Report No.

PRODUCT SPECIFICATION

UERW - 301

Magnetic Card reader・writer
ISO 3・Tracks version

THE JAPAN STEEL WORKS, LTD.

Auto-ID System Group

January 25, 1999

WARNING

To prevent electric shock and machine troubles never turn on the power before completion of all wiring.

Any attempt to repair or modify this equipment automatically negates the customer's right to operate the equipment.

■ Installation Environment

Do not install the machine in places under the following conditions:

- The ambient temperature exceeds the 5 - 40 °C ranges.
- The ambient humidity exceeds the 35 - 85 % RH ranges.
- Intensive temperature change causes condensation.
- Corrosive gas or combustible gas is generated.
- Vibration or shock is directly transmitted to the machine.
- Water, oil, chemicals, vapor or steam affects the machine.
- Dust, salt or iron content is significant.
- The induction interference is significant. Static electricity, magnetism or noise is generated easily.
- The air from the air conditioner affects directly.
- The direct sunlight affects directly.
- Heat such as radiant heat is accumulated.

■ Power Supply

- The machine is not provided with a power switch. To turn the power on or off , plug or unplug the power cable.
- In order to prevent damage and troubles of the machine supply the specified power.
- In order to prevent electric shock and troubles of the machine do not turn on the power before completion of all wiring.

■ Inhibition of modification

- Never modify the machine. Otherwise accident or troubles of the machine occur.

Table of Contents

1. Outline

The machine is a motor type magnetic card reader / writer provided with the RS-232C interface. Various magnetic cards, from low coercive force (min 300 Oe) cards to high coercive force (max. 4,000 Oe) cards, are applicable.
The machine is capable of reading or writing simultaneously data from or in three tracks.

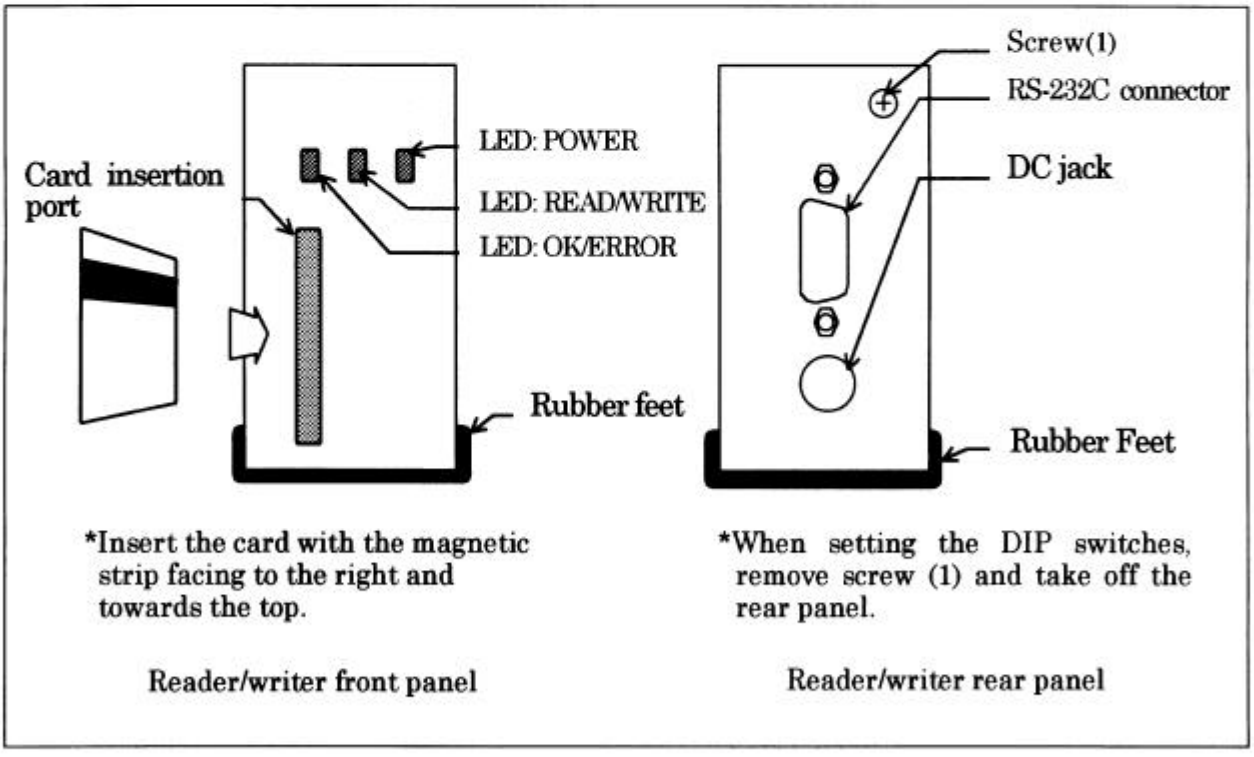
Scope of fabrication

(1) Magnetic card reader / writer unit :	1 set
(2) Operation manual (this manual) :	1 copy
(3) AC adapter :	1 pc
(4) Rubber leg :	1 set

Options

The RS-232C cable is available as an option.

2. Figure



*Insert the card with the magnetic strip facing to the right and towards the top.

Reader/writer front panel

*When setting the DIP switches, remove screw (1) and take off the rear panel.

Reader/writer rear panel

3. General Specification

3-1. Type

UERW-301

3-2. Specification of the Power Supply

Item	Feature	
Source Voltage	DC24 ± 5%	
Consumption Current	Standby	0.14A
	Writing	Max 1.3A

* This device is not equipped with a power switch.
The power comes on automatically when the AC adapter is plugged into an electrical outlet.

3-3. Environmental Feature

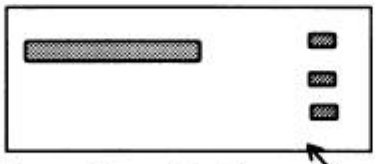
Item	Feature
Operating Temperature / Humidity	0 to 50 °C Indoor without significant dust
	35 to 85% RH however, without any dew formation

3-4. Dimension and weight

216 (D) x 47 (W) x 122 mm(H) , but exclusive of the projections 1.3 kg
Installation : Vertically / Horizontal Installation (each direction)

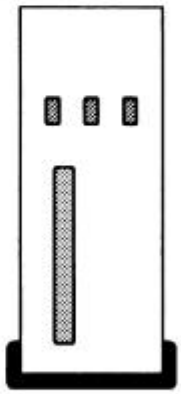
*When placing the machine on its side for horizontal operation, position the front panel towards the front with the right side on the bottom.

Placing the machine in any other position can cause a malfunction.

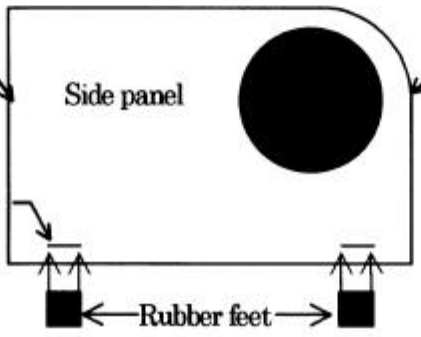


Placing the machine on its side

Position this side on the bottom



Placing the machine upright

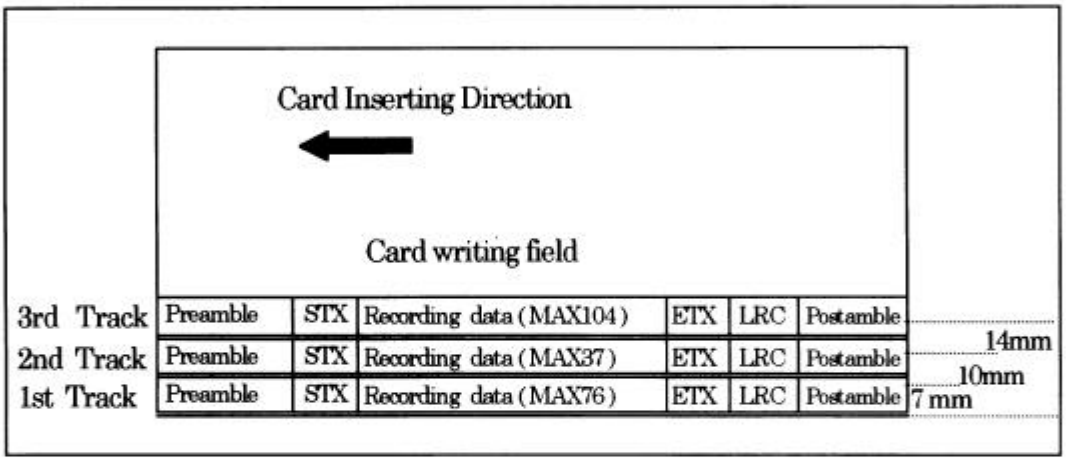


*Peel off the double-sided tape from the rubber feet (2) enclosed and attach by aligning at the positions of the rubber feet silk-screen printing on the side panel as shown in the drawing.

4. Card Data Format

4-1. Card Format

Item	Feature	
Recording of card	1st Track	IATA
	2nd Track	ABA
	3rd Track	MINTS
Number of characters	1st Track	79 characters (including STX / ETX / LRC)
	2nd Track	40 characters (including STX / ETX / LRC)
	3rd Track	107 characters (including STX / ETX / LRC)



4-2. Magnetic Data Character Code List

(1) 1st Track

Low order 4bit \ High Order 2 bit	0	1	2	3
0		0		P
1		1	A	Q
2		2	B	R
3		3	C	S
4		4	D	T
5		5	E	U
6		6	F	V
7		7	G	W
8		8	H	X
9		9	I	Y
A			J	Z
B			K	
C			L	
D			M	
E			N	
F			O	

(2) 2nd, 3rd Tracks

Low order 4bit		
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
A	A	
B	B	
C	C	
D	D	
E	E	
F	F	

5. Specifications of each section

5-1. Card Reader Writer Unit

Item	Feature	
Standard of card	In accordance with ISO 7811 /2	
	Thickness	0.68 to 0.80mm
Recording density	1st Track	210BPI ± 15%
	2nd Track	75BPI ± 15%
	3rd Track	210BPI ± 15%
Recording method	Frequency Modulation System (F2F)	
Coercive force	300~650,1750,2750~4000 Oe (to be switched by DIP SW or Command)	
Card transport method	Drive roller	
Card transport speed	20 ± 5cm / sec / (at normal temperature)	

5-2. Communication Interface

5-2-1. RS-232C Interface

Item	Feature	
Standard of card	In accordance with ISO 7811 / 2	
Communication speed	2400, 4800, 9600(*), 19200bps (to be switched by DIP SW)	
Transmission method	Start-Stop Synchronism System (Semi-Double)	
Transmission data form	Data length	7,8(*)Bit
	Parity	EVEN,ODD,NON(*)
	Start bit	1bit
	Stop bit	1bit
Communication cable	Cable length	MAX 15m
	Connector	D-SUB 9pin(Female)

(*) Factory default setting

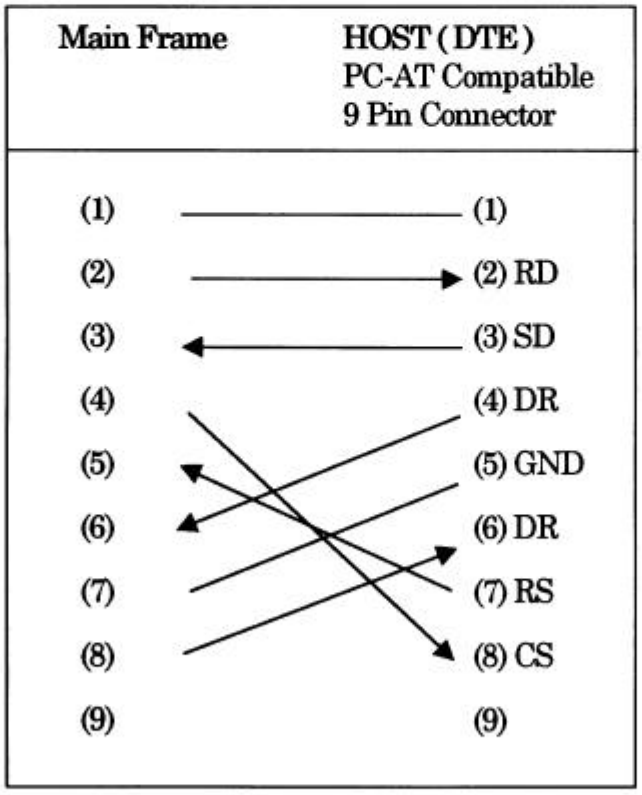
5-2-2. RS-232C Pin Configuration (DTE)

Pin NO.	Signal	IN / OUT	Feature
1	FG	—	Frame Ground
2	SD (TXD)	OUT	Data transmission
3	RD (RXD)	IN	Data receiving
4	CS (CTS)	OUT	ON at all times
5	RS (RTS)	IN	Not monitored
6	RESET	IN	Reset of the reader/writer is set to control (*1) This is normally fixed in the OFF position.
7	SG	—	Signal Ground, Common Return wire
8	ER (DTR)	OUT	ON at all times
9	—	—	—

* As to RS (RTS), ER (DTR), they are fixed by ON when the power of the main frame turns ON. Connect the shell of the RS-232C cable used to frame ground (FG).

*1 When performing hardware reset of the machine, fix to ON for about 10 μ sec. The reader/writer can be restarted by again fixing to OFF.

5-2-3. RS-232C Cable Connection



5-3. LEDs

Name	Color	Description
Power	Green	Indications that the power is on.
R / W	Two-color Light emission	Controllable from the machine or host. ・From-machine control state (when the green lamp is lit): Card writing waiting state (when the orange lamp is lit): Card writing waiting state ・From-host control state Refer to Item (9) of Section 7.2
OK / EER	Two-color Light emission	Controllable from the machine or host. ・From-machine control state (when the green lamp is lit): Card reading/writing OK (when the red lamp is lit): Card Reading/writing error ・From-host control state Refer to Item (9) of Section 7.2

*R / W : Read / Write
*OK / ERR : OK / ERROR

5-4. Buzzer

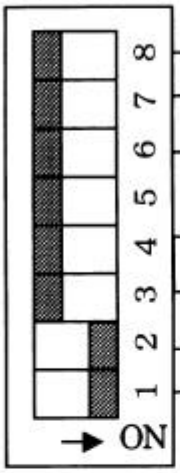
It is possible to set the buzzer sounding time within 10 to 990 msec. by using the host command (refer to Item (8) of Section 7.2).

Buzzer sound	Contents during host control
Single beeping sound	Indicates that commands are able to be received immediately after the power has been switched on.
Repeated beeping sound	Indicates that a communications error has occurred when receiving commands by the reader/writer.

5-5. DIP SW

5-5-1. Meaning of DIP SW

(1) DIP SW 1



1 : ON

0 : OFF

◎ Set prior to shipment from factory

Operating Mode

	Bit 7	Bit 8	Operating mode
◎	0	0	Normal mode
	1	0	Aging mode
	X	1	Not used

Communication Protocol Setting

◎ 0 : 9600 bps, data length: 8 bits, no parity, stop bit: 1
1 : Setting of DIP switch 2 valid

R/W Track No. Setting (*1)

	Bit 3	Bit 4	Track no.
◎	0	0	Tracks 1 through 3
	1	0	Tracks 1
	0	1	Tracks 2
	1	1	Tracks 3

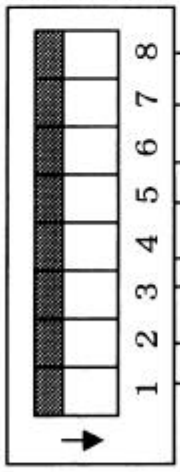
Coercive Force Setting (*2)

	Bit 1	Bit 2	Coercive force
	0	0	300 to 650 Oe
	1	0	-
	0	1	1750 Oe
◎	1	1	2750 to 4000 Oe

*1: Parameters of card reading and writing commands are given priority.

*2: Parameters of system reset commands are given priority. Operation is performed in accordance with DIP switch settings prior to executing commands.

(2) DIP SW 2



Set for indicating the presence of a rack.
(Do not set this bit to 1 when not using this reader/writer as an individual unit.)

◎ 0 : Rack
1 : No rack

Not used

Parity Settings (valid only when bit 6 of switch 1 is set to 1)

Bit 5	Bit 6	Parity
0	0	EVEN
0	1	ODD
1	X	No parity

Communication Speed Settings
(valid only when bit 6 of switch 1 is set to 1)

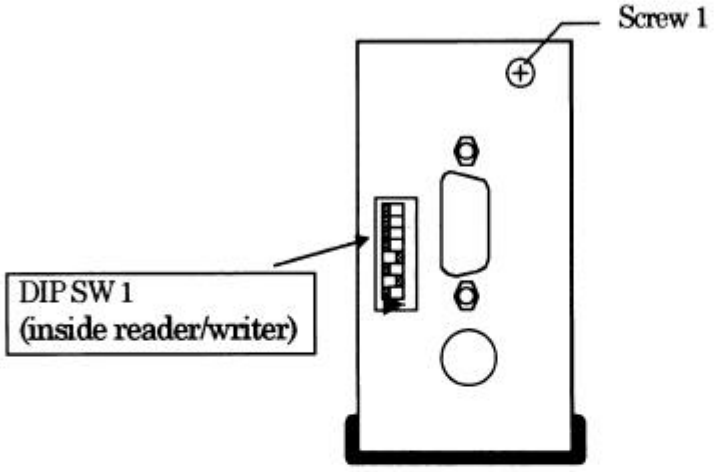
Bit 1	Bit 2	Bit 3	Communication rate (bps)
0	0	0	1200
1	0	0	2400
0	1	0	4800
1	1	0	9600
0	0	1	19200

5-5-2. Setting method of DIP SW

The DIP SW is available inside the Main frame.

(1) DIP SW 1

Remove the cover at the rear part of the main frame when setting of DIP SW is to be changed. The cover can be removed by removing screw 1 .

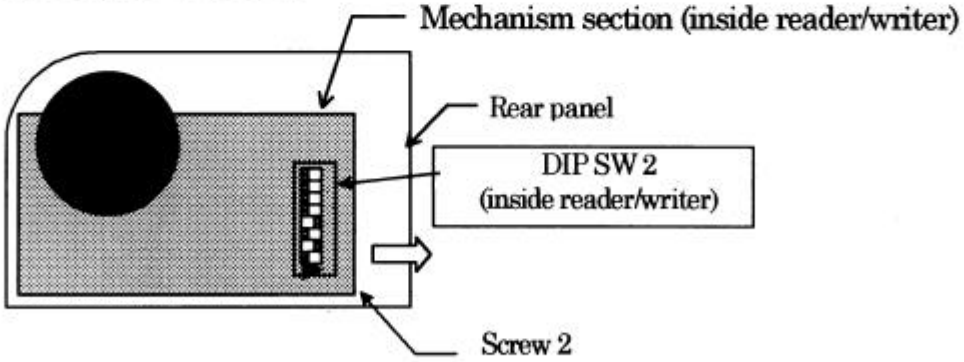


Reader/writer rear panel

(2) DIP SW 2

Remove the cover at the rear part of the main frame and it is also necessary to take the mechanism section in the main frame out when setting of DIP SW 2 is changed.
The mechanism section can be taken out by removing of the screw 2 .

Caution : When re-mounting the mechanism section, insert it carefully so that the front LED can be put in the hole.



6. Specification of Communication

6-1. Transmission control Character

Control Character	HEX	Description
STX	02	Start of TEXT
ETX	03	End of TEXT
BCC	—	Block checking character Horizontal even number parity from a character next to STX to ETX
US	1F	Block breaking signal of TEXT
ACK	06	Acknowledge
NAK	15	Negative Acknowledge
CAN	18	Command Format error
ETB	17	Command running end
DC1	11	OK
DC2	12	Error

6-2. Telegram Block Format

(1) Command / Response (a part) Format

STX	CMD	Data/Parameter	ETX	BCC	
02h	—	—	03h	—	Code (: Optional value)
1	1	Dependence on command	1	1	Number of characters

(2) Response (a part) Format

ACK	NAK / CAN / ETB / DC1 / DC2
06h	
1	

7. Host Commands

7-1. Commands List

7-1-1. Normal Command list

No.	Commands	Description
1	SYSTEM RESET <20h>	The LED, buzzer ON/OFF and card writing coercive force are set. If any card remains in the machine , it is ejected.
2	COMMAND CANCEL <21h>	In case of card reading / writing the card waiting state is canceled.
3	0 PREAMBLE SET/READ <22 h>	A value of "0" is set for preamble for each track. In addition, the set value is read.
4	CARD READ <30h>	The card data is read, and the data and the result are sent.
5	VERIFY ON CARD WRITE <31 h>	The set data is written in the card. Data is verified after writing and the results are transmitted.
6	CARD ERASURE <32h>	The card data is deleted. (0h is written)
7	VERIFY OFF CARD WRITE <33 h>	The set data is written in the card. Data is not verified.
8	BUZZER CONTROL <40h>	The buzzer is sounded for the specified time.
9	LED CONTROL <41h>	The R / W and OK / ERROR LEDs are turned on and off.
10	SYSTEM INFORMATION READ <50h>	The machine information is sent. (1) Setting of LED / buzzer (2) Setting of object track (3) Execution / non-execution of card removal / insertion (4) Setting of DIP switch
11	VERSION READ <53 h>	The type and version data of the hard are transmitted.
12	CARD EJECT <60 h>	The card is ejected. After executing a command, the motor does not operate until the card is removed and then reinserted.

7-1-2. Special command list

	Commands	Description
1	CARD REAR EJECT <70 h>	The card is ejected from an outlet on the opposite side of the insertion port. However, in the case of installing the machine in a rack as in the UERW, do not use this command since it can cause a malfunction. This command is set to inactive at the time of shipment from the factory.
2	RAW DATA READ/WRITE/ PARAMETER SETTING <71 h>	Received data is written according to the parameters set by the user (STX, ETX, etc.). In addition, card data is read based on the set parameters.

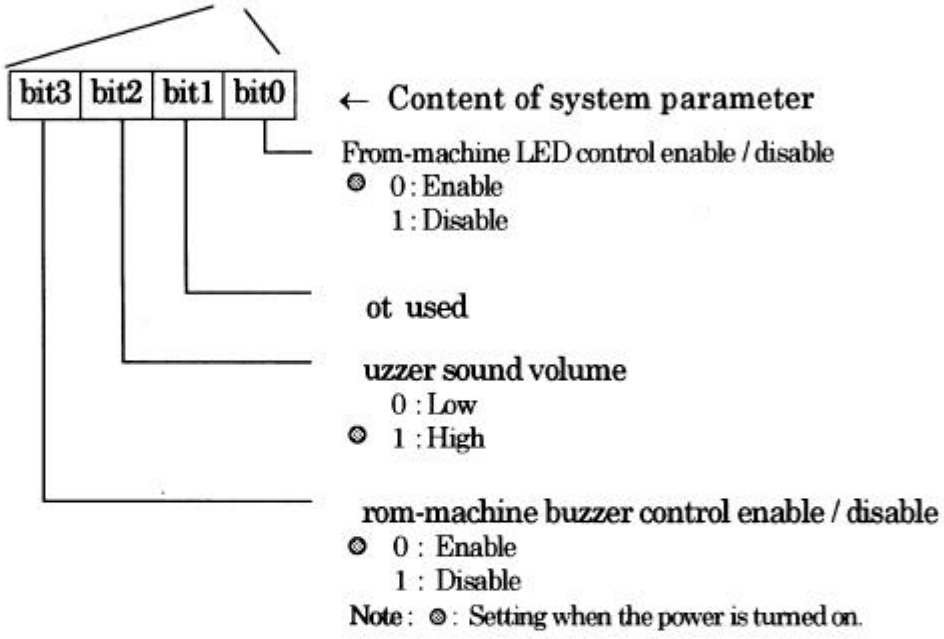
7-2. Command format

(1) System Resetting

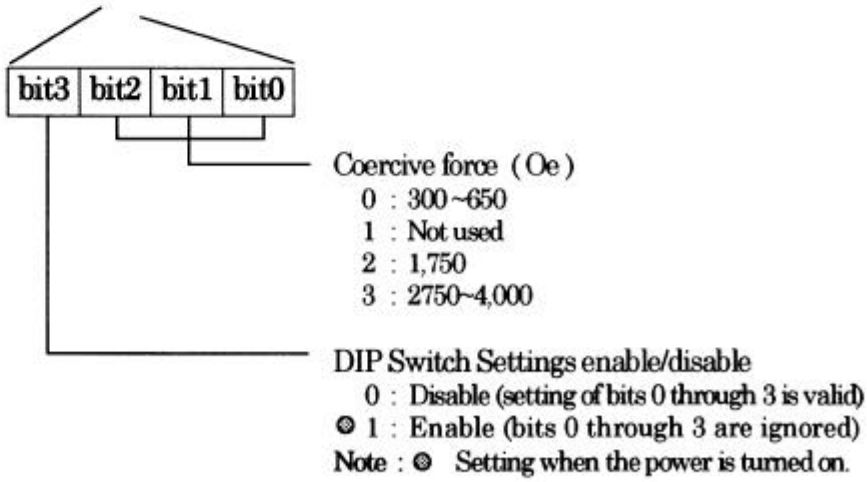
The LED and buzzer setting and the card writing coercive force setting are performed . If any card remains in the machine , it is ejected .

STX	CMD	Buzzer/LED	Coercive force	ETX	BCC	
02h	20h	—	—	03h	—	Code
1	1	1	1	1	1	Number of characters

・Buzzer / LED parameter : 3 × h (1 byte required)



・Coercive force parameter : 3 × h (1 byte required)



<<Caution >>:

When the command was executed and the card was ejected , the machine is set to the card removal waiting state . If you want to continue reading / writing , once remove and insert the card .

(2) Command Cancel

In case of card reading / writing the card waiting state (before sending of ETB) is canceled . The command that created the card waiting state is canceled by this command .

STX	CMD	ETX	BCC	
02h	21h	03h	22h	Code
1	1	1	1	Number of characters

After reception of command the machine returns ACK (06h).
After the card waiting state is canceled , it sends ETB (17h).

(3) 0 Preamble Set/Read

This command is for setting a value of 0 for the preamble located prior to the card data and for reading the set value. This is used to control the writing starting position of card data. However, it does not guarantee that a value of 0 is actually written during the write command.

· Settings

STX	CMD	Preamble 0					ETX	BCC	
		Track 1	US	Track 2	US	Track 3			
02h	22h	max.256	1Fh	max. 256	1Fh	max. 256	03h	-	Code
1	1	0 to 3	1	0 to 3	1	0 to 3	1	1	Number of characters

· Furthermore, the default value is as shown in the following table.

Track	Default value
Track 1	63
Track 2	22
Track 3	65

The reader/writer sends back ACK (06 h) if there are no setting errors after receiving a command, and after executing the command, ETB (17 h) is sent back. When there is a setting error, the machine sends back CAN (18 h) and interrupts execution of the command. Furthermore, the preamble value is not changed for tracks having a character number of 0.

· Reading

STX	CMD	ETX	BCC	
02h	22h	03h	21h	Code
1	1	1	1	Number of characters

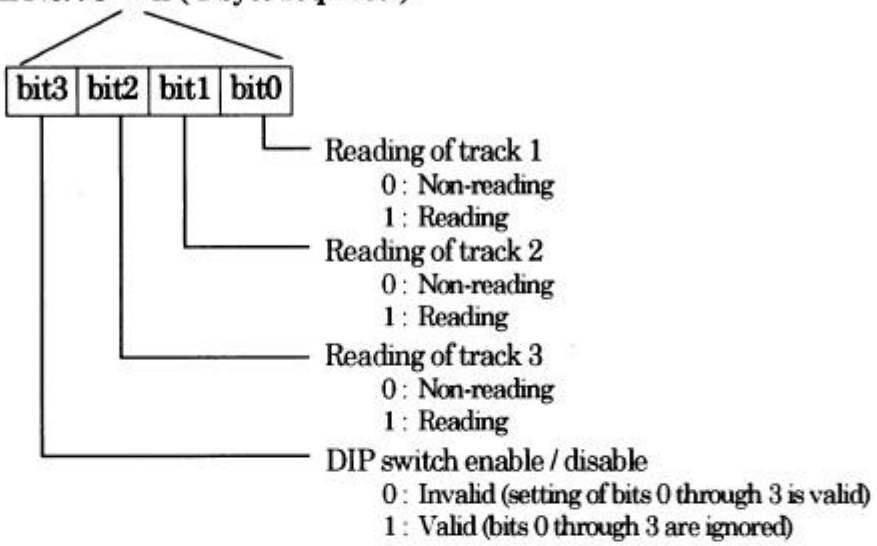
The machine sends back ACK (06 h) after receiving a command, and sends the set value. The transmission format matches the setting format.

(4) Card Read

The card data is read , and the result is sent to the host .

STX	CMD	Read track NO	ETX	BCC	
02h	20h	—	03h	—	Code
1	1	1	1	1	Number of characte

Read track No. : 3 × h (1 byte required)



	State	Operation	Transmitted data	R/W LED (*1)	OK/ERR LED (*1)
1	When receiving a command	If the received command is OK, namely if the message length is OK, the machine waits for insertion of the card. (However, reciprocation starts if there is a card waiting inside thereader/writer.)	ACK (06h)	Green light lit	Not lit
		The command is not executed if the message length is NG.	CAN (18h)	-	-
		The command is not executed if there is a communication error.	NAK (15h)	-	-
2	Card insertion standby	The machine reciprocates the card after it has been inserted. Reading of data begins (*2).	ETB (17h)	Green light lit	Not lit
3	Card reciprocation	If card reciprocation is OK, the data that has been read is checked.	-	Green light lit	Not lit
		If card reciprocation is NG, operation is interrupted and an error results.	DC2 (12h)	Not lit	Red light lit
4	Data check	An OK results when the read data is normal.	*3	Not lit	Green light lit
		An NG results when the read data does not satisfy ISO standards.	*3	Not lit	Red light lit
5	OK/Error result	The card waits inside the reader/writer.	-	Not lit	Red and green lights lit

*1 LED illumination is valid only when LED control is selected by the machine with the system reset command.

*2 When the card has been ejected (by executing the eject command or system reset command), the machine is set to the card removal waiting state. Card reciprocation does not start in this state. In this case, pull out the card and reinsert it. The machine will begin card reciprocation.

*** 3 Transmission format**

STX	CMD	Card data / Error								ETX	BCC	
		RS	Track1	US	RS	Track2	US	RS	Track3			
02h	30h	*	—	1Fh	*	—	1Fh	*	—	03h	—	Code
1	1	1	0 to 76	1	1	0 to 37	1	1	0 to 104	1	1	Number of characters

*** Content of RS (Read Status)**

Code	Meaning
30h	Normal
31h	STX error
32h	ETX error
33h	Parity error
34h	LRC error
35h	Formal error
36h	—
37h	—
38h	Non-reading
39h	Other error (LRC not detected, etc.)

(5) Card Writing

Data is written in card based on the reception data.

STX	CMD	Card data / Error					ETX	BCC	
		Track1	US	Track2	US	Track3			
02h	31h	*	1Fh	—	1Fh	—	03h	22	Code
1	1	0 to 76	—	0 to 37	1	0 to 104	1	1	Number of characters

1. In the absence of US, all data is written to the track specified with the DIP switch.
2. When lower-case characters are contained in the reception data track, they are written as upper-case characters.

	Status	Operation	Transmission Data	R/W LED (*1)	OK/ERR LED (*1)
1	During command receiving	The next check is performed on received data and if OK, the machine waits for insertion of the card. (However, reciprocation starts if a card is waiting inside the reader/writer.) ①The number of US must be 0 or 2 ②The number of data characters of each track must be within standards	ACK (06H)	Orange light on	Lights off
		The command is not executed in the case of a command error.	CAN (18h)	-	-
		The command is not executed in the case of a communication error.	NAK (15h)	-	-
2	Waiting for card insertion	When a card is inserted, the machine reciprocates the card and writes data (*2).	ETB (17h)	Orange light on	Lights off
3	Card reciprocation	When card reciprocation is OK, verification of data begins.	-	Orange light on	Lights off
		When card reciprocation is NG, operation is interrupted.	DC2 (12h)	Lights off	Red light on
4	Verification	In order to read card data, the card is reciprocated and reading ends successfully if there is agreement with the set data.	*3	Lights off	Green light on
		An error occurs if the data does not match.	*3	Lights off	Red light on
5	Completion as OK or error	The card waits inside the reader/writer.	-	Lights off	Red/green lights on

*1: Lighting of the LEDs is only valid when LED control by the reader/writer has been selected with the system reset command.

*2: When the card has been ejected (execution of eject command or system reset command), the machine is set to the card removal waiting state. In this state, card reciprocation does not start. In this case, **pull out the card and then reinsert it**. The reader/writer will then begin card reciprocation.

* 3. Transmission Format

STX	CMD	Verification results			ETX	BCC	
		Track 1RS	Track 2RS	Track 3RS			
02h	31h	-	-	-	03h	-	Code
1	1	1	1	1	1	1	Number of characters

* Description of RS (Read Status)

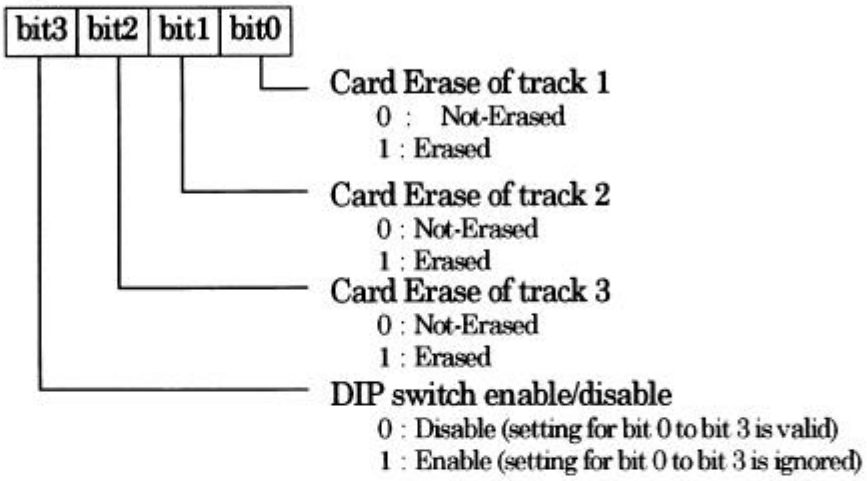
Code	Meaning
30h	Normal
31h	STX error
32h	ETX error
33h	Parity error
34h	LRC error
35h	Format error
36h	Verification error
37h	--
38h	Reading of incorrect track
39h	Other error (LRC not detected, etc.)

(6) Card Erasure

When 0h is written in the card, the data is deleted.

STX	CMD	Clear track NO.	ETX	BCC	
02h	32h	—	03h	—	
1	1	1	1	1	Code
					Number of characters

Clear track No. : 3 × h (1 byte required)



After reception of command the machine returns ACK (06h), the R/W LED (orange) lights, indicating WRITE, and the card waiting state is set. After the card is inserted, ETB (17h) is sent. In case of Data Clear OK the card data is sent, the OK/ERR LED (green) lights, indicating OK. In case of error DC2 (12h) is sent, the OK/ERR LED (red) lights, indicating ERROR.

(The LED lighting is valid only in the case when the from-machine LED control is selected.)

After completion of card reading the card waits in the machine.

<<Caution>> :

When the card has been ejected (execution of eject command or system reset command), the machine is set to the card removal waiting state. In this state, card reciprocation does not start. In this case, pull out the card and then reinsert it. The reader/writer will then begin card reciprocation.

(7) Verify OFF Card Write

Data is written onto the card based on received data. This command does not perform a check as to whether or not data was actually written.

STX	CMD	Card data					ETX	BCC	
		Track 1	US	Track 2	US	Track 3			
02h	33h	—	1Fh	—	1Fh	—	03h	—	Code
1	1	0 to 76	1	0 to 37	1	0 to 104	1	1	Number of character

1. In the absence of US, all data is written to the track specified with the DIP switch.
2. When lower-case characters are contained in the reception data track, they are written as upper-case characters.

	Status	Operation	Transmission Data	R/W LED (※1)	OK/ERR LED (※1)
1	During command receiving	The next check is performed on received data and if OK, the machine waits for insertion of the card. (However, reciprocation starts if a card is waiting inside the reader/writer.) ①The number of US must be 0 or 2 ②The number of data characters of each track must be within standards	ACK (06h)	Orange light on	Lights off
		The command is not executed in the case of a command error.	CAN (18h)	—	—
		The command is not executed in the case of a communication error.	NAK (15h)	—	—
2	Waiting for card insertion	When a card is inserted, the device transports the card and writes data to the card (*2).	ETB (17h)	Orange light on	Lights off
3	Card reciprocation	When card transport is OK, data verification begins.	—	Orange light on	Lights off
		When card transport is NG, operation is interrupted.	DC2 (12h)	Lights off	Red light on
4	Completion as OK or error	The card waits inside the device.	DC1(11h)/ DC2(12h)	Lights off	Red /green lights on

*1: Lighting of the LEDs is only valid when LED control by the reader/writer has been selected with the system reset command.

*2: When the card has been ejected (execution of eject command or system reset command), the machine is set to the card removal waiting state. In this state, card reciprocation does not start. In this case, pull out the card and then reinsert it. The reader/writer will then begin card reciprocation.

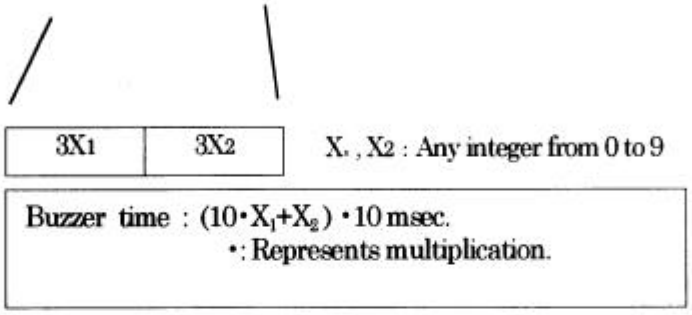
(8) Buzzer Control

The buzzer is sounded for the specified time.

STX	CMD	Buzzer data	ETX	BCC	
02h	40h	—	03h	22h	Code
1	1	2	1	1	Number of characters

After reception of command the machine returns ACK (06h) and sounds the buzzer for the time given by the following formula, and then sends ETB (17h).

• Buzzer data : "00" to "99" (2 characters required)

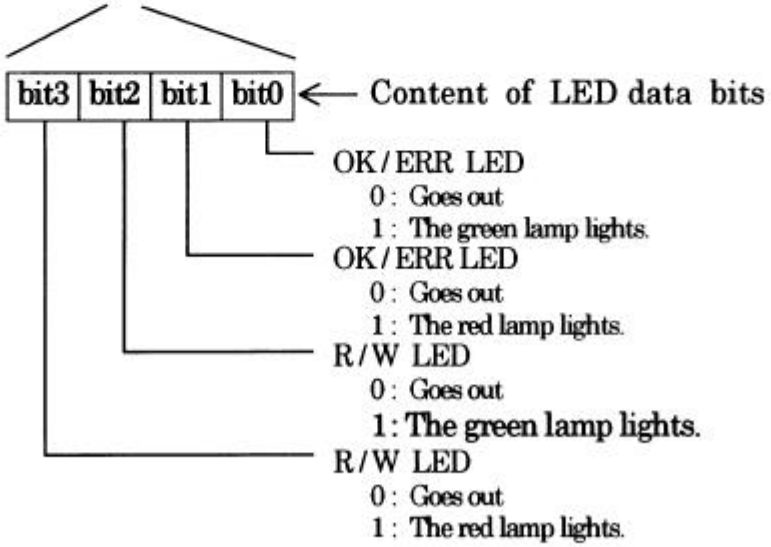


(9) LED Control

The R/W and OK / ERR LED turning-on / turning-off is executed.
After reception of command the machine returns ACK (06h), and after the LED lights/goes out it sends ETB (17h).

STX	CMD	System information	ETX	BCC	
02h	41h	LED data	03h	—	Code
1	1	1	1	1	Number of characters

• LED data : 3 × h (1 byte required)



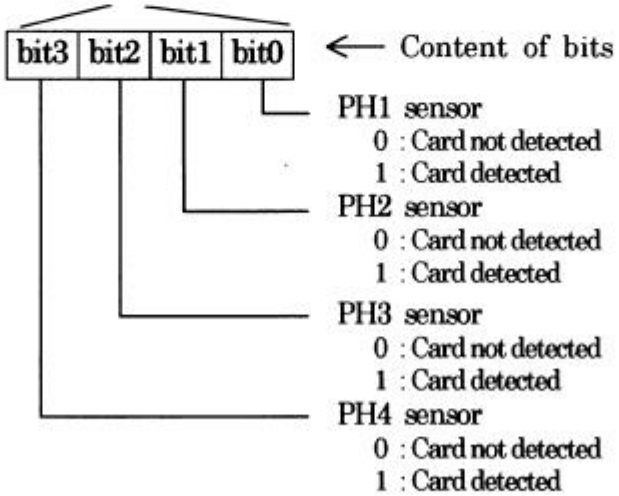
(10) Reading of System Information

The setting of LED / buzzer, setting of object track, execution / non-execution of card removal / insertion , and settings of DIP switch are read.
After reception of command the machine returns ACK (06h) and sends the system information.

STX	CMD	System information	ETX	BCC	
02h	50h	LED data	03h	—	Code
1	1	21	1	1	Number of characters

System information			
INDEX	Number of characters	Parameter	Remarks
0	1	Buzzer/LED setting	SYSTEM RESET command buzzer/LED parameter
1	1	R/W track	Settings of DIP switch
2	1	R/W coercive force	SYSTEM RESET command coercive force parameter
4	1	Card state	Removal / insertion waiting / non-waiting 30h : R / W command reception enable 31h : Card removal waiting state
3	1	Card position/exist non-existence	Sensor state (*)
5	1	DIP switch 1	Sending from LSB ON : 31h OFF : 30h
13	1	DIP switch 2	Sending from LSB ON : 31h OFF : 30h

(*) Card position : 3 × h (1 byte required)



he sensors PH1 to PH4 are four sensors located n order in vicinity of card insertion port.

(11) Version Reading

The hardware model and software version are transmitted.

STX	CMD	ETX	BCC	
02h	59h	03h	5Ah	Code
1	1	1	1	Number of characters

After receiving a command, the machine sends back ACK (06 h) and transmits version information (character sequence).

• Transmission Format

STX	CMD	Version information	ETX	BCC	
02h	59h	-	03h	-	Code
1	1	-	1	1	Number of characters

(12) Card Ejection

The card is ejected. If the command is executed normally, the card is ejected to the position where the card can be taken out manually.

After execution of command the machine is set to the card removal waiting state. Accordingly, the READ / WRITE command is not executed unless the card is once removed and inserted.

STX	CMD	ETX	BCC	
02h	60h	03h	63h	Code
1	1	1	1	Number of characters

After reception of command the machine returns ACK (06h) , and after ejection of card ETB (17h) is sent. If card jam occurs, DC2 (12h) is sent to quit execution.

<<Caution>>:

If the card was ejected as a result of execution of this command, the machine is set to the card removal waiting state. If you want to continue reading/writing, once remove and insert the card.

(13) Card Rear Ejection

The card is ejected towards the side opposite from the card insertion port.

STX	CMD	ETX	BCC	
02h	70h	03h	73h	Code
1	1	1	1	Number of characters

When the machine is in the state that allows execution of this command, after receiving the command, the machine sends back ACK (06 h) and send ETB (17 h) after ejecting the card. When the machine is in the state that does not allow execution of this command (the machine is set to this state when shipped from the factory), the machine sends back CAN (18 h) and interrupts execution. If a card becomes jammed in the machine, the machine sends DC2 (12 h) and interrupts execution.

<<Caution>>:

This command should only be used when the machine is not installed in a rack. Do not use this command with UERW. In the case of using with UERW, the use of this command may result in damage to the card and UERW.

(14) Read/Write/Parameter Setting of Raw Data

This command sets card parameters (data length, etc.), and, based on these parameters, sends data received by the machine to the card.

- Message Format

DLE	STX	CMD	Data/Parameters	DLE	ETX	BCC	
10h	02h	71	-	10h	03h	-	Code
1	1	1	-	1	1	1	Number of characters

Data/parameters are subjected to the following restrictions.

1. DLE (10 h) is added in front of the US (17 h) of the control code.
2. DLE (10 h) is added in front of the code that matches DLE (10 h).

- Parameter Reading/Setting/Initial Values

This is used to set parameters, read set parameters and initialize to parameters identical to ISO standards.

DLE	STX	CMD	Parameter setting	R/W/ initial value	Single character bit length	Parity	Start Code	End Code	75/ 210BPI	DLE	ETX	BCC
10h	02h	71h	39h	30h/31h/32h	*1	*2	*3	*4	*5	10h	03h	-
1	1	1	1	1	0/3/0*	0/3/0*	0/3/0*	0/3/0*	0/1/0*	1	1	1

*: Corresponds to respective characters during parameter reading (R), setting (W) or initialization.

*1: Single character bit length of card data

Track 1	Track 2	Track 3	
'4' to '8'	'4' to '8'	'4' to '8'	Code
1	1	1	Number of characters

*2: Parity even/odd/none of card data

Track 1	Track 2	Track 3	
'0' / '1' / '2'	'0' / '1' / '2'	'0' / '1' / '2'	Code
1	1	1	Number of characters

*3: Start code (value other than 0 at STX on card)

Track 1	Track 2	Track 3	
-	-	-	Code
1	1	1	Number of characters

*4: End Code (LSB has value of 1 at ETX on card)

Track 1	Track 2	Track 3	
-	-	-	Code
1	1	1	Number of characters

*5: BPI

(Track 2) 75/210BPI	
'0' / '1'	Code
1	Number of characters

· Reading

Card data is read based on the set parameters after which the results are transmitted.

DLE	STX	CMD	Read	Parameter	DLE	ETX	BCC	
10h	02h	71h	30h	-	10h	03h	-	Code
1	1	1	1	1	1	1	1	Number of characters

The parameters and operating sequence are the same as during the card read command (30 h). The reader/writer transmits the results of reading the card in the following format.

DLE	STX	CMD	Parameter setting	Description of card data/error										DLE	ETX	BCC
				RS	Track1	DLE	US	RS	Track2	DLE	US	RS	Tracl3			
10h	02h	71h	30h	*	-	10h	1Fh	*	-	10h	1Fh	*	-	10h	03h	-
1	1	1	1	1	0 to 128	1	1	1	0 to 128	1	1	1	0 to 128	1	1	1

* Description of RS (Read Status)

Code	Meaning
30h	Normal
31h	STX error
32h	ETX error
33h	Parity error
34h	LRC error
35h	Format error
36h	–
37h	–
38h	Incorrect reading
39h	Other error (LRC not detected, etc.)

• During Writing

Data is written to the card based on reception data.

DLE	STX	CMD	write	Description of card data/error							DLE	ETX	BCC
				Track1	DLE	US	Track2	DLE	US	Track3			
10h	02h	71h	31h	*1	10h	1Fh	*1	10h	1Fh	*1	10h	03h	-
1	1	1	1	0 to 128 *2	1	1	0 to 128 *2	1	1	0 to 128 *2	1	1	1

*1: The reception code is written directly to the card.

*2: This does not necessarily guarantee the amount of data that can be written. The amount of data that can be written varies according to the number set for 0 preamble and magnetic flux density.

Data is written to the card based on the set parity, single character bit number, start code and end code that were set for the parameters. The parameters and operating sequence are the same as those during the card write command (31 h).

The machine performs verification after writing and transmits the results of verification in the format indicated below.

DLE	STX	CMD	write	Description of results of verification				DLE	ETX	BCC	
				Track 1RC	Track 2RC	Track 3RC	Track 4RC				
10h	02h	71h	31h	*	*	*	*	10h	02h		Code
1	1	1	1	1	1	1	1	1	1	1	Number of characters

* Description of RS (Read Status)

Code	Meaning
30h	Normal
31h	STX error
32h	ETX error
33h	Parity error
34h	LRC error
35h	Format error
36h	Verification error
37h	-
38h	Incorrect reading
39h	Other error (LRC not detected, etc.)

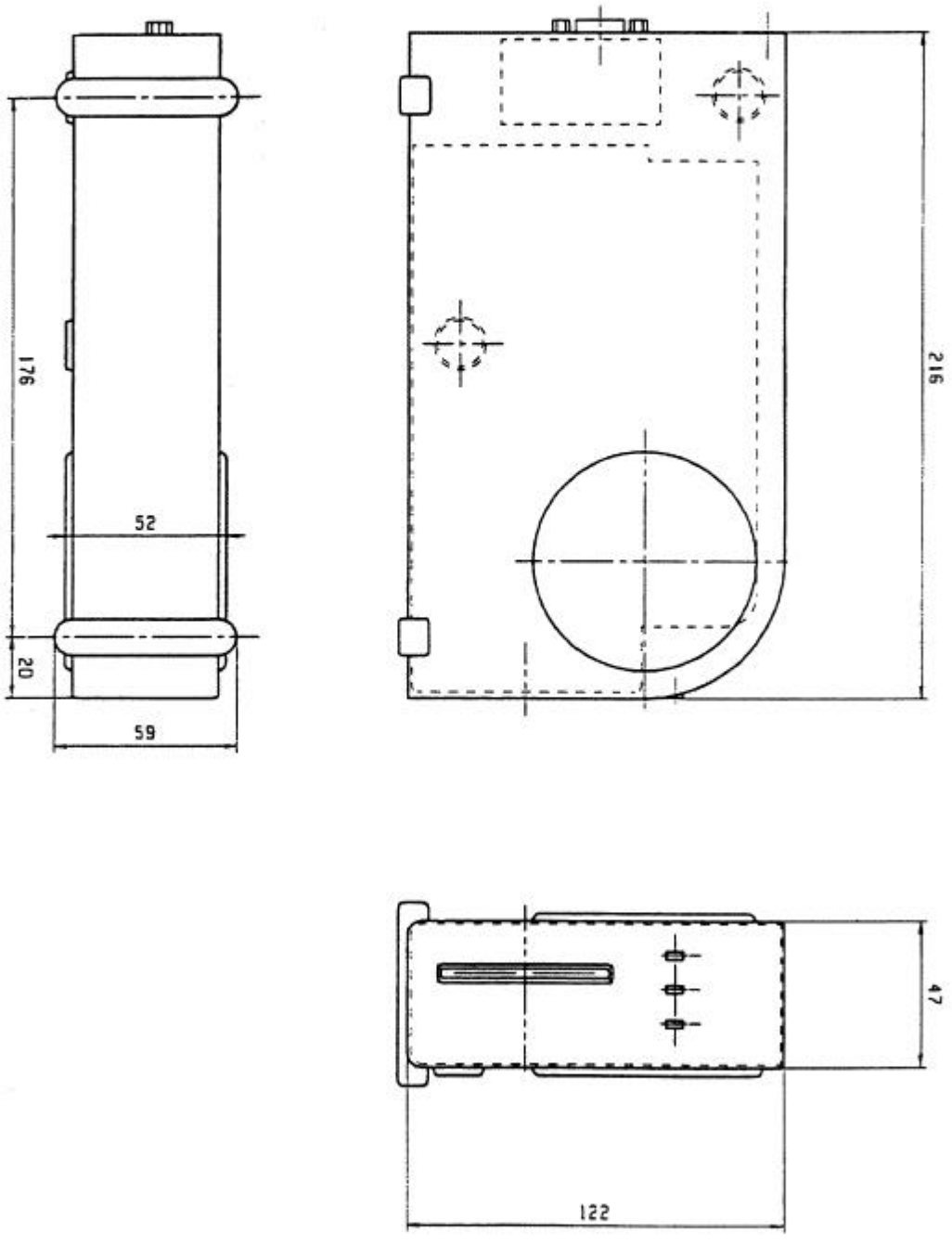
7-3. Command Sequence List

	Command	Host end	Direction of communication	Main Frame end
1	System Reset <20h>	STX., 20h., Parameter, ETA, BCC	→	
			←	ACK : OK / NAK : Communication Error / CAN : Command error
				Reset
			←	ETB:OK / DC2:ERR
2	Command Cancel <21h>	STX., 21h, ETX, BCC	→	
			←	ACK : OK / NAK : Communication Error / CAN : Command error
				Cancellation of Standby For card insertion
			←	ETB
3	Preamble Set /Read <22 h>	Set	→	
		STX, 22h, Tr1 parameter, US, Tr2 parameter, US, Tr3 parameter, ETX, BCC	←	ACK: OK/NAK: Communication error/ CAN: Command error
				Reset
			←	ETB
		Read	→	
		STC, 22h, ETX, BCC	←	ACK: OK/NAK: Communication error/ CAN: Command error
			←	STX, 22h, Tr1 parameter, US, Tr2 parameter, US, Tr3 parameter, ETX, BCC
4	Card Read <30h>	STX. 30h.Trk1. DATA.US. Trk2 DATA.US. Trk3.DATA.ETX. BCC. OK without : Trk DATA : data of n track	→	
			←	ACK : OK / NAK : Communication Error / CAN : Command error
				Card insertion
			←	ETB
			←	Card reading DC1 : OK / DC2 : ERR
5	Card Writing With Verification <31 h>	STX, 31h, Tr1 DATA, US, Tr2 DATA, US, Tr3 DATA, ETX, BCC Trn DATA not required Note: Trn DATA: Data of nth track	→	
			←	ACK: OK/NAK: Communication error/ CAN: Command error
				Card insertion
			←	ETB
				Card writing
			←	STX, 31 h, Tr1 RC, Tr2 RC, Tr3 RC, ETX, BCC: OK, /DC2: ERR (*)
6	Card Erasure <32h>	STX , 32h., Parameter, ETX, BCC	→	
			←	ACK : OK / NAK : Communication Error / CAN : Command error
				Card insertion
			→	ETB
				Card Data Is Deleted
		Note: Trn DATA: Data of nth track	←	DC1: OK/DC2: ERR
7	Card Writing Without Verification <33 h>	STX, 33 h, Tr1 DATA, US, Tr2 DATA, US, Tr3, DATA, ETX, BCC	→	
			←	ACK: OK/NAK: Communication error/ CAN: Command error
				Card insertion
		Trn DATA not required	←	ETB
				Card writing
		Note: Trn DATA: Data of nth track	←	DC1: OK/DC2: ERR (*)

*: ERR refers to the card becoming jammed inside the reader/writer during card reciprocation. Whether or not R/W results are normal is checked with the value of RC.

8	Buzzer control <40h>	STX, 40h, .Parameter, ETX, BCC	→ ← ←	ACK : OK / NAK : Communication Error / CAN : Command error Buzzer on ETB
9	LED control <41h>	STX, 41h., Parameter., ETX, BCC	→ ← ←	ACK : OK / NAK : Communication Error / CAN : Command error LED lamps turned on/off ETB
10	System information read <50h>	STX, 50h., Parameter, ETX, BCC	→ ← ←	ACK : OK / NAK : Communication Error / CAN : Command error STX, 50h, System information ETX, BCC
11	Reading of Version Information <59 h>	STX, 59h, ETX, BCC	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error STX, 59 h, version information, ETX, BCC
12	Card eject <60 h>	STX, 60h, ETX, BCC	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error Card eject ETB: OK/DC2: ERR
13	Card Rear Eject <70 h>	STX, 70h, ETX, BCC	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error Card rear eject EBT: OK/DC2: ERR
14	Raw Data Read/Write <71 h>	Parameter reading DLE, STX, 71 h, 39 h, 30 h, DLE, ETX, BCC	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error DLE, STX, 71 h, 39 h, 31 h, parameter, DLE, ETX, BCC
		Parameter writing DLE, STX, 71 h, 39 h, 31 h, parameter, DLE, ETX, B	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error ETB: OK/DC2: ERR
		Parameter initial value STX, 71 h, 39 h, 32 h, ETX, BCC	→ ← ←	ACK: OK/NAK: Communication error/ CAN: Command error ETB: OK/DC2: ERR
		Raw data reading DLE, STX, 71 h, 30 h, parameter, DLE, ETX, BCC Note: Trn DATA: Data of nth track	→ ← ← ←	ACK: OK/NAK: Communication error/ CAN: Command error Card insertion ETB Card reading DLE, STX, 71 h, 30 h, RC, Tr1 DATA, DLE, US, RC, Tr2 DATA, DLE, US, RC, Tr3 DATA, DLE, ETX, BCC: OK /DC2: ERR(*)
		Raw data writing DLE, STX, 71 h, 31 h, parameter, DLE, ETX, BCC	→ ← ← ←	ACK: OK/NAK: Communication error/CAN: Command error Card insertion ETB Card writing STX, 31 h, Tr1 RC, Tr2 RC, Tr3 RC, DLE, ETX, BCC: OK / DC2: ERR (*)

8. External Appearance



9. Cares When Handling

9-1. When the magnetic head is contaminated , the READ / WRITE error occurs. Periodically clean the magnetic head . (It is advisable to use the cleaning card .)

9-2. When connecting or disconnecting the connector , be sure to turn off the power in advance .

9-3. When changing the setting of DIP switch , be sure to turn off the power in advance .

9-4. In order to prevent damage and troubles to the machine , supply the specified power .

9-5. Carefully handle the cards so that the important data is not lost by mistake . The manufacturer does not assume responsibility for loss of card data .

9-6. The number of times cards reciprocated per minute must be no more than 20.

9-7. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
4. Consult the JSW, or an experienced radio/TV technician for assistance.

10 . Warranty

10-1. The warranty period of the product is one (1) year after delivery .
If defect is found within the warranty period , please send the product to the manufacturer , and it will be repaired and returned promptly .
However , in the following cases the repair must be executed at user's expenses even within the warranty period

(1) When the machine was used in an environment not specified in the product specification or in an excessively severe environment .

(2) When the machine was dropped or is affected by shock .

(3) When the machine was used by a method not specified in the product specification .

(4) When the machine was modified by the user .

(5) When the machine was repaired by the user .

(6) Natural calamity

(7) Troubles caused by contamination of magnetic head

10-2. The warranty is valid only for the product but does not cover loss or damages caused by use of the product .

Due to improvement of the product, part of the specification may be changed without notice .

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