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### **Magnetic Thin Film Memory**

Ferrite core memory which was used for the main memory of early electronic computers has an architecture where the conductor wire for recording/reading was run through the small ferrite core, so it had limits for downsizing, mass production and speeding up. On the other hand, wire memories making use of magnetic wires —magnetic alloy film formed on the surface of copper wire— become a thin magnetic film suited to mass production because a closed magnetic circuit was realized by electrodeposited magnetic film which had an axis of easy magnetization in the circumferential direction and textile-type wire memory making use of textile technology. This memory was further developed into fine strip memory going through processes—forming the laminate structure of permalloy vapor-deposited film and copper vapor-deposited film, then processing it into a stripe shape using etching technology, and then form digit lines using permalloy film such as for IC-formed ferrite core memory. Also, magnetic thin film which had properties to bring about the reduction of driving current and the remarkable improvement of the S/N ratio was successfully developed by means of embedding the word line into grooves formed on a ferrite plate and making a ferrite flux keeper, thereby developing production technology for non-destructive read memory good for mass production.

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### **Magnetic Recording Technology**

Carbon wire type recording technology discovered by Poulsen around the beginning of the twentieth century was improved in a variety of ways and by the combination of ring type magnetic heads and oxide magnetic fine powder type magnetic recording medium (magnetic tape) evolved into read/write equipment which was able to record short wave/long hours. However, the improvement of poor SN ratios due to noise generated from non-linear/hysteresis— properties of magnetization—was a challenging problem. In 1938, K. Nagai, Igarashi, et al., proposed an AC bias method instead of the DC bias method—conventional noise reduction technology. Accordingly, they achieved the elimination of strain/improvement of sensitivity and realized a considerable increase of the SN ratio, thereby remarkably improving recording properties. Because of this, the nation's first tape recorder was developed and thanks to the AC bias method, the long-hour recording of audio data was put to practical use. Furthermore, they carried out theoretical and experimental studies about magnetic recording, thereby contributing to many studies which

provided guidelines for the improvement of magnetic tapes and magnetic heads. In 1960, Iwasaki, et al., proposed to use metal magnetic powder—Fe-Co-based magnetic alloy fine powder which is high in magnetic coercive force  $H_c$  and saturated magnetic flux density,  $B_s$ , as a recording medium instead of oxide magnetic powder previously used for recording medium. Accordingly, they proved that it was possible to realize far greater density recording medium than oxide magnetic powder, thereby making a contribution which led to the later development of a high density recording medium.