

TALK

SOUND

FROM THE MAKERS OF "SCOTCH" BRAND MAGNETIC TAPE

Bulletin No. 5

VISIBLE TRACKS ON MAGNETIC TAPE

The sound track recorded on magnetic tape may be made visible by means of a method which is similar to the mapping of fields around magnets by means of iron filings. The iron particles must, of course, be much smaller than iron filings. The particles which are used are carbonyl iron with a diameter of about 3 microns - or about 0.0001 inch.* In addition to being small, the particles must be able to move about so that they can settle in regions where the tape is strongly magnetized. In order to provide the desired mobility, the carbonyl iron may be dispersed in a light oil or in a volatile substance such as heptane. Even ordinary water may be used.

In order to see the track recorded on a piece of magnetic tape, the simplest method is merely to pass the recorded tape through a suspension of carbonyl iron in heptane. The heptane quickly evaporates, leaving the carbonyl iron particles settled on the regions which are most strongly magnetized. The photographs illustrate typical sound track patterns which have been made visible in this manner. The longer wavelengths recorded on the tape are evident to the naked eye. Very short wavelengths, as short as 0.001

inches, may also be observed. However, in the case of the short wavelengths, more satisfactory results are obtained if the carbonyl iron is dispersed in a light oil instead of being suspended in heptane.

The track made visible in the manner described above has a number of uses. One application of the method is to permit an evaluation of the degree of alignment of magnetic heads. This requires a study of very short wavelengths. One can determine with a microscope whether or not a recorded track is perpendicular to the direction of tape travel. (A paper on this subject will appear shortly in Audio Engineering.)*

Another application is in editing, which may be facilitated by making the sound track visible. Relative positioning of the sound tracks in multi-track recording may also be examined. Defects in the gaps of record heads may be revealed, and some idea of fringing effects may be obtained. Occasionally one may find tape defects which contribute to noise, using a microscope to examine the visible track.

The method cannot be used to reveal weakly recorded signals and for best results a fairly high signal level is necessary.

* Carbonyl iron may be obtained from the General Aniline and Film Corp., Grasselli, N. J. The finest available particle size should be specified.

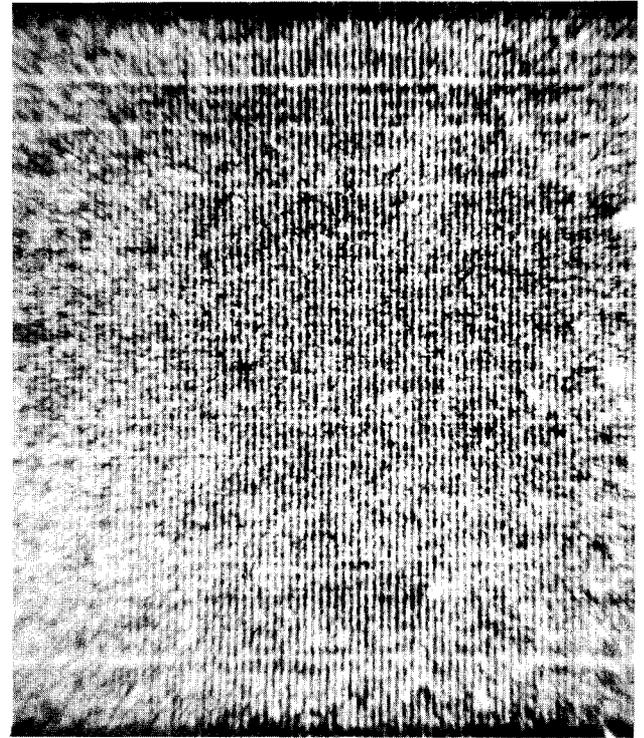
* BF Murphy and HK, Smith, "Head Alignment with Visible Magnetic Tracks", *Audio Engineering*, Vol 33, 1949 Jan, p 12.

Magnetic Products Division **3M**
COMPANY

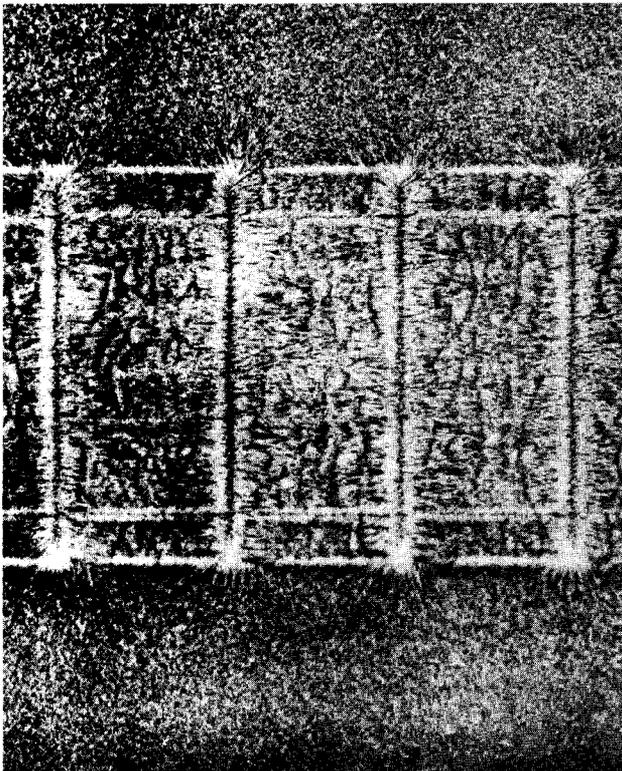
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PHOTOGRAPHED SAMPLES OF
RECORDED TAPES SHOWING
VISIBLE SOUND TRACKS

This is a
75 cps note
as recorded on
a Brush head at
7.5 in /sec. The
fringing at the sides
and some lamination
defects may be seen. The
tape used was especially
made to be a noisy one with
a rough backing to accentuate
"modulation noise". This noise can
be seen as irregularities between the
recorded poles. ↓



↑ This photo-micrograph illustrates
the fine definition obtainable with
an oil suspension. The wavelength
is .002 in. so that the lines are .001
in. apart. Lamination defects may
be observed.



↑ This is the word "TAPE" as re-
corded on an Ampex machine
(30 in./sec., full 1/4 in. width
recording). Most of the length
of the recording is the "A"
sound.