

TALK

SOUND

FROM THE MAKERS OF "SCOTCH" BRAND MAGNETIC TAPE

BULLETIN NO. 4

ESTABLISHING A. C. BIAS VALUES IN MAGNETIC RECORDERS

Different magnetic tapes in general operate best at different values of the A.C. bias current. However, the optimum bias for use with "SCOTCH" Sound Recording Tapes No. 101 and No. 111 are the same. Too low a value of bias may result in high distortion and low signal to noise ratio. A bias current set at too high a value results in loss of response at high frequencies.

Except in machines designed for professional use, the bias setting is not particularly critical. In machines designed for home use an approximation of the optimum value of bias may be had through the use of an audio oscillator, a vacuum tube volt meter, and some means for measuring output of the playback system.

Connect the V.T. volt meter across the bias windings of the recording head where its reading will be proportional to the bias current. Record a K.C. note at some level well below the overload point of the tape. Observe the output of the playback system as a function of bias current keeping the recording level fixed. For some value of the bias a maximum output will be observed. The following rules will help select the operating bias in terms of the bias current for maximum output:

(A) For Low Speed Machines Using D. C. Erase.

To obtain the best signal to noise ratio it is necessary to compromise by sacrificing high frequency response. The optimum bias current is approximately 50% greater than the bias for maximum output.

(B) For Low Speed Machines Using High Frequency Erase.

Because a good A.C. erase system results in a lower tape noise level than D.C. (or permanent magnet) erase, a lower value of bias may be used. Adjust the bias for maximum output of the 1000 cycle signal.

(C) For High Speed Professional Machines.

In general, more precise techniques for bias setting are required for professional machines. A reasonable compromise, however, is to choose a bias current twice that for maximum output of the 1000 cycle signal.

In a future bulletin more precise directions will be given for choosing optimum bias by use of a distortion meter or harmonic wave analyzer.

Magnetic Products Division **3M**
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4. STRAY EXTERNAL D. C. FIELDS.

These will produce the same effect as any of the sources of D. C. fields located in the head. Ordinarily the earth's magnetic field is negligible, but serious fields can be caused by magnetized steel parts or especially by nearby meters.

In testing for the existence of asymmetric fields, a small permanent magnet which may be held near the heads is a help. If some position of this magnet reduces even harmonic distortion, the polarity of the magnet should be noted and conditions changed. The heads may be demagnetized by gradual removal from a 60 cycle field of about 1000 oersteds. Bad waveform may be tested by reversing the leads to the heads; if such recon-

nection changes the amount of distortion or the polarity of the magnet held nearby to improve it, then the waveform is not good. Any steel parts should be demagnetized and any nearby meters temporarily moved to see whether there is an effect. Generally more than one influence is at work with their effects sometimes additive and sometimes subtractive, so it is important to separate the various causes; otherwise very wrong conclusions may be drawn.

It is also worth noting that these same factors which cause even harmonic distortion work to increase noise, and their removal will lower the noise as well as lessen the distortion.