TECHNICAL BULLETIN 224

Characteristics of Magnetic Stripes

The magnetic stripe consists of magnetic material in a binder system that is coated onto a backing material. The stripe on Circle Systems' magnetic stripe cards is itself coated again to prevent mechanical wear of the stripe from the magnetic particle materials being evaluated.

The magnetic stripe particles dispersed in the binder system are the important memory elements in the overall stripe construction. There are literally millions of these particles in the stripe and when the stripe has been encoded each particle may be considered as a small magnet with a north-south polarity. The polarities have been set in specific directions by the encoding process and their resulting magnetic fields will be visualized with the use of inspection particles.

These individual magnets will retain their encoded magnetic strength and polarity unless acted upon by some significant outside force. The three most notable forces are heat, external magnetic fields and radiation. It is unlikely that the Circle Systems cards would be at all affected in the course of normal inspector activity.

The heat required to destroy the magnetism in a magnetic material is known as its curie temperature. The curie temperatures, of the materials used as the magnetic stripe, range from 250°F and higher. The other materials involved in the card construction would be rendered useless before the 250°F temperature was reached. Unless exposed to a fire, there is little danger of failure of the magnetic stripe due to temperature.

Coercivity, expressed in oersteds, is a measure of the magnetic field strength required to affect erasure or polarity reversal in a magnetic material. An external magnetic field of 50 oersteds or less will have very little erasing effect on any stripe with a coercivity greater than 250 oersteds. The Circle Systems Type A High Coercivity Card has a coercivity of 3600 oersteds. Because the strength of a magnetic field falls off by the square of the distance from the source, the mere spacing between the stripe and the source offers considerable protection. Examples of some field strengths for reference purposes are as follows:

The earth's magnetic field		0.6 oes.
The field strength directly on the case of an electric hand drill		10.0 oes.
The field strength 3" away from a 1500 oersted bulk deguasser	under	50.0 oes.

Based on tests that have purposely exposed magnetically precoded materials to microwave radiation and X-rays, the intensity levels below those that adversely affect a human being will have no adverse effects on the recorded signals. Also, Circle Systems' cards were evaluated after extended exposure to an approved refined petroleum distillate and a conditioned water bath approved for magnetic particle inspection. Neither fluid caused any detrimental effect on the magnetic or physical properties of the cards or their usefulness.