

The magnetic stripe card and reader

The magnetic stripe reader is a point-of-sale (POS) device that interprets data encoded on a magnetic stripe card, usually a credit card, debit card, or gift card. About a hundred characters of information can be stored on a magnetic card, depending on whose formatting system is used.

Millions of magnetic stripe and check reader devices are used worldwide, mostly for security and financial transactions but also in financial institutions, retail stores, telecommunication companies, kiosks, gaming, transit companies, schools, clubs, and sports and recreation facilities for identification and transportation purposes.

Magnetic stripe readers come in different models and sizes. A magnetic stripe reader is designed to read credit card information directly into a POS program. They also come in various interface formats, such as RS-232, USB, and proprietary keyboard interfaces.

Magnetic stripe readers and cards are manufactured in accordance with ISO specifications ISO 7810, ISO 7811, ISO 7812, ISO 7813, and ISO 4909. These specifications delineate the physical properties of the card, including size, flexibility, location of the magnetic stripe, and magnetic characteristics.

Magnetic stripes, also called magstripes, come in two types: high-coercivity and low-coercivity. High-coercivity magstripes are harder to erase and are consequently appropriate for cards that are used frequently and must be durable. Low-coercivity magstripes require less magnetic energy to record and the card writers are cheaper than machines that record high-coercivity magstripes. A card reader can read either type of magstripe, but a high-coercivity card writer can write only high-coercivity cards and a low-coercivity card writer can write only low-coercivity cards.

The magnetic stripe in most cards is contained in a plastic type of film 0.375 inches (9.52 mm) wide located 0.223 inches (5.66 mm) from the edge of the card. The magnetic stripe contains three tracks. Each track is 0.110 inches (2.79 mm) wide, with tracks one and three typically recorded at 210 bits per inch (8.3 kbit/m) and track two recorded at 75 bits per inch (3.0 kbit/m). Each track can contain either 7-bit alphanumeric characters or 5-bit numeric characters.

Magnetic stripe readers are used in high-volume mass transit applications, replacing paper tickets with either a directly applied magnetic slurry or hot foil stripe. Slurry applied stripe cards are less expensive to produce but are of lower quality. These cards would not comply with the standards for making payments or other cards discussed here.

Due to frequent use, cards suffer from damage. Consequently, the digital recording on the stripe is in a very low-density format and is often duplicated several times in case part of the stripe becomes damaged.

According to existing standards, a magnetic card stores information in three separate tracks. All three tracks possess different bit densities and encoded character sets. The average bit density of the first track is 210 bits per inch (bpi). A 64-bit character dataset is used to store information in



track 1. The characters are made up of six data bits and an odd parity bit. The encoding format grants the least-significant bit to come first and the parity bit, last. So, track one can hold around 79 characters.

The information density of the second and third tracks is around 75 and 210 bpi respectively. Only numeric data can be stored on the second and third track. 4-bit binary encoding is used as a decimal subset with odd parity and it is encoded with the least significant bit first and the parity bit last. The second and third tracks hold 40 and 107 characters respectively. The actual usable data stored will be minimized as the Start Sentinel, End Sentinel, and LRC characters are added

A magnetic stripe reader works on credit cards, badges, permits, tokens, and passes by reading the magnetic tape on it. The information in the magnetic tape may contain account or credit card information, as appropriate. The tape is read by magnetic stripe readers in ATMs, identification devices, and payment terminals and is then forwarded to central data processing services.

A USB magnetic stripe reader can be programmed to rearrange, edit, select, and validate data. They automatically distinguish between AAMVA and CA DMV data formats and provide exceptional functionality and value in the smallest possible package. They can read up to three tracks of information with a single swipe in either direction in a standard-length slot device that is easy to use.

Magnetic card stripe layout as defined by the American National Standards Institute:

Track one

Primary Account Number (19 digits Max.)

Name (26 alphanumeric characters Max.)

Expiration date (YYMM) 4 digits

Service Code 3 characters

Optional data: (PVKI) PIN Verification Key Indicator 1 characters

Optional data: (PVV) PIN Verification Value 4 characters

Optional data: (CVV) Card Verification Value 3 characters or (CVC) Card Validation Code 3 digits

Track Two

Primary Account Number (19 digits Max.)

Expiration date (YYMM) 4 digits

Service Code 3 characters

Optional data: (PVKI) PIN Verification Key Indicator 1 characters

Optional data: (PVV) PIN Verification Value 4 characters

Optional data: (CVV) Card Verification Value 3 characters or (CVC) Card Validation Code 3 digits



SOLUTIONS DELIVERED

Track Three

- Primary Account Number (19 digits Max.)
- Country Code (optional) 3 digits
- Currency Code 3 digits
- Currency Exponent 1 digits
- Amount Authorized per Cycle 4 digits
- Amount Remaining this Cycle 4 digits
- Cycle Begin (Validity Date) 4 digits
- Cycle Length 2 digits
- Retry Count 1 digits
- PIN Control Parameters (optional) 6 digits
- Interchange Controls 1 digits
- PAN Service Restriction 2 digits
- SAN-1 Service Restriction 2 digits
- SAN-2 Service Restriction 2 digits
- Expiration Date (optional) 4 digits
- Card Sequence Number 1 digit
- Card Security Number (optional) 9 digits
- Discretionary Data as determined by card issuer

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