

Fifteen years ago it was a very simple thing to choose which tape to use for any particular recording; there was no choice! You just used black-oxide paper tape, the only tape easily available in the United States at that time. Of course, as now, there were those who imported tape from Germany and readjusted the bias on their recorders so that it would record properly. But the rank and file of recordists labored with Brush paper tape and, later on, with the same type put out by Minnesota Mining & Manufacturing Company. However, within a few months the first plastic base tape was out on the market, and our struggles with paper tape were at an end. But not the troubles inherent in the manufacture of those early tapes: oxide shredding, squealing caused by unlubricated coatings, bad winding due to poor slitting methods and a host of other bugs.

Today there are many kinds of tape on the market, each of them with some particular characteristic that recommends it as best for one or application or another. Thus you find tape that is very thin- $\frac{1}{2}$ mil-for extra long play, low-print tape, tape on cellulose acetate base, Mylar base, polyester base, polyvinyl chloride base - in short, with such a profusion of types you should now be able to find the tape that is best for the use you intend to make of it.

You should decide what tape to use in your recorder before loading up with a great variety of tape with different bases, coatings and X thicknesses. Consider, to begin with, the factor of tape thickness. If a fine tape recorder is adjusted to pull standard tape (3M #111, for example, which is 1.92 mils thick overall) its capstan drive cannot function equally as well with tape thinner or thicker. With thinner tape there might be slippage enough to be noticeable, while with thicker tape there might be enough added pressure between the motor drive spindle and the pressure roller to slow down the drive speed. If you

expect to do the best possible recording, you will pick the tape thickness you expect to use and stay with it. This is not to prescribe using thinner tape when the occasion calls for it, when making a reference recording, for instance, that could not be recorded in its entirety on one reel with the thicker tape. But you should not count on getting best results out of your recorder when you do this. Perhaps, someday, tape recorder manufacturers will include in the pressure drive a simple adjustment for varying pressure to accommodate any thickness of tape at will. Perhaps, also, some one of them has already done this but I don't know about it!

The base material most popular in this country now is still cellulose acetate. It is a cast plastic that will snap if jerked with considerable force, but will not elongate excessively before breaking. Cellulose acetate becomes brittle if allowed to lose enough of its water content to the atmosphere. If stored where it can reabsorb moisture it will regain its pliability - but the brittleness becomes permanent if moisture loss brings its relative humidity below 30% or so. When tape is brittle it cannot conform closely to head contours and, therefore, cannot record or play with good high frequency results. H.J. von Braunmuhl, one of tape recording's pioneers (he re-invented high frequency bias) once told me his method for keeping tape pliant. He had a humidity control room built with linen cloths dripping water at a controlled rate. Circulation of air in this room was maintained so that tape moisture remained at correct relative humidity as checked by daily measurement. Of course there are now available better methods of doing this job, but don't expect the best service from acetate tape if you persist (as at least one radio station I know does!) in storing tape on top of radiators.

Cellulose acetate base tape survives normally high temperatures, say up to 120 degrees or so, very well; it is the most "humidity conscious" of the current plastic bases. If you should be called upon to record in a Turkish bath, for example, be careful to rewind the tape loosely. If moist tape is wound tight on a reel it will shrink while drying out to its normal water content and stretch irreversibly while doing so. Thus you may end up with a tape with "ruffles" on the edges that won't be much good for anything --not even for a radio broadcast station;

Polyester base tape performs practically as well as cellulose acetate and has much to recommend it over acetate base. It slits well, therefor winds well, is much less allergic to humidity variation than acetate and performs just about as well at elevated temperatures.

Mylar (Dupont trademark) is probably the best base there is at present. Prestretched and carefully coated it makes about the best tape you can get for most purposes. It is very pliant, <sup>and</sup> does not become brittle with aging or high temperatures. Its only fault, if one can call it a fault, is that when pulled with enough force to overcome its high stretch point it elongates into a tough, tubular plastic string! And then, brother, there's nothing you can do to salvage what was recorded on that string!

A new ultra-thin tape is now being marketed in this country by Agfa, if I remember their ad correctly. It is advertised as being made of two layers of plastic, each prestretched in opposite <sup>direction</sup> ~~direction~~ to the other, resulting in tape which, says the advertiser, is as strong as the same thickness of steel. It is approximately one-third as thick as the thinnest tape now on the market (which is 0.88 mil), which records, reproduces and erases well on the

Most of the tape on the American market is cated with medium coercivity oxide

ordinary tape recorder. Some tape is especially coated and processed for "low-printing", which results, the manufacturers claim, in about 8 db less print through, where the magnetic imprints on one layer of tape print through to the next layer, resulting in a number of confusing echoes, ~~sometimes~~ depending upon recording and storage conditions. I think it is a good idea to use low-print tape for all recording, since, even if no distinct printing is observed, you will get far less of the apparent distortion which is caused by indistinct printing. Tape manufacturers here, as far as I have observed, do not produce much high coercivity tape. There are advantages to be gained with the use of high coercivity coatings - also some disadvantages. (Again my motto "You don't get something for nothing" proves true). Highly coercive coatings require more bias and are more difficult to erase; they print less, should record better at low frequencies and, therefore, should provide a far better master tape or a tape designed to be stored for long periods of time.

Thin coatings record and play better at high frequencies. With the public clamor for highs - which are so commonly confounded with "high fidelity" - and for hours of recording at very low speeds, the tape manufacturers are giving the public what it seems to want. But what the hydra-headed monster yelps for need not affect our choice of medium. There are several important points to consider before plumping for thin coatings on thin tape. Thicker coatings favor increased low frequency response as opposed to high. Since 95% of music falls below 1,000 cps, it seems reasonable to me to use thicker coatings and higher speeds for best all-round results. (Recording on any medium is directly affected by the velocity!) Also, we must remember that, regardless of the coating, printing varies directly with separation between tape layers; ergo, the thicker the tape the less printing. the point is clear, I think, so for best possible recording I would

able coating of high coercivity, low-print oxide, and I would record at the highest speed my recorder was capable of.

Well-made tape today exhibits none of the defects that used to plague recordists ~~even~~ a dozen years ago. Unlubricated tape, shredding of coating, layer to layer adhesion - all are things of the past with standard brand tape. If you get tape that shreds or squeals you should return it for replacement to the manufacturer. Don't complain about squealing, however, if you own a recorder that employs pressure pads and you forget to keep them clean! Squealing is only the outward indication of extreme distortion caused by the tape's vibration between a dirty pressure pad and the heads. (You may thus get both AM and FM spurious modulation - figure it out yourself). Although I disapprove of pressure pads I realize that they are a necessity in low-priced recorders, because without them getting good contact between tape and heads requires the incorporation of much more expensive transport components. If your recorder does have pads, clean them very frequently (if they are made of felt) and make certain, by measuring, that the pressure is correct for the tape you use. Someone recently noted that polyurethane plastic pads are much better in this respect than felt. I have not tried it but the idea seems logical to me. (Try a bit of ordinary plastic sponge).

When you have decided which tape to use, subject it to a few homemade tests. For testing the adhesion of the coating to the base lay the tape on a mirror-smooth surface, coating side up, and try to scrape the coating off with your ~~II~~ thumbnail. Unless your thumbnail is as sharp as a banshee's tooth you won't be able to scrape the coating off - all you'll do is polish it a little. New tape properly stored should be limp. When held up between thumb and forefinger it should droop sharply enough to touch one or the other. Tape should not be "cupped", nor should it curl or have ruffled edges when new. Of course,

or ruffles to the best made tape. Any simple thing to choose which tape

Another rather drastic test of tape is the DC magnetization test. Play back the tape while holding a permanent magnet against it ahead of the playback head. Read the resulting noise in your output meter. If the oxide particles in the coating are uniform the noise reading will be uniform and constant. If the coating is clumped and not uniform in dispersion the noise reading will be more erratic and higher. Don't forget to bulk-erase the tape after this test (or run it through on erase a few times) and to demagnetize the heads carefully.

Keep tape clean of dust, finger marks and bits of adhesive. In spite of some instructions, do not use carbon-tet to clean tape or recorder. You can clean tape by running it past a just-damp lint-free cloth; use alcohol to clean heads or one of the preparations sold for that purpose. Store tape in a cool spot where the humidity is neither too high nor too low - relative humidity between 40% and 70% will not damage it at all if it is acetate or polyester; you don't have to worry about humidity if it is Mylar. All in all, although tape is the easiest medium to use, a little common sense pays big dividends in better quality recordings.

Any questions, criticisms or gripes??

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