S P E C I F I C A T I O N

F O R

M A G N E T I C  C A R D  R E A D E R

( M a n u a l  I n s e r t I o n  t y p e )

W I T H

R S – 2 3 2 C  I n t e r f a c e

Z U – 1 8 7 0 M A 1 0 1

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

MATSUSHITA INDUSTRIAL EQUIPMENT CO., LTD.

# R E V I S E D   R E C O R D

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|      |              |                     |      |

# C O N T E N T S

# 1. INTRODUCTION

This specification describes manual insertion type magnetic card reader with built in RS232 interface and decoder. The card reader is outfitted with a universal magnetic card reader interface (UCIMAG) which handles reader data and RS232 communications..

# 2.  PRODUCT NAME

2.1  Product Name        Manual Insertion type magnetic card reader w/ built-in RS-232
          (Full insertion type)
2.2  Model No.            ZU-1870MA101

# 3.  FUNCTION

3.1  Card operation                    Insertion & Ejection
3.2  Read/Write                    Read only
3.3  Read direction          Backward (Ejection)

# 4.  EQUIPMENT SPECIFICATION

4.1  Out dimension              90 mm(D)     119.5 mm(L)     46 mm(H)
4.2  Weight                    Approximately 105 g
4.3  Supplied voltage
  (1)Supplied voltage              + 5VDC +/-10%
                Ripple(Less than 50 mVp‑p)
  (2)Current consumption          Approx. 30mA
  (3)Connector              DB9
4.4  Environment requirements      At indoor

# 5.  BASIC FEATURES

5.1  Card operating speed          10 to 120 cm/sec
5.2  Magnetic head
  (1) Numbers of channel          2
  (2) Core width              1.4 mm
   (3) Core material          Sendust

## 6. CARD STANDARD

### 6.1  Card standard

| Card Standard | ISO 1 | ISO 2 |
|---|---|---|
| | Track 1st | Track 2nd |
| Recording density | 210 BPI | 75 BPI |
| Recording capacity | 79 Characters | 40 Characters |
| | (7 bit code) | (5 bit code) |
| Recording method | FM | FM |

### 6.2  Location of tracks

ISO (2 Tracks  ISO 7810, ISO 7811

Coercive force(Hc):2.4  10    2.4  10  (A/m)
(300  3000(Oe))

(unit mm)



Figure 6.2 Location of Tracks

## 7.  CIRCUIT CONSTRUCTION

### 7.1    Block diagram

**Magnetic Card Reader**

PC

Card Reader PCB

CN1

L1

X1

UCIMAG ( I/F )

X2

L2

CN2
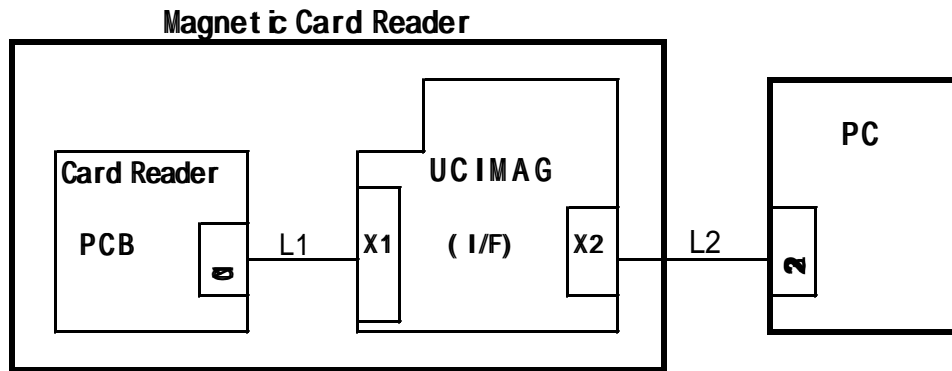
Cable Length    L2 : Approx. 1m

### 7.2 Card Reader and UCIMAG connector

(1) Connector Name:                CN1                                X1

(2) Model No.:      (JST) BS7P-SHF-1AA    (Molex) 51021-1200

(3) Pin No. & Signal Name:

| CN1 | Card Reader Signal Name | | X1 | UCIMAG Signal Name |
|---|---|---|---|---|
| 1 | +5 VDC | | 3 | +5 VDC |
| 2 | /RDT1 | | 7 | /RDT1 |
| 3 | /RCL1 | | 8 | /RCL1 |
| 4 | /RDT2 | | 4 | /RDT2 |
| 5 | /RCL2 | | 5 | /RCL2 |
| 6 | /CLD | | 6 | /CLD2 |
| 7 | GND | | 2 | GND |
| | -- | | 1 | NC |
| | -- | | 9 | NC |
| | -- | | 10 | NC |
| | -- | | 11 | NC |
| | -- | | 12 | NC |

Note : Vcc on UCIMAG comes from voltage regulator (max 3.3 V, 10mA).

7.3   Explanation of input/output signal

Input/output signals are /CLD,/RCL,/RDT, and effective operation mode for each of these signals
shall be "L" level for all.

(1) /CLD                        The /CLD line will be low when a Magnetic Card is inserted in the
    (CARD LOAD)         end of Magnetic Card Reader.
                        The /CLD line will be Low at all othr times

(2) /RCL1, /RCL2          This is used to sample the data line by it's falling edge.
    (READ CLOCK)

(3) /RDT1, /RDT2            The moment /RCL changes from High to Low ; /RDT is "1"
    (READ DATA)         when the (/RDT1, /RDT2)  /RDT line is Low , and /RDT is "0"
                    when the /RDT line is High.

7.4   RS232C Connector

(1) Connector Name:                X2

(2) Model No.:           Molex 51021-0500

(3) Pin No. & Signal Name:

| UCIMAG Side (X2) PinNo. | RS232C Signal Name | Wiring | PC Side (DB-9) PinNo | RS232C Signal Name |
|---|---|---|---|---|
| 1 | DTR$^*$ | | 1 | CD |
| 2 | RTS$^*$ | | 2 | RXD |
| 3 | TX | | 3 | TXD |
| 4 | RCV | | 4 | DTR |
| 5 | GND | | 5 | GND |
| | | | 6 | DSR |
| External  +5V | | | 7 | RTS |
| GND | | | 8 | CTS |
| | | | 9 | RING |
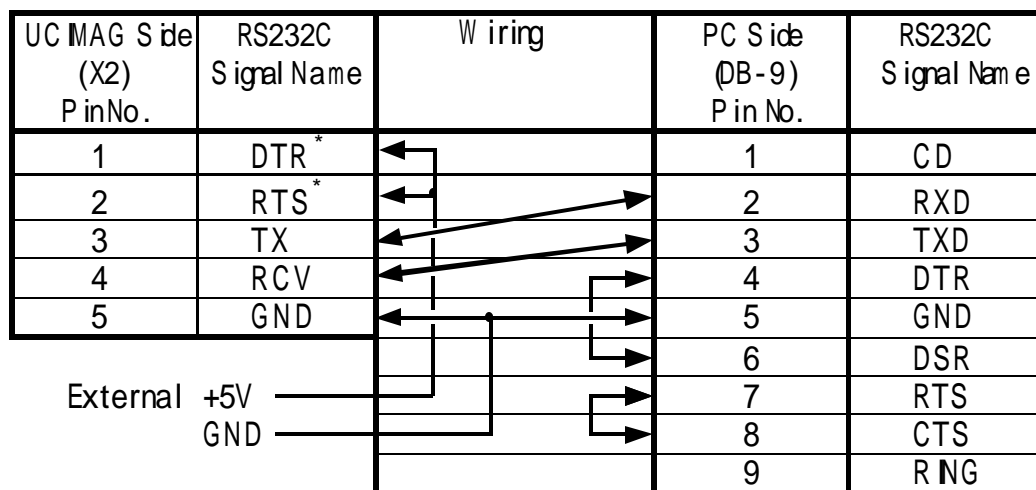
Note : DTR$^*$ and RTS$^*$ are connected to 5VDC power supply

## 8.  ENVIRONMENTAL CHARACTERISTICS

8.1   Operating temperature Range        -10 to +50 $^{o}$C

8.2   Operating humidity Range          10 to 90% RH (No condensation allowed)

8.3   Storage temperature Range         -20 to +60 $^{o}$C

8.4   Storage humidity Range           10 to 95%RH(No condensation allowed)
              (24hours)
   * Test procedure : Place the card reader in the standard environment (temperature:20+/5 $^{o}$C,
         humidity:35 to60%RH). Leave it for 12 hours, and measure the functions.
         Make sure no abnormality is found.

8.5  Vibration              **:** Vibration sweep 10 to 50Hz/m
              X,Y,Z directions

8.6  Shock durability           294 m/s$^{2}$ (30 G)

8.7  Others                Make sure any source of noise that may deteriorate
            the characteristics of the card reader is not present around the card
                  reader.

## 9. HOST RS 232 COMMANDS

9.1 General Description

All command strings begin with a ":" as shown and end with [CR] (not shown)

[CR] = ASCII carriage return character, 0DH.

[LF] = ASCII line feed character, 0AH.

<sh> = high digit of 8 bit hexadecimal checksum

<sl> = low digit of 8 bit hexadecimal checksum

Mode : Polling mode

     Auto Send Mode (default)

Configuration – Saved in EEPROM.

9.2 UCIMAG Configuration Commands

 :Bx      - Change Baud rate x=3-> 9600, x=4->19200

 :EtB     - Enable/disable track reading 't' where t = 1 to 3 b=0 means disable, b=1 means enable

 :Xb      - Read direction, if b=0 forward, if b=1 reverse

 :Ab      - Auto clear bit, if b=0 disable, if b=1 enable

    if Autoclear = 1, UCIMAG will automatically clear track buffers after sending track data,
     user will NOT be able to poll data again.

   if Autoclear = 0, data will remain in buffer until track clear command is sent.

 :Sb      - Auto send bit, if b=0 disable, if b=1 enable

   if Autosend = 1, UCIMAG will automatically send track data as soon as card has been swiped,
    user does not have to poll data.

 :Nb      - Auto notify bit, if b=0 disable, if b=1 enable

if Autonotify = 1, UCIMAG will send the message "TRACK DATA READY" as soon as the card has been swiped. The user can then poll the data with :Tn command.

:Jb     - Include start (%) and end (?) characters in track data, if b=0 disable, if b=1 enable

:RTt     - Select Reader type (determines which card load signals to use)

    0 = swipe,

    1= half insertion using 2 sensors,

    2= full insertion,

    3= half insertion using only 1 sensor in back,

    4= half insertion using 1 sensor in front,

    5= half insertion with 2 sensors + card load signal,

    Returns: reader status

## 9.3 UCIMAG Status Commands

:SR     - Send reader status, its configuration

    Returns: SR:ABCI.scnde.xyz.t.<sh><sl><CR><LF>

       Where:

           A=CardLoad1 signal = 0 or 1

           B=CardLoad2 signal = 0 or 1

           C=CardLoad3 signal = 0 or 1

           I=CardInserted signal = 0 or 1

           s=AutoSend configuration bit = 0 or 1

           c=AutoClear configuration bit = 0 or 1

           n=AutoNotify configuration bit = 0 or 1

           d=direction configuration bit = 0 or 1 (1 = reverse)

           e=UseStartEnd configuration bit = 0 or 1

           x=Track 1 enable bit = 0 or 1 (1=enabled)

           x=Track 2 enable bit = 0 or 1 (1=enabled)

           x=Track 3 enable bit = 0 or 1 (1=enabled)

           t=Reader Type character = 0,1,2,3 see RT command

:ST     - Send track status

    Returns: <LF>ST:dsercc.dsercc.dsercc.<sh><sl><CR><LF>

       Where:

         d= data was detected on track

         s= start character was detected

         e = end character was detected

         r = LRC check was passed

         cc = two characters representing the hex value of byte count of track first set of

       "dsercc" is for track 1, second set is for track 2, and third set is for track 3

:V     - Send Firmware Version

       Returns: Panasonic UCIMAG vx.xx Copyright xxxx

## 9.4 UCIMAG Track Data Commands

:CA      - Clear All tracks

           Returns: Cr/Lf

:TA      - Transmit All tracks (1,2,3)

           same as sending :T1, :T2, :T3 in sequence

           note: track data will only be send if the track enable bit for that particular track is set

:Tt      - Transmit track 't' data buffer in ASCII

           where t = 1,2, or 3 for the track number

           Example Returns: T1:%1234567890?.<sl><sh>.<cr><lf>

           If there is an LRC error in the track data a:

           T1:error.<cr><lf>

:Ct      - Clear track t

:Dt      - Raw hex dump of track t

:Hb      - Enable/disable auto dumping of tracks for debug only

## 9.5 UCIMAG LED Commands

:lb      - Set LED output on or off,

           b=0 means off, b=1 means on

         Returns: Cr/Lf

## 9.6 UCIMAG Reset Command

:RX      - Reset System

## 9.7 Default settings

         Firmware Version = PANASONIC MIECOA UCI-MAG v3 Copyright 1996-1998

         Baud Rate = 9600BPS , no parity, 8 data bits, 1 stop bit

         Reader Type = 2 (Full Insertion)

         Read Direction = 1 (Backward)

         Track 1 = Enabled

         Track 2 = Enabled

         Track 3 = Disabled

         AutoNotify = TRUE

         AutoSend = TRUE

         AutoClear = TRUE

         Include Start & End = TRUE

## 10. ERROR HANDLING

### 10.1 Magnetic Card Read Errors

If a card read is bad no data will be returned when track data is requested with the T1,T2,T3,
or TA commands.
The :SR<CR><LF> command will return the status of the most recent card swipe
The status return string contains data on Missing STX, ETX, and LRC errors for each track
Please see the details of the :SR command in the preceding section

### 10.2 Communication Errors

The UCIMAG will acknowledge most RS232 commands with either a data string or <CR><LF>.
Please see preceding section for details. If the UCIMAG fails to receive the command correctly
it will not respond. The Host PC control software should assume that if no response is received
in 1 second a communication error has occurred and the command should be resent.

### 10.3 Power Failure

If power fails and is then restored, the unit is reset and reinitialized. On reset the UCIMAG will send
the current firmware revision. In this way a host PC can tell when power has been lost on the UCIMAG.

## 11. UNIT LIFE AND RELIABILITY

### 11.1   Life
Magnetic head            : 1,000,000 times pass ( 2 passes / operation)
  (conditions)     In a clean office room. In damp or dirty atmosphere, the life may
        be 1/3 to 1/5 of the above figure.

### 11.2 Error rate              :Less than 0.1 %
  (conditions) This error rate is obtained when a new normal card (data"1010        ")  is horizontally
        passed at the standard speed (30 cm/s to 60 cm/s) by manual operatrion
        in the clean environment at delivery from our company.

## 12.MAINTENANCE
Because of difficulty in changing components on the P.C Board, replacement of whole
unit is recommended for service and maintenance.

## 13. CAUTIONS ON USE

Please be noted that we do not guarantee proper performance of the card reader if it is used other than the indicated specification range.

### 13.1 During installation

(1) Do not drop or bump anything against the card reader. Otherwise, failure may be the result.

(2) Do not touch the P.C.B. with bare hands.

(3) Be sure to install on a flat surface so as to prevent any force to be applied to the card reader

during installation.

(4) Avoid installing the Card Reader in the following environment.

* Watery, humid or dusty place.
* Near machines which generate magnetic field or inducted noise. (Printer ,LED display, CRT etc.)
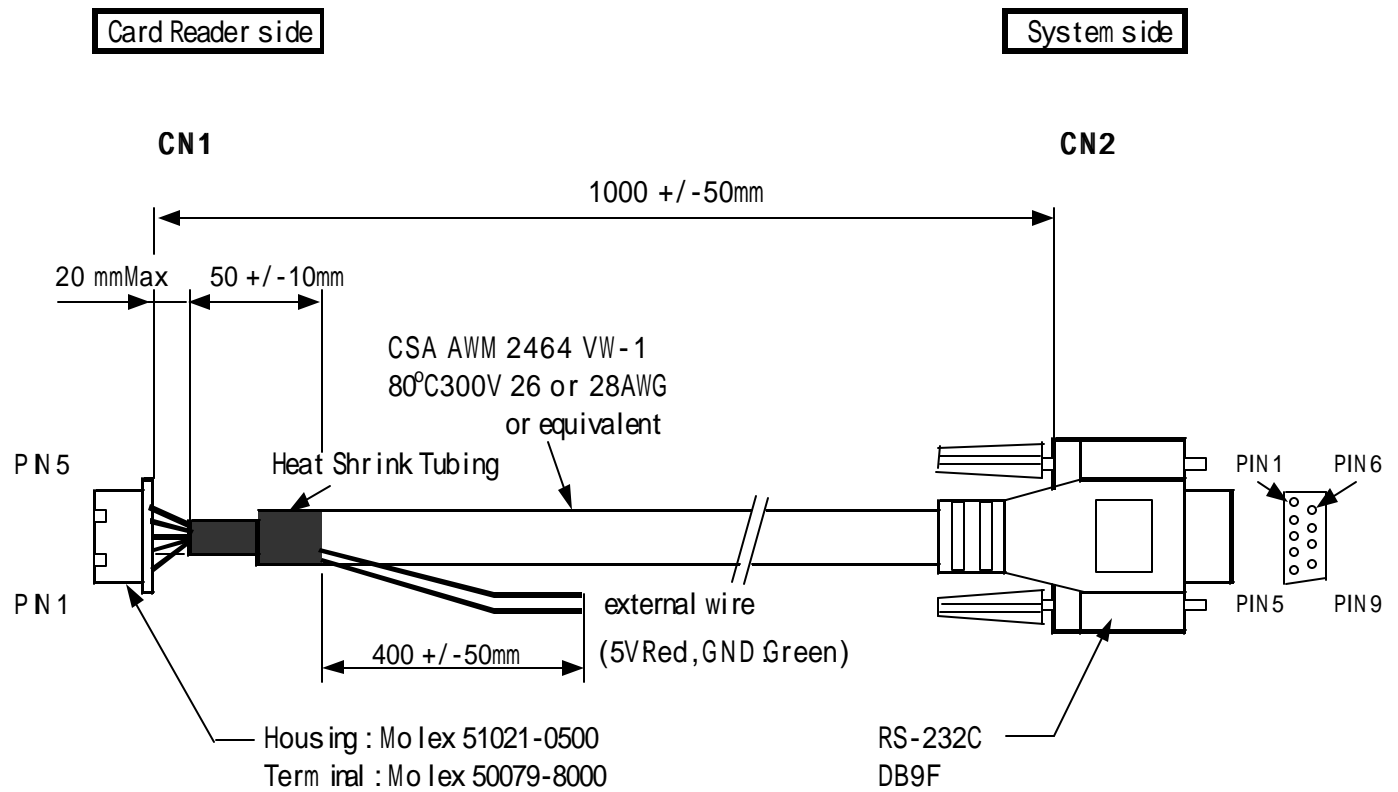* Place which gets direct sunlight.

### 13.2 During use

(1) Be sure to use a card which conforms to ISO standard. Anti-magnetic of the applied card should be 2.4 10 A/m 2.4 10 A/m of ISO standard.

(2) 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 60 cm/s.

(3) 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.

(4) Insert a cleaning card and clean the head periodically to prevent wearing of the magnetic head. Head cleaning using the cleaning card should be performed about once a week if the room is not dusty.

(5) Enviroment conditions such as external noise or electrostatics etc. may affect operation of the card reader and interface. Check the level of noise resistance and electrostatic resistance of your factory before using the card reader.

# 14. APPEARANCE

APPEARANCE

General Tolerance:±0.5

(unit mm)

54.2 +0.3 / 0

48

79 ± 0.3

90

1

Magnetic Card

Coating

Card Entrance Slot(Black)

ø 3.1×4.5
Attachment
Hole

ø 5.2

ø 3.1±0.1
Attachment Hole

Connector
BS7P-SHF-1AA
(JST)

Body 1 (Transparence)
Body 2 (Transparence)

61

71 ± 0.2

4.5

80

90

46

9

General Tolerance +/-

0.5mm

Unit : mm

## 15. CABLE SPECIFICATION

(1) Cable No. :  ZUHIS0040

(2) Cable Dimension

| Card Reader side | | System side |
| --- | --- | --- |

CN1             CN2

1000 +/- 50mm

20 mmMax   50 +/- 10mm

CSA AWM2464 VW1
80°C300V 26 or 28AWG
or equivalent

PIN5

Heat Shrink Tubing

PIN1

PIN1     PIN6

PIN5     PIN9

external wire
(5V:Red, GND:Green)

400 +/- 50mm

Housing: Molex 51021-0500
Terminal : Molex 50079-8000

RS-232C
DB9F

(3) Pin No. & Signal Name

| Card Reader Side CN1 Pin No. | Signal Name | Wiring | System Side CN2 Pin No. | Signal Name |
| --- | --- | --- | --- | --- |
| 1 | DTR | | 1 | CD |
| 2 | RTS | | 2 | RXD |
| 3 | TX | | 3 | TXD |
| 4 | RCV | | 4 | DTR |
| 5 | GND | | 5 | GND |
| | | | 6 | DSR |
| External +5V | | | 7 | RTS |
| GND | | | 8 | CTS |
| | | | 9 | RING |