SPECIFICATION for
MAGNETIC CARD READER
BUILT IN RS232

Model #
ZU-1870MA8R2

Revision 1.00

JUL 2004

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REVISIONS

<table>
<thead>
<tr>
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<th>Date</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>1 JUL 2004</td>
<td>Initial Release</td>
<td>All</td>
</tr>
</tbody>
</table>

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In case there is any contradiction appeared based on technical standard change/update etc., our specifications shall take precedence over such change/update.
PRECAUTIONS

READ THIS SECTION CAREFULLY BEFORE INSTALLING OR USEING THIS READER MODULE.

- Usage

Avoid Extreme Heat and Cold
Do not store or use the reader module in locations exposed to heat, direct sunlight, or extreme cold. Avoid moving the device with which it was incorporated between locations with large temperature differences. If the moisture condensation should occur, do not use the device.
Operation: -10 °C to +50 °C
Storage: -20 °C to +60 °C

Avoid Humidity, Liquids and Dust
Do not store or use the reader module in locations exposed to high humidity, liquids (include rain) or dust. If used in dusty conditions, the magnetic head life will be shortened.

Avoid Corrosive Gases
Keep the reader module away from oil or corrosive gases (salt, brimstone, chlorine, acid, alkali, etc.).

Avoid Radio Frequency Interference
Do not use the reader module near a television or radio receiver.

Avoid Magnetic Fields
Keep the reader module away from magnets and magnetic field sources, such as high voltage, strong electrical current, magnetic security devices or industrial equipment (speakers, microwave ovens and CRT display, etc.).

Avoid Locations Near Electrical Appliances or Other Devices that Emit Electrical Noise
Keep the reader module away from electrical noise sources, such as electric motors, printer, or computer equipment.

Keep Clean the Magnetic Head
Dirt, metal dust and magnetic particles etc. may cause read error. You need to clean the magnetic head using the cleaning cards. Cleaning is recommended every week or when read problems occur.

Do Not Apply More than the Specified Voltages
Do not apply any reverse voltage.
Voltage: DC +4.75 V to +12 V

Do Not Use a Cracked or Deformed Card
Store the card with caution to prevent dirt, scratch and distortion. No foreign matter should be stuck on the magnetic stripe surface. Use of such card may result in a read error.
• **Handling**

**Do Not Disassemble the reader module**
Do not attempt to disassemble, or modify it.

**Do Not Touch the Printed Circuits, Connector Pins or Components**
Before handling the reader module, discharge the static electricity from your body by wearing on the ESD protection such as a grounded wrist strap.
Always handle it by the frame.

**Avoid Dropping, Bumping or Strong Impact**
Avoid subjecting the reader module to severe vibrations or impact.

**Do Not Connect or Disconnect Any Cables while the Power supply is turned On**

• **Others**

**Use Specified Cards**
Be sure to use a card, which conforms to ISO standard. Anti-magnetic of the applied card should be $2.4 \times 10^4$ A/m to $2.4 \times 10^5$ A/m of ISO standard.
Use a card which is encoded the magnetic strip on the front or back of the card. Do not support to read a card which is encoded on both side of the front and back of the card.
Card operation speed should be within the specification range. Forced stop or change of speed during the card operation may cause a read error. Appropriate speed to maintain stable operation is 30 cm/s to 60 cm/s.

**Be Careful when Handling and Storage the Cards**
Do not bend or twist the cards.
Do not attach oil, fats or any greasy substance on the cards.
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1. INTRODUCTION
This specification describes Panasonic’s manual insertion type Magnetic Card Reader (UCI-MAG) with built in RS232 interface and decoder.

1.1. RELATED DOCUMENTS

<table>
<thead>
<tr>
<th>ISO/IEC 7810:2003</th>
<th>Identification cards – Physical characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO/IEC 7811-4:1985</td>
<td>Identification cards – Recording technique – Part 4: Location of read-only magnetic tracks – Tracks 1 and 2</td>
</tr>
<tr>
<td>ISO/IEC 7811-5:1985</td>
<td>Identification cards – Recording technique – Part 5: Location of read-write magnetic track – Track 3</td>
</tr>
</tbody>
</table>

1.2. DEFINITIONS
The glossaries to be used in this document are defined as follows (by alphabetically order).

- **ASCII**: American Standard Code for Information Interchange
- **CR**: ASCII Carriage Return (0Dh)
- **LF**: ASCII Line Feed (0Ah)
- **SH**: High digit of 8 bit hexadecimal checksum
- **SL**: Low digit of 8 bit hexadecimal checksum
2. SPECIFICATIONS

2.1. PRODUCT NAME

Product Name: Manual insertion type magnetic card reader built in RS232 (Full insertion type)
Model No.: ZU-1870MA8R2

2.2. FEATURES

Magnetic Head: Double sided heads
Reading Track: 2 tracks (ISO1 and ISO2)
Reading Speed: 10 cm/s to 120 cm/s
Raindrop proof: IPx4

2.3. FUNCTION

Card Operation: Insertion / Ejection
Read/Write: Read only
Reading Direction: Backward (Ejection)

2.4. PHYSICAL DIMENSIONS

Width: 93.5 mm
Depth: 121.0 mm
Height: 50.0 mm
Weight: Approx. 125 g

2.5. POWER SUPPLY

Voltage: DC +4.75 V to +12 V
Ripple: Less than 50 mV p-p
Current Consumption: Approx. 30 mA
2.6. ENVIROMENTS

Operating Temperature: -10 °C to +50 °C
Operating Humidity: 10 % RH to 90 % RH (No condensation allowed)
Storage Temperature: -20 °C to +60 °C
Storage Humidity: 10 % RH to 95% RH (No condensation allowed) (24hours)
  * Test procedure: Place the card reader in the standard environment (temperature: 20 °C ± 5 °C, humidity: 35 % RH to 60 % RH). Leave it for 12 hours, and measure the functions. Make sure no abnormality is found.
Vibration Sweep: 10 Hz/mm to 50 Hz/mm (X, Y, Z directions)
Shock Durability: 294 m/s² (30 G)
Usage: Out door is available.
Others: Make sure any source of noise that may deteriorate the characteristics of the card reader is not present around the card reader.

2.7. LIFE AND RELIABILITY

Magnetic Head: 500,000 times pass (2 passes / operation)

Note: The life is reliability number based on the result tested in a “clean office” environment. These numbers may be shortened dependent on the actual environment. Especially in a dusty environment*, even in the indoor application, dust or sand may shorten the life against the mechanical parts and most of the card transport mechanisms. In these cases, warranty of the card reader may be void unless the proper protection and countermeasures are performed by the terminal side.
(In a clean office room. In damp or dirty atmosphere, the life may be 1/3 to 1/5 of the above figure.)
* dusty environment: Refer to e.g. IEC 68, EN30721-3-3 class 3S2 or worse.
2.8. MAGNETIC STRIPE CARD STANDARD

2.8.1. PARAMETERS

Card Specification:

<table>
<thead>
<tr>
<th>Track Position</th>
<th>Track 1</th>
<th>Track 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO1</td>
<td></td>
<td>ISO2</td>
</tr>
<tr>
<td>Recording Method</td>
<td>F2F</td>
<td>F2F</td>
</tr>
<tr>
<td>Recording Density</td>
<td>210 BPI</td>
<td>75 BPI</td>
</tr>
<tr>
<td>Recording Capacity</td>
<td>79 characters (7 bits)</td>
<td>40 characters (5 bits)</td>
</tr>
</tbody>
</table>

2.8.2. PHYSICAL CHARACTERISTICS

Thickness: 0.76 mm ± 0.08 mm
Warpage: 2.5 mm max. (include relief height of embossed characters)

2.8.3. MAGNETIC CHARACTERISTICS

Coercive Force (Hc): $2.4 \times 10^4$ A/m to $2.4 \times 10^5$ A/m
Residual Flux ($\psi_r$): $1.25 \times 10^{-8}$ Wb/cm ± $0.15 \times 10^{-8}$ Wb/cm
Squareness Ratio($\psi_r/\psi_m$): more than 0.70
2.8.4. LOCATION OF TRACKS

(Unit: mm)

- Track1: 85.47 – 85.72
- Track2: 5.66 max.
- Track3: 53.92 – 54.03

Center line of first data bit

Center line of last data bit

6.93 min.

7.44 ± 0.51 (Track1,2)
7.44 ± 1.0 (Track3)

8.46 – 8.97
8.97 – 8.46
11.76 – 12.27
12.52 – 12.01
15.32 – 15.82

0.68 – 0.84
2.9. BLOCK DIAGRAM

![Diagram of ZU-1870MA8R2](image-url)
2.10. CONNECTORS

2.10.1. CARD READER CONNECTOR

Connector Name: CN1
Model No.: 53261-0590 (Molex)
Mating Connector: 51021-0500 (Molex)

Pin Assignments:

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal Name</th>
<th>I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SG</td>
<td>-</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
<td>In</td>
<td>Serial Receive</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
<td>Out</td>
<td>Serial Transmit</td>
</tr>
<tr>
<td>4</td>
<td>Vcc</td>
<td>-</td>
<td>Power supply (DC 4.75V to 12V)</td>
</tr>
<tr>
<td>5</td>
<td>Vcc</td>
<td>-</td>
<td>Power supply (DC 4.75V to 12V)</td>
</tr>
</tbody>
</table>

2.10.2. HOST RS-232C CONNECTOR (PC/AT compatible)

Connector Name: DB-9

Pin Assignments:

<table>
<thead>
<tr>
<th>Reader side CN1 Pin #</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vcc</td>
</tr>
<tr>
<td>2</td>
<td>Vcc</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>RxD</td>
</tr>
<tr>
<td>5</td>
<td>SG</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOST side DB-9 Pin #</th>
<th>RS-232C Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CD</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>RING</td>
</tr>
</tbody>
</table>

Vcc
SG
3. HOST PROTOCOL

3.1. PHYSICAL LAYER

The list of communication parameters is shown below:

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Protocol</td>
<td>Asynchronous</td>
</tr>
<tr>
<td>Communication Method</td>
<td>Half-duplex</td>
</tr>
<tr>
<td>Start bit</td>
<td>1 bit</td>
</tr>
<tr>
<td>Data length</td>
<td>8 bits</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bit</td>
<td>1 bit</td>
</tr>
<tr>
<td>Communication Speed</td>
<td>9600 / 19200 bps</td>
</tr>
</tbody>
</table>

The baud rate is selectable, and it can be changed using a *Change Baud Rate* command. The setup at factory shipping is 9600 bps.

3.2. TRANSPORT LAYER

3.2.1. COMMAND FORMAT

: (1 byte) CMD (1 byte) PARAM (0 to more) CR (1 byte)

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>:</td>
<td>3Ah</td>
<td>Colon; Shows the start of message packet.</td>
</tr>
<tr>
<td>CMD</td>
<td>Any value</td>
<td>Command Code; Defined in “3.3 COMMAND LAYER”</td>
</tr>
<tr>
<td>PARAM</td>
<td>Any value</td>
<td>Parameter; Defined in “3.3 COMMAND LAYER”</td>
</tr>
<tr>
<td>CR</td>
<td>0Dh</td>
<td>Carriage Return; Shows the end of message packet.</td>
</tr>
</tbody>
</table>
3.2.2. RESPONSE FORMAT

Response format with a data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD</td>
<td>Any</td>
<td>Command Code; Shows the</td>
</tr>
<tr>
<td>:</td>
<td>3Ah</td>
<td>Colon; Splits command code and a data field.</td>
</tr>
<tr>
<td>DATA</td>
<td>Any</td>
<td>Data; Defined in “3.3 COMMAND LAYER”</td>
</tr>
<tr>
<td>SH</td>
<td>Any</td>
<td>High digit of 8 bits hexadecimal checksum *</td>
</tr>
<tr>
<td>SL</td>
<td>Any</td>
<td>Low digit of 8 bits hexadecimal checksum *</td>
</tr>
<tr>
<td>CR</td>
<td>0Dh</td>
<td>Carriage Return; Shows the end of message packet.</td>
</tr>
<tr>
<td>LF</td>
<td>0Ah</td>
<td>Line Feed; Shows the end of message packet.</td>
</tr>
</tbody>
</table>

*Calculating Procedure of Checksums

In case of example that a return data is “SE:400000030000”.

1st step: “S” (53h) + “E” (45h) + “:” (3Ah) + “4” (34h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) + “0” (30h) = 319h

2nd step: Neglect 3h (upper byte of 319h)

3rd step: Calculate the two’s complement value of 19h (lower byte of 319h)

100h – 19h = E7h (E7h is the two’s complement value of 19h)

Consequently SH is “E” (45h) and SL is “7” (37h)
3.2.3. COMMUNICATION SEQUENCE

Normal Communication Sequence
Normal communication sequence is shown in next figure.

Communication Errors and Retry Sequence
Communication Errors and Retry sequence is shown in next figure.

When the reader doesn’t respond for Tr (Retry wait), HOST may retries the request. Tr should be more than 1 second when using commands with timeout.
Magnetic Card Read Polling Sequence

Magnetic Card Read Polling sequence is shown in next figure.

AUTOSEND/AUTONOTIFY mode are enabled, a response is automatically transmitted at time of card inserted and card read.

The message transmitted with the combination in the mode is shown below:

<table>
<thead>
<tr>
<th>Mode</th>
<th>AUTO SEND</th>
<th>AUTO NOTIFY</th>
<th>Card Insert</th>
<th>Card Read (with no error)</th>
<th>Card Read with ejection (with error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable</td>
<td>Disable</td>
<td></td>
<td>-</td>
<td>&lt;Track data&gt;</td>
<td>“error.”</td>
</tr>
<tr>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td>“Card Inserted”</td>
<td>“Track Read”</td>
<td>“Track Read”</td>
</tr>
<tr>
<td>Enable</td>
<td>Enable</td>
<td></td>
<td>“Card Inserted”</td>
<td>&lt;Track data&gt;</td>
<td>“error.”</td>
</tr>
<tr>
<td>Disable</td>
<td>Disable</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*** quotation mark means message strings.
### 3.3. COMMAND LAYER

<table>
<thead>
<tr>
<th>Classification</th>
<th>Command</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration Commands</td>
<td>Change Baud Rate</td>
<td>B</td>
<td>Sets the communication speed.</td>
</tr>
<tr>
<td></td>
<td>Auto Clear</td>
<td>A</td>
<td>Automatically clear track buffers after sending track data.</td>
</tr>
<tr>
<td></td>
<td>Auto Send</td>
<td>S</td>
<td>Automatically send track data as soon as card has been swiped.</td>
</tr>
<tr>
<td></td>
<td>Auto Notify</td>
<td>N</td>
<td>Automatically send the message as soon as card has been swiped.</td>
</tr>
<tr>
<td>Status Commands</td>
<td>Send Reader Status</td>
<td>SR</td>
<td>Sends the reader status, its configuration.</td>
</tr>
<tr>
<td></td>
<td>Send Track Status</td>
<td>ST</td>
<td>Sends the track status.</td>
</tr>
<tr>
<td></td>
<td>Send Firmware Version</td>
<td>V</td>
<td>Sends the firmware version of the reader.</td>
</tr>
<tr>
<td>Track Data Commands</td>
<td>Transmit Track Data</td>
<td>T</td>
<td>Transmits a data on track.</td>
</tr>
<tr>
<td></td>
<td>Clear Track Data</td>
<td>C</td>
<td>Clears track buffers.</td>
</tr>
<tr>
<td>Reader Commands</td>
<td>Reset Reader</td>
<td>RX</td>
<td>Reset the reader.</td>
</tr>
</tbody>
</table>
3.3.1. CONFIGURATION COMMANDS

All configurations set up by the configuration commands are saved at an EEPROM. After a power up the reader, all configurations are loaded from EEPROM.

Change Baud Rate

Description:
This command sets the serial I/O line baud rate.

Command:

\[ Bx \]

Where:
\[ x \] is the baud rate number. The specifies values are as follows:

<table>
<thead>
<tr>
<th>Value</th>
<th>Baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>“3” (33h)</td>
<td>9600 bps (Setup at factory shipping)</td>
</tr>
<tr>
<td>“4” (34h)</td>
<td>19200 bps</td>
</tr>
</tbody>
</table>

Response:

[CR][LF]

Note: The response is returned with the OLD baud rate.

Example:
Command for set the serial I/O line baud rate is 19200bps:

<table>
<thead>
<tr>
<th>Command</th>
<th>B</th>
<th>4</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>42h</td>
<td>34h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>
Auto Clear

Description:
This command sets AUTOCLEAR bit.

Command:
\[ A b \]

Where:
b is the AUTOCLEAR bit. The specifies values are as following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Auto Clear</th>
</tr>
</thead>
<tbody>
<tr>
<td>“0” (30h)</td>
<td>Disable</td>
</tr>
<tr>
<td>“1” (31h)</td>
<td>Enable</td>
</tr>
</tbody>
</table>

Note: If AUTOCLEAR bit is enabled, the card reader will automatically clear track buffers after sending track data. Then the Host will not be able to get track data again. If AUTOCLEAR bit is disabled, track data remain in buffer until track clear command is sent.

Response:
\[ \text{[CR][LF]} \]

Example:
Command for set the AUTOCLEAR bit is enabled:
\[ : \ A \ 1 \ [CR] \]

<table>
<thead>
<tr>
<th>3Ah</th>
<th>41h</th>
<th>31h</th>
<th>0Dh</th>
</tr>
</thead>
</table>

Auto Send

Description:
This command sets AUTOSEND bit. In case that the AUTOSEND bit is enable, the card reader will automatically send track data as soon as card has been swiped.

Command:
*Sb

Where:
*b is the AUTOSEND bit. The specifies values are as following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Auto Send</th>
</tr>
</thead>
<tbody>
<tr>
<td>“0” (30h)</td>
<td>Disable</td>
</tr>
<tr>
<td>“1” (31h)</td>
<td>Enable</td>
</tr>
</tbody>
</table>

Response:
[CR][LF]

Example:
Command for set the AUTOSEND bit is enabled:

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>1</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>53h</td>
<td>31h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>
Auto Notify

Description:
This command sets AUTONOTIFY bit.

Command:
**N**

Where:
- \( b \) is the AUTONOTIFY bit. The specifies values are as following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Auto Notify</th>
</tr>
</thead>
<tbody>
<tr>
<td>“0” (30h)</td>
<td>Disable</td>
</tr>
<tr>
<td>“1” (31h)</td>
<td>Enable</td>
</tr>
</tbody>
</table>

Note: If AUTONOTIFY bit is enabled and AUTOSEND bit is disabled, the card reader will send the message “Card Inserted” as soon as card has been inserted and the message “Track Read” as soon as card has been read.

See “3.2.3 COMMUNICATION SEQUENCE – Mag Card Read Polling Sequence”.

Response:
- [CR][LF]

Example:
Command for set the AUTONOTIFY bit is enabled:
```
: N 1 [CR]
```
```
3Ah 4Eh 31h 0Dh
```

Response for the message as soon as card has been inserted:
```
Card Inserted [CR] [LF]
```
```
43h 61h 72h 64h 20h 49h 6Eh 73h 65h 72h 74h 65h 64h 0Dh 0Ah
```

Response for the message as soon as card has been read:
```
Track Read [CR] [LF]
```
```
54h 72h 61h 63h 6Bh 20h 52h 65h 61h 64h 6Dh 0Ah
```

3.3.2. STATUS COMMANDS

Send Reader Status

Description:
This command requests the reader to send the reader status, its configuration.

Command:
SR

Response:
SR:abci.scnde.xyz.t.[SH][SL][CR][LF]

Where:
The reader status is as following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
</table>
| a    | Card Load 1 signal           | “0” (30h) = not detected  
|      |                              | “1” (31h) = detected   |
| b    | Card Load 2 signal           | “0” (30h) = not detected  
|      |                              | “1” (31h) = detected   |
| c    | Card Load 3 signal           | “0” (30h) = not detected  
|      |                              | “1” (31h) = detected   |
| i    | Card Inserted signal         | “0” (30h) = not detected  
|      |                              | “1” (31h) = detected   |
| s    | AUTOSEND bit                 | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| c    | AUTOCLEAR bit                | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| n    | AUTONOTIFY bit               | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| d    | Track read direction         | “0” (30h) = forward  
|      |                              | “1” (31h) = backward   |
| e    | Start/End character including in track data | “0” (30h) = not include  
|      |                              | “1” (31h) = include    |
| x    | Track #1 configuration       | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| y    | Track #2 configuration       | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| z    | Track #3 configuration       | “0” (30h) = disabled  
|      |                              | “1” (31h) = enabled    |
| T    | Reader Type number           | “0” (30h) to “6” (36h) |
Example:

Command for the reader status:

<table>
<thead>
<tr>
<th>:</th>
<th>S</th>
<th>R</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>53h</td>
<td>52h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>

Response for the reader status:

<table>
<thead>
<tr>
<th>S</th>
<th>R</th>
<th>:</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>.</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>53h</td>
<td>52h</td>
<td>3Ah</td>
<td>31h</td>
<td>30h</td>
<td>31h</td>
<td>31h</td>
<td>2Eh</td>
<td>31h</td>
<td>31h</td>
<td>30h</td>
<td>31h</td>
<td>31h</td>
<td>2Eh</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>.</td>
<td>E[SH]</td>
<td>D[SL]</td>
<td>[CR]</td>
<td>[LF]</td>
<td>31h</td>
<td>31h</td>
<td>30h</td>
<td>2Eh</td>
<td></td>
</tr>
</tbody>
</table>

Card Load1 signal = detected
Card Load2 signal = not detected
Card Load3 signal = detected
Card Inserted signal = detected
AUTOSEND bit = enabled
AUTOCLEAR bit = enabled
AUTONOTIFY bit = disabled
Track read direction = backward
Start/End character including in track data = enabled
Track #1 configuration = enabled
Track #2 configuration = enabled
Track #3 configuration = disabled
Reader Type number = 3: Half/Full insertion (1 sensor in back)
Send Track Status

Description:
This command requests the reader to send the track status.

Command:
ST

Response:
ST:dsercc.dsercc.dsercc.[SH][SL][CR][LF]

Where:
First set of “dsercc” is for Track #1 status, second set is for Track #2, and Third set is Track #3.
The track status is as following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>Data detection on track</td>
<td>“0” (30h) = not detected “1” (31h) = detected</td>
</tr>
<tr>
<td>s</td>
<td>Start character detection</td>
<td>“0” (30h) = not detected “1” (31h) = detected</td>
</tr>
<tr>
<td>e</td>
<td>End character detection</td>
<td>“0” (30h) = not detected “1” (31h) = detected</td>
</tr>
<tr>
<td>r</td>
<td>LRC error check results</td>
<td>“0” (30h) = passed “1” (31h) = error</td>
</tr>
<tr>
<td>cc</td>
<td>Two characters representing the hex value of byte count of track</td>
<td>“00” = 0 byte to “FF” = 255 bytes</td>
</tr>
</tbody>
</table>

Note: “CC” is RAW data length of magnetic card. NOT transmitted data on track.

Example:
Command for send the track status:

```
: S T [CR]
3Ah 53h 54h 0Dh
```

Response for the track status: 78 bytes on Track #1, 19 bytes on Track #2 and 0 byte on Track #3

```
S T : 1 1 1 1 4 E . 1 1 1 1 1
53h 54h 3Ah 31h 31h 31h 31h 34h 45h 2Eh 31h 31h 31h 31h
1 3 . 0 0 0 0 0 0 . 1 [SH] 0 [SL] [CR] [LF]
31h 33h 2Eh 30h 30h 30h 30h 30h 30h 30h 30h 30h 30h 0Dh 0Ah
```
Send Firmware Version

**Description:**
This command requests the reader to send the firmware version.

**Command:**
V

**Response:**
“Panasonic UCIMAG v.x.xx Copyright yyyy[CR][LF]”

**Where:**
x.xx is firmware version. yyyy is year of copyrighted.

**Example:**
Command for send firmware version of the reader:

<table>
<thead>
<tr>
<th>:</th>
<th>V</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>56h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>

Response for firmware of the reader: The version is v3.10 in 1999-2004 copyrighted.

<table>
<thead>
<tr>
<th>P</th>
<th>A</th>
<th>N</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>I</th>
<th>C</th>
<th>U</th>
<th>C</th>
<th>I</th>
<th>M</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>50h</td>
<td>41h</td>
<td>41h</td>
<td>53h</td>
<td>4Fh</td>
<td>4Eh</td>
<td>49h</td>
<td>43h</td>
<td>20h</td>
<td>55h</td>
<td>43h</td>
<td>49h</td>
<td>2Dh</td>
<td>4Dh</td>
</tr>
<tr>
<td>G</td>
<td>_</td>
<td>v</td>
<td>3</td>
<td>.</td>
<td>1</td>
<td>0</td>
<td>_</td>
<td>C</td>
<td>o</td>
<td>p</td>
<td>y</td>
<td>r</td>
<td>i</td>
</tr>
<tr>
<td>47h</td>
<td>20h</td>
<td>33h</td>
<td>2Eh</td>
<td>31h</td>
<td>30h</td>
<td>20h</td>
<td>43h</td>
<td>6Fh</td>
<td>70h</td>
<td>79h</td>
<td>72h</td>
<td>69h</td>
<td>67h</td>
</tr>
<tr>
<td>t</td>
<td>_</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>-</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>[CR]</td>
<td>[LF]</td>
<td></td>
</tr>
<tr>
<td>74h</td>
<td>20h</td>
<td>31h</td>
<td>39h</td>
<td>39h</td>
<td>2Dh</td>
<td>32h</td>
<td>30h</td>
<td>30h</td>
<td>34h</td>
<td>0Dh</td>
<td>0Ah</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3.3. TRACK DATA COMMANDS

Clear Track Data

Description:
This command clears track buffer.

Command:
C:

Where:
\( t \) is the track number or all tracks. The specifies value are as following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Track Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>“1” (31h)</td>
<td>Track #1</td>
</tr>
<tr>
<td>“2” (32h)</td>
<td>Track #2</td>
</tr>
<tr>
<td>“3” (33h)</td>
<td>Track #3</td>
</tr>
<tr>
<td>“A” (41h)</td>
<td>All Tracks</td>
</tr>
</tbody>
</table>

Note: If this command executed, user will NOT be able to transmit a data again.

Response:
[CR][LF]

Example:
Command for clear on all tracks buffer:

<table>
<thead>
<tr>
<th>:</th>
<th>C</th>
<th>A</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>43h</td>
<td>41h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>
Transmit Track Data

Description:
This command requests the reader to transmit the track data.

Command:

\( Tt \)

Where:
\( t \) is the track number or all tracks. The specifies value are as following:

<table>
<thead>
<tr>
<th>Value</th>
<th>Track Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>“1” (31h)</td>
<td>Track #1</td>
</tr>
<tr>
<td>“2” (32h)</td>
<td>Track #2</td>
</tr>
<tr>
<td>“3” (33h)</td>
<td>Track #3</td>
</tr>
<tr>
<td>“A” (41h)</td>
<td>All Tracks (same as sending T1, T2 and T3 sequence)</td>
</tr>
</tbody>
</table>

Response:

\( Tt: data.[SH][SL][CR][LF] \)

Where:
The track data is as following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
</table>
| \( t \) | Track Number | “1” (31h) = Track #1  
|       |              | “2” (32h) = Track #2  
|       |              | “3” (33h) = Track #3  |
| data | Data on track | Any            |

Note: If there is an error in track data, a response is “\( Tn: error.[CR][LF] \)”. TA command is added [CR][LF] to the last of response data.

Example:
Command for transmit data on all tracks:

\[
\text{Command for transmit data on all tracks:} \\
\text{TA} \\
\text{3Ah 54h 41h 0Dh}
\]

Response for a data on all tracks:

\[
\begin{array}{cccc}
T & 1 & : & ? \\
\hline
54h & 31h & 3Ah & 25h & 3Fh & 2Eh & 0Dh & 0Ah \\
T & 2 & : & ? \\
\hline
54h & 32h & 3Ah & 25h & 3Fh & 2Eh & 0Dh & 0Ah \\
T & 3 & : & ? \\
\hline
54h & 33h & 3Ah & 25h & 3Fh & 2Eh & 0Dh & 0Ah \\
\end{array}
\]

\[
\text{[CR]} \quad \text{[LF]} \\
0Dh \quad 0Ah
\]
3.3.4. READER COMMANDS

Reset Reader

Description:
This command resets the reader.

Command:
RX

Response:
The reader will send the current firmware version after the reset sequence. See “Send Firmware Version” command.

Example:
Command for reset the reader:

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>X</th>
<th>[CR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Ah</td>
<td>52h</td>
<td>58h</td>
<td>0Dh</td>
</tr>
</tbody>
</table>
4. MAINTENANCE

Because of difficulty in changing components on the Printed Circuits Board, replacement of whole unit is recommended for service and maintenance.
5. APPEARANCE

General Tolerance: ± 0.5
Unit: mm
The product label with which the manufacturing number was printed is stuck on the reader module.

Manufacturing Month:
1 = January
: 
9 = September
O = October
N = November
D = December

Manufacturing Year:
The last digit of the Christian era