Glossary of Terminology & Acronyms

Magnetic Stripe

AAMVA:
American Association of Motor Vehicle Administrators

ABA:
American Bankers Association

ABA Track:
Used to refer to the ANSI/ISO Track #2 encoded at 75 BPI density in BCD format

AC Erasure:
See Erasure

Acicular:
Needle shaped, i.e., a particle whose length is three or more times its width

ACK:
Positive acknowledgment, an ASCII control character verifying receipt of signal without error

Adjacent Reversal Effect:
The characteristic of an encoded magnetic stripe, due to inadequate separation of the flux reversals, in which the read voltage does not stabilize at a zero value between reversal peaks

AFNOR:
Association Française de Normalisation, France's National Standards Organization

Air Gap:
A nonmagnetic section, whether air or material, in an otherwise closed magnetic circuit

AIM:
Automatic Identification Manufacturers

Alignment:
While the magnetic stripe slurry on the substrate is still wet, it is subjected to a magnetic field which aligns the magnetic particles with their axes parallel to the direction of encoding

ALPHA:
Alphanumeric; generally refers to the ANSI/ISO ALPHA Data Format, which is a 7-bit 64- character set

Ampere Turn/meter (A/m) :
The S.I. unit of coercivity. 1 oersted = 79.557 A/m

Analog Decoding:
A generic decoding technique using a measured parameter (such as the voltage of a charging capacitor), determined by the immediately preceding bit-cell, as valid for the current bit-cell in order to determine whether it represents a 0-bit or a 1-bit

ANSI:
American National Standards Institute. ANSI has adopted ISO Standards 7810, 7811, 7812, and 7813 as National Standards for ID cards (see ISO)

APACS:
Association for Payment Clearing Services, U.K.'s National Standards Organization for transaction cards (replacing BSI - British Standards Institute)

APTA:
American Public Transit Association

ASCII:
American Standard Code for Information Interchange, the most widely used set of binary numbers for data and control communications; consists of 128 7-bit characters, of which 96 are alphanumeric, symbol, and punctuation characters and 32 are control characters; an eighth parity bit is usually added for error checking. The 64 6-bit character subset containing the capital alphabet, numerals and certain punctuation characters is widely used for data only communications

Aspect Ratio:
The ratio of length to width of a magnetic particle (pigment)

ATB:
Automatic Ticketing & Boarding, a tab size paper ticket containing a magnetic stripe, used by airlines

ATM:
Automatic Teller Machine

Azimuth Error:
A decode error resulting from misalignment of the read head gap with the encoded flux reversals on a magnetic stripe

B:
Magnetic flux density or induction; the cgs unit is gauss

Br :
Residual induction

Bs :
Saturation induction

BCD:
Binary coded decimal; generally refers to the ANSI/ISO BCD Data Format, which is a 5-bit 16 character set

Balanced Head:
A head with dual coil windings configured to cancel external magnetic fields (i.e., those not coming through the gap)

Ball Mill:
A rotating chamber containing small spheres used to uniformly disperse the magnetic pigment in the slurry

Barium Ferrite:
A magnetic pigment, BaFe, commonly used in high coercivity magnetic stripes.(700-4000 oersteds)

Baud Rate:
The number of transmission elements per second in a communications line; the element may contain a single data bit, in which case baud rate equals bits/sec., or the element may contain two or more bits, as in the case of high speed modems

BH Meter:
A device for measuring the intrinsic hysteresis loop of a sample of magnetic material. Usually the sample is magnetized in a 60 hz field supplied by a solenoid and the intrinsic flux is detected by integrating the emf produced in an opposing pair of search coils, one of which surrounds the sample. The hysteresis loop may be displayed on an oscilloscope by feeding the X and Y plates with voltages proportional to the magnetizing coil current and the integrated search coil emf respectively

Binary:
Having only two possible values, i.e., zero or one

Binder:
A resin, such as polyurethane, in the magnetic slurry, which when dry in the magnetic stripe locks the magnetic particles with their axes aligned

Biphase:
The binary encoding technique used in magnetic stripe, wherein a bit-cell represents a logic One if it has a flux reversal at its midpoint and represents a logic zero if it does not; also known as Aiken Biphase, and two-frequency coherent-phase encoding

Bit:
A binary digit, having the value of either 0 or 1

Bit-Copying:
See Skimming

Bit Cell:
The distance on a magnetic stripe required for the encoding of a binary digit, i.e., a bit; numerically equal to the reciprocal of the encoding density

Bit Density:
The number of bit cells encoded per unit length along the magnetic stripe, usually expressed as bits-per-inch, or BPI

Bit & Strobe:
An encoder encode input or reader decode output interface using a binary-state (0,1) data line with an associated clocking pulse line (strobe) to indicate when sampling of the data line is valid; a Bit & Strobe interface is independent of the encoding format and protocol being used

Black Iron Oxide:
Ferrosoferric oxide (Fe_3O_4) magnetic iron oxide

Bleed:
Graphics printed up to one or more edges of the card

Blocking:
(a) The process of sticking together of tickets during storage. This process is sometimes accompanied by the transfer of magnetic or other print materials from one card to the next;
(b) the process of magnetic stripe tape sticking together in roll form

BPI:
Bits per inch; see Bit Density

BSI:
British Standards Institute

Buffered Data:
Decoded data from a magnetic stripe read held in temporary memory until needed

Bulk Degausser:
See Bulk Eraser

Bulk Eraser:
Equipment for erasing a roll of tape. The roll is usually rotated while a 60 cycle AC erasing field is decreased either by withdrawing the roll from an electromagnet or reducing the AC supply to an electromagnet. This equipment will generally erase coercivities less than 1000 oersted

Butterfly Pouch:
An unlaminated ID badge with a hinge running along one edge into which the prepared ID card is inserted and laminated

Byte:
An ordered set of 8 bits

Calender:
To press so as to produce a smooth surface finish and increase particle packing density; may reduce thickness

Card:
Commonly used generic term for magnetic stripe media regardless of shape, construction, and material; e.g., magnetic stripe cards, badges, tickets, forms

Carrier:
(a) A thick paper folder with a hard, glossy inner surface into which an ID badge is inserted for processing through a laminator;
(b) a heavy stock paper folder that holds a magnetic stripe card for mailing to the cardholder

Cassette Head:
A read/encode head specifically designed for usewith analog cassette tape recording, sometimes used in card readers

CAT:
Credit Authorization Terminal; See POS

CBEMA:
Computer and Business Equipment Manufacturers Association

CEN:
Comité Européen de Normalisation (European Committee for Standardisation)

CENELEC:
Comité Européen de Normalisation de Electrotechnique

cgs:
A system of units in which the centimeter-gram-second are the units for the fundamental quantities length-mass-time

Character:
The specific binary number (a pattern) and its associated letter, number, symbol, or function in a set of data transmission codes, e.g., the ASCII code

Check Digit:
Using an algorithm with one or more data sets to compute a digit, which is used to verify validity of the data set. Under ANSI/ISO specs, the final digit of the individual account number

Chromium Dioxide Tape:
A magnetic tape used in audio cassettes, with a coercivity around 600 oersteds

Clock:
See Bit & Strobe

Clocking Bits:
The all-Zero bit-cells encoded at the beginning and end of a magnetic stripe to permit the read circuit to synchronize at the beginning of a read

CMOS:
Complementary Metal Oxide Semiconductor Logic; logic zero = <1.5 VDC, logic One = >3.5 VDC, and very low current source

Cobalt-Doped:
Cobalt modified iron oxide magnetic pigments with intermediate coercivities (500-1600 oersteds)

Coating Thickness, c:
The thickness of the magnetic coating applied to the base film. Magnetic stripe coatings range in thickness from 170 to 650 microinches with a preponderance of coatings being approximately 400 microinches thick. In general, thin coatings give good resolution at the expense of reduced output; thick coatings give a high output at the expense of degraded resolution

Coercive Force:
The demagnetizing force required to reduce the induction to zero. Erroneously used as the maximum demagnetizing force required to erase a magnetic stripe, i.e. that for a fully saturated material

Coercivity (Hc) :
A term for various demagnetizing fields measured in oersteds or ampere-turns per meter. The intrinsic coercivity mHc is the demagnetizing field required for zero induction on a B-H plot, i.e., the coercive force. The Remanent coercivity rHc is the demagnetizing field required to produce zero remanence after its removal. All three of the above coercivities are similar in magnitude

Cold Peeling:
A method of applying the magnetic stripe to a card; the magnetic material is peeled from the tape without heat and then laminated to the card

Compensation:
The ability of a reader decode circuit to correct for jitter in order to yield a valid decoded bit- string during reading a magnetic stripe

Conversion (Converters) :
A general class of manufacturers who convert plastic and paper stock for a variety of end uses, including those who manufacture cards, badges, tickets and forms containing a magnetic stripe

Core:
(a) The central material layer, usually PVC, of a laminated magnetic stripe card on which the graphics are printed before overlay lamination;
(b) The high- permeability low-coercivity ring running from the gap through the coil of a read or encode head

Credit Card Size:
An ID badge or card measuring 2.125" wide by 3.375" long by 0.030" thick; sometimes used for cards whose thickness is different from 0.030"

CSA:
Canadian Standards Association

Cupping:
Curvature of a stripe in the lateral direction

Curl:
The deviation of a card from flat. Can be defined as three types; lengthwise curl, widthwise curl and diagonal curl

Data (IBM) Size:
An ID badge or card measuring 2.328" wide by 3.250" long

DC Erasure:
See Erasure

Debit Card:
(a) A card with value encoded on the magnetic stripe, which is re-encoded with a lower value at each use;
(b) A magnetic stripe card used with a PIN number to authorize electronic debit of funds from an account

Decibel, db:
A dimensionless unit for expressing the ratio of two powers or, more usually, voltages or currents, on a logarithmic scale. If A and B represent two voltages or currents, the ratio A/B corresponds to 20 log10 (A/B) decibels. 1 db represents a difference of approximately 11% between A and B. Other values are:

Ratio:	1	1.4	2	4	10	100	1000
db:	0	3	6	12	20	40	60

Decode:
The process which yields a bit-string of Zeros and Ones from the flux reversal patterns on a magnetic stripe during reading

Degaussing:
The process of demagnetizing a magnetic material such that its remanent magnetism is zero

Demagnetization Curve:
The second quadrant portion of the saturated condition hysteresis loop of a permanent-magnet material (frequently called the B/H curve)

Demagnetizing Force:
A magnetic field opposite in polarity to that of a previously magnetized material in such a way that it reduces the remanent induction

Density:
See Bit Density

Die Cutter:
A punch & die device used to cut a photo or ID material to exact size for insertion into a laminating pouch

Differential Interface:
An input/output circuit which uses two transmission lines for each circuit, swinging opposite in polarity for a data bit

Digital Card Head:
A read/encode head specifically designed for digital biphase recording on a flat magnetic stripe

Digital Recording:
A method of recording in which the information is first coded in a digital form. Most commonly, a binary code is used and recording takes place in terms of two discrete values of residual flux

Digital Decoding:
A proprietary decoding technique using a digital computer with clock/counter to predict the current encoded bit-cell based on prior multiple bit- cell history, and to digitally determine whether the current bit-cell represents a 0-bit or a 1-bit

DIN:
Deutsches Institut für Normung, Germany's National Standards Organization

Dispersion:
Distribution of the oxide particles within the binder. A good dispersion can be defined as one in which equal numbers of particles would be found in equal, vanishingly small volumes sampled from different points within the coating. The quality of dispersion affects many stripe properties, including orientability, surface smoothness, and sharp waveform definition

Dispersion Effect:
The characteristic of an encoded magnetic stripe, due to the action of the encode head fringe field on the stripe's dispersion in particle coercivities, which produces a read voltage peak waveform of lower amplitude and broader width

Domain, Magnetic:
The smallest element of a ferromagnetic material which acts as a permanent bar magnet

Dropout:
An imperfection in the stripe leading to a variation in output. The most common dropouts take the form of surface imperfections, consisting of oxide agglomerates, imbedded foreign matter, or redeposited wear products

Dual Gap Head:
See Spatial Decoding

Dual Stripe Card:
A card containing two separate magnetic stripes, e.g. at the top and bottom or on the front and back of the card

Dynamic Range:
The characteristic of a reader defined by the total jitter compensated as a function of read speed

Dyne:
The cgs unit of force

EBCDIC:
Extended Binary Coded Decimal Interchange Code, a 256 character set of 8-bit binary numbers, consisting of alphanumeric, symbol, and control characters, used in some data communications applications

EFTA:
Electronic Funds Transfer Association

EIA:
Electronic Industries Association

Electromagnet:
A device consisting of a current- carrying coil, usually with an iron core, used to produce a magnetic field

Emboss:
To produce raised letters and numbers on a PVC card, e.g., the account number and name on a credit card, by mechanical pressure from the back side

Embossing:
Initialization of a plastic card by forming characters with a male and female die combination such that the entire plastic substrate is raised in the shape of visible characters. The resulting raised characters can transfer their images to a paper form by the use of an imprinter

emu:
Electromagnetic unit, a unit pole in the cgs-emu system of units. The analogous magnetic quantity in the SI system of units has the dimensions Ampere- Turnsxmeters2

Enable:
To turn ON; to be active

Encoder:
The electromechanical device, which contains a means for measuring distance traveled along a magnetic stripe, used to produce flux reversals at specified locations along the stripe

Encoding:
The process of creating flux reversals at specific locations along the length of a magnetic stripe such that the flux reversal pattern represents specific data

Encrypt:
Using an algorithm to transform data to conceal its meaning or value

End Sentinel:
A defined bit-pattern in an encoding Format, which cannot be used for a data character, and which is encoded on the magnetic stripe immediately following the last data character bit-pattern

Erasure:
A process by which a signal recorded on a stripe is removed. Erasure may be accomplished in two

ways: in AC erasure, the stripe is demagnetized by an alternating field which is reduced in amplitude from an initially high value; in DC erasure the stripe is saturated by applying a unidirectional field

Erasure Resistance:
The ability of a magnetic stripe to resist a signal loss of >15% when brought into intimate contact with a magnetic field. Resistance to a flux of 2000 gauss, for instance, would provide reasonable expectancy of survival in a household environment. See SFD, Coercivity

Erg:
The cgs unit of work, equal to one dyne- centimeter

Ferric Oxide:
See Gamma Ferric Oxide.

Ferromagnetic Material:
Any material that has a permeability substantially greater than 1 and that exhibits magnetic hysteresis properties. Strongly attracted by a magnetic field

Field Separator:
A designated character in an encoding character set which is used to separate data fields, and cannot be used for data

Flat Card Printing:
Initialization of a card by printing of characters on a substrate surface without disturbing or displacing substrate material, usually using thermal printing techniques

Flux Density (B) :
The number of lines of magnetic flux per unit area; the cgs unit is gauss

Flux Reversal:
See Flux Transition.

Flux Transition:
A location (interface) on the magnetic stripe where the magnetic particles on the two sides of the interface have like poles facing each other, i.e., a South-South or a North-North interface, resulting in a concentration of magnetic flux at the interface

Format:
The set of unique bit-string patterns of Zeros and Ones corresponding to the set of data characters used in magnetic stripe encoding; many different data formats are used, the best known being the ANSI/ISO BCD and ALPHA formats

Format Code:
Under the ANSI/ISO Track #1 protocol there are two defined formats: Code "A" has the name first, and Code "B" has the account number first; for Track #3, the first two digits identify the data format used

Formatting:
The process of applying a format algorithm to the data characters to be encoded in order to produce the binary bit-string encoded on the magnetic stripe

Forward Read:
Reading the magnetic stripe starting at the end containing the Start Sentinel

Framing Characters:
The Start Sentinel, End Sentinel, and LRC Characters

ftpi:
Flux transitions (i.e., reversals) per inch

Full Duplex: :
Transmission with echo

Gamma Ferric Oxide:
A magnetic pigment (gFe203) commonly used in low coercivity magnetic stripes (285-390 oersteds). The prefix "gamma" (g) distinguishes the ferromagnetic form from the nonferromagnetic crystal structure which is usually referred to as alpha (a)

Gap Depth:
The dimension of the gap measured in the direction perpendicular to the surface of a head

Gap, Head:
The short section of non-magnetic material at the face of a read or encode head which is in contact with the magnetic stripe during reading or encoding; in practice, essentially the same as an air gap

Gap Length:
The dimension of the gap of a head measured from one pole face to the other. In longitudinal recording, the gap length can be defined as the dimension of the gap in the direction of stripe travel

Gap Width:
The dimension of the gap measured in the direction parallel to the head surface and pole faces. The gap width of the encode head governs the track width. The gap widths of read heads are made appreciably less than those of the encode heads to minimize tracking errors

Gauss:
The cgs unit of magnetic induction, = 1 maxwell/cm2

Gilbert:
The cgs unit of magnetomotive force

Gimbal:
The head mounting mechanism which permits the head to follow contours on the magnetic stripe without losing contact

Gloss:
Specular reflection of light from a surface

Government/Military Size:
An ID badge or card measuring 2.625" wide by 3.875" long

H:
Magnetizing force or field strength; the cgs unit is oersted

Hc:
Coercivity

Half-Duplex:
Transmission without echo.

Hard Magnetic Material:
Any material that exhibits ferromagnetic properties and that has a substantial remanence after exposure to a magnetizing force

Head Pressure:
The force per unit contact width with which the head is held in contact with the magnetic stripe

Head, Encode:
A device consisting of a solenoidal coil wrapped around a ring of magnetically conductive material which has a short section of non-magnetic material called a gap; the magnetic field produced at the gap is used to create flux reversals in a magnetic stripe

Head, Read:
A device similar to and acting in reciprocity to an encode head, such that movement of the head gap across the concentrated magnetic flux at a flux reversal induces a current in the head coil

Head-to-Stripe Contact:
The degree to which the surface of the magnetic coating approaches the surface of the head during normal operation of a read or write device. Good head-to-stripe contact minimizes separation loss and is essential in obtaining high resolution

High Coercivity:
Different people have different conceptions as to where the line is between "high" and "low" coercivity. The term should not be used in isolation but should be accompanied by a value in oersteds, or used in a context where the dividing line is clearly understood

High Energy:
A term coined when co-doped 650 oe. audio tapes were introduced as a cheaper alternative to chrome dioxide. The energy referred to improve output at high frequencies. High energy, when used in magnetic stripe parlance, does not imply more output. The term is now misused as a synonym for high coercivity and its use should be discouraged

Hot Stamping:
(a) A method of applying the magnetic stripe to a card; adhesive is applied to the magnetic material on a tape, and the magnetic material transferred from the tape to the card with a heated roller;
(b) similar to (a), except used to transfer ink or foil to cards for printed images

Hub:
The center cardboard or plastic part of a roll of tickets or magnetic stripe tape

Human Factors:
Generally, a read malfunction caused by operator error rather than media or equipment causes

Hysteresis:
The property of a material wherein its condition at any instant depends upon its preceding condition; the failure of the magnetism to retrace its path as the field H varies

Hysteresigraph:
A device used to plot the B-H hysteresis loop for a magnetic stripe or magnetic tape

Hysteresis Loop:
A curve showing the cyclic relationship between magnetizing force H and induction B in a magnetic material; also called the B-H curve

I/O:
Input/Output; the communications circuit of a device

IATA:
International Air Transport Association

IATA Track:
Used to refer to the ANSI/ISO Track #1 encoded at 210 BPI density in ALPHA format

ICMA:
International Card Manufacturers Association

ID Badge:
A magnetic stripe card used for identification, usually supplied unlaminated; the user's photo, name and data are inserted between the layers and then laminated into a solid card

IEC:
International Electromechanical Commission

Indent Print:
To embed letters and numbers on a PVC card by mechanical pressure, without embossing the other side

Indent Printing:
Initialization of a plastic card by displacing the plastic substrate material on one side with a male die, to form visible characters without disturbing the substrate on the opposite side. Unlike embossing, their images cannot be transferred to a paper form by imprinters

Individual Signal Amplitude:
The peak-to-peak amplitude of a signal read voltage signal

Inductance:
The inductance of a coil or solenoid is the rate of increase in magnetic flux linkage with increase of current in the coil, where linkage is the product of the flux through the coil by the number of turns; the cgs unit of inductance is the henry, equal to 108 maxwell-turns per ampere of current

Induction, Magnetic (B) :
The flux density entering a magnetic material; the cgs unit is gauss, equal to 1 maxwell/cm2

Induction, Residual (Br) :
The induction remaining in a magnetic material when the magnetizing force adequate to saturate the material is reduced to zero

Induction, Saturation (Bs) :
The induction at the largest magnetization possible in a magnetic material

Initialization:
(a) Encoding the timing track on a dual stripe card;
(b) Placing unique cardholder data on a card such as encoding the magnetic stripe, embossing, or printing on a card before issuing it to the cardholder;
(c) Same as (b) except it may be general data such as the initial prepaid amount value on a debit card

Intensity of Magnetization:
The number of "unit poles" per unit of area

Iron Oxide:
See Gamma Ferric Oxide

ISO:
International Standards Organization

ISO 31/V:
ISO Standard Specification for Quantities, Units and Symbols, Part 5. Electricity and Magnetism

ISO 7810:
Identification Cards - Physical Characteristics

ISO 7811-1:
Identification Cards - Recording Technique Part 1: Embossing

ISO 7811-2:
Identification Cards - Recording Technique Part 2: Magnetic Stripe

ISO 7811-3:
Identification Cards - Recording Technique Part 3: Location of Embossed Characters on ID-1 Cards

ISO 7811-4:
Identification Cards - Recording Technique Part 4: Location of Read-Only Magnetic Tracks - Tracks 1 and 2

ISO 7811-5:
Identification Cards - Recording Technique Part 5: Location of Read-Write Magnetic Track - Track 3

ISO 7811-6:
Identification Cards - Recording Technique Part 6: High Coercivity Magnetic Stripe

ISO 7812:
Identification Cards - Numbering System and Registration Procedure for Issuer Identifiers

ISO 7813:
Identification Cards - Financial Transaction Cards

ISO/IEC 10373:
Identification Cards - Test Methods

JIS:
Japanese Industrial Standard, published and translated into English by Japan Standards Association

Jitter:
The flux reversal spacing variation on a magnetic stripe, whether real or apparent; if the reversal is improperly placed on the stripe, it is called encoded jitter; jitter resulting from speed changes during the read is called acceleration jitter; jitter resulting from read circuit changes with amplitude or frequency is called phase jitter

Keepe:
A soft magnetic material temporarily added to a magnetic circuit to form a closed circuit

Knee Ratio:
A value calculated directly from BH curve (VSM) used by some media manufacturers to evaluate magnetic stripe performance = Hc X Br divided by the area under the BH curve in the upper left hand quadrant. Its maximum value of 1 represents ideal performance

Lamination:
(a) A method of applying magnetic stripe tape to a card; adhesive is applied to the film side of the tape, and the entire tape with magnetic material is bonded to the card;
(b) A method of fabricating cards, built up of several layers of material with thin sheets of adhesive in

between and bonded under heat and pressure;
(c) See Cold Peel

Laminator:
(a) A device with dual, heated, spring- loaded rollers through which an ID badge is processed to laminate the layers into a solid card;
(b) A flat platen press using controlled heat-pressure-cooling cycles to laminate multiple layers into a solid sheet

Lateral Direction:
Across the width of the stripe

Leading Zeros:
Clocking bits before the Start Sentinel

Lead Screw:
A device consisting of a threaded shaft and moving carrier (for head or card) such that the encode head moves equidistant intervals along the stripe for each complete rotation of the shaft

Lecithin:
A fatty acid ester, found in egg yolk and soy beans, used as a surfactant

Left Hand Reader:
(a) Swipe-Type: with the reader slot pointing away from you, the magnetic stripe is to your left as you push the card through the reader;
(b) Insert Type: with the reader slot horizontal and the magnetic stripe facing up, the stripe is on your left as you push the card into the reader. Most readers are left hand units. For right hand reader, the stripe is located to your right in the above definitions

Lepidocrocite:
An iron oxide mineral (Fe203.H20) used to make magnetic pigments

LGAI:
Laboratory General D'Assaigs Investigacions, Spain's National Test Laboratory

Linkage:
The product of the flux through a coil by the number of turns in the coil; the cgs unit is maxwell- turns

Line of Flux:
A term used to describe magnetic flux; 1 line of flux = 1 maxwell

Lithography:
A printing process using a metal plate on which the image area is ink-receptive and the blank area is ink-repellent

Longitudinal Direction:
Along the length of the stripe

Low Coercivity:
Usually refers to 300 oersted magnetic stripe initially used on ANSI/ISO Standard ID cards. However, usage of the term can be misleading, see High Coercivity

Low Energy Stripe:
This term should not be used, see High Energy. If in doubt as to what it means, question the user of the term

LRC Character:
Longitudinal Redundancy Check; an encoded bit-pattern following the End Sentinel in some encoding protocols to check for bit errors in the message, including the start/end sentinels, data, and field separators

Lug Pouch:
An unlaminated ID badge with a laminated strip (lug) along the hinge edge, into which a prepared ID card (or photo) is inserted and laminated

Magnet:
A piece of ferromagnetic material having a North Pole and South Pole, with magnetic flux emanating from the North Pole and terminating at the South Pole. The elemental magnet is called a bar magnet

Magnet Circuit (closed) :
A path of magnetic material without an air gap. If a magnetic conductor extends from one pole of a magnet, or solenoid, around to the other pole, and for the solenoid runs clear through it, the magnetic flux is largely concentrated in the conductor and is greater in total amount than if the flux were entirely in air; even a short air gap reduces the flux considerably

Magnetic Coating:
See Magnetic Stripe

Magnetic Conductor:
A soft ferromagnetic material, such as iron, which has high permeability, low coercivity, and high saturation induction

Magnetic Field:
A region in which magnetic lines of flux or force occur

Magnetic Field Strength (H) :
The magnitude of the force in free space that would be exerted on a unit magnetic pole; the cgs unit is oersted, equal to 1 maxwell/cm2

Magnetic Flux (F) :
The total quantity of lines of flux that exist in a given area; the cgs unit is maxwell

Magnetic Line of Force:
An imaginary line representing the points in a magnetic field that produce the same force on a unit magnetic pole; 1 line of force = 1 maxwell

Magnetic Pole:
A region where lines of magnetic flux originate (North) or terminate (South)

Magnetic Stripe:
A thin layer of material consisting of oriented ferromagnetic oxide particles, also called pigments, rigidly held together by a resin binder and bonded to a non-magnetic carrier medium such as paper or plastic

Magnetism:
That physical phenomenon in which a force is exerted at a distance on matter either from the movement of electrical charges in a conductor or from the presence of magnetic poles in a permanent magnet

Magnetite:
Lodestone; an iron oxide (Fe_3O_4) magnetic pigment with low coercivity (400-450 oersteds)

Magnetization:
The excess induction in a ferromagnetic material over that for free space; the cgs unit is gauss, equal to 4p poles/cm3

Magnetization Curve:
The portion of the first quadrant of a B-H hysteresis loop that shows the relationship between magnetizing force and induction for a magnetic material magnetized from an initially completely demagnetized state

Magnetizing Force (H) :
Same as magnetic field strength

Magnetomotive Force:
The work required to move a unit pole around a closed magnetic circuit; the magnetic force required to produce one maxwell of flux in a material of unit reluctance; the cgs unit is gilbert, equal to one erg per unit pole

Magneton:
A unit of magnetic value equal to 1126 ergs per gauss per gram-atom

Magnetostriction:
Change in dimension by certain materials when magnetized

Mark:
Telegraph parlance for a logic One

Maxwell:
The cgs unit of magnetic flux, the flux through a square centimeter normal to a field of one oersted in a vacuum

Media:
The magnetic stripe together with its substrate carrier, e.g., card, badge, ticket, etc

Metal Pigment:
Surface treated pure metal magnetic pigments with intermediate coercivities (1400 oersteds)

Microinch:
One millionth of an inch (.000001 inch)

Micron:
One millionth of a meter, equal to 40 microinches (.00004 inch)

Mil:
One thousandth of an inch (.001 inch)

mks:
A system of units in which the meter-kilogram- second are the units for the fundamental quantities length-mass-time

Modem:
Modulator-demodulator, a device which accepts data, modulates it, transmits it over a communication system (e.g., telephone), and performs the reverse when receiving data

Motorized Reader:
Any reader in which the relative motion between the magnetic stripe and the read head is produced by a motor rather than manually

N:
North pole of a magnet

NAK:
Negative acknowledgment, an ASCII control character advising error in the received signal and requesting a repeat transmission

NBS:
National Bureau of Standards (now called NIST)

Nibble:
Half a byte, i.e. 4 bits

NIST:
National Institute of Standards and Technology

NNI:
Netherlands Normalisatie - Instituut, Netherland's National Standards Organization

Nonmagnetic Material:
Any material that is unaffected by a magnetic field. For practical purposes, the permeability of such materials is substantially the same as that of a vacuum

North Pole (N) :
The portion of a magnetized object that, if free to move, will point toward the portion of the Earth geographically designated as North; lines of flux emanate from the North pole and enter the South pole

NRZ Effect (Non Return to Zero:
The characteristic of an encoded magnetic stripe, in which the read voltage (when read in the same direction as encoded) does not fully return to zero after a flux reversal peak voltage, but instead maintains a non-zero value of the same sign as the prior peak voltage. The NRZ Effect is due to the conjoint action of the encode head fringe field and the remanence tensor of the stripe

OEM:
Original Equipment Manufacturer

Oersted:
The cgs unit of magnetizing force, equal to one dyne per unit pole, or magnetic field strength, equal to the field at one centimeter from a unit pole

Off-line:
See On-Line

On-Line:
The magnetic stripe terminal (e.g. ATM, EFT, CAT, POS) is connected via a communications link to the central authorization/transaction computer during the transaction. If the terminal holds transaction data in local memory for later transmission to the central computer, it is said to be off-line

Open-Circuit Magnet:
Any magnetic circuit that is not fully continuous, i.e. that contains a nonmagnetic gap

Orientation:
The process by which particles are rotated so that their magnetic pole faces tend to lie in the same direction along the length of the stripe

Orientation Field:
the magnetic field applied to the magnetic stripe layer while still wet, to orient the magnetic particles longitudinally

Orientation Ratio:
The ratio of remanence in the longitudinal direction to the remanence in the transverse direction of a magnetic stripe

Output:
The magnitude of the read signal voltage, usually measured at the output of the read amplifier

Overlaminate:
See Overlay

Overlay:
A thin transparent layer laminated or coated on a magnetic stripe card to protect the printing ink from wear

Overwrite:
Re-encode; the data on the magnetic stripe is erased and new data is encoded

Oxide:
See Pigment, and Magnetic Stripe

Oxide Build-up:
The accumulation of oxide or, more generally, wear products in the form of deposits on the surface of the heads

Oxide Coating:
See Magnetic Stripe

Oxide Shed:
The loosening of particles of oxide from the stripe coating during use. The term is often used to denote the production of wear products in general

Oxide Thickness:
The thickness of the magnetic stripe material

PAN:
Primary Account Number

Paper Ticket:
Card or ticket with base material made from paper stock

Parity Check:
A self-checking code employing binary digits in which the total number of ones (or zeros) in each code expression is always even or always odd. A check may be made for even or odd parity as a means of detecting errors in the system

Parallel Interface:
Communication in which an 8-bit byte of data at a time is transmitted

Particle Shape:
Gamma ferric oxide particles are acicular needles with an average dimensional ratio of 6 to 1 and magnetic poles at the needle ends. Barium ferrite particles are irregular shaped, thin plates with their magnetic poles on the top and bottom of the plates

Permeability:
The ratio of the flux density in a material to the magnetizing force producing it, referenced to the value for a vacuum

Permeance:
A term describing the relative ease with which flux passes through a given material or space. The reciprocal of reluctance

Personalization:
See Initialization

Pigment:
The ferromagnetic particles in a magnetic stripe are usually called magnetic pigments since they are made in a fashion similar to pigments used in the paint and coloring industries; see Gamma Ferric Oxide, Barium Ferrite and Strontium Ferrite

PIN:
Personal Identification Number, a 3 to 6 digit number encrypted in the magnetic stripe encoding on a financial card, which the cardholder must enter on a keyboard before the card reader system will process the transaction; equivalent to an electronic signature

Polarity:
The direction of the magnetic field about a magnet, determined by the location of its North and South poles; every magnet has two equally stable polarities, obtained by interchanging its poles

Polyester:
A plastic material frequently used for ID badges, access control cards, and tickets; more expensive but stronger than PVC; cannot be embossed and requires higher laminating temperatures

POS:
Point of Sale. The term also refers to two types of terminals used in retail stores: (a) A terminal with magnetic stripe reader, keyboard, display and autodialer modem, connected to the telephone network and used for on-line credit/debit authorization; (b) A more complex terminal including the above features less modem, connected to a host computer, which handles all transaction processing including item price look-up, data collection, and credit/debit authorization

POT:
Point of Transaction; see POS

Pouch:
The unlaminated outer layer of an ID Badge, usually polyester, between which the paper core is placed for lamination

Pre-Paid Card:
A card with value encoded on the magnetic stripe, which is re-encoded with a lower value at each use

Precursor Effect:
The characteristic of an encoded magnetic stripe in which the read voltage exhibits a secondary peak (of the same sign as the prior flux reversal peak voltage) immediately before the voltage reversal for the subsequent peak. The Precursor Effect is due to the conjoint action of the encode head fringe field and the remanence tensor of the stripe

Print-through:
The phenomenon in magnetic recording tape where a strongly magnetized layer changes the magnetization of an adjacent layer in the reel of tape; not a problem in magnetic stripe technology

Profile:
The deviation of the magnetic stripe surface from flatness; a positive profile is convex, and a negative profile is concave

Protocol:
A set of definitive directions that must be followed if the result is to be acceptable for a given purpose

PTB:
Physikalisch-Technische Bundesanstalt, the German standards laboratory

PVC:
Polyvinylchloride, the plastic most commonly used for credit/debit cards; less expensive but shorter life than polyester; can be embossed and requires lower laminating temperatures

Quality:
The degree to which a product meets the specifications

Reader:
The electromechanical device used to extract data from a previously encoded magnetic stripe

Reading:
The process of detecting the flux reversals as one moves along the length of a previously encoded magnetic stripe

Real-time:
Data is outputted as it is being read from the magnetic stripe, i.e. at a varying rate with manual readers; opposite of buffered

Reciprocity, Electromagnetic:
Electric current moving through a conductor produces a magnetic field about the conductor; reciprocally, a conductor moving through a magnetic field will have a current induced in it

Reference Card:
An international standard magnetic stripe card designed as RM7811/2, supplied and certified by PTB, with the stripe made from certified SRM 3200 tape

Reference Tape:
A tape used as a reference against which the performances of other tapes are compared. The use of a reference tape is necessary in specifying most performance characteristics because of the difficulty of expressing these characteristics in absolute terms

Reference Signal Amplitude:
The maximum average read signal amplitude of the PTB standard Reference Card corrected to the NIST master standard tape

Reformatting:
The process of applying an inverse format algorithm to the binary bit-string resulting from a magnetic stripe read in order to extract the encoded data characters

Reliability:
The degree to which a product maintains specified quality under operating conditions

Reluctance:
The relative resistance of a material or space to the passage of flux. The reciprocal of permeance

Reluctivity:
The reciprocal of permeability

Remanence:
The magnetic flux density that remains in a magnetic circuit after removal of applied magnetomotive force

Remanence Tensor:
The property of a magnetic stripe, resulting from the Effective Coercivities of individual magnetic particles and the way in which they are laid down, which determines the remanence vector resulting from an encoding process

Remanence Vector:
The direction and magnitude of the magnetic dipole at a point in an encoded magnetic stripe

Resolution:
(a) The degree to which the distance between differing states of magnetization recorded along a stripe can be reduced and these states still be usefully distinguished on reading;
(b) ratio of the output signal amplitude at the 500 flux transitions per inch (FTPI) to the output signal amplitude at 200 FTPI

Retentivity (Br /Bs) :
The ratio of the residual induction to the saturation induction of a magnetic material; also called Squareness Ratio

Reverse Read:
Reading the magnetic stripe starting at the end containing the End Sentinel

Right Hand Reader:
See Left Hand Reader

RM:
Reference Material, the German PTB analog of the NIST SRM

Roll-On Stripe:
See Hot Stamping

RS-232-C:
An EIA Recommended Standard interface defining data and control circuits, for use between data terminal equipment (i.e., computers) and data communication equipment (i.e., modems) using serial binary data interchange; a subset of the standard is widely used for communication between any two types of data processing equipment

RS-422-A:
An EIA Recommended Standard for differential interface communications

RS-449:
An EIA Recommended Standard interface, essentially an expansion of the RS-232-C interface with additional control circuits

RS-485:
An EIA Recommended Standard for data communications using a 32-station multi-drop, addressable network

S:
South pole of magnet

Saturation:
A condition where all the available elementary magnetic domains in a ferromagnetic material are aligned in substantially the same direction

SCIA:
Smart Card Industrial Association

Screen (Silk Screen) :
A stencil printing process using a silk, organdy, plastic or steel screen with pervious printing areas and impervious nonprinting areas

Self-clocking:
That property of biphase which permits encoded magnetic stripes to be read at different speeds; the Ones frequency is always twice the Zeros frequency, and the read circuit need only sync on a string of known Zeros to begin reading at any speed

Serial Interface:
Communication in which a single data bit at a time is transmitted

Separation Loss:
See Spacing Loss

Separator:
See Field Separator

SFD (Switching Field Distribution) :
A measure of the spread of individual particle coercivities determined by differentiating the B-H hysteresis loop. A figure of 0.2 implies a gaussian distribution of 20% of particles below and 20% above the nominal quoted coercivity. SFD is zero for completely uniform particles

Shaft Encoder:
A device with a wheel in continuous contact with a magnetic stripe such that a pulse is generated by the device at equidistant intervals of stripe movement

Shield:
A soft magnetic material used to prevent the passage of magnetic flux between regions

Shunt:
A soft magnetic material used to by-pass, divert, or redirect the magnetic flux from the air gap of a magnet

SI:
Système International d'Unités, a system of units based on meter-kilogram-second (mks) and the Ampere-Turn, i.e. mks-A

Skimming:
To copy the magnetic stripe encoding from one card to the stripe on another card; also called bit-copying

Slot Reader:
See Swipe Reader

Slurry:
The mixture of magnetic particles dispersed in a liquid to facilitate deposition and orientation on a substrate such as tape, card, or ticket

Solenoid:
An electrical conductor wound into a cylindrical coil; when electric current flows through the coil, the magnetic field about the solenoid is similar to that about a bar magnet

Soft Magnetic Material:
Any material exhibiting ferromagnetic properties but having a remanence that is substantially zero after exposure to a magnetizing force

South Pole (S) :
The portion of a magnetized object that, if free to move, will point toward the portion of the Earth geographically designated as South; lines of flux emanate from the North pole and enter the South pole

Space:
Telegraph parlance for a logic Zero

Spacing Loss:
The loss in output that occurs when the surface of the coating fails to make perfect contact with the surfaces of either the write or read head; the read signal decreases exponentially with distance between gap and stripe

Spatial Decoding:
A proprietary decoding technique using a dual gap read head, with the gaps spaced for a specific encoding density, such that the sequence of flux reversals detected at the two gaps determines whether the current encoded bit-cell represents a 0-bit or a 1-bit

Specific Magnetization:
The magnetization per unit mass of a material; the cgs unit is poles/gram (or emu/gm)

Spiking:
A high spot at the edge of a magnetic stripe caused by material "squirt-out" in hot stamping

Squareness Ratio:
Same as retentivity

SRM 3200:
Standard Reference Material Number 3200, a secondary standard magnetic tape supplied by the National Bureau of Standards (now National Institute for Standards and Technology) and certified for signal amplitude output

Standards:
Usually refers to the ANSI/ISO Standards for financial cards, which apply to the magnetic stripe media only, and not to encoding and reading equipment

Start Sentinel:
A defined bit-pattern in an encoding format, which cannot be an all-Zeros pattern, and which is encoded on the magnetic stripe immediately preceding the first data character bit-pattern

Strobe:
See Bit & Strobe

Strontium Ferrite:
A magnetic pigment, SrFe, commonly used in high coercivity magnetic stripes. (700-4000 oersteds)

Subinterval:
The bit cell divided by two.

Substrate:
The material on which the magnetic stripe is deposited

Surface Asperities:
Small, projecting imperfections on the surface of the coating that limit and cause variations in head-to-stripe contact

Surface Profile:
The average deviation of the magnetic stripe surface from a straight line, measured in micro-inches per tenth of an inch of width

Surface Roughness:
The average surface irregularity of the magnetic stripe in both the longitudinal and transverse directions, measured in micro-inches

Surfactant:
Surface active agent; a substance which alters interfacial tension, e.g., wetting agent, dispersing agent, used in magnetic stripe slurries

Susceptibility:
The ratio of the intensity of magnetization to the magnetizing force, referenced to the value for a vacuum

Swipe Reader:
A manually operated reader with a long narrow channel (slot) through which the magnetic stripe edge of the card is pushed

T&A:
Time and Attendance systems or applications

Tape Transfer Process:
The magnetic stripe material on a tape specifically made for the purpose is transferred from the tape to a card or substrate by laminating, hot stamping, or cold peeling methods

Telescoping:
The deviation from flat of a roll of tickets or magnetic tape, where the center hub is displaced from the roll

Tesla:
The SI unit of magnetic flux density, equal to 104 gauss

Thermal Ticket:
Card or ticket with one or both sides coated with a thermal sensitive coating

Thermal Transfer:
See Hot Stamping

THRIFT:
Thrift Industry (Savings and Loans, Credit Unions, etc.)

THRIFT Track:
Used to refer to the ANSI/ISO Track #3 encoded at 210 BPI density in BCD format

Tilt:
See Zenith Error

Timing Mark/Hole:
A mark or hole on the ticket which is sensed by a detector. Used to detect the position of a card in a printer or encoder (usually before cutting ticket)

Timing Track:
A pattern of flux reversals encoded on a magnetic stripe track other than the data track, used to generate the required pulses during encoding of the data track

Top-of-Form Mark:
A mark used to detect the top of a card or ticket (usually for printing or for cutting)

Track:
A strip of specified width and location running the length of the magnetic stripe on which data is encoded. ANSI/ISO standards define three track locations for the magnetic stripe on credit/financial cards, called Track 1, 2 and 3; the tracks are 0.110" wide, with Track 1 closest to the card edge

Track Spacing:
The distance between the center lines of adjacent tracks

Trailing Zeros:
Clocking bits following the End Sentinel-LRC

Triplex:
A material comprising a sandwich of paper- plastic-paper

Triplex Ticket:
Card or ticket with a base material made from Triplex stock

TTL:
Transistor-transistor-logic; logic Zero = <0.8VDC, logic One = >2.4VDC, and will source 1.6 mA

Unit Poles:
A fictitious concept used to assign values to the intensity of force exerted between two magnetic bodies in free space and divorced of any association with a pole of opposite polarity in the same body; the cgs unit pole (emu) is the quantity of magnetism wherein two such poles separated by one centimeter repel each other with a force of one dyne. The mks-A and SI system of units replace this concept with current flowing in a coil, i.e. Ampere-Turns

USNC:
U.S. National Committee for IEC

Viscosity:
A liquid's resistance to flow resulting from the combined effects of adhesion and cohesion

Vibrating-Sample Magnetometer, VSM:
A device for determining the magnetic properties of a sample of magnetic material by vibrating it in a

magnetic field and measuring the emf induced in search coils located close to the sample. The VSM is particularly useful in determining the specific magnetic moment of oxides and the oxide loading of high coercivity stripes, since it can be designed to provide much higher magnetizing field strengths (10,000 oersted or more) than can be conveniently obtained in a B-H meter

Wear:
Mechanical alteration of the magnetic stripe and of the read/encode head resulting from the motion of the head along the stripe

Wearability:
The degree to which a product maintains reliability for a rated life

Web:
A continuous roll of paper or plastic being manufactured, printed, or processed in a machine

Weber:
The SI unit of total flux, equal to 108 maxwell

Wet Coating:
A method of applying the magnetic stripe slurry directly to the finished card, either by printing or extruding

Write:
Same as encoding

Zenith Error:
Tilting of Head. The change in perpendicularity of the head relative to the plane of the magnetic stripe