one for each of two channels) with  $\pm$  12-dB range in 4-dB steps; left- and right output and left and right master controls; line/record, bypass/equalize, meter in/out, subsonic filter in/out, and power switches. ....\$330

### Three IC Paragraphic Equalizer

Top-of-the-line ADC Paragraphic® equalizer with 24 ancillary switches to bring 36 bands per stereo channel under control, combining parametric EQ versatility and ease of operation of graphic EQ. Features  $\pm$  12-dB range slide controls (center fre-



quencies at 32, 56, 180, 320, 560, 1k, 1.8k, 3.2k, 5.6k, 10k, 18k Hz); LED vertical signal-gain meters ( $\pm$  12-dB range in 2-dB increments) and separate left and right slide controls; separate left and right meter-level controls; two-way tape dubbing; LED slide control position indicators; subsonic filter; LED power indicator adjustable for 12, 24, or 36 dB scale; bypass/equalize, meter in/out, line/record switches; sound-level meter (SLM) input jack on front panel. ....\$500

### SA-1 Spectrum Analyzer

Real-time spectrum analyzer with built-in pink-noise generator and supplied calibrated microphone. Features a network of 132 LEDs that display audio spectrum in real time for visual equivalent of sound system's frequency response; range selector with 12-, 24-, and 36-dB positions; left and right mode selector buttons; peak-hold and slow display buttons; pink-noise in/out and mic/line switches. ....\$230

## 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; reverb 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 reverb 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  $\pm$  0.5 dB. Model L10 speakers: 2-way (7-in woofer and 1-in soft-dome tweeter); frequency response 48-18,000 Hz  $\pm$  3 dB, 38-20,000 Hz  $\pm$  5 dB; efficiency 90 dB/Watt; input range 50-100 W. Delay/amplifier 3 1/2" H

$\times$  15 3/4" W (19" W optional)  $\times$  12" D. ....\$995

**10 01.** Similar to ADS 10 minus built-in power amplifier; optional bolt on rack handles (extends to standard 19 in) and walnut side panels available; black satin finish .....\$750

## AUDIO CONTROL

### C-101 EQ/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  $\pm$  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  $\pm$  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  $\times$  19"W  $\times$  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  $\pm$  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  $\pm$  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  $\times$  19"W  $\times$  6.5"D. ....\$229

### 520B EQ/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  $\pm$  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  $\pm$  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  $\times$  12.3"W  $\times$  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  $\pm 12$  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  $\pm 1$  dB, 15-30,000 Hz  $\pm 0.1$  dB; THD and 1M dist. 0.0075%; hum and noise -90 dB at 0 dB reference, 115 dB below rated output; filter bandwidth 1/3 octave at 3-dB point with 6 dB attenuation; frequency tolerance  $\pm 2\%$  of band centers; input impedance 600 ohms/500 ohms switchable; max. input +24 dB; slew rate 8 V/ $\mu$ sec; 3 $\frac{1}{2}$ " H  $\times$  19" W  $\times$  10" D.....\$595

### 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,  $\pm 15$  dB boost or cut. Each channel has ten sliders, gain slider, EQ bypass switch, and LED overload indicator; four  $\frac{1}{4}$ -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/ $\mu$ sec; 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; 3 $\frac{1}{2}$ " H  $\times$  19" W  $\times$  5 $\frac{1}{2}$ " D.....\$295

EQ/110R. One-channel version of EQ/210.....\$195

### 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  $\pm 0.5$  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/ $\mu$ sec; 1 $\frac{3}{4}$ " H  $\times$  19" W  $\times$  5 $\frac{1}{2}$ " D.....\$295

## BOZAK

### 902S Time Delay System

Analog electronically-controlled time-delay system with built-in 35-W power amplifier and separate pair of speakers. Timer delay: features delay time, delay remix, signal blend, treble contour, and output level controls; delay 30-130 msec continuously variable; high-frequency EQ  $\pm 12$  dB; THD + N 1.0%, delay line; frequency response 30-7700 Hz  $+0/-3$  dB. Power amp: features auto-ranging peak-reading LED vertical bar graph display; frequency response 20-20,000 Hz  $+0/-0.5$  dB; THD and IM dist. 0.01% at 1000 Hz. Loudspeakers; incorporates indirect-radiating full-range driver; frequency response 41-10,000 Hz; 8-ohm impedance; input 70 W program. Delay system 2 $\frac{1}{2}$ " H  $\times$  17 $\frac{3}{4}$ " W  $\times$  9 $\frac{7}{8}$ " D; speaker 20" H  $\times$  13" W  $\times$  11" D.....\$975

902. Same as 902S without speakers.....\$795

## CERWIN-VEGA

### E-3 Stereo Graphic Equalizer

Covers 13 frequency bands (32.5 Hz to 16.5 kHz)  $\pm 12$  dB; frequency response 20-20,000 Hz  $\pm 0.15$  dB with equalizer controls at center detent; output 7.75 V with 600-ohm load; control accuracy within 0.15 dB of calibrations; hum and noise -98 dB; distortion less than 0.005% (harmonic or IM); two each source and tape input, balanced unbalanced; line and tape output through phone jack and XLR connector, half octave control below 250, full-octave control above 250 Hz; 19" W  $\times$  10 $\frac{1}{4}$ " D  $\times$  3 $\frac{1}{2}$ " H.....\$550

## 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,  $\pm 15$  dB boost or cut; each channel features octave frequency adjust controls;  $\pm 20$  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, screw-driver-adjusted attenuation controls, and normal/inverted outputs. Frequency response 10-100,000 Hz  $\pm 0.3$  dB, 20-20,000 Hz  $\pm 0.1$  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; 7 $\frac{1}{2}$ " H  $\times$  19" W  $\times$  14 $\frac{1}{2}$ " D.....\$1195

## dbx®

### dbx Type II Tape

#### Noise-Reduction Systems

Type II systems reduce noise by more than 30 dB across entire audio-frequency spectrum and add 10 dB additional recording headroom when used with any tape recorder. In addition, they decode dbx discs.

**Model 224.** Linear decibel compander offers simultaneous encode/decode process for full monitoring capability with 3-head open-reel and cassette recorders, but will also work with 2-head decks. Effective noise reduction 30 dB plus 10 dB headroom; dynamic range 110 dB peak signal to weighted background noise; frequency response  $\pm 0.5$  dB 40-20,000 Hz, -1dB at 30 Hz; slew rate greater than 10 V/ $\mu$ sec; equivalent input noise -85 dB unweighted, 20-kHz bandwidth, referenced to 1 V; THD less than 0.4% 30-100 Hz, less than 0.1% 100-20,000 Hz; IM distortion less than 0.2% SMPTE; power consumption 7 W; 17 $\frac{5}{16}$ " W  $\times$  7 $\frac{1}{2}$ " D  $\times$  1 $\frac{3}{4}$ " H; 6 lb.....\$299

**Model 222.** Similar to Model 224 but designed for use with 2-head recorders. Has separate encode (record) and decode (playback) functions but no monitoring capability. Specifications are the same as well.....\$219

**Model 128.** Dynamic range enhancer/tape noise-reduction system performs all functions of Model 224 plus provides expansion of dynamic range, as well as compression. Expansion ratio continuously variable 1.0: 2.0; compression ratio 1.0 to infinity; effective noise reduction 30 dB plus 10 dB headroom; dynamic range 100 dB peak sig-



nal to weighted background noise; input/output levels 8/5.5 V rms; frequency response 20-20,000 Hz  $\pm 1$  dB enhancer section, 30-20,000 Hz NR section; equivalent input noise -85 dBV unweighted, 20 kHz bandwidth, ref. 1 V; THD 0.1% at 1.0 expansion enhancer section, less than 0.5% 30-100 Hz and 0.1% 100-20,000 Hz NR section; IM distortion 0.2% SMPTE; power consumption 10 W; 11" W  $\times$  10 $\frac{3}{8}$ " D  $\times$  1 $\frac{3}{4}$ " H; 8 lb.....\$499

**Model 21.** dbx disc (and tape) decoder designed to reproduce full 90 dB of a live performance. Also designed to virtually eliminate pop, ticks, and surface noise on records. Dynamic range

100 dB; nominal/maximum input 300 mV/6 V rms; output level 5.5 V rms; frequency response  $\pm 0.5$  dB 30-15,000 Hz; hum and noise less than -100 dBV, referenced to 1V. A weighted, 20-kHz bandwidth; THD less than 0.2% at 1 kHz (encode/decode) up to 4 V rms output; IM distortion less than 0.2% SMPTE; power consumption 5 W; 8 $\frac{3}{4}$ " W  $\times$  6 $\frac{5}{8}$ " D  $\times$  2 $\frac{3}{4}$ " H; 2.5 lb.....\$109

### dbx Dynamic Range Expanders

Expanders are designed to increase the dynamic range of records, tapes, and FM broadcasts by as much as 50%, while reducing noise by as much as 20 dB.

**Model 3BX.** Advanced expander makes loud passages louder, soft passages quieter, Bass, midrange, and treble frequencies are processed individually. Features 3 rows of LEDs that monitor degree of expansion in each range; expansion level control; transition level control; tape-monitor loop to restore loop required by expander in stereo system. Expansion ratio continuously variable 1.0-1.5 (0 to 50% increase), linear in dB; dynamic range 100 dB peak signal to weighted background noise; input level nominal/max. 300 mV/7 V rms; output level 7 V rms; frequency response  $\pm 0.5$  dB 20-20,000 Hz at 1.0 expansion; equivalent input noise -85 dBV unweighted, referenced to 1 V, 20-kHz bandwidth; THD 0.1% at 1.0 expansion; IM distortion 0.15% SMPTE; power consumption 30 W; 17 $\frac{3}{4}$ " W  $\times$  10 $\frac{1}{4}$ " D  $\times$  3 $\frac{3}{4}$ " H; 12 lb.....\$759

**Model 2BX.** Similar to Model 3BX except divides frequency range into 2 bands (bass and treble) and has 2 rows of expansion monitoring LEDs. Output level 6 V rms; power consumption 20 W; 8.3 lb.....\$499

**Model 1BX.** Similar to Model 2BX except has infrasonic filter in its rms level detector to prevent mistracking caused by turntable rumble and record warp; 10 LEDs to monitor upward and downward expansion; power consumption 10 W; 11" W  $\times$  10 $\frac{1}{4}$ " D  $\times$  3 $\frac{3}{4}$ " H; 4.5 lb.....\$279

**Model 3BX-R.** Remote control allows Model 3BX expander to be operated from a remote location and provides more control capability. Includes release-time control for adjusting reaction time of 3BX; fade switch; master volume control; bypass switch; LEDs that indicate operational modes; 25-ft cable.....\$189

### dbx Signal-Improvement Units

**Model 118.** Dynamic range enhancer is a single-band linear decibel expander/compressor and limiter/peak limiter designed to expand dynamic range of any program source. Specifications same as Model 3BX; power consumption 5 W; 10 $\frac{3}{8}$ " W  $\times$  3 $\frac{3}{4}$ " H; 5 lb.....\$239

**Model 110.** Subharmonic synthesizer that passes low-frequency signals plus same signals a full octave lower (synthesized by sampling original signals) to recreate subharmonics. Dynamic range 100 dB peak signal to weighted background noise; input level nominal/max. 300 mV/7 V rms; output level 7 V rms; frequency response 20-20,000 Hz  $\pm 2$  dB; equivalent input noise -85 dBV unweighted referenced to 1 V, 20-kHz bandwidth; THD 0.1% typical, main signal channel; IM distortion 0.15% SMPTE, main channel; power consumption 10 W.....\$249

### dbx Model 20/20 Computerized

#### Equalizer/Analyzer

Automatic equalizing system combines a microprocessor-controlled 10-band graphic equalizer, real-time analyzer, pink-noise generator, sound-pressure-level (SPL) indicator and includes a calibrated microphone. EQ center frequencies 31.5, 63, 125, 250, 500, 1k, 2k, 4k, 8k, 16k Hz; EQ range  $+14/-15$  dB; accuracy  $\pm 0.1$  dB at full boost/cut,  $\pm 0.1$  dB/step; gain 0 dB; THD 0.01% 20-20,000 Hz. Analyzer/SPL meter/generator: analyzer dynamic range 80 dB; display 30 LED  $\times$  10 band; meter bandwidth at 90 dB SPL input 15-20,000 Hz; dynamic range 80 dB; generator accuracy  $\pm 0.5$  dB. Microphone type electret condenser; frequen-



## SIGNAL PROCESSORS

cy response  $\pm 1$  dB 20-20,000 Hz; 25-ft cable. 19"W  $\times$  12 1/2"D  $\times$  5 1/4"H.....\$1500

### 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  $\pm 1$  dB; 1.75" H  $\times$  19" W  $\times$  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  $\pm 1$ -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  $\times$  10.5" W  $\times$  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  $\mu$ sec-10 msec; input/output level 0 to +4 dBm; input impedance 10k ohms unbalanced; 3.5" H  $\times$  19" W  $\times$  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  $\pm 1$  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  $\pm 0/-0.5$  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  $\mu$ sec-100 msec; release time continuously variable from 1 msec-1 sec; 115 V ac, 50-60 Hz  $\pm 2\%$  or 230 V ac, 50-60 Hz  $\pm 2\%$ ; 3.5" H  $\times$  19" W  $\times$  9" D.....\$700

### FISHER

**NR500 Tape Noise-Reduction System**  
Studio Standard "Super D" dual-process noise-re-

duction system designed for use with three-head cassette decks. Companding system uses special phase-compensated split-band system that processes low and high frequencies separately to eliminate "breathing" effects. Features separate encoding and decoding channels; tape/source monitoring switch; internal calibration system to ensure compatibility with any tape deck; fluoroscan peak level meters. Companding 40 dB max.; dynamic range 100 dB; THD 0.08% at 1 kHz, rated level; frequency range 20-30,000 Hz; noise-reduction capability 40 dB max.; record/play input level/impedance 350 mV/50k; record/play output level/impedance 350 mV/330 ohms; power consumption 7 W nominal at 120 V ac, 50/60 Hz; 17 5/16" W  $\times$  10 5/8" D  $\times$  13 1/4" H; 8 lb 13 oz.....\$350

### FURMAN SOUND

#### PQ-6 Stereo Parametric Equalizer/Preamp

Three-band stereo parametric equalizer designed as instrument preamp, feedback suppressor in PA system, or patchable onboard equalizer for recording studios, broadcast stations, or stage productions. Each channel features 1/3-octave narrow/4-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  $\pm 0.5$  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 115V, 60Hz or 230 V, 50/60 Hz; 3.5" H  $\times$  19" W  $\times$  8" D.....\$525  
**PQ-3.** Mono version of PQ-6; 1.75" H.....\$315

#### RV-1 Reverberation System

Reverberation system incorporates shock-mounted triple 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),  $\pm 18$ -dB midrange EQ, and treble shelving ( $\pm 18$  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  $\times$  19" W  $\times$  8" D.....\$315

#### LC-2 Limiter/Compressor

Limiter/compressor features input and output level controls; attack, release, compression ratio controls; LED-style meter that displays gain over 20-dB range; LED power and overload indicators. Front-panel pushbuttons select between normal compression and "de-essing" or side-chain modes. Input 10k ohms unbalanced (optional 20k ohms balanced at main input); max. input before clipping for balanced input 8.7 V rms (+21 dBm); output 270 ohms unbalanced (optional 600 ohms balanced); max. output level 8.7 V rms (+21 dBm) unbalanced, 17.4 V rms (+27 dBm) balanced; minimum terminating impedance 2.5k ohms; attack 400  $\mu$ sec to 25 msec; release 200 msec to 5 sec; compression ratio 2:1 to 50:1; frequency response 20-20,000 Hz  $\pm 0.5$  dB; S/N 92 dB unweighted with 5 dB of gain reduction; THD 0.04% with no gain reduction, 0.07% with 5 dB of gain reduction; 19" W  $\times$  8" D  $\times$  13 1/4" H; 5 lb; 115 V ac 80 Hz, 230 V ac 50/60 Hz, 5 W.....\$315

### 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,  $\pm 12$  dB boost or cut. Features high-speed operational amplifier BIFET 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  $\pm 0.5$  dB (EQ flat), 0-500,000 Hz  $\pm 0.1$  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/ $\mu$ sec; S/N 90 dB below 2 V rms; max. output 10 V before clipping; 19" rack-mountable.....\$250

### INTEGREX

#### 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 reels or 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 40k ohms (all inputs), all outputs variable, low impedance (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), 70 dB (from tuner in), at tape output 70 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  $\times$  15.5W  $\times$  6.75" D.....\$137  
**Dolby Calibration Tapes.** Specify reel or cassette.....\$20

#### DFM Dolby Noise Reducer

Decodes Dolby B-encoded cassette or reel tapes and Dolby-encoded FM broadcasts; front-panel on/off, 25/75-usec deemphasis input select, and Dolby-decoding in/out switches; rear-panel input level calibration, output level, and 25/75 usec deemphasis 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  $\times$  8.5" W  $\times$  4" D.....\$100

### 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,  $\pm 12$  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  $\pm 0/-1$  dB; THD and IM dist. 0.003%; gain 0 dB/-6dB; 6 1/4" H  $\times$  17 3/4" W  $\times$  12 1/4" D.....\$600  
**MU-S80.** Electret condenser microphone for room acoustics measurements with SEA-80. Frequency

response 30-16,000 Hz  $\pm 2$  dB; sensitivity 72 dB  $\pm 3$  dB; output impedance 600 ohms .....\$200

### SEA-70 Graphic Equalizer

Stereo graphic equalizer with 12 frequency "tone-zone" controls in each channel, two-deck SEA recording/dubbing. Features wide dynamic range expansion; LED status indicators;  $\pm 12$  dB/ $\pm 6$  dB control-range switch .....\$400

### SEA-20GL Graphic Equalizer

Seven frequency "tone zone" control ranges (one per  $1\frac{1}{2}$  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/-6dB) .....\$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 7W;  $3\frac{7}{8}$ "H  $\times$   $15\frac{3}{8}$ "W  $\times$   $9\frac{1}{2}$ "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 read-outs; frequency response (min. bandwidth) -3 dB at 500 Hz, -10 dB at 1 kHz, -20 dB at 2.5 kHz; (max. bandwidth)  $\pm 0.5$  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  $\mu$ V rms 20 Hz to 20 kHz; has 8 phono jacks and tape deck connectors;  $2\frac{7}{8}$ " H  $\times$   $17\frac{1}{2}$ " W  $\times$   $8\frac{1}{4}$ " 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  $\pm 0.5$  dB; distortion 0.1% (THD), 0.5% (IM); internal noise 40  $\mu$ V rms;  $2\frac{7}{8}$ " H  $\times$   $16\frac{3}{4}$ " W  $\times$   $7\frac{5}{8}$ " D.....\$329

## KOSS

### K/4DS Digital Delay System

Designed to recreate concert hall sound in home environment; stores in digital format 17,000 bits of information of live performances from club, theater, concert hall, and auditorium employing 16,384-bit computer circuitry and RAM; automatically delays recorded material to conform with optimized ideal room stored in computer; hooks into any stereo



system; second set of speakers required. Features built-in 15 W/ch amplifier; switchable speaker selector for 4th dimension, stereo only, and phones and left/right speaker dimension control; EQ switch (enhances bass response of ambience speakers and rolls off bass response below 50 Hz); min./max. gain set with LED limit indicator; stereophones level, dimension, and 4th dimension/stereo comparator controls with two phone jacks .....\$399  
With speakers .....\$459

## LT SOUND

### ACC-2 Amplitude Control Center

Stereo unit has Allison Research vca with feed-forward circuit design, de-essing with switchable knee, or normal compression. Functions as compressor, limiter, expander, de-esser, and on-board oscillator for amplitude-modulated tremolo effects. Each channel has compression ratio, compression attack and release controls; expander threshold, expander ratio, and attack and release controls; three-color LED gain-reduction indicators. S/N ratio 90 dB below 1 V; typical distortion 0.001%; compression/limiting slope variable between 1:1 and infinity;  $19\frac{1}{2}$ " H  $\times$   $3\frac{1}{2}$ " W  $\times$   $7\frac{1}{4}$ " D.....\$995

**CLX-2.** Similar to ACC-2 except has no tremolo-effects capability, expander ratio, expander threshold, and attack and release controls. Has key function for keyed expansion or noise gating;  $2\frac{1}{2}$ " H.....\$595

### SL-2 Stereo Limiter

Stereo unit functions independently or in a stereo tracking mode. Provides three controls for attack and release. Functions as a hard limiter, average limiter, or automatic level control. S/N ratio 90 dB below 1 V; typical distortion 0.01% (not undergoing limiting);  $19\frac{1}{2}$ " H  $\times$   $7\frac{1}{4}$ " D  $\times$   $2\frac{1}{2}$ ".....\$195

### NR-2 Noise Reducer 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  $\pm 0.75$  dB; S/N 90 dBm; dist. 0.2% at 1000 Hz; input impedance 47,000 ohms; output impedance 200 ohms for 2k-ohm loads;  $2.5\frac{1}{2}$ " H  $\times$   $12.75\frac{1}{2}$ " W  $\times$   $6.15\frac{1}{2}$ " D.....\$298

### NR-4 Four-Channel Compressor

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  $\pm 0.75$  dB; THD 0.2% (compressed and expanded); slew rate 13 V/ $\mu$ sec; expander noise output -95 dBm; max. input level +26 dBm;  $2.5\frac{1}{2}$ " H  $\times$   $12.75\frac{1}{2}$ " W  $\times$   $6.15\frac{1}{2}$ " D.....\$249

**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.....\$449

### TC-1 Thompson Vocal Eliminator

Removes most or all of solo vocalist from standard stereo records and leaves most of the background instruments and vocals untouched. Works on tapes and records.  $19\frac{1}{2}$ " H  $\times$   $7\frac{1}{4}$ " D  $\times$   $2\frac{1}{2}$ ".....\$295

### TAD-4 Thompson Analog Delay

Stereo ambience unit for recording use features two separate channels each of analog delay and studio reverb. Controls continuously variable for echo EQ, reverb EQ, echo repeat, direct level, echo level, reverb level. Delay time continuously variable 20-240 msec; delay bandwidth ratio continuously variable with delay time; bandwidth 12 kHz at 20-70 msec, 8.4 kHz at 100 msec; down to 3.5 kHz at 240 msec; dynamic range greater than 90 dB;  $19\frac{1}{2}$ " H  $\times$   $7\frac{1}{4}$ " D  $\times$   $2\frac{1}{2}$ ".....\$725

### 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  $\pm 1.5$  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  $\pm 18$  dB for bass, midrange, and

treble; rack-mountable;  $2\frac{1}{2}$ " H  $\times$   $19\frac{1}{2}$ " W  $\times$   $7\frac{1}{2}$ " D.....\$495  
**RCC.** Reverb control center similar to ECC without echo capability; frequency response 10-40,000 Hz  $\pm 0.5$  dB direct, 20-5500 Hz reverb; dynamic range 72 dB below 1V; THD and IM dist. 0.05%.....\$195

### RV-2 Stereo Reverb 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  $\pm 0.5$  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);  $2\frac{1}{2}$ " H  $\times$   $19\frac{1}{2}$ " W  $\times$   $7\frac{1}{2}$ " D.....\$305

### PEQ-2 Parametric Equalizer

Dual 4-band parametric equalizer. Studio quality EQ has rumble filter, selectable peak-dip or shelving response on upper and lower bands, bypass switch, peak indicator, both RCA balanced and unbalanced inputs and outputs. Frequency range coverage 20-20,000 Hz; bandwidth 0.15-2.0 octaves; maximum level +22 dBm; maximum boost/cut 15 dB; input impedance 47k ohms; output impedance 47 ohms; THD 0.007%; IM distortion 0.002%;  $19\frac{1}{2}$ " H  $\times$   $7\frac{1}{4}$ " W  $\times$   $3\frac{1}{2}$ " D; 8.5 lb.....\$475  
**PEQ-1.** Same as PEQ-2 but single-channel version and no low-frequency rumble filter; 5 lb..\$249

## MARANTZ

### EQ 20 Equalizer

10-band stereo graphic equalizer with separate left- and right-channel controls and 24-karat-gold-plated input and output jacks for low-oxidation/low-distortion audio connections. Features 20 detented slide controls; tape equalization recording capability; extra tape monitor with EQ defeat switch to bypass equalizer. Frequency response 10-25,000 Hz  $\pm 1$  dB; S/N ratio 110 dB A weighted at 1 kHz referenced to rated output (1 volt); THD 0.005% at rated output, 20-20,000 Hz; IM distortion 0.005% at rated output, SMPTE method; sensitivity for rated output 1100 mV line in and tape in; line input impedance 110k ohms; line output impedance 3.5k ohms; power consumption 8.5 watts at 110-120 V ac, 60 Hz;  $16\frac{1}{8}$ " H  $\times$   $7\frac{1}{2}$ " D  $\times$   $2\frac{7}{8}$ " W; 5.25 lb.....\$250

## 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;  $6\frac{1}{8}$ " H  $\times$   $17\frac{1}{2}$ " W  $\times$   $12\frac{1}{2}$ " D.....\$730

### MXD-5 Analog Delay Line

Echo delay line uses spring reverb with 20-to-200-millisecond range. Features include selective impedance matching in inputs and outputs to provide compatibility with almost any instrument, microphone, amplifier, recording console, PA mixer; LED indicators for monitoring input signal and overload; separate outputs for echo and direct- and echo-sound mix; 0/-20/-40-dB output level selector; jacks for optional footswitch. Size is  $19\frac{1}{2}$ " W  $\times$   $8\frac{1}{2}$ " D  $\times$   $3\frac{3}{4}$ " H; weight is about 8 lb.....\$400

## MXR

### One-Third Octave Equalizer

31-discrete-band one-channel  $\frac{1}{3}$ -octave equalizer

# 9

## SIGNAL PROCESSORS

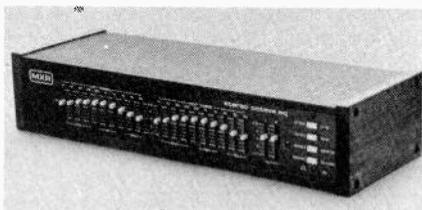
with center frequencies set at 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10,000, 12,500, 16,000, and 20,000 Hz,  $\pm 12$  dB boost or cut; EQ in/out switch; dynamic range 108 dB; THD 0.01% at 0 dBV (20-20,000 Hz), 0.009% at 0 dBV (1 kHz); IM distortion 0.01% at 0 dBV (60 Hz/7 kHz, 4:1); frequency response 20-20,000 Hz  $+0/-1$  dB; max. slew rate 7 V/ $\mu$ sec; 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.....\$385

### Fifteen-Band Stereo Equalizer

Fifteen-band stereo graphic equalizer, spaced 2 $\frac{3}{4}$ -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,  $\pm 12$  dB boost or cut; tape monitor and in/out switches; THD 0.02% at 0 dBV from 20-20,000 Hz, 0.009% at 0 dBV (1 kHz); 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/ $\mu$ sec; optional rack mount ears available; walnut side panels.....\$357

### Ten-Band Stereo Octave Equalizer

Vertical format, 10-band, 2-channel graphic equalizer with center frequencies at 31, 62, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz. Independent left and right level controls; switchable subsonic filter; complete tape monitoring facilities with ability to preequalize when recording; bypass



switch; control range  $\pm 12$  dB; maximum input/output level  $+16$  dBV; input impedance 20k ohms nominal; output impedance 100 ohms; equivalent input noise  $-95$  dBV; maximum slew rate 7 volts/microsecond; THD 0.02% at 0 dBV (20-20,000 Hz), 0.009% at 0 dBV (1 kHz); IM distortion 0.009% at 0 dBV (60 Hz/7 kHz, 4:1); frequency response 20-20,000 Hz  $+0/-1$  dB; 19" W  $\times$  3 $\frac{1}{2}$ " H; solid-walnut end pieces; optional rack-mount "ears" available.....\$250

### 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  $\pm 12$  dB; gain: unity  $\pm 1$  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  $\pm 1$  dB at 0 dBV; THD 0.05% at 0 dBV (20-20,000 Hz), 0.009% at 0 dBV (1 kHz); IM 0.05% at 0 dBV (60/7000 Hz, 4:1).....\$220

### Five-Band Equalizer

Two-channel equalizer with center frequencies at 50, 100, 200, 2000, and 10,000 Hz. Independent left and right level controls with LED level-set indicators; subsonic filter; tape-monitor and equalizer

bypass switches; control range  $\pm 12$  dB; max. input/output level  $+13$  dBV; input impedance 20 kohms nominal; output impedance 100 ohms; equivalent input noise  $-95$  dBV; THD 0.05% at 0 dBV (20-20,000 Hz), 0.005% at 0 dBV (1 kHz); IM dist. 0.005% at 0 dBV (60 Hz/7 kHz, 4:1); frequency response 20-70,000 Hz  $+0/-3$  dB; sloping console design with solid wood end pieces..\$150

### Dynamic Expander

Linear dynamic expander provides up to 6 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/ $\mu$ sec; 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.....\$327

### Compressor

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  $\pm 1$  dB per 20 dB; frequency response 30-20,000 Hz  $\pm 1$  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.....\$160

### 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  $\pm 0.2$  dB; phono S/N 87 dB; phono gain 40 dB at 1000 Hz; THD and IM dist. 0.005%; max. signal output  $+16$  dBV; rear-panel ac convenience outlet; black anodized extrusion with solid walnut end pieces; optional rack-mount ears available; 3 $\frac{1}{2}$ " H  $\times$  19" W.....\$500

**System Preamp II.** Same as System Preamp, except includes second RIAA phono preamp, allowing independent selection of two turntables.....\$550

## 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

### NR-100 Noise-Reduction System

Dolby-C noise-reduction processor designed specifically to be used with Nakamichi 700ZXE, 700ZXL, and 1000 ZXL cassette decks. Can be used without recorder recalibration and is selected by setting noise-reduction switch on cassette deck to EXT. Provides 4 channels of NR (both stereo channels in record and playback); noise reduction approximately 18 dB at 1 kHz, 20 dB 2k-8k Hz; power supplied by remote-control socket on recorder; 9 $\frac{7}{16}$ " D  $\times$  4 $\frac{23}{32}$ " W  $\times$  1 $\frac{9}{16}$ " H; cable length 27 $\frac{1}{2}$ ".....\$230

### NR-200 Noise-Reduction System

Dolby-C noise-reduction system designed to be

used with any high-quality tape recorder. Rack-mountable system has its own power supply, peak-responding LED recording-level meters; left, right,



and master recording-level controls; output control; calibration oscillator; MPX filter; and switch for choosing between Dolby B and C processing. Features encoder and decoder sections for true off-tape monitoring with 3-head cassette decks. Noise reduction Dolby B/C 10 dB beyond 2 kHz/20 dB 2k-8k Hz; frequency response 20-20,000 Hz  $\pm 1$  dB; THD less than 0.1% (400 Hz, ref 0-dB level); power consumption approx. 20 W; 19" W  $\times$  10 $\frac{3}{16}$ " D  $\times$  2 $\frac{13}{16}$ " H; 12 lb 2 oz.....\$450

## NIKKO

### EQ-1 Graphic Equalizer

Ten-band stereo graphic equalizer ( $\pm 12$ -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  $\pm 1$  dB; THD 0.007%; S/N 105 dB (IHF "A"); 3 $\frac{1}{2}$ " H  $\times$  19" W  $\times$  9" D.....\$320

### EQ-2 Graphic Equalizer

Six-band stereo graphic equalizer with center frequencies set at 40, 125, 400, 1250, 4000, and 12,500 Hz,  $\pm 12$  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  $\pm 1$  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.....\$210

### ATD-1 Time Delay Synthesizer

Designed to be used in audio systems where delay is piped through its own amplifier and speaker systems but will operate successfully with single am-



plifier/speaker systems. Features three separate Hall Size controls for up to 15 different time delays; five Reverberation controls; three Hall Character controls to combine time-delayed signals for multiple-reflection effect; Stage Distance control; front-panel input level control with 5-step LED peak-level indicator; output-level control; Tape Mode button for mixed or discrete recording of direct and time-delayed signals; rear-panel terminals for connection to preamp tape-out terminals; rear-panel tape-in/out terminals for direct connection to tape deck; Delayed output to second amplifier; Main output for single amplifier/receiver systems. Delay time 27-135 msec large, 16-88 msec mid, 13-64 msec small; reverberation at 500 Hz 0.2-2 sec large, 0.2-1.5 sec mid, 0.1-1 sec small; audio input/output 0.1 V/2-3 V; frequency response 20-20,000 Hz  $\pm 0.1$  dB main, 20-5000 Hz  $\pm 3$  dB delayed; THD 0.02% main (20-20,000 Hz), 0.6% delayed (500 Hz); S/N unweighted 80dB main, 60 dB delayed; 19" W  $\times$  13" D  $\times$  2 $\frac{1}{2}$ " H; 11 lb.....\$350

## 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  $\pm 12$  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; 3<sup>9</sup>/<sub>16</sub>"H × 16<sup>15</sup>/<sub>16</sub>"W × 9<sup>1</sup>/<sub>16</sub>"D.....\$150

### PHASE LINEAR

#### 1100 Series Two Parametric EQ

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/-1dB; 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; 5<sup>1</sup>/<sub>2</sub>"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-coding; 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 3V 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; 3<sup>1</sup>/<sub>2</sub>"H × 19"W × 8<sup>1</sup>/<sub>2</sub>"D.....\$400

### PIONEER

#### SG-9 Stereo Graphic Equalizer

Graphic equalizer with ± 10-dB EQ range in each of 12 channels (center frequencies at 16, 32, 64, 125, 250, 500, 1k, 2k, 4k, 8k, 16k, 32k Hz), using slide-type controls. Rated THD 0.006% 20-20,000 Hz with all controls flat, 1-V output. 16<sup>9</sup>/<sub>16</sub>"W × 14"D × 5<sup>7</sup>/<sub>8</sub>"H; 15.5 lb.....\$395

#### SR-303 Reverberation Amplifier

Reverb amplifier with 3-dimensional-effect visual display. Frequency response 5-70,000 Hz ± 1 dB (depth volume control set to minimum); S/N ratio 90 dB; reverberation time 0-3.0 sec at effect 1, 400 Hz; THD 0.05 at 1 kHz, depth volume control set to minimum, output 1 volt; 16<sup>9</sup>/<sub>16</sub>"W × 13<sup>1</sup>/<sub>4</sub>"D × 3<sup>7</sup>/<sub>8</sub>"H; 9.5 lb.....\$195

#### 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 Fluorescan meters; 3<sup>7</sup>/<sub>8</sub>"H × 16<sup>1</sup>/<sub>2</sub>"W × 13<sup>1</sup>/<sub>4</sub>"D.....\$195

### ROTEL

#### 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; 3<sup>7</sup>/<sub>32</sub>"H × 16<sup>15</sup>/<sub>16</sub>"W × 11<sup>13</sup>/<sub>32</sub>"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; 5<sup>1</sup>/<sub>16</sub>"H × 16<sup>15</sup>/<sub>16</sub>"W × 10"D.....\$250

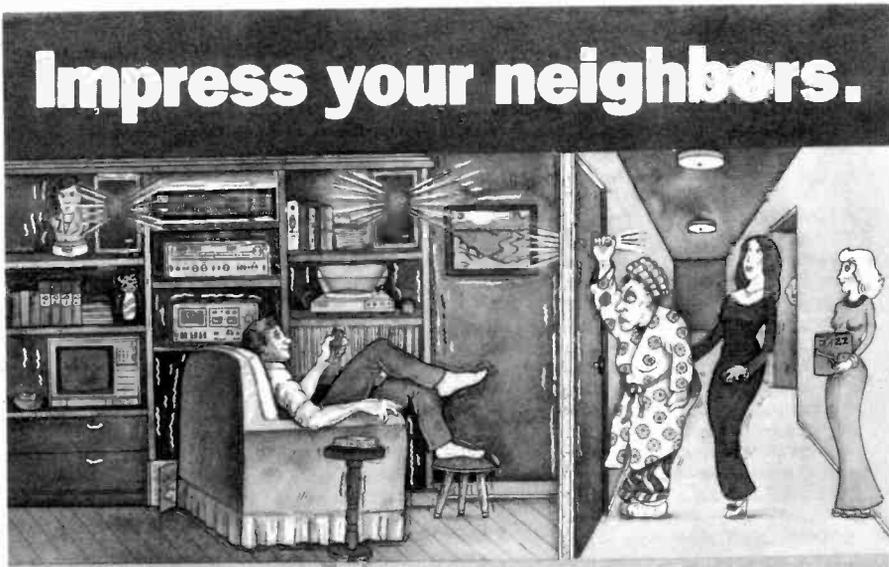
RE-500. Similar to RE-700 except 3<sup>1</sup>/<sub>16</sub>"H × 16<sup>15</sup>/<sub>16</sub>"W × 10<sup>1</sup>/<sub>16</sub>"D.....\$150.

### SAE

#### 2800 Stereo Parametric Equalizer

Four-band parametric equalizer system with con-

trol 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 (L.O., 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;



Graphic equalization, an integral part of the contemporary home music system, gives you the kind of *focussed* music power that will bring your neighbors over for a late night get together.

The new MXR Stereo Octave Equalizer lets you remix your music so that you can bring up that earth shattering bass line, screaming guitar solo or any part of the performance loud enough for everybody to hear without boosting noise.

Annoying problems like hiss, turntable rumble and other kinds of distortion are easily overcome with the Stereo Octave Eq. It can accommodate the extended dynamic range of the new high performance discs and be an invaluable tool when recording car stereo cassettes.

Featuring professional specs and the highest quality components hand-assembled in Rochester, N.Y., USA, the MXR Stereo Octave Eq adds clean, noise-free power to specific parts of your music while maximizing your system's response. Check one out at your local MXR dealer and get to know your neighbors better.

MXR Innovations, Inc.  
740 Driving Park Avenue, Rochester, New York 14613 (716) 254-2910



# 9

## SIGNAL PROCESSORS

nominal rated output 2.5 V; frequency response (controls at flat) 20-12,000 Hz  $\pm 0.25$  dB; clipping level 6.5 V at 1000 Hz; THD 0.01% at 2.5 V, 0.026% at 8.5 V;  $-0.9$  dB gain; front panel  $8\frac{3}{4}'' \times 19''$ ; chassis depth  $3\frac{1}{2}''$  in. ....\$700

**1800.** Two-band version of 2800 with lo band covering 40-1200 Hz and hi covering 1200-20,000 Hz;  $5.25'' \times 19'' \times 3.5''$  D .....\$400

**C-6.** Unassembled walnut cabinet for 2600 ...\$50

**C-4.** Unassembled walnut cabinet for 1800 ...\$45

### 180 Parametric Equalizer

Two-band stereo parametric equalizer with adjustable bandwidth (0.3-3.8 octaves) and center frequency in each control group; features tape equalization facilities and level match controls; frequency response 20-20,000 Hz  $\pm 0.25$  dB; THD and IM dist. 0.02%; S/N 90 dB;  $4\frac{3}{4}'' \times 17\frac{1}{2}'' \times 3\frac{1}{2}''$  D .....\$300

### 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;  $2.75'' \times 15'' \times 8''$  D .....\$500

### 5000A Click and Pop Filter

Filter is designed to eliminate or considerably reduce audible effects of scratches, grit, mistrack-

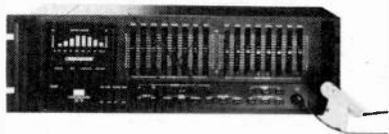


ing, static, imperfections, and normal wear of records during normal play and tape recording. Frequency response 20-20,000 Hz  $\pm 1$  dB; S/N ratio greater than 96 dB; THD and IM less than 0.1%;  $10\frac{3}{4}'' \times 9\frac{1}{4}'' \times 3\frac{1}{4}''$ ; 6 lb .....\$225

## SANSUI

### SE-9 Graphic Equalizer

Microprocessor-controlled stereo graphic equalizer with unique motorized fader-setting system, 4-curve memory storage, spectrum-analyzer display, built-in pink-noise generator, and external electret condenser microphone. All 16 (8 bands  $\times$  2 channels) frequency controls are dual slide potentiome-



ters, one section boosting/cutting its band by  $\pm 12$  dB, the other producing a varying dc voltage for physically positioning the sliders. Using the automatic adjustment procedure, fader-to-fader interaction is minimized. Automatic setup procedure requires only 30 seconds overall. Left/right frequency spectra are shown on a gas-display calibrated in 3-dB increments over a 24-dB range. Under and

over LEDs warn of out-of-range conditions. Features 2-way dubbing, 2-deck monitoring facilities. Center frequencies 80, 160, 315, 630, 1.25k, 5k, and 10k Hz; in/out level 1 volt with flat control settings; THD 0.008%; frequency response 10-100,000 Hz  $+0/-1$  dB; S/N ratio 105 dB; input/output impedance 30k/600 ohms.

**SE-9S.** SE-9 with brushed-aluminum front panel. ....\$700

**SE-9B.** SE-9 with matte black front panel and rack-mounting hardware .....\$700

### 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,  $\pm 12$  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;  $6\frac{5}{16}'' \times 19'' \times 11\frac{3}{4}''$  D (with detachable handles for rack mounting)  $\times 11\frac{3}{4}''$  D .....\$300

**SE-7S.** Same as SE-7B but with brushed aluminum finish faceplate and rosewood cabinet;  $6\frac{5}{16}'' \times 17\frac{1}{16}'' \times 11''$  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,  $\pm 12$  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;  $4\frac{3}{8}'' \times 19'' \times 11\frac{3}{4}''$  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  $\pm 2$  dB (at reverb time min.); 20-30,000 Hz  $\pm 10$  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;  $4\frac{1}{16}'' \times 11\frac{1}{16}'' \times 10\frac{7}{16}''$  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  $\pm 1$  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;  $13\frac{1}{4}'' \times 17\frac{3}{8}'' \times 19''$  with handles)  $\times 11\frac{3}{4}''$  D .....\$300

### PLUS N33 Noise-Reduction System

Super D noise-reduction system uses companding scheme. Features a phase-compensated band-splitting filter; "Decliner" 2:1 compansion; optimized level sensing; mic/line mixing; fluorescent peak-reading signal-level meters; MPX filter. Dynamic range 100 dB; frequency response 10-30,000 Hz  $\pm 1$  dB; THD 0.08% at rated output, 1 kHz; noise reduction 40 dB maximum using a tape deck with 50-dB minimum S/N ratio; mic level/impedance 0.3 mV/400-10,000 ohms; record/playback line input level/impedance 100 mV minimum/50k ohms; encode output level/impedance 80 mV/2k ohms; decode output level/impedance 530 mV/2k ohms;  $17\frac{3}{8}'' \times 10\frac{3}{4}'' \times 13\frac{1}{4}''$  .....\$300

## SHURE

### SR107 Equalizer

Ten-octave equalizer. Rotary controls for each octave (15-dB boost or cut) at 31, 63, 125, 250, 500, 1000, 2000, 4000, 8000, 16,000 Hz); 15-dB master level control; LED overload indicator; 20-dB additional adjustable gain; bypass switch; balanced/unbalanced line input; balanced microphone output; balanced/unbalanced AUX-level output;  $19'' \times 8\frac{1}{2}'' \times 1\frac{3}{4}''$ ; 120 V ac, 50/60 Hz, 6 W .....\$315

### M63 Audio Master

Add-on tone-control unit for compact mixers; two high-level inputs; five outputs (high-impedance/high-level AUX; high- and low-impedance mic, 600-ohm balanced line, headphone); high- and low-pass 96-dB/octave filters; separate bass and treble boost/cut controls; output VU meter; 120 V ac, 50/60 Hz, 3 W;  $11\frac{3}{4}'' \times 6'' \times 2\frac{3}{4}''$  .....\$205

### M610 Feedback Controller

Ten-band, cut-only equalizer with eight linear potentiometers and two slide switches; high/low-impedance three-pin input and output connectors; phono-jack AUX-level input and output; bypass switch; master volume control; 120 V ac, 50/60 Hz, 3 W;  $12'' \times 7'' \times 2\frac{3}{4}''$  .....\$210

## 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  $\pm 12$  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/ $\mu$ sec; black anodized rack mount aluminum;  $1\frac{3}{4}'' \times 19'' \times 6''$  D .....\$990

### NFM-6X2 Mixer

Six-input stereo mixer with transformerless discrete circuitry. Each input has gain trim switch for optimizing S/N ratio, phase-reversal switch, pan-pot, rotary gain control. Input noise figure 2 dB (150-ohm mic.); frequency response 5-50,000 Hz  $\pm 0.1$  dB; THD at max. gain (one input) and output level of +24 dBm is 0.002%; slew rate greater than 400 V/ $\mu$ sec;  $19'' \times 12'' \times 3\frac{1}{2}''$  .....\$1890

## SONY

### PCM-10 Digital Audio Processor

Two-channel analog-to-digital pulse-code modulation 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  $\pm 1$  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 phono jack (headphone); supplied with 75-ohm coaxial cable with phono plugs, RK-112 connecting cord power cord, and demo tape;  $7\frac{7}{8}'' \times 18\frac{7}{8}'' \times 15\frac{3}{4}''$  .....\$5500

## SOUND CONCEPTS

### SD550 Ambience Restoration System

Dual-channel audio delay system; continuous delay variation from 50 to 100 msec; continuous reverb variation from 0 to 100%; high frequency rolloff from -3 to +6 dB; front mix level from 0 to 100%, rear level 0 to 100p; 50 or 100 msec delay range; rear output delay or quad direct; front output direct or delay mix; input front or quad rear; input impedance 60,000 ohms min.; output impedance 300 ohms max.; frequency response 20-10,000 Hz +1, -3 dB with 5 msec delay and zero dB high frequency rolloff; dynamic range 90 dB min.; S/N 85 dB min., 90 dB weighted; 1% max. dist. at 1 kHz and 1 V rms, consisting almost entirely of 2nd harmonic; 3 1/2" H x 15 1/2" W x 9" D.....\$700

### IR2100 Image Restoration System

Expands stereo image beyond confines of space between speakers to reproduce sonic image presented to recording microphones; loudspeaker/listener angle continuously adjustable from 20-100 degrees; continuous adjustment of perimeter to central sound level balance; master volume control; connects in tape loop or between pre- and power amp; S/N 80 dB; dist. 0.1% max.; handheld with 15-ft remote cable; 6" H x 3 3/4" W x 1.5" D.....\$250

### SX80 CX Decoder

Reexpands source material encoded by CBS CX companding system, improves perceived S/N ratio by 20 dB. Frequency response 20-20,000 Hz ± 0.25 dB; S/N 85 dB; THD 0.1% maximum; provision for displaced tape recorder; bypass, volume, calibration controls; 5 1/2" W x 3 1/2" D x 2 1/2" H.....\$100

## SOUNDCRAFTSMEN

### SP4002 Signal Processor/Preamplifier

Ten-band two-channel graphic equalizer/preamplifier. Equalizer: center frequencies set at 30, 60, 120, 240, 480, 960, 1920, 3840, 7680, and 15,360 Hz, ± 15 dB boost or cut; features LED input-to-output balancing indicators and 18-dB zero-gain control; HD and IM dist. 0.01% at 2 V; S/N 114 dB at 10 V out, 100 dB at 2 V output. Preamplifier: features two stereo or four mono phono preamps, each with inputs, outputs, and independently variable ± 20 dB gain stage; accepts moving-coil, variable-reluctance, or moving magnet cartridges with 0.28-300 mV output; 0-750 pF variable cartridge loading; pushbutton switching from one to six input sources through subsonic filter, two external processing loops, equalizer, and mono A + B mixer to two tape or two line outputs; three-way tape dubbing; two amplified headphone outputs from 8-2000 ohms; ± 20 dB stepped level control; frequency response 5-100,000 Hz ± 0.25 dB (hi level), 20-20,000 Hz ± 0.5 dB (phono); THD and IM dist. 0.01% at 1 V; phono impedance 47k or 100k ohms switchable; phono S/N 97 dB at 10 mV in. Includes environmental test record and Computone charts; rack-mount brushed aluminum black and silver panel; 7" H x 19" W x 11" D.....\$699

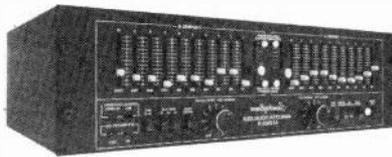
### TG3044-R Third-Octave Equalizer

Third-octave stereo equalizer with 15 center frequencies set at 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, and 1000 Hz on 1/3 octave and six center frequencies set at 1600, 2500, 4000, 6300, 10,000, and 16,000 Hz on alternate 1/3 octaves, 22 dB boost or cut (controls full), 15 dB boost or cut (controls flat); features pushbutton EQ defeat, lo-shelf, and separate monitor input and output controls; LED unity gain input-to-output balancing indicators; separate zero-gain level controls; THD and IM dist. 0.01% at 2 V; S/N 114 dB at 10 V out, 100 dB at 2 V out; **input impedance 47k ohms; output impedance 600 ohms (balanced); in/out voltage 12 V**; black anodized aluminum front panel; 5 1/4" H x 19" W x 11" D.....\$550

### AE2420 Analyzer/Equalizer

Incorporates dc differential/comparator circuitry

for EQ analysis and equalizer; comparator converts wave shapes of pink noise input signal and



speaker output signal to dc levels with 0.1-dB accuracy; eliminates precisely-calibrated pink noise generator and provides user with complete system analysis and automatic cartridge adjustment; includes pink noise generator, 12-in pink noise test record, and Computone charts.....\$499

### RP2215-R Equalizer

Provides front-panel pushbutton control of line or tape equalization for conventional hi-fi systems or separate stereo outputs for multiple-system equalization; tape monitor circuit provides monitoring equalized program material during use. Features environmental test record for listening environment equalization; four LEDs for front-panel display controlled by zero-gain level controls for input vs output level balancing. S/N 114 dB; THD 0.01% at 2 V, 0.05% at 1 V (typical); ± 15 dB boost or cut each octave; 600 ohm output; black anodized aluminum panel; 5 1/8" H x 19" W x 11 1/4" D.....\$370

**RP2201-R.** Similar to RP2215-R without LED/zero-gain balancing circuit; has 18-dB zero-gain controls; S/N 105 dB at 10 V out; ± 12 dB boost or cut each octave.....\$299

**SE450.** Same as RP2201-R without environmental test record, Computone charts, and line equalization; S/N 100 dB; available in brushed aluminum silver or black front panel with black vinyl cabinet; not rack-mountable.....\$249

### TG2245-R Equalizer

Professional equalizer with balanced or unbalanced input/output. Features separate switching for each channel; subsonic filter; high shelving, low shelving, EQ defeat; external loop input; inputs and outputs duplicated on front panel; 2-channel, 10-band/ch system. Boost/cut range ± 12 dB; output 10 V rms; THD at rated output 0.01%; S/N ratio at rated output 105 dB; 19" W x 11" D x 3 1/2" H.....\$399

## SOUND WORKSHOP

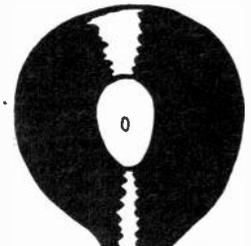
### 262 Stereo Reverb

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 800 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; 1/4-in phone jacks; 3 5/8" H x 19" W x 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

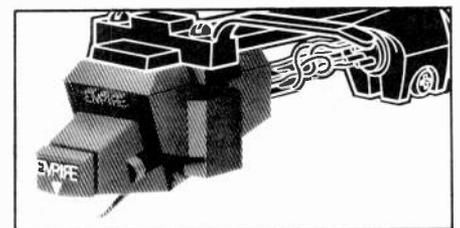
Designed to interface with latest 4- and 8-track recording systems. Input section: features separate left/right level controls with peak-reading LEDs and input mix; impedance 10k ohms; -20 dBV min. and +20 dBV max. levels. Output section: left/right reverb level controls; source impedance 47 ohms; nominal 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



# FILL IN THE BLANKS.

When you're recording from your records, make sure you get all the music.

A great performance on tape demands a great performing phono cartridge.



## EMPIRE PHONO CARTRIDGES

THERE'S A NEW SOUND WAITING IN YOUR SYSTEM.

CIRCLE NO. 9 ON READER SERVICE CARD

# 9

## SIGNAL PROCESSORS

unweighted; decay time 2.5 sec; RCA phono jacks; 3 $\frac{5}{8}$ "H  $\times$  19"W  $\times$  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,  $\pm$  15 dB boost or cut. Features gyrator synthesized inductor filter circuits; unity gain slide control for each channel (adjustable  $\pm$  15 dB); pushbutton tape monitor, EQ tape, EQ line, EQ bypass, and LED power on controls. Frequency response 0-500,000 Hz  $\pm$  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  $\mu$ V 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  $\times$  19"W  $\times$  7"D .....\$300

**2102R.** Same as 210R minus unity gain controls; solid oak or walnut end panels optional; 3.5"H  $\times$  19"W  $\times$  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-1 Graphic Equalizer

Five-band stereo graphic equalizer module with center frequencies set at 60, 240, 1000, 3500, and 10,000 Hz,  $\pm$  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  $\pm$  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

#### GEM-2 Graphic Equalizer

Provides equalization control at the important high and low ends (high treble and deep bass) and mid-high range. Each stereo channel has five slide controls with center frequencies at 38, 68, 240, 1.6k, and 15k Hz. Features exclusive three tape function system to permit recording with equalization, playing back with equalization, and tape monitoring. Frequency response 10-150,000 Hz  $\pm$  0.5 dB; max. gain/attenuation  $\pm$  14 dB; gain at flat setting 0 dB; distortion at 1 kHz 0.02% at 0 dB gain; output 2 V rms; dynamic range 8.5 V rms (flat settings); S/N 92 dB at rated output; input/output impedance 50k/600 ohms; inputs EQ in, tape play; outputs EQ out, tape record .....\$120

#### 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,  $\pm$  14 dB; has separate volume and balance slide controls and on/off monitor switch. Frequency response 20-20,000 Hz  $\pm$  0.5 dB; HD 0.04%; S/N 85 dB; input impedance 68k ohms; output impedance 600 ohms; rack mountable .....\$240

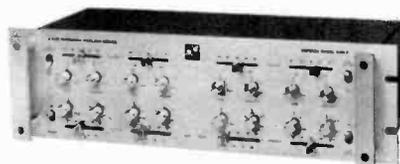
#### GEM-4 Varigraphic Equalizer

Stereo bi-FET equalizer with variable center-fre-

quency potentiometers that provide "parametric-like" control, true EQ curve modifier, and total tape-recording flexibility with switching facilities for EQing during recording and/or playback. Features five slide and five rotary controls per channel with frequencies at 33-78 Hz, 110-260 Hz, 470-1.1k Hz, 1.9-4.5 kHz, and 6.8-16 kHz. Boost/cut range  $\pm$  14 dB; frequency response 10-50,000 Hz  $\pm$  2 dB; THD less than 0.01% at 1 kHz; S/N 94 dB IHF A weighted; input/output impedance 100k/100 ohms; output 6 V rms max. with 10,000-ohm load; gain unity (0 dB) in flat positions; center Q 2.5; power consumption 3 W nominal; 19"W  $\times$  7.4"D  $\times$  5.3"H; 11 lb .....\$210

#### GEM-7 Parametric Equalizer

Stereo parametric equalizer in which each channel has four separate EQ sections and each section incorporates separate frequency and bandwidth level controls. Variable-frequency controls on each channel are logarithmically paired. Features bi-FET technology; complete tape deck switching capability with separate switching for recording with EQ, playing back with EQ, and conventional monitoring function; handles and standard front-panel rack-mount notches. Frequency selection continuously



variable 30-820 Hz and 820-16k Hz; boost/cut range  $\pm$  18 dB ( $\pm$  36 dB possible with two bands set for identical frequency), continuously variable; bandwidth 0.16-2 octaves, continuously variable; frequency response 5-100,000 Hz  $\pm$  2 dB with controls flat; THD less than 0.01%; IMD less than 0.005%; S/N 89 dB IHF A weighted; input output impedances 50k/100 ohms; output 6 V rms max. with 10k load; gain 0 dB controls flat; power consumption 3 watts nominal; 19"W  $\times$  7.4"D  $\times$  5.3"H; 11 lb .....\$450

### 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

### 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,  $\pm$  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  $\pm$  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 8V .....\$350

### TECHNICS

#### SH-8030 Dimension Controller

New Space Dimension Controller with 5-band stereo equalizer, mixing capabilities, and dimension display. Features slide-control equalizer section;

microphone and program-source mixing facilities; effect position control for switching processor in



and out of signal path; and 3-dimensional-effect dimension display with peak-level scale. Frequency response 7-150,000 Hz +0/-3 dB line, 20-20,000 Hz RIAA  $\pm$  0.5 dB phono, 35-30,000 Hz -3 dB mic; THD line in at 150 mV output 0.005%; S/N ratio 80 dB IHF-A curve, line in; dimension controller echo time 90 msec, sound-image localization 30 $^\circ$  backward; EQ center frequencies 60, 250, 1k, 4k, 16k Hz over  $\pm$  12-dB range; input sensitivity 150 mV line in, AUX, tape, 2.5 mV phono, 1.5 mV mic; output 150 mV line and rec out; power consumption 25 W; 16 $\frac{1}{8}$ "W  $\times$  11 $\frac{1}{32}$ "D  $\times$  4 $\frac{3}{32}$ "H; 10.6 lb .....\$420

#### SH-8020 Stereo Frequency EQ

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,  $\pm$  12 dB boost or cut, with LEDs on slide pots and  $\pm$  12 dB (green) and  $\pm$  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  $\pm$  1 dB; 6 $\frac{1}{32}$ "H  $\times$  16 $\frac{1}{8}$ "W  $\times$  9 $\frac{1}{32}$ "D .....\$390

#### SH-8015 Graphic Equalizer

Stereo graphic equalizer with illuminated display that indicates the variable ranges. Features dual 5-band equalization for each channel (63, 240, 1k, 4k, 16k Hz  $\pm$  12 dB range); equalizer on/off switch; equalizer position switch; tape monitor switch with LED indicator that permits monitoring signal source/tape deck output. Frequency response 5-100,000 Hz -3 dB; max. output 6 V; THD 0.02%; input sensitivity 0.5 V; S/N ratio 101 dB IHF A weighted at 1 V output; overall gain  $\pm$  0 dB; output voltage 0.5 V at 0.02% THD; power consumption 12 W; 15 $\frac{1}{8}$ "W  $\times$  10 $\frac{3}{32}$ "D  $\times$  3 $\frac{3}{8}$ "H .....\$200

### URSA MAJOR

#### Space Station SST-282 Digital Reverb System

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 tapes, 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 .....\$2195

#### 8 $\times$ 32 Digital Reverberation Unit

Compact unit provides control over all important parameters while synthesizing clean and natural reverberation, and LED numeric display gives confirmation of all parameter settings. Unique LED displays show dynamic properties of input and reverberated signals. Features 32 registers that retain contents (up to 32 complete reverb set-ups) even with power off; basic programs include Plate I, Plate II, hall, space. Early reflection/initial delay times variable from 6 to 96 msec; early reflection/initial delay levels selectable in 8 steps; decay time variable from 0.2 to 19.9 sec, depending on program selected; three values of LF, 4 values of HF decay. Bandwidth 8 kHz; dynamic range 80 dB; sampling rate 20 kHz; 19"W  $\times$  10"D  $\times$  3 $\frac{1}{2}$ "H .....\$595

# 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. .... \$7.95

**Refill Kit.** Comprised of three large and three small non-abrasive felt pads and 1-oz bottle of cleaning solution. .... \$2.95

#### Allsop 3 CHS VCR 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; has absorbent cleaning chamois and non-abrasive felt pads; includes cleaning solution. .... \$29.95  
Replacement cartridge with cleaning solution. .... \$8.95

#### Allsop Beta VCR Cleaner

Beta-format videocassette recorder cleaner for audio, video, and erase heads, pinch rollers, and capstan. Cleans in 4-6 seconds; shuts off automatically; has absorbent cleaning chamois; includes cleaning solution. .... \$29.95  
Beta replacement cartridge with cleaning solution. .... \$8.95

### 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 nonabrasive, nonflammable, residue-free. .... \$5.95

**Wipe Heads.** 25 6-in jumbo tip swabs per package. .... \$1.49

#### Plastic Wax

Dustcover cleaner and polisher; removes scratches from plastics and eliminates static electricity; for use on plastic, wood, glass, metal, formica, vinyl, etc. .... \$9.95

#### 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. .... \$9.95

#### Video Disc Cleaner

Cleans and polishes video discs; removes scratches, eliminates static, and retards dust accumulation, smudges, and fingerprints.

Heavy-duty model. .... \$8.95  
Light-duty model. .... \$6.95

### 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/Hz. 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 7 1/2 ips; recalibrates meter sensitivity due to headroom increase. Available for 3 1/4 - 7 1/2 and 7 1/2-15 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

### BIB

#### Audiophile Edition

##### 24-AE Cassette Tape Splicer

1/8-in. cassette tape splicer suitable for recording tape of any thickness; makes diagonal or butt splices. .... \$15.95

##### 90-AE Tape Head Demagnetizer

Designed for cassette, 8-track, reel-to-reel recorders; built-in auto-off switch when not in use; includes two removable probes. .... \$24.95

##### 115-AE Tape Head Cleaning Kit

Multitangled tape head cleaning tools for use on all tape recorders; includes inspection mirror with cleaning brush, cleaning fluid, and replacement tips. .... \$14.95

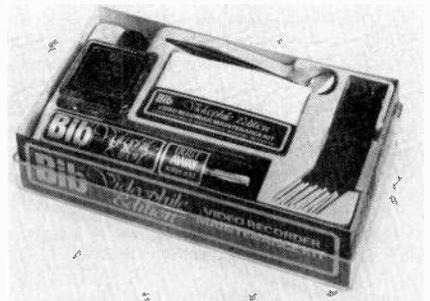
##### 122-AE Tape Head Cleaning Fluid

Professional fluorocarbon formula; cleans tape heads, capstans, pinch rollers; residue-free, safe for all recorder surfaces. .... \$3.45

#### Videophile Edition

##### VE-2 Video Maintenance Kit

Comprises five VE-5 cleaning tools, VE-7 head cleaning fluid, VE-4 dust-away air blast, inspection



mirror, antistatic cleaning cloth, maintenance manual for VHS- and Beta-format recorders. .... \$24.95

##### VE-3 Video Tape Eraser

Instantaneously erases recorded material from video tape; erasure capability — 78 dB; thermal-protected circuit. .... \$44.95

##### VE-4 Dust-Away Air Blast

Compressed air spray blaster removes dust, dirt, oxide from tape travel path; moisture-free, temperature constant. .... \$5.95

##### VE-5 Maintenance Cleaning Tools

Tools have lint-free pads at tip; clean video, audio heads, tape guides pinch rollers; pkg of five. .... \$4.95

##### VE-6 Tape Head Demagnetizer

Demagnetizes heads and guides of all video recorders; off switch; comes with two removable probes. .... \$24.95

##### VE-7 Video Tape Head Cleaning Fluid

2-oz cleaning fluid in glass bottle; cleans video and audio heads, capstans, tape guides of all video machines; nontoxic and nonflammable. .... \$4.95

##### VE-9 Video Tape Splicing Kit

Repairs broken video tape easily and accurately. .... \$39.95

##### VE-11 Head Cleaning Cassettes

Removes harmful debris from tape path in 15 seconds; safe and nonabrasive; for VHS-format machines. .... \$26.95

**VE-12.** Same as VE-11 except for Beta-format machines. .... \$26.95

##### VE-13 Video Lens Care Kit

Cleaning fluid, special brush with dust cap and antistatic cloth in handy carry-along wallet. .... \$8.95

##### VE-15 Antistatic TV Screen Treatment

Retards attraction of dust and dirt by preventing static build-up on TV screen; removes smudges and fingerprints. .... \$7.95

# 10 ACCESSORIES

## 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...\$1.60
- Q4-239** Cartridge tape head cleaner; includes two additional belts...\$2.60
- 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...\$1.50
- 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 X 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
- VTU02.** As above but interfaces with Radio Shack TRS-80 computer with Level 2 BASIC and disk...\$595
- AIB232.** As above but interfaces with Apple computers; plugs into any I/O connector...\$545

## 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
- 3143.** Similar to 8503 except holds up to 12 VHS or Beta video cassettes...\$57.95
- 3135-01 Audio Cassette Storage Chest**  
Solid walnut lacquer-finished cassette chest holds up to 24 cassettes; has flopped-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
- 8509.** Similar to 3135 without lid; holds up to 36 cassettes...\$21.95
- 8508.** Similar to 8509 except holds up to 24 cassettes...\$19.95

- 8506.** Similar to 8507 except holds up to 12 cassettes...\$15.95

## 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 remot 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 X 4" W X 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

## 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

## OSAWA

### CT-406 Cassette Winder

Manual cassette winder provides 7:1 gear ratio for rapid winding of cassettes. No larger than cassette itself...\$9.95

### CW-403 Pocket Cassette Winder

Battery-operated, high-speed cassette winder with automatic shut-off at end of tape. Rewinds C60 cassette in 35 seconds. Requires two AA cells...\$19.95

### PC-501 Index Label Book

Contains 100 replacement labels and 156 color-coded identification tabs for cassettes...\$4.99

### PC-502 Index Card Book

Provides 24 color-coded cassette replacement liners and 100 self-adhesive identifying tabs...\$4.99

### PC-507 Cassette Repair/Maintenance Kit

Designed for repairing and/or editing cassette tapes. Provides precise splicing block with 90° and 60° cutting slots and tape hold-downs. Includes scissors, tweezers, Phillips and straight-slot screwdrivers, splicing tape, sensor tape, tape probe, replacement pressure pads, and screws...\$24.95

### QC-205 Tape Deck Cleaning Kit

Contains separate cleaning solutions for tape heads and pinch rollers (11 ml each), mirror, and 10 cotton swabs. Fluid refills available...\$7.99

### QC209 Head-Cleaning Cassette

Cleaning tape removes oxide from tape heads, capstans, pinch rollers, depositing it on a replaceable, specially-surfaced pad. Safe to use on all tape heads...\$7.99

### TC-1 Tape Head Cleaner

Nonflammable spray-type cleaner for all tape

heads, pinch rollers, and plastic and metal parts. Comes with 10 cotton swabs and extension tube...\$5.99

## REALISTIC

The company's tape accessory line is as follows:

- 44-232. 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
- 44-214. 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
- 44-1170. Cleaning swabs and 2-oz Freon head-cleaning solvent...\$2.99
- 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; splits tape; has pop-out tape guide...\$21.00

### 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" X 1" X 5/8".

- QM-311.** For 1/4-in tapes...\$23.00
- QM-312.** For 0.150-in cassette tapes...\$23.00
- QM-313.** For 1/2-in video and audio tapes...\$26.80

### 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...\$5.00
- QM522.** Cassette reel tabs; 50/package...\$5.00
- QM524.** 1/4-in metal-sensing reel tabs; 50/package...\$5.00

### QM-707 Handylap

Kit includes lapping block with five 5 X 9-in coarse abrasive black lapping sheets of paper, five 5 X 9-in medium abrasive yellow sheets, and five 5 X 9-in fine abrasive red sheets...\$93.50

- QM-702.** Coarse lapping paper; black...\$7.00
- QM-703.** Medium lapping paper; yellow...\$13.20
- QM-704.** Fine lapping paper; pink...\$13.20

### QM-230 Cassette Bulk Eraser

Self-powered hand-held unit completely erases cassette tapes; requires no batteries or external power source; contoured Cyclac case with wood grain finish...\$32.50

### 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 1/2-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 Cyclac case; coiled cord...\$56.80

**QM-212.** 220-V professional bulk eraser...\$59.80

### QM-250 Professional Bulk Tape Eraser

Demagnetizes professional cassette, 1/4-in, 1/2-in, and 1-in open-reel, broadcast 8-track cartridge, and 1/2-in VHS/Beta video cassette tapes; holds up to 10 1/2-in reel sizes; 3.25" H X 10" W X 7" D...\$336.40

### QM-202 Head Demagnetizer

Head demagnetizer for use with reel-to-reel, cas-

sette, 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.....\$22.80  
**QM-203.** 220-V professional head demagnetizer.....\$23.20

**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.....\$24.00

**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.....\$4.00  
**QM-182.** Combination 8-track head/capstan cleaner.....\$4.40

**Alignment Tapes**  
**AT-210B.** For cassette recorders.....\$14.40  
**AT-200B.** Master recording provides zero reference, azimuth alignment, and DIN frequency response tests; includes 3000-Hz tone for speed and flutter.....\$52.00  
**AT-820.** For 8-track; 8-min cycle.....\$12.00  
**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.....\$55.20  
**AT-120.** 1/4-in reel-to-reel 7.5-ips master recording tape.....\$51.80

**Cassette Storage/Carrying Cases**  
 Burl walnut vinyl book-like cassette case; cassettes and hubs lock in place.  
**QM408.** Holds max. 8 cassettes.....\$9.00  
**QM412.** Holds max. 12 cassettes.....\$10.80  
**QM416.** Holds max. 16 cassettes.....\$12.80

**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.....\$31.20  
**QM-95.** VCR maintenance kit includes spray head cleaner, cellular foam swabs, anti-static dustcloth, and screwdriver that removes headcover screws.....\$17.00

**VCR-103.** Tape head cleaner spray for VCR heads, pinch rollers, and capstans; 3 oz.....\$4.80  
**VCR-105.** Tape head cleaner liquid removes dust, dirt, and tape oxide deposits from VCR heads and parts; 3.2 fl oz.....\$4.60  
**VCR-109.** High-velocity jet air stream Super Blast Spray cleaner eliminates loose tape oxide dirt and dust; 10 oz.....\$5.20  
**VCR-205.** Head demagnetizer with angled tip; removes residual magnetism from heads, rollers, and guides.....\$25.20  
**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.....\$56.80

**QM-313.** Grooved anodized aluminum splicing block for repairing or editing 1/2-in video cassettes; two deep slits for straight or diagonal cuts; includes double-backed adhesive.....\$26.80  
**VCR-506.** Illuminated inspection mirror for dark, hard-to-reach areas of VCR.....\$7.40  
**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.....\$6.80  
**AS-141.** Cassette life extender features non-abrasive cleaning belt; includes liquid cleaner.....\$3.80  
**AS-183.** 8-track head/capstan cleaner; designed for use every ten hrs; includes liquid cleaner.....\$4.40  
**AS-206.** 8 track/cassette head demagnetizer; plugs into car cigarette lighter.....\$32.00

## RECOTON

**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 3/4-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, 3/4-oz Magic Tape Dew cleaning fluid, and Magic Wand Applicator with six replacement pads.....\$5.95

**RBM-42 Magic Tape Cleaning Kit**  
 Includes 3/4-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

**CH100 Record and Tape Care Kit**  
 Total audio maintenance system kit, for cassette and 8-track cartridges, record and stylus maintenance. Can be used on all home and auto decks.....\$23

## 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" X 5" X 3.5".....\$58.50

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 129

# 10 ACCESSORIES

## 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" X 2.5" X 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 ..... \$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

## 29-500 VCR Head Cleaning Kit

Specially angled chamois-like applicators are used to apply a Broad Spectrum Freon TC based formula that quickly removes dirt, oxide buildup, and plasticizers from tape head. Kit comes with five applicators and 1 oz. bottle of cleaning formula ..... \$11.20

**29-501.** Wide Spectrum video head cleaner ..... \$4.85

**29-502.** Video head applicators ..... \$5.80

**29-503.** Video lint-free cleaning cloths ..... \$5.25

## 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.** Similar to 34-000 but with smoked top ..... \$6.50

## ROTEL

## RY-1010 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<sup>27/32</sup>" H X 16<sup>15/16</sup>" W X 11<sup>13/32</sup>" D ..... \$470

## 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, 2-1/4-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<sup>13/16</sup>" H X 13<sup>7/8</sup>" W X 5" D ..... \$299.95.

**QT-1 RM.** Rack-mount version; black metal cabinet; 5<sup>7/32</sup>" H X 19" W X 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 X 7<sup>3/4</sup>" W X 4<sup>7/8</sup>" D ..... \$189.95

Rack-mount version of SP-1; 4<sup>1/8</sup>" H X 7" W X 5" D ..... \$189.95

## TMS-1 Tape Recorder Selector

Connections for up to three tape recorders to be used at once in any combination of functions; direct tape-to-tape transfer without going through a preamp; connects to tape-monitor jacks of audio system. Internal network prevents overloading system when multiple recorders are connected in parallel. Black metal case with white lettering; 4<sup>1/4</sup>" W X 3<sup>1/2</sup>" D X 3" H ..... \$50

**TMS-2.** Deluxe version of TMS-1. For connection of up to five tape recorders or other line-level sources; 7<sup>3/4</sup>" W X 4<sup>1/8</sup>" D X 4<sup>1/8</sup>" H ..... \$90

## 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.** 6 pre-cut 1.0-mil polyester splicing tabs ..... \$1.39

**SST-7/32-18.** 8 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

## SOUNDAIDS

## Cassette Storage Cabinet

Wood cabinet with lock-jointed corners holds 68 cassettes in four hand-fitted drawers. 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<sup>3/4</sup>" H X 5<sup>9/16</sup>" W X 12<sup>3/16</sup>" D ..... \$38.00

## SOUNDCRAFTSMEN

## AS1000 Spectrum Analyzer

Real-time analyzer with differential comparator circuitry and 0.1-dB readout accuracy. Features 2-dB/step display with total range of 58 dB with display position control; built-in pink-noise generator with auto-scan feature. Generates octave-band test signals or all-band pink noise for frequency-response measurement of a single component or entire sound system. Bands 10; THD 0.01%; 19" W X 11" D X 3<sup>1/2</sup>" H; 15 lb. .... \$499

## 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<sup>3/4</sup>" H X 6<sup>1/4</sup>" W X 4<sup>3/4</sup>" 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

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# How do you build a cassette deck like a 24-track professional recorder? Build the 24-track first.

The new Revox B710 cassette deck comes from a unique company founded by Switzerland's Dr. Willi Studer. For decades Studer has been making the world's most respected studio master recorders... the legendary machines used to record everything from the Beatles' *Sgt. Pepper* to WFMT's Chicago Symphony broadcasts. Now this engineering expertise has been applied to the first and only Revox cassette deck. There's nothing else like it on the market today.

## Professional Transport Design

The B710 follows the strict design principles set for our multi-track studio recorders. The transport frame is rock-solid die cast aluminum. Mounted inside are two Hall Effect direct-drive capstan motors, both slaved to the same quartz crystal for exact synchronization. The B710 has no belts, no pulleys, no clutches. Instead, two tach regulated spooling motors work with the micro-processor to deliver smooth tape handling and gentle, jerk-free stops. Also, the B710's unique hinged headblock engagement system assures perfect azimuth alignment—a virtual impossibility with conventional designs.

## Logical Features

The four digit electronic counter doubles as a 24-hour clock timer for programmable start/stop of record or play. After rewind, the counter automatically resets to zero at the exact beginning of the tape oxide. The cassette coding sensors automatically determine correct bias and EQ for the tape formulation (I, II or IV) inserted. Mic/line mixing, MPX filter, headphone volume control, and Dolby\* noise reduction are all standard.

## The Sound

As with all Studer and Revox products, the B710 will ultimately be judged on its ability to reproduce music with exceptional clarity...the sound you'd expect from a professional recorder.

Judge for yourself. Hear the B710 today at your nearest Revox dealer. Or, for more information, write or call Studer Revox America, Inc., 1425 Elm Hill Pike, Nashville, TN 37210 / (615) 254-5651.



*\*Dolby is a trademark of Dolby Laboratories.*



**STUDER REVOX**

*Professional standards in audio components.*

CIRCLE NO. 19 ON READER SERVICE CARD

# 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™ calendaring 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*

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