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***Binder breakdown - It's still with us and it's getting worse!***

*by Scott A. Wyatt*

Many of you may have heard about or actually experienced the problem with binder breakdown on older PVC-backed (Polyvinyl chloride) media, and in some cases even with new analog and digital recording media. Generally, with analog audio tape, the situation is usually the following: you thread the tape onto the transport and begin to rewind. Within a few seconds, a squeal can be heard as the tape tries to pass by the tape lifters and guides. Soon the transport slows down due to the excess friction, and in some cases this resistance stops the transport completely. Upon glancing at the tape path you notice all tape guides and possibly the heads are coated with a dark colored gum which must be cleaned immediately before attempting the same rewind effort again. The problem is commonly known as binder breakdown and is not a new problem. Most of the world's studios have experienced this problem for many years, and although we are hearing about it less, the problem hasn't gone away. Old masters, as well as new tape right off the shelf is presenting us with this problem each day. Binder is the adhesive that binds the oxide to the backing. Binder breakdown is due (supposedly) to the use of polyurethane binder, that under humid conditions, has a tendency to absorb water. The water reacts with the urethane molecules, causing them to move to the surface of the tape, where the adhesive is then deposited all along the tape path. The problem is not unique to one manufacturer; Agfa, BASF, Ampex, and 3M have all experienced the problem. To quote Philip DeLancie, mastering engineer at Fantasy Studios in Berkeley, California, from his May 1990 MIX article, "...with the exception of Agfa, tape manufacturers haven't gone out of their way to publicize the problem." Well, the manufacturers haven't gone out of their way to assist either! Steve Smith, product line manager at Ampex, indicated the problem is significant but not so widespread that everyone needs to be concerned about it. He also indicated that Ampex has a fix that works and they pass the information on to the customer at no charge. Dell Eilers of 3M admitted the problem has existed but he was only aware of the problem with much older tapes. 3M offers the same solution as Ampex - carefully bake your tapes! Ampex and 3M jointly state their tapes should last 10 years, and they recommend people should budget for the cost of transferring their material from one storage format to another every 10 years. Real helpful.

With our having more than 1500 reels in our archive that could be a problem, we have embarked on a restoration process that is somewhat manageable. The recommended solution is to bake your tapes at an ideal temperature of 140° F, with no more of a variation of ten degrees in either direction. About 10 to 12 hours of baking time is required for 1/4 inch tapes, and 24 to 36 hours for two inch tapes. The tapes must be allowed to reach room temperature prior to working with the tape. Once the tape is usable, you have about one month before the whole binder breakdown process starts all over again. Once baked, it is recommended that you store the tape in a sealed plastic bag (zip lock) to prevent humidity from accelerating the binder breakdown process. Even with this process, when playing the tape, you must constantly clean the tape path and tape heads. CAUTION: this problem does not occur with acetate-backed media. DO NOT BAKE ACETATE TAPE as it is quite flammable – the results are disastrous!

OK - try to find an oven that has the capability of baking at 140° F. Such facilities are extremely rare!!! Our solution was to convert an obsolete computer printer sound isolation box into an oven with \$25 worth of parts from the hardware store. We purchased 3 - 125 Watt infrared heat lamps, 3 porcelain light bulb sockets, wire, and a 600-Watt dimmer switch. We also purchased a \$5 thermometer from the Chemistry department that is able to read from 0 to 250° F. We installed the heat lamps inside of the printer box, installed two metal shelves (with holes), installed the thermometer, a small whisper fan (not on a dimmer switch) and sealed up most of the small air leaks (by the hinges) with duct tape, and success - 140° F. We have been lucky to hit upon the right combination of cubic space, heat application, and heat loss. If we were unable to maintain the 140° F level, the dimmer would need to be adjusted. Good luck with designing a similar solution for your own tapes.

By the way, keep smiling - the problem exists with digital tapes and discs as well!!!!!!