

MODEL MT-85

LOW COERCIVITY ENCODER/READER

TECHNICAL REFERENCE MANUAL

Manual Part Number 99875107 Rev 5

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MAGTEK[®]

REGISTERED TO ISO 9001:2000

1710 Apollo Court
Seal Beach, CA 90740
Phone: (562) 546-6400
FAX: (562) 546-6301
Technical Support: (651) 415-6800
www.magtek.com

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REVISIONS

Rev Number	Date	Notes
1	23 Jul 98	Initial Release
2	7 May 99	Sec 1: Under Requirements added new P/N for Track 2 only, Under Options Added MTD and Web site; Sec 2: Changed RTS to CTS, changed baud rate to 4800. Sec 3: Reformatted section for clarity and added BCC notes.
3	31 Jul 01	Front Matter, Agency Approvals: Added CE Class A approval, added UL and CUL listed.
4	13 May 03	Front Matter: added ISO line to logo, changed Tech Support phone number, added new warranty statement.
5	6 Nov 03	Sec 1, Optional, Updated configurations. Modified Table 3-1 note, Modified D command request.

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FCC WARNING STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference. And (2) This device must accept any interference received, including interference that may cause undesired operation.

CANADIAN DOC STATEMENT

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

CE STANDARDS

Testing for compliance to CE and FCC requirements was performed by an independent laboratory. The unit under test was found compliant to Class A.

UL/CSA

This product is listed per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

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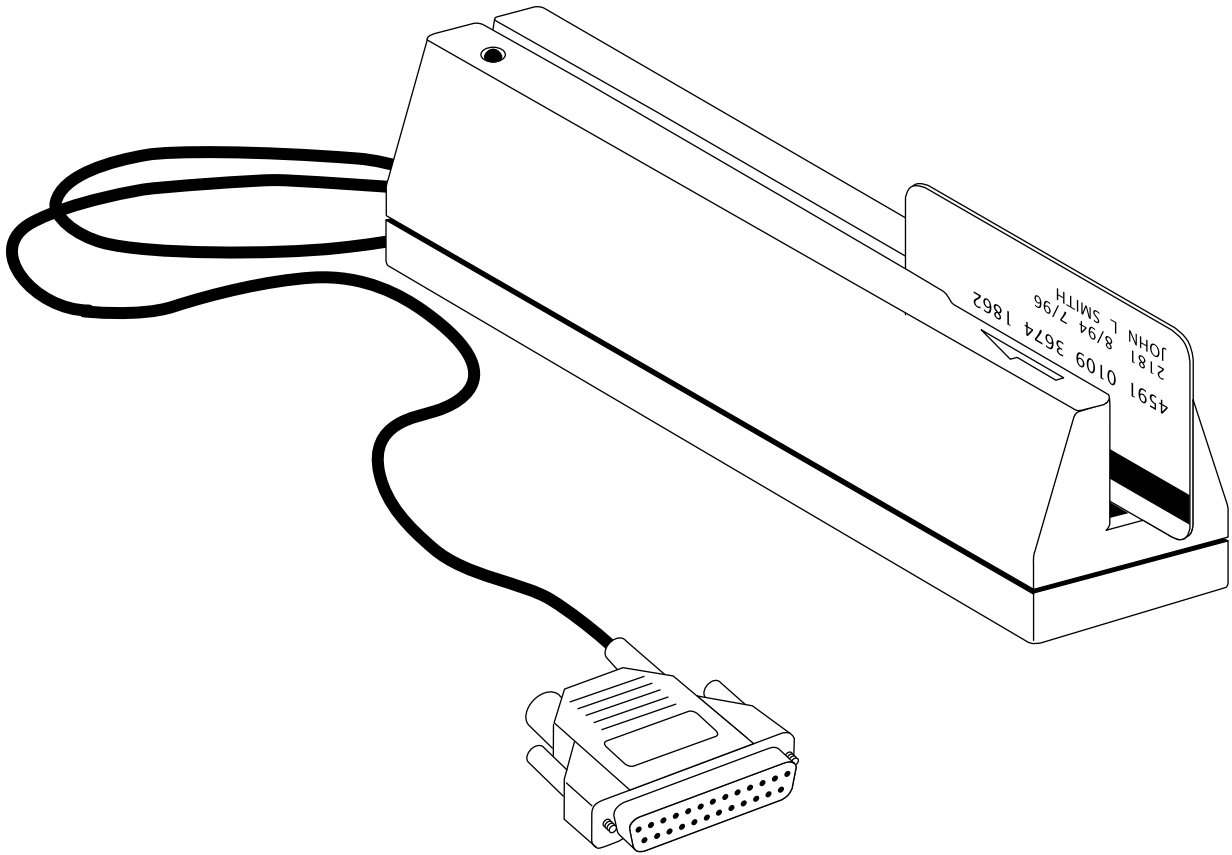


Figure 1-1. MT-85 Encoder/Reader

SECTION 1. FEATURES AND SPECIFICATIONS

The Model MT-85 Low Coercivity Encoder/Reader reads and encodes magnetic stripe cards that comply with ANSI/ISO standards. The Encoder/Reader is compatible with PC computers or any computer with an RS-232 interface serial port. The MT-85 encodes at low coercivity (LoCo), which is the energy level of 300 Oersteds.

FEATURES

- Reads and encodes magnetic stripes per ANSI/ISO standards
- Capable of reading and encoding media per ANSI/ISO specifications such as tickets, cards, badges, and passbooks
- Programmable baud rate, parity, and block check character (BCC)

REQUIREMENTS

- MT-85 Encoder
 - P/N 15033001, Tracks 1,2,3
 - P/N 15033002, Track 2 only
- 120 VAC power supply to 12V DC 500mA (P/N 64300072)
or
- 230 VAC power supply to 12V DC 500mA (P/N 64300073)

OPTIONAL

- Encoder/Reader Demo Program - Windows 95 or Windows NT.
 - 3.5" disks, P/N 30037389
 - From Web site, Encoder/Reader Demo (P/N 99510004)
- MTD (MagTek Device Drivers for Windows)
 - CD (P/N 30037385)
 - From Web site, MTD Drivers (P/N 99510013)
- Adapter, 9- to 25-pin, P/N 78200017

SPECIFICATIONS

The specifications are listed in Table 1-1.

Table 1-1. Specifications

Reference Standards	ANSI/ISO
Dimensions	
Length	8.63" (219.07mm)
Width	2.25" (57.15mm)
Height	2.37" (60.32mm)
Weight	1 Lb. (0.45 kg)
Cable Length	5' (1.5 Meter)
Encoding Energy	LoCo - 300 oersted
Power Supply	DC 12V 500mA
Power Consumption	400mA maximum at 12VDC
Recording Density	ISO standard
	210 BPI for Track 1
	75 BPI for Track 2
	210 BPI for Track 3
Speed	3 to 35 inches per second
Interface	RS232
Operating Temperature	41 ⁰ to 122 ⁰ F (5 ⁰ to 50 ⁰ C)
Storage Temperature	32 ⁰ to 131 ⁰ F (0 ⁰ to 55 ⁰ C)
Operating Humidity	15% to 90% (Noncondensing)
Storage Humidity	10% to 100% (Noncondensing)

The dimensions of the Encoder are shown in Figure 1-2.

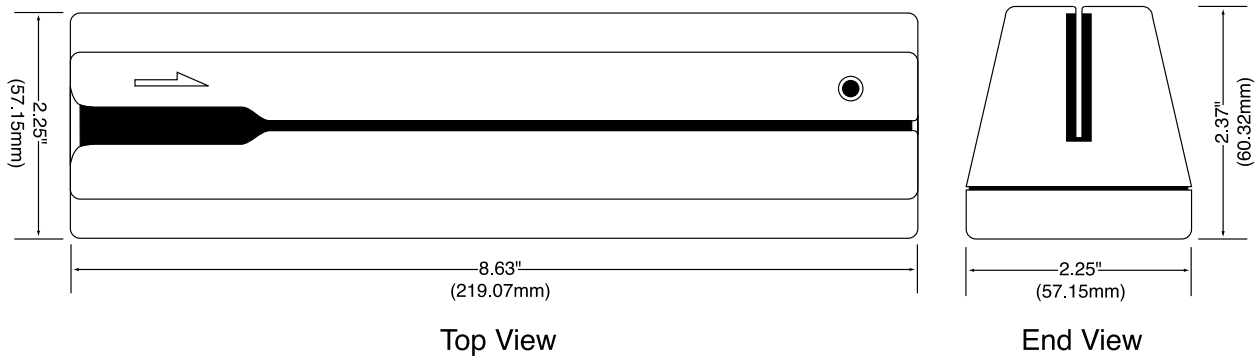


Figure 1-2. Dimensions

The orientation of the Encoder, the power supply, and the adapter are shown in Figure 1-3.

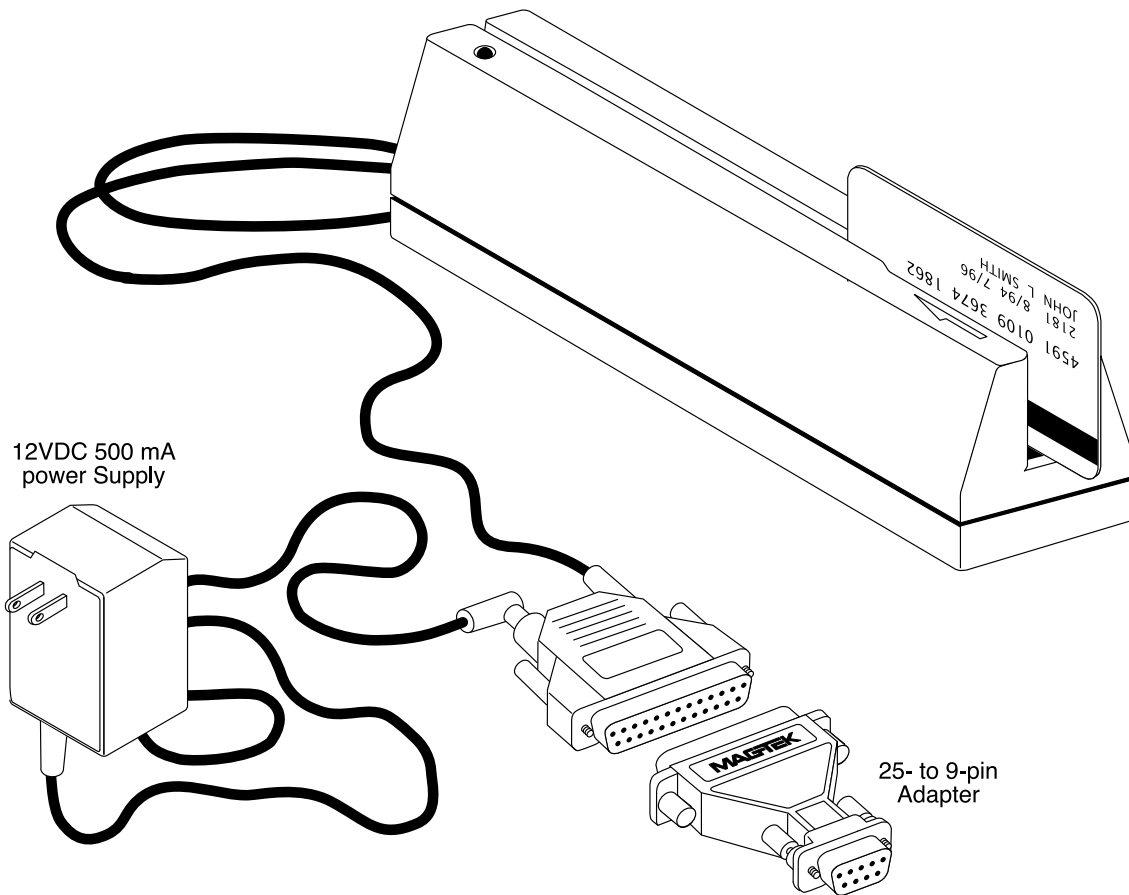


Figure 1-3. MT-85 Orientation, Connections, and Parts.

SECTION 2. INSTALLATION

The installation of the MT-85 consists of installing the hardware and application software. Install the MT-85 as described below.

HARDWARE

Follow these steps:

1. If the PC serial port has a 25-pin connector, plug the 25-pin connector from the MT-85 into the PC serial port. Plug the power supply, 12VDC @ 500mA, into the MT-85 cable and into wall power.

If the PC has a 9-pin connector, use a 9-pin to 25-pin adapter (part number 78200017) for the connection between the MT-85 cable and the PC.

2. If a software program is not activated, the red LED will go ON and remain on until the software is activated.

Note

The CTS must be active for the MT-85 to operate. When CTS is active, the LED will be green.

3. Activate the software program; the MT-85 Demo program is described below as an example.
4. When the program is opened, the red LED will change to green. Swipe a LoCo card. The unit will beep, and the green LED will turn OFF momentarily then ON. The mag-stripe information from the card will be transmitted to the PC.
5. If using the Encoder/Reader Demo software, change the encode data. Then click on the button that indicates the data is to be encoded. When the unit has received a properly formatted encode message, the audio alarm will beep and the LED will flash yellow.
6. Swipe the same card previously used to read the data. If the encode is successful, the audio alarm will beep once, the card information will be sent to the PC, and the LED will turn green. If the encode is unsuccessful, the audio alarm will beep three times, the unit will send a NAK message, and the red LED will go OFF momentarily then turn green.

Note

The LED will flash yellow for about 30 seconds. If a card is not swiped within that period, the Encode will time out, transmit a "T" error message, and return to read mode.

COMMUNICATION SETUP

The default settings for communication are as follows:

Function	Setting
Baud Rate	4800
Parity	Odd
Data Bits	7
Stop Bits	1
BCC	No

PIN LISTS

The pin list for the 25-pin connector (from the MT-85 to the PC) is shown in Table 2-1. The pin list for the power jack on the 25-pin connector is shown in Table 2-2.

Table 2-1. MT-85 Cable 25-pin connector

Pin	Signal at MT-85
2	RXD (input)
3	TXD (output)
4	CTS (input)
5	RTS (output)
7	GND
6	-
8	-
20	-

Table 2-2. DC power jack on 25-pin connector

Pin	Signal
Center	+12VDC
Outer	GND

SECTION 3. OPERATION

This section contains Transmit Character Format, LED and Audio Indicators, Encoded Message Format, an Encode Example, Transmitted Data and Character Formats, and MT-85 Commands.

TRANSMIT CHARACTER FORMAT

Each ASCII character is transmitted with 1 start bit, 7 data bits, 1 parity bit, and 1 stop bit. The parity setting can be defined with the "S" command. To generate application software for the MT-85, use standard RS-232 communication protocol.

Before reading or encoding a card, the application software should have the computer activate the CTS of the MT-85 and receive the activation of the RTS of the MT-85.

For reading a card, the MT-85 will send all track data to the computer if the read is good. If any track contains a read error, the Start Sentinel (% , ; or +) for that track will be followed by an "E" and terminated with ES (?). Any good tracks will be transmitted.

For encoding a card, the MT-85 will send the same data back to the computer as the data loaded to the MT-85 when a good encode is completed. The MT-85 will send a NAK message (<STX><NAK><ETX>) to the computer if a read-after-write error is detected.

LED AND AUDIO INDICATORS

There is a three-color LED indicator on the panel for status. There is also an audio alarm in the form of beeps.

Red LED

The red color indicates that the power is ON, but the CTS has not been activated.

Green LED

The green color lights when the unit is at read mode and the unit is ready to read a magnetic stripe card.

Yellow LED

The yellow color blinks when the unit is in write mode and is prepared to encode a card. If the card is not encoded within approximately 30 seconds, the unit will time out and the green color will appear.

Audio Alarm

The audio alarm beeps once when a card is read or encoded successfully. The alarm beeps three times for a read or encode error. The alarm also beeps when a message is transmitted to the unit; one beep for a good receipt of the message, three for an error in receipt of the message. The unit beeps three times for a time-out error that occurs if a card is not swiped within 30 seconds.

ENCODE MESSAGE FORMAT

The format of the encoded data for three tracks is as follows:

<STX> <SS> track data 1 <ES> <SS> track data 2 <ES> <SS> track data 3 <ES> <ETX>

where: <STX> is the Start of Text character (0x02, or control B on the keyboard). This character prepares the Encoder to receive a message.

 <SS> is the Start Sentinel for each track to be encoded. Each track of card data must start with its identifying Start Sentinel and end with an End Sentinel (which is always a question mark (?)). You may encode any combination of the three tracks, but they must be sent in 1, 2, 3, order. The Start Sentinels are as follows:

<u>Track</u>	<u>SS</u>	<u>Symbol</u>	<u>Format</u>
1	%	percent sign	7-bit format
2	;	semicolon	5-bit format
3	+	plus sign	5-bit format

track data is the actual data to be encoded on each track. These must be legal characters for that track. That is, you cannot encode letters on Tracks 2 and 3 in 5-bit format, so these should not be sent. (See Appendix A.)

<ES> is the End Sentinel for each track encoded. The End Sentinel is a question mark (?) for all three tracks. This must end each set of track data.

<ETX> is the End of Text character (0x03, or control C on the keyboard). When this character is received by the encoder, it will switch to the encode mode until either a successful encode or an abort command is received.

ENCODE EXAMPLE

To encode “ABCDEFGH” on Track 1 and “123456789=112233” on Track 2 and keep Track 3 the same, the data to the encoder is as follows:

Request:

`<STX>%ABCDEFGH?;123456789=112233?<ETX>{BCC}`

The STX character shows on the computer’s screen as a happy face (on some systems it might appear as \$02). The ETX character shows on the computer’s screen as a heart (on some systems it might appear as \$03). It is not necessary to send a carriage return after the ETX. With this command, Tracks 1 and 2 will be encoded. Track 3 will be left as it is. The {BCC} is required only if that option is enabled.

Response:

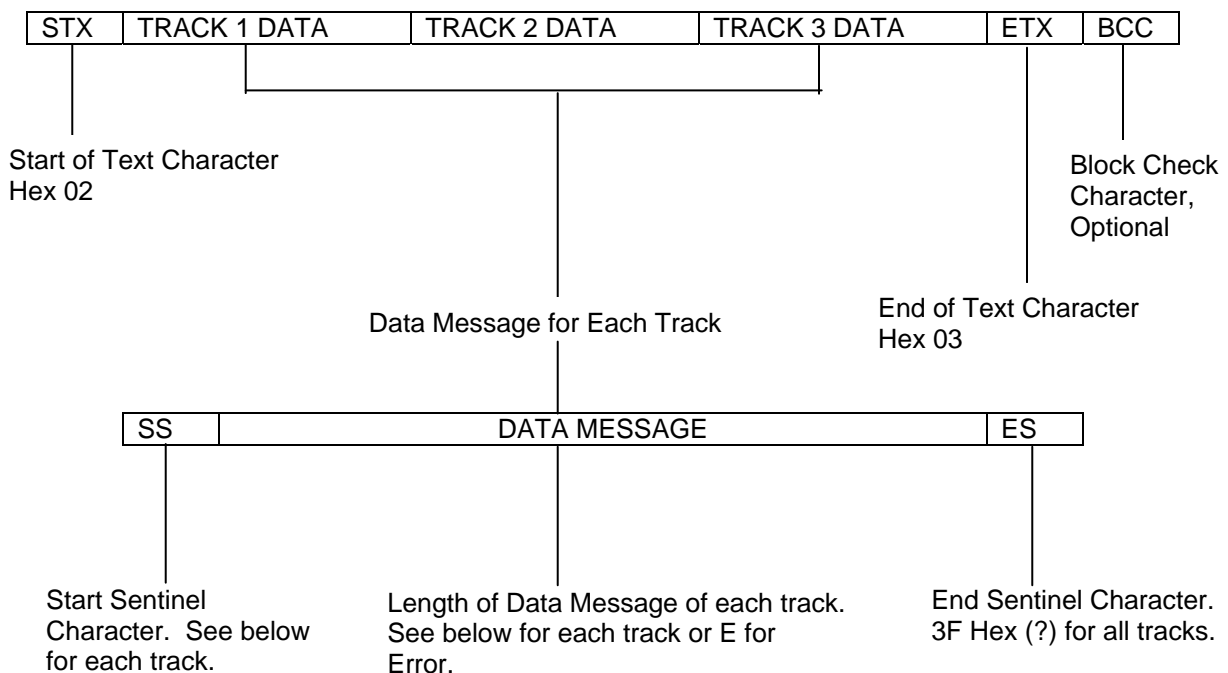
After a good encode, the MT-85 will return the data that was read from the tracks being encoded:

`<STX>%ABCDEFGH?;123456789=112233?<ETX>{BCC}`

If there is an error in any of the encoded tracks, a NAK message will be sent:

`<STX><NAK><ETX>{BCC}`

TRANSMITTED AND RECEIVED DATA FORMATS



MT-85 RS-232 Reader/Encoder

Notes:

1. The three tracks of data must be entered in order; for example, enter Track 1 first, followed by track 2, then track 3.
2. The maximum length of the data message of each track and the SS of each track are as follows:
Track 1: 76 characters; Start Sentinel is % (25 Hex).
Track 2: 37 characters; Start Sentinel is ; (3B Hex).
Track 3: 104 characters; Start Sentinel is + (2B Hex).
3. The optional Block Check Character (BCC) is appended to the message. It is generated by exclusive ORing (XOR) each transmitted character including ETX, but excluding STX.
4. The End Sentinel character (ES) is 3F Hex (?) for all tracks.
5. If a card is not swiped within the 30-second timeout, the unit will terminate the encode operation and send a "T" response:

<STX>T<ETX>{BCC}

MT-85 COMMANDS

The MT-85 commands are Setup (S), Dump (D), Version (V), and Cancel an Encode operation (Q).

Setup (S)

[Y] is bitmapped as shown in Table 3-1 in both the "S" and "D" commands:

Table 3-1. Communication Setup

Bit value in [Y]								Field
P	6	5	4	3	2	1	0	
.	0	0	Baud Rate: 1200
.	0	1	2400
.	1	0	4800
.	1	1	9600
.	.	.	.	0	0	.	.	Parity: Odd
.	.	.	.	0	1	.	.	Even
.	.	.	.	1	0	.	.	Mark
.	.	.	.	1	1	.	.	Space
.	.	.	0	.	.	.	.	BCC: Don't Use
.	.	.	1	.	.	.	.	Use
	0	0						Always zero
x								Parity Bit

x =the parity bit (not included in the byte)

Note

On all requests and responses, {BCC} is present only if enabled.

The “S” command will set MT-85 communication parameters.

Request:

1	2	3	4	5	6
<STX>	<ESC>	S	[Y]	<ETX>	*

*BCC is ignored in this command, even if enabled.

Response:

1	2	3	4	5	6
<STX>	<ESC>	S	[Y]	<ETX>	{BCC}

[Y] is defined in Table 3-1, above.

Dump (D)

The "D" command will dump its internal configuration.

Request:

1	2	3	4	5
<STX>	<ESC>	D	<ETX>	*

*BCC is ignored in this command, even if enabled.

Response:

1	2	3	4	5	6	7	8-63	64	65
<STX>	<ESC>	44H	x	x	x	[Y]	Not used - Reserved for future use.	<ETX>	{BCC} (opt)

Locations 4-6 indicate which tracks are enabled. Enabled tracks contain the value 44H; disabled tracks are 00Hex; location 4 is Track 1, location 5 is Track 2, and location 6 is Track 3. The communication byte [Y] in location 7 is defined in Table 3-1, above.

Version Request (V)

The "V" command requests the firmware part number and version.

Request:

1	2	3	4	5
<STX>	<ESC>	V	<ETX>	*

*BCC is ignored in this command, even if enabled.

Returns the MT-85's firmware version.

Response:

1	2	3 - 10	11 -13	14	15
<STX>	V	[Part Num]	[Revision]	<ETX>	{BCC}

[Part Num] is 8 decimal digits. [Revision] is a single letter (the major revision) followed by two decimal digits (the minor revision). For Example: <STX>V15033401F01<ETX>{BCC}

Cancel Encode (Q)

The "Q" command can be used to cancel an encode request before the 30-second timeout.

1	2	3	4	5
<STX>	<ESC>	Q	<ETX>	*

*BCC is ignored in this command, even if enabled.

There is no response to the "Q" command if an encode operation is in process, but the LED will change from yellow to green. If encode was not enabled, the "Q" command returns a NAK message.

APPENDIX A. CHARACTER SETS

Table A-1. Track 1, 7-Bit Character Set

Character	Hex	Character	Hex	Character	Hex	Character	Hex
Space	20	0	30	@ at sign	40	P	50
! exclamation mark	21	1	31	A	41	Q	51
" double quote	22	2	32	B	42	R	52
# pound sign	23	3	33	C	43	S	53
\$ dollar sign	24	4	34	D	44	T	54
% (ss) per cent sign	25	5	35	E	45	U	55
& ampersand	26	6	36	F	46	V	56
' apostrophe	27	7	37	G	47	W	57
(left paren	28	8	38	H	48	X	58
) right paren	29	9	39	I	49	Y	59
* asterisk	2a	: colon	3a	J	4a	Z	5a
+ plus sign	2b	; semi-colon	3b	K	4b	[left square bracket	5b
, comma	2c	< left bracket	3c	L	4c	\ back slash	5c
- hyphen	2d	= equal sign	3d	M	4d	] right square bracket	5d
. period	2e	> right bracket	3e	N	4e	^ (fs) carat	5e
/ forward slash	2f	? (es) question mark	3f	O	4f	_ underline	5f

Track A-2. Track 2/3 5-Bit Character Set

Character	Hex	Character	Hex	Character	Hex	Character	Hex
0	30	4	34	8	38	< left bracket	3c
1	31	5	35	9	39	= (fs) equal sign	3d
2	32	6	36	: colon	3a	> right bracket	3e
3	33	7	37	; semi-colon	3b	? (es) question mark	3f

