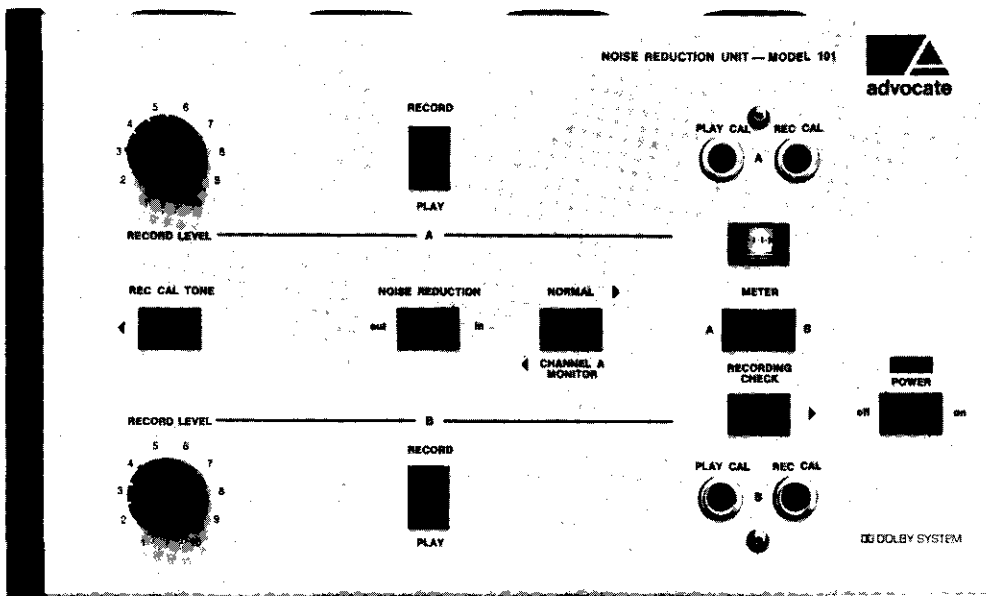
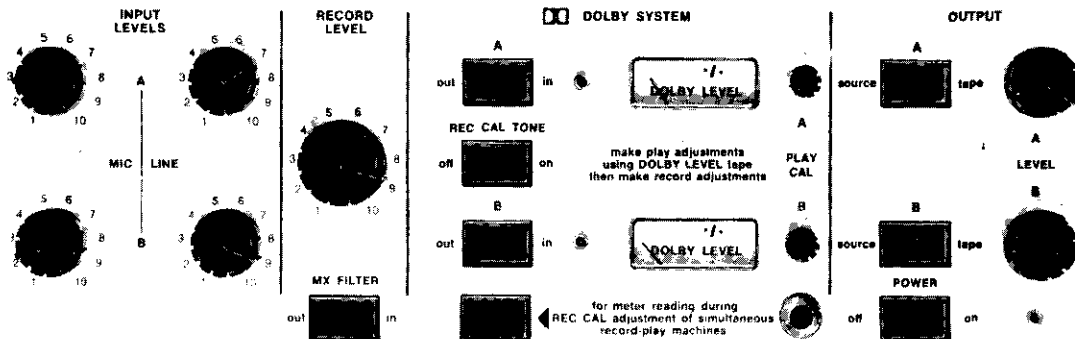


Running the Gamut of Tape Recorders with Two Dolby "Home Systems"

NOISE REDUCTION UNIT — MODEL 100

ADVENT

CAMBRIDGE, MASSACHUSETTS



new equipment reports

THE CONSUMER'S GUIDE
TO HIGH FIDELITY EQUIPMENT

THE EQUIPMENT: Advent Model 100 Noise Reduction Unit. Dimensions: 13 by 5 by 7½ inches deep. Price: \$250. Advocate Model 101 Noise Reduction Unit. Dimensions: 12½ by 7 by 2 inches high. Price: \$125. Manufacturer: Advent Corporation, 377 Putnam Ave., Cambridge, Mass. 02139.

COMMENT: Ever since Advent announced it would produce devices based on the "B-parameter" (consumer-version) Dolby noise-reduction equipment, we've received a growing stream of letters from readers asking whether such devices really do a job—and if so, how well they do it. Many of these letters also contain questions about just what the Dolby circuitry is supposed to do. Now, having used both Advent-made Dolby units with a variety of recorders, we are in a position to answer these questions in some detail.

There are, in fact, three forms in which Advent markets the Dolby circuitry: the Advent Model 100 noise reduction unit, the Advocate Model 101 noise reduction unit, and the Advent Model 200 cassette deck. The Dolby circuitry built into the last of these is entirely prealigned to the deck's operating parameters. The \$250 Model 100 and \$125 Model 101—the two units we have been working with—are separate components that can be used with virtually any tape recorder and require alignment to that equipment. Note that the Model 101 bears the trade name Advocate, which Advent is using for products designed with a broad spectrum of music listeners in mind.

In all three units the noise-reduction circuitry is similar and is made under license from Dolby Laboratories. The Dolby technique relies on the fact that noise is masked by loud passages in the program material and becomes obtrusive only as signal levels drop. The original, professional Dolby model boosts weak input signals in each of four independent frequency bands, covering the entire frequency range. The stronger the instantaneous signal in each band, the less it is boosted; high-level passages are not boosted at all. This action telescopes or compresses the signal, keeping it in the optimum operating range of the associated equipment and therefore above inherent noise levels. When the signal is to be retrieved for listening it is fed backward through the Dolby circuitry, reducing levels in each band by an amount precisely reciprocal to the previous boost. Any noise picked up while the signal is compressed is therefore reduced along with the previously boosted lowest-level signals so that the final sound has a greater useful dynamic range than it would have without Dolbyizing.

Dolby at Home

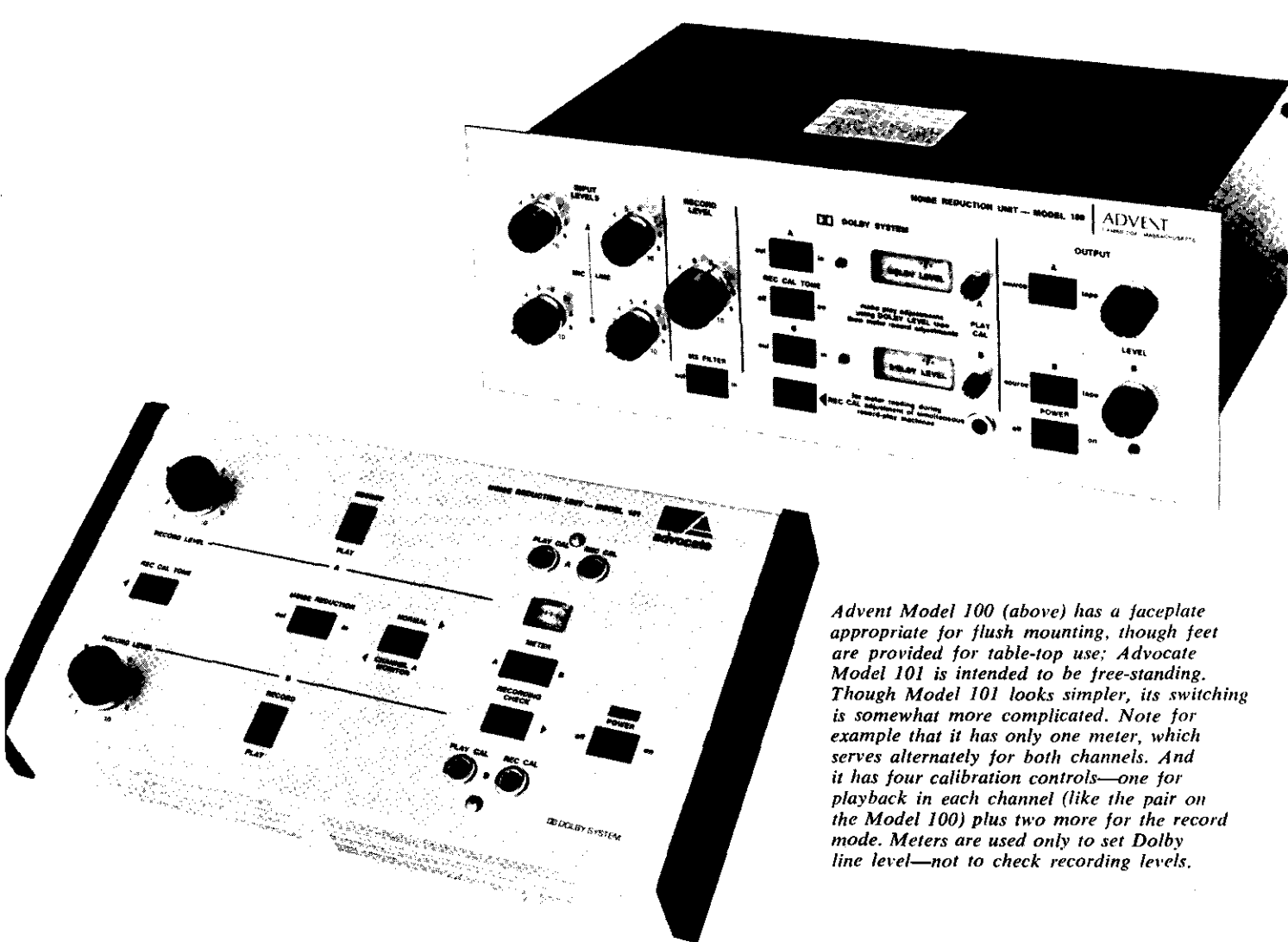
Tape hiss is far and away the most noticeable and consistent form of noise encountered in a high-quality home system, and the B-parameter Dolby circuitry is engineered specifically to combat it. Since

hiss is by definition high-frequency noise, the home models operate only in the upper frequency range—simplifying circuitry and reducing cost drastically by contrast to the professional units. Maximum action of the B-parameter circuit is 3 dB at 600 Hz, 6 dB at 1,200 Hz, 9 dB at 2,400 Hz, and 10 dB at 4,000 Hz and above—all measured as a boost in signals to be recorded and a reduction in signals being played back, and all assuming a low signal level, say around 45 dB below "Dolby level" (the level above which a signal is not compressed).

And that Dolby level is the key to the operation of the Model 100 and Model 101. For the technically minded, it is defined (like 0 VU in professional recording) as a flux level on the tape of 200 nano-webers per meter, which translates into a standard line level for 0 VU once the system is aligned. While the numbers are relatively unimportant to the user, unless both the input and output via the Dolby bear the same relationship to standard Dolby level, the circuit's action will not be exactly reciprocal in the two processes and the final audio output will not be a precise reproduction of the original sound.

Before going into some of the ramifications of that statement, let's examine the equipment itself. Of the two units we have worked with, the Model 100 is electrically more complex, though somewhat simpler to use. It contains four complete Dolby circuits: one for recording and one for playback in each channel. On the input side there are separate level controls in each channel for mike inputs and for line inputs plus a single master record-gain control. The Dolby-level test-tone generator is built into this side of the circuit. On the playback side there are tape-monitor switches and output level controls for each channel.

Connections are made from the tape recorder outputs on a stereo receiver or amplifier to the Model 100's inputs, and from the 100's record outputs to the line inputs of the tape recorder. On the playback side, connections are made from the tape recorder line outputs to the playback inputs of the Model 100 and from the 100's output to the tape-amp inputs on the stereo system. When using a recorder with a separate playback head, either the monitor switch on the Model 100 or that on the stereo system itself can be used for source/tape comparisons in most setups, the unused switch being left in the monitor position. For live recordings the mikes must be connected to jacks on the rear of the Model 100 or fed in from associated equipment via the line inputs. If they are connected to the usual jacks on the tape recorder, their signal will go onto the tape un-Dolbyized. When the jacks on the 100 are used, mike signals may be mixed with those from the line inputs. (The Model 101, which is conceived primarily with an eye to the needs of recordists who tape from FM, discs, or other tapes, has no mike inputs—though mikes may be fed to its inputs through mixers or other equipment in the system.)



Advent Model 100 (above) has a faceplate appropriate for flush mounting, though feet are provided for table-top use; Advocate Model 101 is intended to be free-standing. Though Model 101 looks simpler, its switching is somewhat more complicated. Note for example that it has only one meter, which serves alternately for both channels. And it has four calibration controls—one for playback in each channel (like the pair on the Model 100) plus two more for the record mode. Meters are used only to set Dolby line level—not to check recording levels.

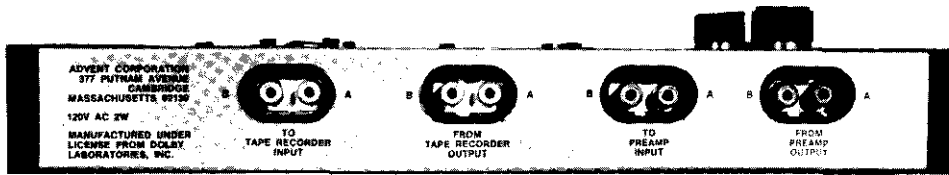
Matching Levels

Once the model 100 is connected into the circuit, it must be aligned with the tape recorder in order to set Dolby levels. Variations in tape recorder design affect the procedure that is necessary, and Advent has done an excellent job of covering all possible contingencies in the alternative procedures it specifies in the owner's manual. To show how it all works, let's take a maximum-capability recorder, one that has separate record and playback heads, output metering during recording, and separate input and output level controls. First you put a test tape on the recorder. (Advent supplies both open-reel and cassette test tapes with both models.) While playing the tape, which is recorded to Dolby-level flux density, you set the recorder's playback meters to the 0-VU point and then calibrate the Model 100's meters to the Dolby-level point. You now have a standard level—but in the playback mode only. Next you take a sample of the tape you will be using and record onto it a signal from the Model 100's built-in Dolby-level generator, setting the record gain so that the recorder's playback meters again read 0 VU for this test signal. The test signal therefore is achieving standard flux density on the tape. You have now aligned the input

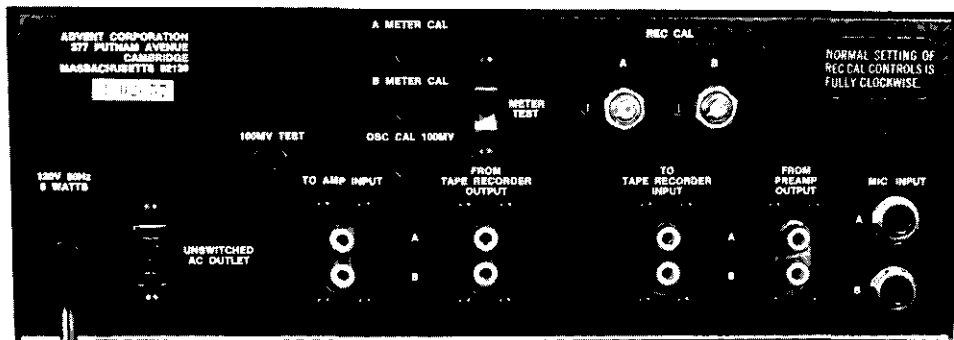
the output section so that record and playback processes will be exactly reciprocal.

From this point on, the record and playback level controls on the recorder remain untouched and those on the Model 100 are used instead. If you change to another kind of tape for recording, you must realign the 100's record section because the relationship between input and output signal levels will not necessarily be the same. In fact it is a good idea to check the whole system from time to time to make sure that aligned knobs have not been moved inadvertently or that a new batch of tape is not behaving a bit differently from that used in the original test. It also is a good idea to record a few seconds of test tone at the beginning of each Dolbyized tape so that the playback section can be aligned to it if necessary. This would be of particular value if you plan to trade tapes with anyone who owns Dolby-circuit equipment or if you may want to make copies of Dolbyized tapes. Incidentally it is possible to make Dolbyized copies by straight dubbing from the Dolbyized original—that is without "decoding" the original and then re-Dolbyizing—and a sample of the standard-level signal on the original tape can simplify this process too.

Switch to the Model 101, or choose a recorder with fewer controls, and the process of alignment or use may become even more complex. The Model 101 has



Model 101 (above) has only the four inputs and four outputs on the back panel. Model 100 (below) has mike inputs as well, feeding into built-in preamps and mixer system. It also has test point and screwdriver adjustments for servicing. Though the Model 101 is conceived as a product for those recordists who use FM and discs as source material, it can be used in making live recordings by plugging mikes into equipment ahead of the Dolby circuit—an appropriately equipped stereo receiver, for example—and monitoring the signal for aural balance at that point. With the Model 100, which has two sets of Dolby circuits, live recordings can be monitored off the tape, using one set for the signal being fed to the recorder and the other for compensated playback. Note convenience outlet on Model 100.



only one pair of Dolby circuits, so it will not handle both record and playback signals in the same channel simultaneously (though since the channels are individually switchable between record and playback modes, you can play one channel while you record the other—as you would need to do in sound-on-sound recording). In the most difficult situation—using the Model 101 with a recorder that has combined record/playback heads, no output level controls, and no output metering—alignment may take a certain amount of cut-and-try backtracking. The necessary connections and adjustments can of course be made on many small battery-operated recorders—even mono cassette models, fitted with the necessary jacks—but remember that the Advent units require AC power. Considering that it need be done only once for a given recorder and tape type, we did not find the alignment chore excessively complex or irksome even at its most involved. Our first few passes at the routine required about five or ten minutes apiece; with the familiarity bred of frequent changes in setup during our tests, this time dwindled to about a minute for most matings of recorder with the Dolby unit.

What You (Won't) Hear

Assuming good quality in the components used with it, the Dolby circuitry offers advantages that most

emphatically are worth the extra fuss. It should be news to nobody at this point that the units work: they do reduce noise without introducing audible side effects. But similar statements have been made on behalf of low-noise tapes, whose advantage in terms of audible improvement is piddling by comparison. Even the much-touted characteristics of chromium dioxide tape appear to offer relatively modest gains by contrast to what the Dolby does with ordinary tape.

Used with a high-quality cassette deck, especially one with good high-end response, the noise reduction is if anything even more startling than it is with an open-reel deck, because non-Dolbyized cassettes are inherently noisier than open-reel tapes to begin with. Therefore while the increase in dynamic range still remains 10 dB at most, its effect becomes more audible. However, because of this inherent noise problem, not all cassette decks seem to be engineered for that last half-octave or so at the top—whatever the printed specifications may say about head response. Even when used with a deck in which the designer has made a compromise between noise and response, the Dolby circuitry still produces a noticeable improvement. But with the less expensive recorders, not only is there less likelihood of a high end good enough to take maximum advantage of the Dolby treatment, but also record/playback curves tend to become increasingly irregular—whatever the over-all response figures may be. And this is true of open-reel as well as cassette

equipment. The result could be frequency-selective side effects in using Dolby circuitry.

Let's say that you are working with such a recorder—or with a tape that doesn't match your recorder's bias, which might also produce unevenness in response curves—and the playback curve has a 6-dB peak centered around 13 kHz. Assuming that the record characteristic of the unit has no corresponding dip to even out the record/playback response, tones in the peaking region will enter the Dolby circuitry 6 dB above optimum level. In a high-level passage—that is, close to Dolby level where the circuitry has little effect—you simply will have an unwanted 6-dB peak. But for low levels—say -20 VU or so—the expander action of the Dolby circuitry may tend to emphasize the peak even more. So for optimum Dolby operation, both broad response and linearity are desirable characteristics in the recorder you use.

Advent makes this recommendation in its literature, in fact, though in use we found it difficult if not impossible to spot imbalances or side effects attributable to nonlinearities in the recorder. In addition we tried to simulate these effects by equalizing the Dolbyized signal and by intentional misalignment of levels. It required extreme measures before audible Dolby mistracking, as we might call it, occurred. Precise alignment of the system thus does not seem critical in normal use. Those slight imbalances you may encounter could easily be corrected by slight adjustment of the system's tone controls.

Half Measures

There was, however, one situation that we could not adequately correct: the playing, without compensating Dolby circuitry, of tapes that had been Dolbyized (or, conversely, using the special circuitry in playing un-Dolbyized tapes). Since Ampex has announced that it is producing Dolbyized cassettes, and other companies are rumored to be thinking along similar lines, we paid particular attention to this point. How will the new Ampex cassettes sound on conventional (i.e., non-Dolby) equipment?

In theory they should sound brighter than conventional cassettes, which could be a blessing on equipment with weak response at the high end, and we have repeatedly encountered the statement that an adjustment of treble controls is all that will be needed to get good reproduction of the Dolbyized product. This may be true of equipment with extremely poor high-frequency response; but after working with quality decks we must disagree.

Since samples were not yet available from Ampex when this report was prepared, we recorded our own cassettes using the Model 101 and a Harman-Kardon CAD-4 deck, which presumably gave us a comparable product (since Dolby operating parameters are closely controlled by the Dolby licensing system). The results we obtained with the CAD-4 were matched very closely in tests using other cassette decks and open-reel equipment at various speeds. In one of the cassette tests, we copied the opening measures of Verdi's *Falstaff*—which has loud orchestral tutti interspersed with relatively low-level material—via the 101; then played back the cassette with the Dolby switch in the off position.

Nothing sounded amiss in playing the loud pas-

sages, of course. The low-level passages, which had been boosted by the Dolby circuitry, consequently sounded unnaturally bright on playback without the appropriate Dolby compensation. When the treble control was turned down in an attempt to subdue the excessive brightness, the loud passages became correspondingly dull. And intermediate settings of the treble control could do little to alleviate the impression of high-frequency response that popped in and out as program levels changed. So, although relatively little program material contains the extreme contrasts necessary to produce this effect, for serious listening we feel that the appropriate Dolby circuitry is essential to truly satisfactory playback of Dolbyized materials.

Making the Decision

A serious recordist might find that either the Model 100 or Model 101 offers advantages over recorders—cassette or open-reel—that have built-in Dolby circuitry. He can choose a deck to suit his own needs and tastes and still have the benefit of noise reduction. And he can change decks at will. The Model 100, in particular, allows for precise setting of all operating parameters including the test-signal level if you have an accurate voltmeter. Conversely, the relatively casual user who shies away from adding still more knobs and meters should find the built-ins more attractive than the separate Dolby units.

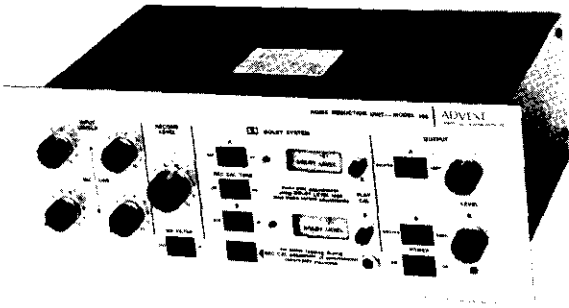
You will not reap the full advantage of the Model 100 or 101 on poor tape equipment. Maximum effect probably would accrue on cassette decks selling for over \$100 and on open-reel recorders selling for somewhere around \$300 and higher. Even if you have an expensive deck with a separate playback head, don't write off the Model 101 as beneath the dignity of your equipment. Although its price is half that of the Model 100 we found that it cuts no corners in terms of signal quality. And you can continue to monitor recordings for distortion and malfunction even though the 101 will not allow you to hear properly de-Dolbyized sound from the playback head while you are recording. With either unit and a high-quality deck in good condition (properly cleaned, with the correct bias for the tape you are using, and with unworn heads) you should experience sound at any speed that is roughly comparable to what you would otherwise expect at twice the speed. And if you use the unit in conjunction with low-noise tape, you can stretch dynamic range still further.

You will notice little if any improvement in recording on a quality machine at 7½ ips from discs or FM because the dynamic range of these signals will not, as a rule, be significantly greater than that of the recorder at that speed. For live recording, however, the Dolby's extra 10 dB of dynamic range will allow you to set levels more conservatively than before, allowing ample headroom for unexpected peaks without at the same time forcing low-level signals down into the mud. Indeed, if you'll pardon the pun, the advent of the Dolby may reawaken you to the joys of making your own live recordings. And of course it should cut tape costs for most users in half. The appearance of either model would have been a major event for tape recordists; the availability of both is almost an embarrassment of riches.

TECHNICAL

By JULIAN D. HIRSCH

ADVENT MODEL 100 NOISE-REDUCTION UNIT



Most audio enthusiasts have heard of the Dolby noise-reduction system, which is now used by most recording companies to improve the signal-to-noise ratio of their master tapes by some 10 dB or more. The professional Dolby equipment, which operates independently in four separate frequency bands, is large and expensive. However, a simplified single-band version, known as the "B-Type," is now available at a much lower price.

The Advent Model 100 Noise Reduction Unit is an "add-on" B-Type Dolby system, designed to record and play back with any home stereo tape recorder. The operating principle is simple. When the input signal level is low (the only time tape hiss can be heard), the high-frequency response is boosted in the recording channel. The amount of boost is controlled by the signal level (there is no boost for high-level signals). During playback, a complementary treble roll-off is applied, also as a function of level. Ideally, the playback roll-off exactly compensates for the recording boost, resulting in a flat overall record/playback characteristic at all levels. However, any hiss introduced in the tape recording is reduced by the playback roll-off — as much as 10 dB — without loss of highs in the program material. Identical circuits wired in a mirror-image relationship are used to supply the boost during recording and the cut during playback. Each channel of the Model 100 therefore contains two Dolby modules, permitting a fully processed signal to be monitored from the tape as the recording is being made.

Although the Dolby system is dynamic, and the response characteristics of the recording and playback channels are constantly changing, the complementary actions of the two portions of the system are designed to be precisely matched and completely inaudible in their action. The success of the system depends on close control of signal levels at all points. A properly adjusted Dolby playback system will function with any tape made on any other correctly calibrated Dolby recording system. However, noise reduction in playback will not occur with tapes not made through a Dolby unit.

The Advent Model 100 is a compact, self-powered unit meas-

uring 12 $\frac{7}{8}$ x 5 x 8 $\frac{3}{4}$ inches. Its profusion of knobs might seem somewhat formidable to the uninitiated, but it is really very simple to use. When connected to a system employing an amplifier or receiver, it is inserted in the tape-recording/tape-monitoring path of the amplifier. The inputs and outputs of the tape recorder are then connected to the Model 100. All the Model 100 circuits are duplicated for stereo applications.

Advent supplies both a reel of tape and a cassette recorded with the standard Dolby 400-Hz reference level. With the appropriate calibration tape played through the recorder, the individual channel playback-calibration controls on the Model 100 are adjusted for correct indications on its two meters. This assures that the Dolby circuits will receive the correct levels from any Dolbyized recorded tape.

To record a tape through the Dolby system, the recorder is loaded with the tape to be used, and a spring-loaded switch on the Model 100 is pushed while the machine is in the record mode. This records a standard-level 400-Hz tone which, upon playback, should deliver the same level to the Dolby circuit as the calibration tape did. If the output is high or low, the tape machine's recording-level controls are reset and the process repeated until the recording circuits are calibrated. If the recorder has three heads, this can be done in a single continuous operation instead of by several approximations.

After calibration, the recorder is ready to record and play back through the Dolby circuits, provided its controls are not disturbed. The Model 100 itself has adjustment facilities for output levels (separate for each channel), as well as a master recording-level control and separate microphone and line input-level controls for each channel. These add input-mixing capability if the recorder lacks this feature; if the recorder has microphone inputs, they are not used, since they would not be included within the Dolby noise-reduction loop.

There are slide switches on the Model 100 to by-pass the Dolby circuits, and to compare source and tape-output signals. Another switch connects a multiplex filter to remove any 19-kHz or other high-frequency signals from a stereo-FM tuner output that might influence the Dolby circuits. There is also a headphone jack that, on the unit tested, did not seem to be able to drive 8-ohm phones above a moderate level.

The Advent Model 100 worked exactly as represented. We used it with several open-reel and cassette recorders. The reduction in hiss level was striking. If your tape recorder has a response to 12,000 Hz or beyond at 3 $\frac{3}{4}$ ips (as many do), it is likely that the only audible difference between this and the 7 $\frac{1}{2}$ -ips speed is the hiss level. With the Advent Model 100 in the hookup, most recorders will have less noise at 3 $\frac{3}{4}$ ips than they

would at $7\frac{1}{2}$ ips without it. Furthermore, every open-reel recorder (and most cassette recorders) that we tried had lower noise with the Model 100 than any stereo-FM broadcast we could receive. In effect, then, there was absolutely no degradation of frequency response or signal-to-noise ratio when taping FM broadcasts at $3\frac{3}{4}$ ips with the Dolby noise reduction system in use.

We measured separately the recording and playback frequency responses at levels from 0 to -40 dB. When the two curves were superimposed, they appeared to be complementary. A much more definitive test was to connect the recording output to the playback input and measure the overall system response at various levels. It proved to be within ± 0.5 dB from 20 to 20,000 Hz at all levels down to -40 dB. The multiplex filter had a virtually ideal response, with less than 0.5 dB of level change up to 15,000 Hz and a sharp drop-off to below -40 dB at 19,000 Hz.

The harmonic distortion of the complete Advent Model 100 system was under 0.4 per cent up to a 0-dB level, and under 0.2 per cent at most lower levels. The output clipped at +12.5 dB (about 4 volts). The output noise was about -60 dB. The noise reduction resulting from the use of the Model 100 varied with frequency. It was about 10 dB above 4,000 Hz, falling to 3 dB at 600 Hz.

The Advent Model 100 would be a valuable adjunct to any

tape-recording system. It is apparently quite easy to become accustomed to tape hiss — even the very low level hiss of the best home recorders. However, when the hiss virtually disappeared, as happened when we used the Model 100, we found ourselves immediately much less satisfied with tapes that were not Dolby processed.

The Advent Model 100 is not inexpensive (\$250; an optional walnut cabinet is \$20). Obviously, it will rarely be used with low-price recorders, which need it most. However, with the Model 100, the better home recorders will be able to produce fully professional results at $3\frac{3}{4}$ ips and sometimes at $17\frac{7}{8}$ ips, and this will probably be its chief contribution to home recording.

The instruction manual is excellent — a nontechnical textbook on the Dolby process — and we would like to reaffirm that the complete calibration process requires only a few seconds, and need not be repeated unless the control settings are disturbed or a different recorder is used.

Advent will shortly release a new Dolby system, Model 101, under the "Advocate" brand name. This stereo unit is essentially half of the Model 100, with a corresponding price reduction. It will require the user to switch a single pair of Dolby circuits from recording to playback functions when he listens to a tape he has made, but in return he can have the benefits of the Dolby system at a price compatible with low-cost tape recorders.

BEHIND THE SCENES BERT WHYTE

Almost coincident with the introduction of the 33- $\frac{1}{3}$ long-playing record, magnetic tape became the standard medium for producing a master recording. Then as now, it was valued for its ease of handling and editing, wide frequency and dynamic range, and low distortion. On the other hand, there were also some problems like tape hiss, print-through, and crosstalk. That was in 1949, and although there were advances in magnetic head structure, tape oxides, and standardization of equalization, these noise problems still plagued the industry for 17 long years, until in 1966 a young physicist named Ray Dolby introduced a revolutionary tape-noise-reduction system.

The rest is history. Although a few die-hard skeptics still view the Dolby System with a jaundiced eye, most of the recording industry has enthusiastically endorsed it, and it is in use throughout the world . . . even behind the Iron Curtain! Most record companies here and abroad use the Dolby A301 noise reduction units in multiples. To name just two, London/Decca has over 50 units, Columbia something of the order of 80.

Dolby has become a common word in the lexicon of every knowledgeable audiophile. Most of them have some idea of how the system works and they own and enjoy disk recordings free of tape hiss, cut from Dolby System tape masters. While these audio-

philes rightly regarded the Dolby System as the "tool" of the professional recording engineer, they were not unaware of the consumer-oriented potentialities of the system. The advantages of a noise-reduction system for home recording and for pre-recorded tapes were obvious. The question was whether a much simpler and far less expensive system could be derived from the highly sophisticated Dolby A301 unit. Dr. Dolby designed just such a system, and called his home-type noise-reduction system the "B" Type. A little later on I'll explain the differences between the two systems.

On February 10th, 1970 the Advent Corp. of Cambridge, Mass., a licensee of Dolby Laboratories, introduced their version of the "black box" and demonstrated it to the hi-fi press and to some record company executives. They call their unit a Noise Reduction Unit. Reaction to the device and to the idea was enthusiastic, especially when it was realized that this independent unit made tape noise reduction possible with any format — open reel, 8-track cartridge, or cassette — and paved the way for "Dolby-ized" pre-recorded tapes in these formats.

At this point I think it would be pertinent to review briefly the operation of the Dolby A301, the professional system, and how the "B" Type works.

Essentially the Dolby A301 is a highly sophisticated type of compression/expansion

system, with some elegant solutions to the problems that have plagued this type of device for many years. For one thing, previous compression/expansion systems operated over the whole frequency band at all signal levels and under dynamic conditions one could hear the "swishing" and "breathing" sounds characteristic of that kind of circuitry. The A301 is set up to work on low-level signal components over four independent frequency bands. The bands are set for compression thresholds of 40 dB below peak operating level. The bands are divided as follows; Band One, 80 Hz low-pass; Band Two, 80-Hz-3-kHz band-pass; Band Three, 3-kHz high-pass; Band Four, 9-kHz high-pass. Band One provides noise reduction in the hum- and rumble-frequency range; Band Two in the mid-audio range (broadband noise, crosstalk, print-through); Bands Three and Four, in the hiss range. All the bands work together, in varying degrees of momentary noise reduction in their respective frequency ranges. It is important to remember that high-level signals pass through the system unaltered, the masking effect of the ear making inaudible any background noise at those amplitudes. The noise that bothers us is that during low-level passages. In the record processor, all low-level signals are boosted 10 dB up to about 5 kHz. Above 5 kHz, the boost rises smoothly to 15 dB at 15 kHz and then levels

out. This boosting (compression) occurs before the recording.

The processed signals are recorded on a typical professional recorder, which does not require any special modification for use with the Dolby System. In the playback processor of the A301, the recording is attenuated in a complementary way—in exact proportion to the boosted signals. At the same time, noise acquired in the audio channel (tape machine, etc.) is reduced. The amount of noise reduction is the same as the boost in the compressor . . . 10 dB up to 5 kHz, rising to 15 dB at 15 kHz. So the A301 reduces the tape hiss, hum, print-through, and crosstalk to levels which in general recording practice are inaudible. This is accomplished with no degradation of frequency response or added distortion. Nor can the action of the system be heard—there is no “breathing” or “swishing.”

The Dolby “B” Type noise-reduction system works in the same fashion as the A301, except that instead of four independent frequency bands, the “B” Type has one band designed to reduce tape hiss. From the earliest days of home recording and the earliest pre-recorded tapes, tape hiss has been the bane of the tape enthusiast’s life. It has been the greatest barrier to the growth of tape recording and has restricted the sales of pre-recorded tapes. The problems of print-through and crosstalk in home tapes has never been of the magnitude of the hiss, and in recent years their effect has been negligible. The “B” Type system gives 8 dB of noise reduction at 2 kHz, rising to 10 dB at 4 kHz. As in the A301, the “B” Type works only on low-level signals, boosts them before recording, attenuates them in complementary fashion on playback, and reduces tape hiss at the same time. The “B” Type system employs a record and a playback processor just like the A301, and there is no degradation of the audio signals in any parameter. In short, the system is a “kissin’ cousin” of the professional A301, except it works on a single-band basis for the reduction of tape hiss.

I have a prototype Advent Noise Reduction Unit, and it is handsome and works flawlessly. The Advent unit was not found wanting in any respect.

Quoting Advent on their “B” Type unit, “it is intended to be inserted in a component stereo system between an amplifier (or re-

ceiver) and a tape recorder.. It becomes a unified tape recording control center with the following features: Separate input-level controls on both stereo channels for both microphone and line inputs. These maintain input-mixing capabilities for any recorder, and add these to any recorders presently lacking them; a master recording-level control that governs both stereo channels and allows recording level to be set without disturbing the balance of stereo channels or individual inputs; output level controls for each channel that permit matching the requirements of any pre-amp, amplifier, or receiver; complete calibration facilities for optimum use of the Dolby System with any recorder. These include calibration meters, an internal test-tone oscillator, and two “Dolby Level” tapes (open reel and cassette) that enable the unit to be set to a standard characteristic for all “Dolbyized” tapes, including pre-recorded commercial releases.

Setting up to use the Advent unit is fairly easy. Here is a typical situation: you feed the tape outputs of a pre-amp into the line inputs on the back panel of the Advent (all connections are standard RCA, except phone jacks for the microphones); from the Advent you plug into the line inputs on a tape recorder. From the outputs of the tape machine you plug into the “from tape” receptacles on the Advent. The “amp-out” on the Advent is connected to “tape-monitor in” on the pre-amp. Now you are all set to calibrate the system. For this you need special tapes (which are supplied by Advent with each unit).

How it Performs

What is it like using a “B” Type noise reduction system? It is a fascinating experience and at first a bit eerie. Mr. Marc Aubort of Dolby Laboratories and Elite Records was kind enough to furnish me with some “B” Type recordings, made from Dolby A301 masters. In a solo piano recording that was superbly clean, when you got to the quiet sections—the extreme pianissimos, and long rests in the music—the absence of hiss was almost unreal! As you get used to it you notice the much wider dynamic range, the extreme clarity of the recording. It is like exploring a whole new world. In the last movement of the

Brahms 3rd symphony, it is startling to hear the big orchestra in a full forte, and then a moment later a pianissimo and some rests—without a smidgin of hiss to mar your enjoyment. Needless to say, you can record FM “off-the-air” and from records with noise reduction, but you must remember that the signal-to-noise ratio will be only as good as the medium from which you are recording. The Dolby System cannot remove noise retroactively! However, you may still like the results for at least your tape machine will not be adding any noise of its own. If you are fortunate enough to make some live recordings, then you will get the full benefit of the noise reduction. In this respect, I think Advent might have placed the microphone input jacks on the front panel, rather than the rear. I have made some live recordings with the Advent with superbly quiet results. However, my most exciting live recording thus far, was one in which I used the Dolby prototype box. I was fortunate enough to record the Suffolk Symphonic Orchestra, an estimable group of 75 musicians. The concert was held in a school auditorium with pretty fair acoustics, although the stage treatment dampened some instruments too much. The program was ideal for testing the Dolby system—a Mozart “Figaro” overture, a cello concerto by an old Russian Romantic, Davidov, with a brilliant young soloist, Jeffrey Solow, who made his Carnegie Hall debut shortly after this concert. And, ambitious wonder, the complete 1947 version of Stravinsky’s “Petrouchka”!

The results were just terrific. There were many sections in the concerto that were quiet and Petrouchka was quite unbelievable in the great dynamic range I achieved, and the clarity of everything. There are many rests in Petrouchka and it was just great not to hear illusion-destroying hiss. When I had a chance a little later, I played the concert back through the Advent, and having calibrated it properly, the noise reduction worked like a charm. One of the things you can do with a Dolby tape is make a one-to-one copy to another tape machine *without going through a noise reduction unit*. I did this and then played the copy through the Advent unit to achieve noise reduction. Nice to know this if you want to send a Dolby copy to a friend who has the means to restore it via a “B” Type box.

THE STUDIO CENTER, INC.
650 PLACENTIA BL, N. E.
ATLANTA, GEORGIA 30303
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Advent Corporation	377 Putnam Avenue	Cambridge, Mass.	02139
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