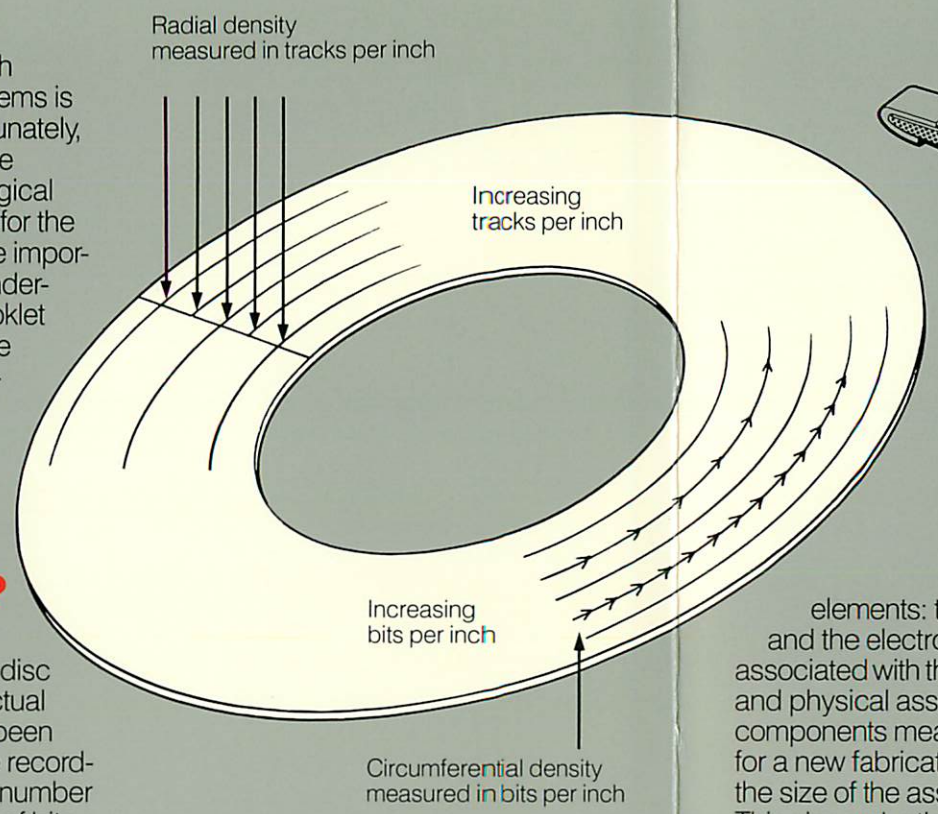
What is thin film?

Today an understanding of the high technology used in computer systems is required to "keep in touch." Unfortunately, the "buzz words" of the industry are usually accompanied by technological jargon which is far too specialized for the normal D.P. professional, and more importantly, not necessary for a basic understanding of the concepts. This booklet has been designed to describe the latest disc drive technology generally known as "thin film" in terms of what it is, why it is needed, and how it will benefit our users with our next generation of disc drive equipment.



Why thin film heads?

As the amount of data that can be stored on each new generation of disc drives has been increasing, the actual space used to store the data has been decreasing. The capacity of these recording surfaces is determined by the number of tracks per inch and the number of bits per inch. For example, a Memorex 3650 style device records at 480 tracks per inch and 6,350 bits per inch or three million bits per square inch. The 3680 records at 800 tracks per inch and 15,000 bits per inch for a total of twelve million bits per square inch.

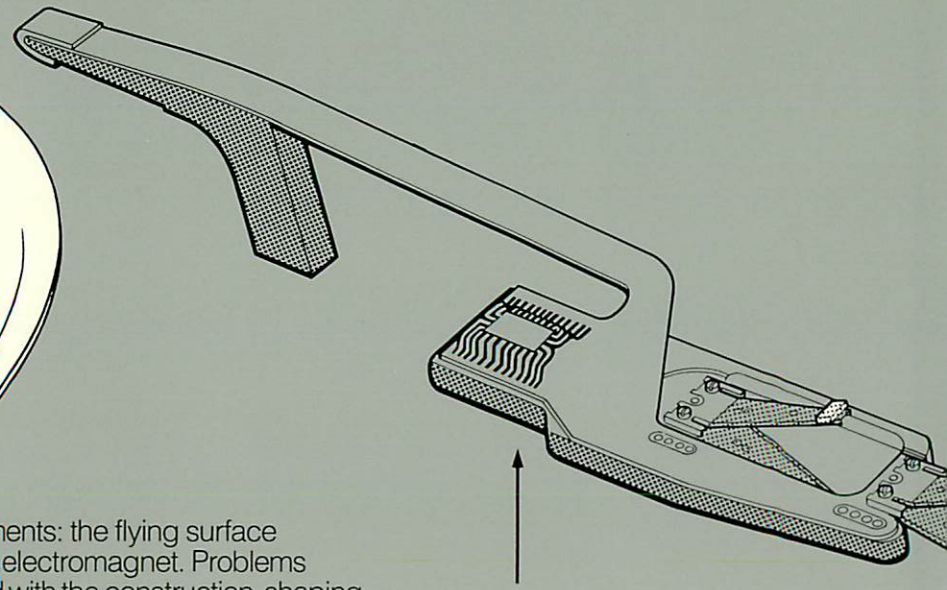
A simple example of the function of a head, whether ferrite or thin film, is to fly over the surface of the disc and generate a magnetic flux path which jumps from the head and magnetizes the disc coating. To read from the disc we simply generate a flux reversal in the magnetic read/write head. As we get into higher and higher storage densities, we need higher frequencies of flux reversals. This can be accomplished by lowering the flying height of the read/write head or increasing the rate of flux changes a head can achieve, or a combination of these two.

Ferrite technology is limited to approximately 9,000 bits per inch. To go beyond this density will mean the need for higher frequencies of flux reversals. To achieve this, the ferrite heads will be replaced with thin film head technology.

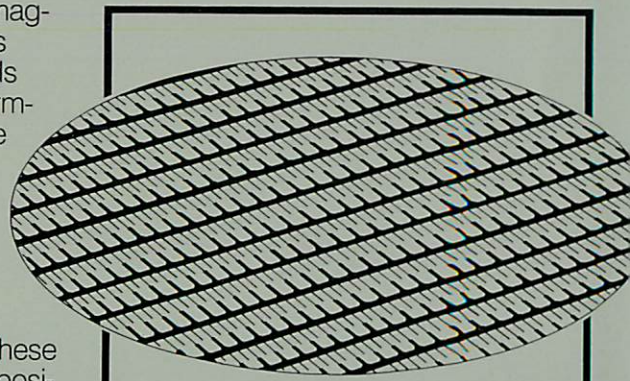
How are thin film heads made?

The read/write head used in the present generation disc drives is mechanically assembled. It is composed of two primary elements: the flying surface and the electromagnet. Problems associated with the construction, shaping and physical assembly of the essential components mean that there is a need for a new fabrication process to enable the size of the assembly to be reduced. This size reduction is required to enable the flying height to be reduced. The magnetic properties of the ferrite materials being used in these Winchester heads are also a limiting factor, and new permalloys are needed to increase the rate that flux changes can be made in the read/write head.

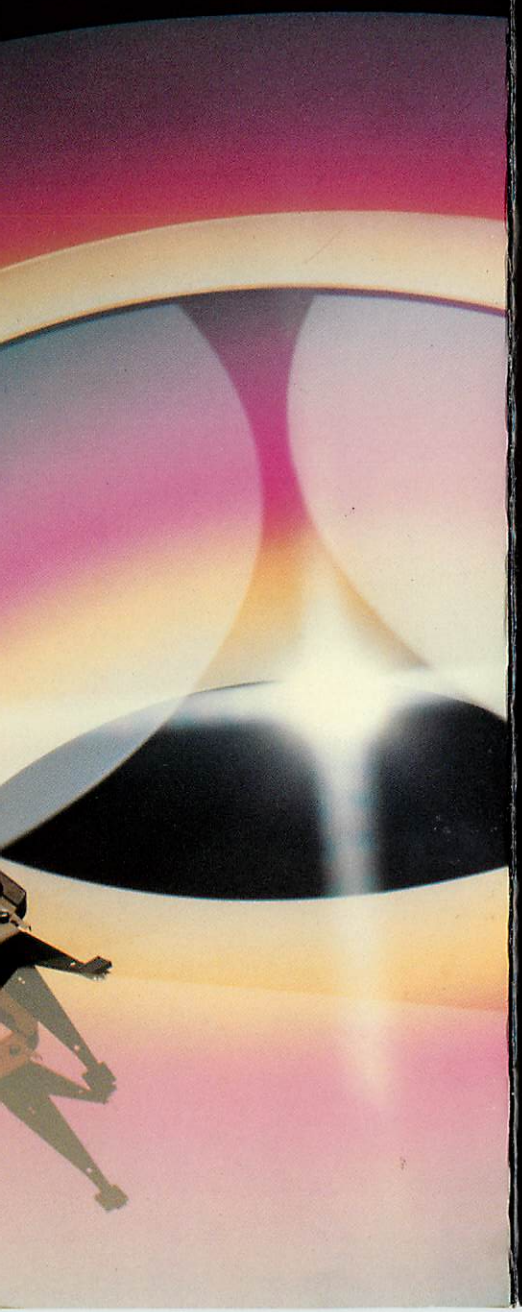
Techniques developed in the semiconductor industry for the creation of integrated circuits are the basis of the new manufacturing processes used for the thin film heads. These processes involve the successive depositions of different materials in a series of thin films. These films are used to build up the pole tips and windings needed to make up the magnetic transducer used in the read/write head.



Integrated circuit
containing read/write
head signal amplifier
and selection logic



Fabrication wafer on which
multiple thin film heads are
deposited during the
manufacturing process



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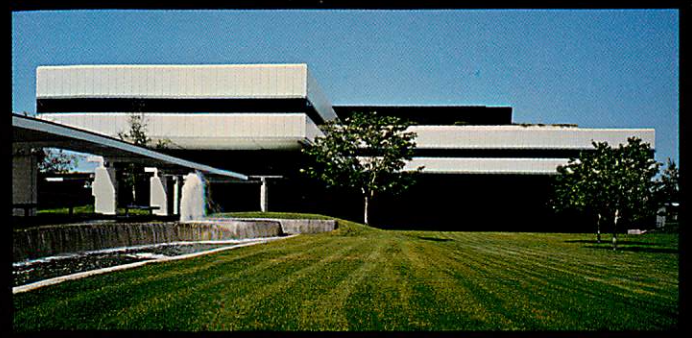

MEMOREX

Thin Film Technology