

MAGNECORD HISTORY

By John S. Boyers as he remembers.

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The genesis of Magnecord started with Russell John Tinkham (Tink) and Clayton Guinard (Spec) Barker who were working at Armour Research Foundation (ARF). Barker was in some kind of promotion operation, and Tinkham was a staff engineer. The advent of the so-called Armour "Toaster" recorder with flat frequency response and good motion plus all of the big ideas that came out of war research, led to rather considerable interest on the part of broadcasters for a good wire recorder. Barker and Tinkham got their heads together and one said that he thought there was some money to be made in making these products but did not know where he could raise the capital. But Barker, I think it was, expressed the opinion that he knew very well where to raise the capital but didn't quite know how to do the other part of the job. Consequently, the two of them complemented each other, and they essentially had a deal on the spot.

Tink came to me one afternoon in early '46 as I recall it, and over a cup of coffee he outlined to me what he and Spec had in mind. He also invited a machinist by the name of Robert L. Landon, and the four of us set out to interest capital in investing the proposed company. We had a number of meetings over lunch at the Chinese restaurant called Won Kow in Chinatown, approached a number of possible capital sources and finally made an arrangement with a group of individuals from Madison, Wisconsin headed by a lawyer named Glen Roberts. All together we raised \$125,000 and we were incorporated in May of 1946 with Glen as Chairman and Tink as president. I was Chief Engineer and Assistant Treasurer so I could sign checks.

We started operations on the third floor of an office building at 304 W. 63rd Street. We knew we were illegal in doing it but went ahead and did it anyhow. (304 W. 63rd Street is now a filling station.) We set out to make a professional grade wire recorder and after some rather considerable effort achieved our goal. We called it the SD-1 which stood for "superduper". The name came out of a conference we had one Saturday afternoon when we were about ready to name the thing, and I suggested SD as standing for superduper and the name stuck.

It had a frequency response essentially flat from 50 to about 12,000 Hz, and the wide band signal to noise ratio was 42 dB. The wire was pulled by a capstan developed by Earl Kent at C.G. Conn. I do not know of any other machine where the wire ran at a reasonably uniform speed. In simple machines the wire was pulled by a take up reel and the speed depended on how much wire had been wound up. We did not have a flutter meter, but the motion was reasonably good for those days.

Designing and making both the record and playback heads fell to me. The playback heads were patterned after one developed at ARF, and they were 1-1/2 inches long with a built in hum bucking coil. To provide a smooth low frequency response they were made long to avoid the end effects associated with short playback heads. The gaps, as I recall it, were made with 1 Mil brass shim stock. Making the 0.004 groove for the wire was made using a dental saw that had been ground down to the wire size. That groove was in the edge of Mu-metal 0.020 thick and it had to be about 0.020 deep. The first cut could not be more than about 0.003 deep or the saw would not cut straight. Bob Landon assembled a holder for the metal and a milling machine did the work. I had to learn how

to run that machine and to make those small dimensions repeated. The wire was made by The National Standard Co. in Niles, Michigan; One of their project engineers gave me a reel of hard oxide coated wire so we could polish those heads.

Making record heads was simple because they could be made smaller, about 0.5 inches long. There were two coils, one for audio and the other for the 60 K Hz bias.

The erase heads were the first, to my knowledge, example of a double gap head and used 5 Mil mu-metal laminations. I had worked for some considerable period trying to make a really satisfactory erase head but without much success. About two o'clock one morning I was essentially at the end of my rope. Any head I made out of 20 Mil mu-metal got hot enough to burn the wire in the coil, and when I soldered a fin on the pole piece in an attempt to keep it cool, it got hot enough to melt the solder. That was the clue I needed which told me that all of the energy going into the coil was being dissipated as heat rather than generating magnetic field. Happily I had some 5 Mil mu-metal handy and with scissors cut out some suitable laminations and that head worked the first time. We tooled it and produced quite a few of them. In fact, we continued to use that style head even after we made tape recorders.

The SD-1 wire recorders kept us in business for about a year and a half, and we produced something like 150 of them altogether. I remember Boeing Aircraft gave us an order for 13 which they used in telemetry for rocket shots on the West Coast.

Tape technology reached a point in early '48 where it was obvious wire was on the way out, and Tink and I decided late one night in the Commodore Hotel in New York that we had to go into the tape recorder business if we wanted to survive. On the trip back home on the train the two of us had laid out the building block approach that eventually resulted in the PT-6 system.

Our first tape machine was a device called Audi-Ad. The name is a contraction of audible advertiser and the machine was a one-minute scramble box loop with white paper tape and a record-playback facility that could be used in point-of-sale advertising. We made 1,000 of them, sold them all and some of the stories we got back about their successful application were nothing short of fantastic. The unit used AC bias and the heads were of the double "J" style that had been invented by someone at ARF. Incidentally, they were not very well made and the performance varied all over the place. Based on our experience with the Audi-Ad, we made an endless loop machine for the Museum of Science and Industry that controlled a rotating stage in the Sears & Roebuck exhibit. We eventually sold the museum quite a number of similar machines as replacements for phonograph records.

The PT-6 development started in March of 1948, and we shipped the first production machine the last day of September of that year. In the meantime, we had moved the plant because the city found out we were running a manufacturing operation in an office building and gave us 24 hours to clear out. We got that extended, but it was a hectic period nonetheless. In fact, 12 or 14 hour days, 7 days a week were quite common in those days.

The PT-6 had reasonable motion but did not have highly accurate speed and the simple drive mechanism did not lend itself to that kind of operation. We had to learn how to make production quantities of record playback heads and that took a bit of doing. When we started putting the things together we would count it a good day if we got two good

ones out of the hundred or so that could be assembled. I eventually worked out a scheme for accurately positioning the two "J" pieces which resulted in a yield of about 98%. we also had to learn how to make accurate equalizers on a production basis, and we probably produced more bridged T equalizers than anybody else ever made. They were made by pairing up a coil and condenser with a movable slug in the coil that was used to tune it to the right frequency. The slug was then fixed in the coil by a dab of wax and the assembled equalizer was potted in a can. There were plug-in varieties for various tape speeds. Most of the PT-6 series machines were either-or units, but we eventually came up with a three head assembly that would make a simultaneous machine. There were a wide variety of units including both portable and rack-mount styles with an adapter for handling 10-1/2" reels, an endless loop adapter, a switch for transferring between two machines using only one amplifier so continuous recording could be accomplished, a voice operated relay, and perhaps five or six other things.

In those days one of the big audio events of the year was the Audio Fair held under the auspices of the Audio Engineering Society in the old New Yorker Hotel in New York. As I recall it, I visited Spec in the sales office in the bank building at the corner of Michigan and the river one Friday afternoon in the Spring of 1949. On the way out of the building I asked him if he had any thoughts about what we would do for the Audio Fair that coming Fall. His reply was to the effect that he had not thought very much about it, and I suggested the possibility of making a two-channel machine using the three head assembly I mentioned above. His parting word as he headed home towards Oak Park was that he would think about it over the weekend and call me Monday morning. That was the start of the two channel Binaural PT-63 BAN.

We set out to make a two channel either/or amplifier which we called a PT-63 BN. We made a sample and a number of people had great fun making binaural recordings. One of the technicians working for us at that time took one home over a weekend, and he and his wife recorded the sound of a ping pong game about two o'clock Sunday morning. I think that was perhaps the first such recording ever made. Another fellow took one out to Park Ridge and recorded the sound of a Northwestern steam locomotive going by, and there were many recordings of traffic sounds and the like. We learned a great deal about microphone placement in order to avoid the "hole-in-the-middle" effect, how to make a recording for use on loudspeakers and the techniques required for use on headphones. Of course, it turned out that Bill Snow and others had discovered about the same kind of phenomena at Bell Telephone Laboratories some twenty years before.

We took the two channel machine to the Audio Fair that fall and quite conclusively sold the show. Any time I walked down the hall I would hear someone talking about those stereo recordings that were being demonstrated at Magnecord.

By the time we got back home all twelve of the machines we had made were sold; we set out to make another twelve, and by the time those were finished they were sold. So, we made a production run of 100 to 200 of the thing. I checked some years later and discovered that perhaps half of those machines were not being used for sound recording at all but rather were used for data taking in which one channel recorded the data and the other was used to record a running log.

In the early '50s we developed a multi-channel slow-speed machine for the FAA, a high-speed machine having response up to about 100 kHz for the Navy, and perhaps a

number of other relatively minor things that do not now come to mind. We also developed various drive mechanisms that were successors to the original PT-6 as well as a number of entries into what might be called a popular tape recorder market based on the PT-6 and various electronic assemblies.

I left Magnecord in the Fall of 1954, and I am aware of the ensuing history only in a very cursory fashion. We also built some of the early Thermofax machines for Minnesota Mining Company, developed the Krasno-Ivey flicker photometer. This latter instrument was used to measure the flicker fusion point of a person's eyes both before and after the administration of nitroglycerin. Dr. Krasno claimed that the direction and magnitude of the shift could be used to forecast the onset of a heart attack. Dr. Ivey unfortunately became entangled in a cancer cure about that time and was discredited in the medical profession which partly led to the demise of the flicker photometer.

I was the only one in the organization that knew C.G. Barker's true name and the only reason I knew it was because I had to sign his personnel security questionnaire form when we obtained clearance from the Federal Government. I respected his desire not to divulge the name and have maintained that attitude ever since. Tink, as you probably know, died several years ago. Bob Landon, the last I knew of him worked for the Park Board in purchasing in Chicago, and Barker is a manufacturer's representative and manufacturer in the San Diego area.

I have wandered here now for almost two belts on my dictating machine, but I have undoubtedly omitted a number of interesting items.

JSB/nh 2-14-80

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