



Behind The Gear

This Issue's Master of Magnetic References
Jay McKnight by Alex Kostelnik
 of Magnetic Reference Laboratory

Jay McKnight is the founder and operator of MRL - Magnetic Reference Laboratory. If you've ever owned and maintained an analog tape deck you know MRL as one of the few sources for calibration tapes. Before that he worked at Ampex, Gotham Audio and Armed Forces Radio, to name a few. Jay helps people every day with their never-ending questions about analog tape recording. Jay is a man you are lucky to come across - a tremendous resource. His place in audio history is assured. His hard work is behind so much that we take for granted.

compete with Ampex and do it better and make the money instead of Ampex making the money." So he got together with Ed Seaman, another ex-Ampexer. I think Ed had been chief engineer of the instrumentation division at one time, and he was now a wheeler-dealer entrepreneur. Ed contacted me to be the engineer. We started Magnetic Reference Lab (MRL) in 1972. The old Ampex system was typically cobbled together in a way that took quite a bit of time to calibrate for different kinds of test tapes - different width, speed, equalization, etc. Each time it was set up for a run of tapes, it had to be re-calibrated from scratch - which both meant that there were lots of chances not to get things right, and not to find out that it was wrong. Having spent a half a day or a day setting it up, you had to run a lot of tapes to make the production economic. We figured that we could design a system that would be quick and easy to change over and re-calibrate.

Let's talk about how MRL got started. Wasn't Ampex already making test tapes? Did you compete against your old employer?

I had survived goodness knows how many layoffs at Ampex since I started there in 1952, but I didn't survive the one in 1972. And I was stunned. I thought that was the end of the world when I got laid off there after twenty years.

Why was Ampex having all these layoffs?

We always felt that the Ampex management was something short of being all it should be. The fast buck mentality is by no means an Enron invention. At Ampex, I worked on audio standards and measurements. And quite often, I consulted with their test tape department. I did that over many of the years that I was there, actually.

So there was Ampex and STL, right? And later MRL?

Yes.

Who were your partners?

In the US, there was originally Ampex, and several people had run the Ampex Standard Tape Lab over the years. By the 1960s, Tony Bardakos was the fellow who actually made the calibration tapes at Ampex, and Bob Morrison was the chief engineer, so to speak of the calibration tape work at Ampex. Bob left Ampex to start STL (Standard Tape Labs) around 1968, and then Tony continued making the tapes at Ampex, until they laid him off in 1972. Tony said, "We can do this on our own as well as Ampex does it, and we can

How is business now, with everybody running digital audio workstations?

The number of people who want calibration tapes is down, but then number of calibration tape vendors is down too. And we used to have five suites in an office building - we now have two. We used to have four or five people pretty much full-time. Now Chuck is the only full-time employee. I'm there about half time, and our office manager comes in maybe once a week.

What about when people say that analog still has more to go if people wanted to put the time and energy into it? We could still improve our signal to noise ratio...

We've given people a couple of easy suggestions for improved EQ curves that I think are worthwhile if people will do it [see http://www.flash.net/~mrltapes/mcknight_proposed-mastering-eq.pdf]. But it does take some effort, especially if you've got an umpteen-channel machine to re-equalize.

So what advice do you have for young people who are going to be reading Tape Op who own a lot of these old machines? Any advice for them on how to get over their fear of being overwhelmed by this kind of technology?

Well, a lot of what we hear is that the cost of doing the analog recording is so much higher than the digital recording that people can barely afford tape, and often they can't justify the cost of

repairing and maintaining their equipment, much less getting a calibration tape. "What, you want \$200 for a calibration tape!? I only paid \$20 for this tape recorder." Well, to some extent if you are going to work with analog equipment, you're going to need to learn how to service it. We have a lot of technical information on our website, including a beginner's guide at <http://www.flash.net/~mrltapes/which-cal-tape.html>. It has several basic ideas, such as, "The first thing you need if you're going to do analog tape recording is the service manual!"

RTFM!

Exactly!

You had become quite an authority on magnetic recording through the '60s - and in 1973 your knowledge was needed for an unusual assignment... our President was being investigated and he had some tapes he'd made in the Oval Office.

The first purpose, I recall, was to try to make the tapes that they had found more understandable. But before very long they found out that there was an 18-minute gap in one of the tapes, and that's what the panel focused on. What we were able to do was verify which machines had made the recordings and which had been used to erase the recordings. The recordings were made on a Sony Model 800B, a little consumer-kind of machine... it ran 15/16ths inches per second, and Nixon's staff had attached a sound-activated start and stop feature. And the Secret Service came through every evening and put new roll of tape on it if it had run out of tape. The machine that was used in the erasure was an Uher 5000, a commonly used German dictation recorder. What we could establish was that you can hear the clicks where the machine's been put in and out of recording mode. And we could establish that the clicks were in fact from going in and out of recording. We could say that the likelihood that it was done accidentally was incredibly remote. The erasing machine was put in and out of recording mode six times, so judge for yourself how likely that was to have been accidental.

How did you identify what machines were used? I'm assuming there's a signature of the bias frequency?

Actually we looked for bias frequency, but we couldn't find it. But there was a click that turned out to be produced by a relay that's peculiar to that type of Uher machine. We knew there was a click, but we didn't establish exactly what caused it. The ironic thing was that the identification of what caused that click was made by Mike Hecker at SRI [Stanford Research Institute, a think tank], who was a consultant to the Nixon side - he was the one that found the thing that nailed it down to being the Uher recorder. You can develop the track using a spray-on magnetic developer that contains a carrier fluid and carbonyl iron powder, and you can see what and where the track is on the tape, and compare that with the heads on the supposed recorders. We also did some flutter analysis on the buzz that was left. We published that part of the report in the AES Journal

[Flutter Analysis for Identifying Tape Recorders, Journal of the Audio Engineering Society, Vol. 24, Number 9 (1976)]. We have now put the complete "Watergate" report onto the AES Historical Committee website, at <http://www.aes.org/aeshc/docs/forensic.audio/watergate.tapes.introduction.html>

Is that the closest you can get to tape machine forensics? Because track placement and flutter are going to have mechanical aspects that are fairly unique to each tape recorder.

Yes, exactly.

How do you feel about the fact that a lot of young people now like analog recording because it sounds cool and sounds fat - in essence, they seek the faults of an analog tape machine. And yet everyone's job at Ampex was to make it sound accurate.

Well, it's like Arif Mardin said, "It's entertainment." I don't take it personally. They use it for what they use it for. When we did this stuff at Ampex in the '50s and '60s, we listened to it, and if the output sounded to our ears like the input, we said, "That's a good machine." Things are more complicated now. In the 1950s and 1960s, we did the basic design testing by measuring with tones - look at distortion and frequency response.

Speaking of changing technology - do you think audio has come very far in the last 40 years? Buddy Holly recordings sound damn good to this day. What have we been doing all this time?

Personally, I think the big advance was the audio compact disc. You can now get something to use at home that conveys, for all practical purposes, the quality of the original master recording - and at a decent price with good availability.

Who is the voice on the MRL tapes? ["One kilohertz at reference fluxivity."]

From our founding in 1972 until 1991, the MRL voice was MRL founder Tony Bardakos, the same voice that is on the Ampex test tapes in the late 1960s. By 1991 we needed new announcements, but Tony had retired and was not interested in doing them. So we hired local voice talent Tim Enos, and did the recording at Music Annex in Menlo Park, CA.

Check the green dot on the spine of your MRL tape box. If you e-mail Jay, he'll tell you what kind of tape yours was recorded on! ☺

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