R4945A

EPROM Programmer

Operation Manual

MANUAL NUMBER FOE-8311253A03

This product has been discontinued.
The Operation Manual is provided by ADC Corporation under the agreement with Advantest Corporation.

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Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that ADC Corporation (hereafter referred to as ADC) bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by ADC, the protection provided by the equipment may be impaired.

• Warning Labels

Warning labels are applied to ADC products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest ADC dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

• Basic Precautions

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protective conductor terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.
- Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on ADC products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the ADC sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.
- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.
- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

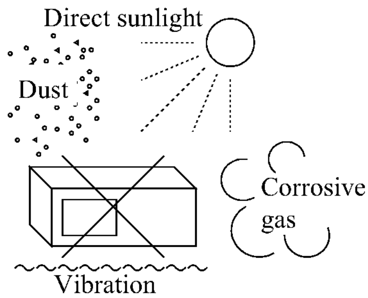
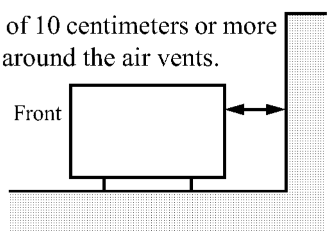


Figure-1 Environmental Conditions

- Operating position

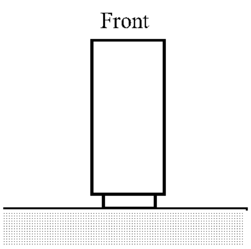
A clear space of 10 centimeters or more must be kept around the air vents.



The instrument must be used in a horizontal position.
To prevent the internal temperature from rising, cooling fans are installed in some instruments.
The air vents on the case must be unblocked.

Figure-2 Operating Position

- Storage position



This instrument should be stored in a horizontal position.
When placed in a vertical (upright) position for storage or transportation, ensure the instrument is stable and secure.

-Ensure the instrument is stable.
-Pay special attention not to fall.

Figure-3 Storage Position

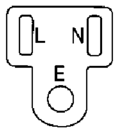
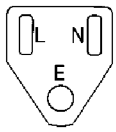
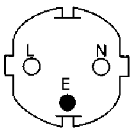
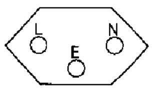
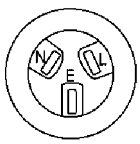
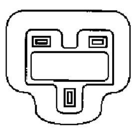
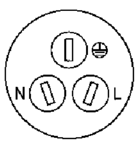
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

Notice

Please read the words in this manual as below, because the model R4945 has been replaced with a new model R4945A.

	New	Old
① Model Number :	R4945A	R4945
② Buffer RAM memory :	16Mbit	8Mbit

PREFACE

1. Unless specified otherwise concerning the socket adapter, it is assumed that the standard type (R49451A) is used.

2. The composition of this manual is as follows.

Composition	Content	For the beginner of the ROM programmer	For the expert of the ROM programmer
Chapter 1 GENERAL	Outline of the Product, Standard Attachment List, General Precautions, Setup Method	Be sure to read.	Be sure to read.
Chapter 2 BASIC OPERATION	Basic Key Operation Method, Description of the Displays	Be sure to read.	Can start the operation with references to this chapter and [A.4 Command Table] and [A.5 Command Flow Chart] of the Appendix.
Chapter 3 EXAMPLES OF OPERATION	Examples of operation of the copy of the master device (ROM) etc.	Be accustomed to the operation with the following two examples. (1) Copy of the master device (ROM) (2) Comparison of the master device (ROM) with the written device (ROM)	As required, refer.
Chapter 4 SETTING THE ROM TYPE	Function and operation method of the main command key [TYPE]	Refer to the chapter on the required function.	
Chapter 5 WRITING IN ROM	Function and operation method of the main command key [DEVICE]		
Chapter 6 DATA EDIT	Function and operation method of the main command key [EDIT]		

(cont'd)

Composition	Content	For the biginner of the ROM programmer	For the expert of the ROM programmer
Chapter 7 DATA TRANSMISSION	Function and operation method of the main command key [SELECT]	Refer to the chapter on the required function.	
Chapter 8 DEBUG RAM FUNCTION			
Chapter 9 FUNCTIONS OF THE SWITCHES			
Chapter 10 BACKUP OF THE SET VALUES AND CONFIR-MATION OF REVISION			
Chapter 11 ERROR TREATMENT	Countermeasure for the errors	when an error, refer.	
Chapter 12 REMOTE CONTROL	How to go to the remote control mode, description on the differences from the basic control sequence	As required, refer.	
Chapter 13 MAINTENANCE	How to replace the MUP socket and fuse, operation check method	When it is necessary to replace the MUP socket or fuse or check the operation, refer.	
Chapter 14 DESCRIPTION OF THE OPERATIONS	Description of the operations	As required, refer.	
Chapter 15 SPECIFICATIONS	Specification list		
APPENDIX	Device setting code list, remote control,franslation format, abbreviation list, description of ferminology		
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EXTERNAL VIEW			

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1. GENERAL

1.1 Outline of R4945

(1) Programming is enabled by specifying the typical MOS type PROM of from 16K bits to 4M bits through the key board.

(2) The special programming circuit is employed to enable high-speed write operation.

(3) The socket adapter type makes it possible to correspond to a variety of the packages.

(4) The device is protected from malfunction by the reverse insertion and insertion failure preventive checks, power-down at the time of device insertion and ID-CHECK mode.

(5) The reliability check functions such as Vcc margin check, V_{OH}, V_{OL} level check and sum check functions check the quality of the device after programming is finished.

(6) Simultaneous write of split data is possible.

(7) Nine types of translation formats are provided as standard.

(8) Eight types of data edit functions are provided.

(9) The interfaces for serial I/O (RS-232C) and parallel I/O (based on Centronics) are provided as standard and the remote control is enabled by the serial interface.

(10) The applicable voltage and frequency of the power supply are AC 90V to 250V and 48Hz to 66Hz respectively to correspond to world-wide use.

(11) The 8M bit buffer RAM is provided as standard to enable 4M bit split write.

(12) The option buffer RAM (No. +80) enables an extension up to 16M bits.

1.2 Check of Attachments

Upon receipt of this equipment, run checks thereon as shown below.

① Run visual checks against any and all damages or imperfections.

② Check the quantity and rating of standard attachments to assure their conformance with Table 1-1.

In the event of any damage, missing standard attachments, or equivalent, contact an ADC CORPORATION sales representative.

Request to User : When ordering add-on attachments and the like, be good enough to stipulate the model (or stock) No. concerned.

Table 1 - 1 Standard Attachments

	Product name	Model	Stock No.	Q'ty	Remarks
1	Socket adapter	R49451A	-	1	
2	Power supply cable	A01402	DCB-DD2428X01	1	
3	Power supply adapter	A09034	JCD-AL003EX03	1	
4	Power supply fuse	T0.4A/250V	DFT-AAR4A	2	
5	Operation manual	-	JR4945	1	Japanese
		-	ER4945		English

1.3 Environmental Condition for Use

1.3.1 Environmental Condition

(1) Avoid use on a place with much dust, corrosive gas and direct sun light. Use this equipment under the ambient temperature of 0 to 40°C and ambient humidity of less than 85%.

(2) Do not install other equipment generating noise near this equipment. Avoid programming to the device at a place with noise sources.

(3) Use the receptacle provided with the grounding wire.

(4) Take a care so that no sudden change or abnormal reduction of the voltage of the AC line power supply occurs during the operation of this equipment.

(5) Because heat is radiated by ventilation for cooling and natural convection from the ventilation port on the top of the main body, do not block the ventilation port by placing an object on the top.

(6) Because the LCD (liquid crystal display) is used, avoid use at a place with serious mechanical impact or vibration.

(7) When using this equipment and device, take measures to prevent static electricity (using the grounding band).

1.3.2 Storage

If you do not use this equipment or the adaptor for a long time, cover it with the vinyl sheet, pack it in the corrugated box used for shipment to you and place the box at a place with low humidity, no direct sun light and low temperature.

1.3.3 Transportation

If you transport this equipment, use the package used for delivery to you.
If you lose the package, pack in the following manner.

① Wrap this equipment with vinyl sheet.

② Put the equipment into the corrugated box of the thickness of more than 5 mm, with the shock absorber inside.

③ Put the attachments, place the shock absorber on the top, close the corrugated box and tie the packing string.

1.3.4 Cleaning

The R4945 should be cleared periodically with a soft cloth.

CAUTION

Do not use solvents such as benzene, toluene, acetone, and other organic solvents that can affect plastic.

1.4 Set-up

1.4.1 Power Supply

Use this equipment under the power supply voltage of AC 90V to 250V and the frequency of 48Hz to 66Hz.
When connecting the power cable to the AC power supply, check that the POWER switch on the rear panel is set to OFF.

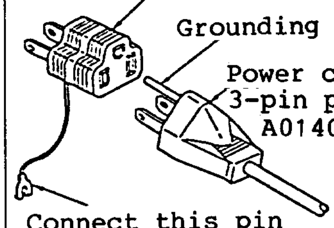
1.4.2 Power Cable

The plug of the power cable is provided with three pins and the round pin is for grounding. (See Figure 1-1 (a).)
Use the receptacle provided with the grounding facility. If you use only two pins, connect the adapter (A09034) attached to the plug to the receptacle. In this case, be sure to connect the grounding lead wire from the adapter to the external grounding wire or the ground. As shown in Figure 1-1 (b), the adapter A09034's two electrode widths are different and therefore when inserting into the receptacle, check the directions of the plug and receptacle. If the adapter A09034 cannot be used with your available receptacle, use the adapter KPR-13 (optionally available).

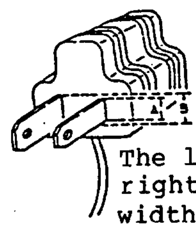
NOTE

1. Unless the grounding wire is attached, the equipment may malfunction due to the noise from the power line.

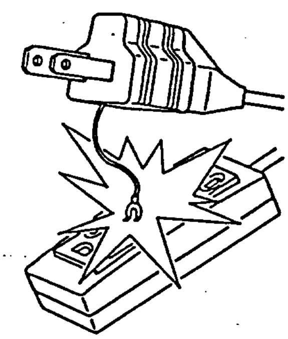
2. When the grounding wire from the adapter is connected, take a care not to make it contact the AC power supply. If it is made in contact by mistake, this equipment or other devices may be damaged.



(a) Power plug



(b) Adapter A09034



Take a care of short-circuit of the adapter grounding lead wire.

Figure 1 - 1 Plug and adapter of the power cable

1.4.3 Socket Adapter Connection

Replace the socket adapter depending on the device. See the device setting code list of the section A.1.

CAUTION

1. Do not connect the socket adapter until the POWER switch is turned OFF. However, if the socket adapter must be replaced with data maintained, press the RESET button to initialize the condition and replace it.

2. If the power is turned ON with the device inserted in the socket, the device may be damaged. Never turn ON the power with the device inserted.

Connection method

① By inserting the two guide pins of the socket adapter into the guide pin holes of the main body, set the socket adapter along the slope of the main body.

② Force the socket adapter so that the connector is connected securely.

③ If the socket adapter is set parallel to the slope without clearance, the connection is completed.

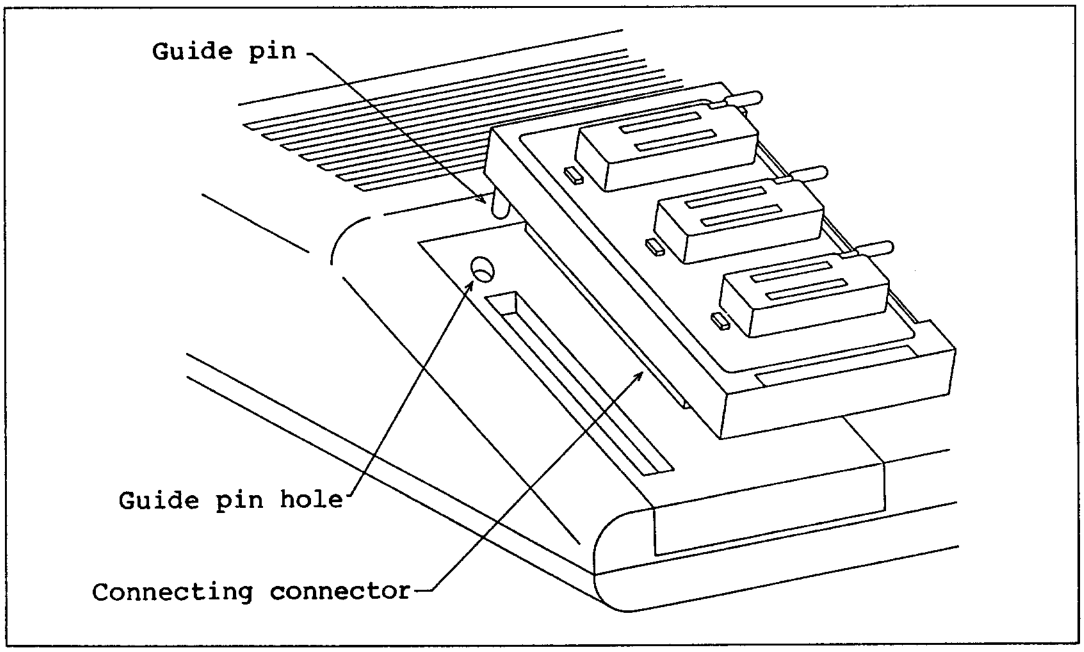


Figure 1 - 2 Connection of the socket adapter and main body

2. BASIC OPERATION

The basic key operation and display are described below.

2.1 Power ON/OFF

(1) How to turn ON the power

① Check that the POWER switch on the rear panel is OFF and that no device is inserted into the socket.

↓

② Connect the power cable to te AC POWER connector on the rear panel.

↓

③ Turn ON the POWER switch. The initial condition is displayed if there is no error in the internal operation.

↓

COPY 390552 MBM27C4000	Initial condition (The display content differs depending on the setting.)

(2) How to turn OFF the power

① Press the [RESET] button.
The initial condition is displayed.

↓

```
COPY          100570
Am27C1024
```

Initial condition
(The display content differs depending on the setting.)

↓

② Extract the device from the socket.

↓

③ Turn OFF the POWER switch.

2.2 Insertion of the Device (ROM)

The standard socket adapter (R49451A) to be connected to this equipment is provided with three sockets (MUP socket). When setting the applicable device type, the LED on the left side of the socket lights. Insert the device into the socket and fasten it by turning down the lever.

CAUTION

Be sure to insert the device in the initial condition. If the power is turned ON/OFF with the device inserted or the devide is extracted during the execution of the function, the device may be damaged.

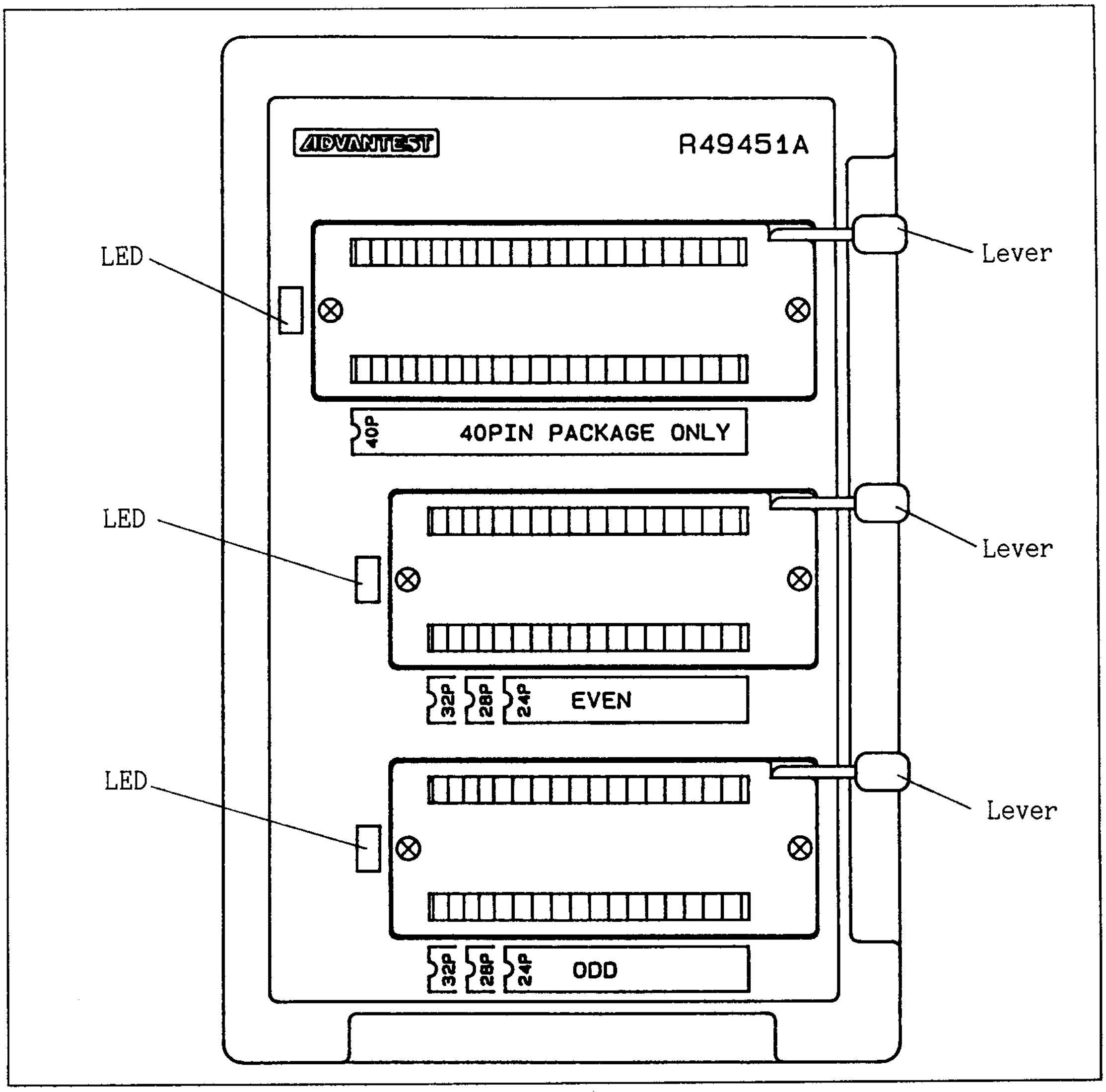


Figure 2 - 1 Standard socket adapter (R49451A)

2.3 Basic Key Operation

(1) Description of keys

[SELECT] [EDIT] [TYPE ◁] [DEVICE ▷] --- Sets the main commands. The TYPE key and DEVICE key move the cursor also.

[0] to [F] ---- Sets the sub-commands and parameters by direct key entry.

[▽] [△] --- **Roll key**
Sets the sub-commands and parameters in the roll mode. Valid when the display is surrounded with [ ]. However, although no [ ] is displayed when a sub-command or device name is selected, this key is valid. (See the section 2.5.)

[SET] ----- Executes the individual operations and terminates the key setting.

[RESET] ----- Cancels the operation and returns to the initial status.

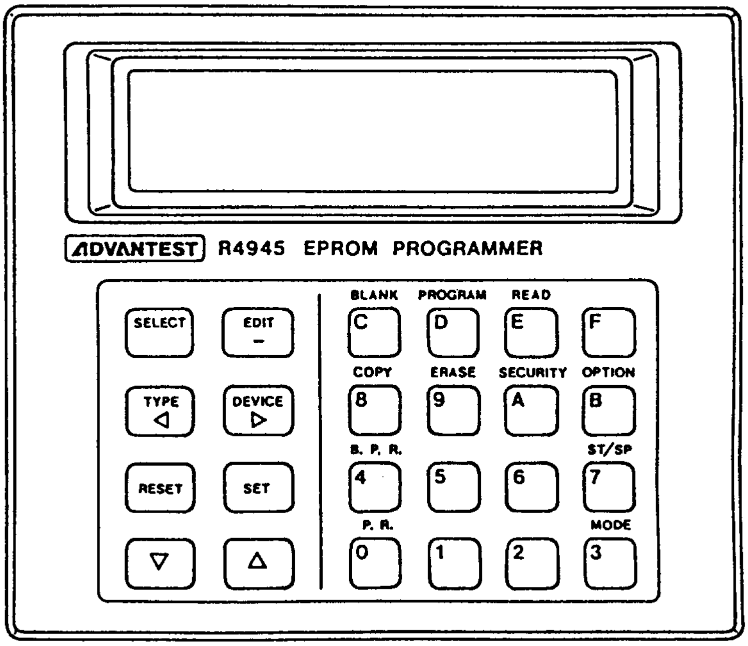
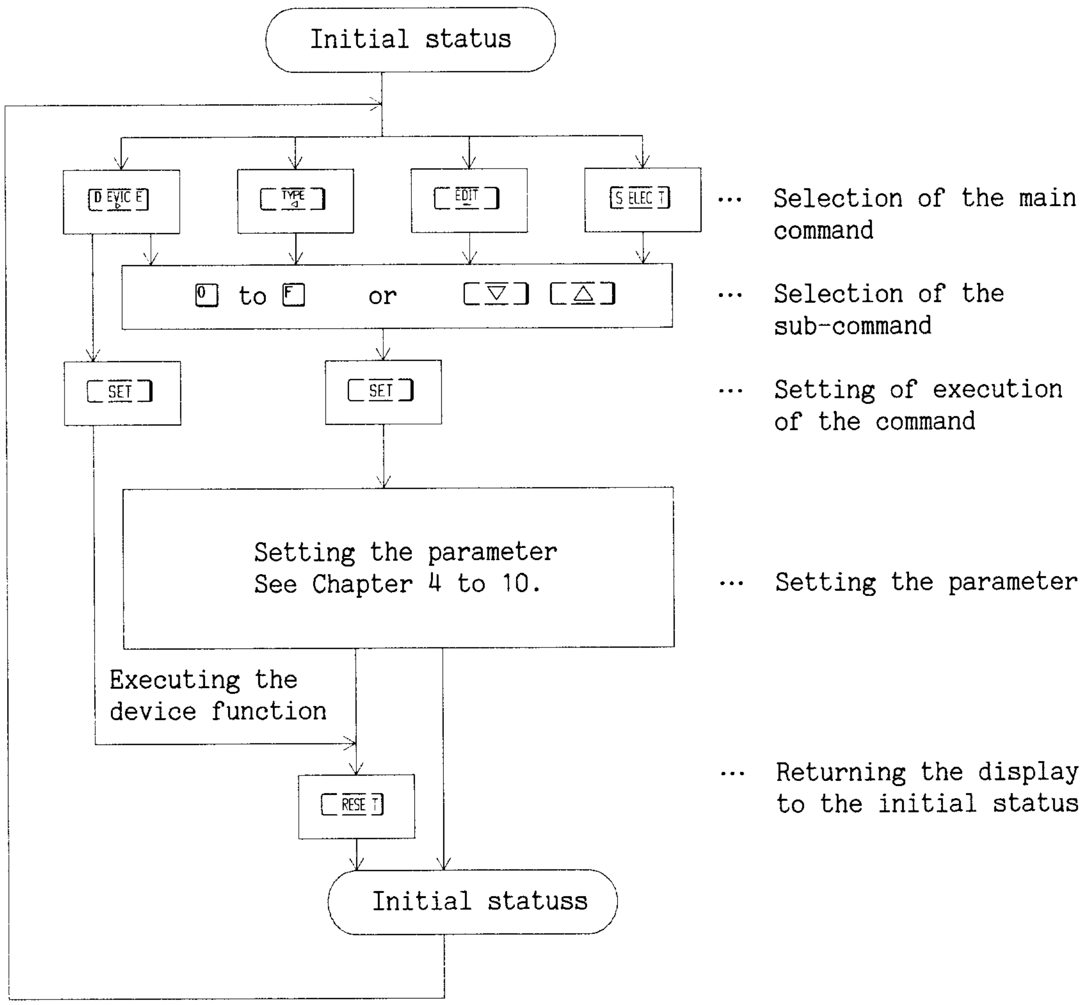


Figure 2 - 2 Front view of the panel (part)

(2) Key operation flow



2.4 Command Functions

This section describe the main commands and sub-commands. For the operation method, parameter function and precautionary notes, refer to Chapter 4 to 10.

(1) TYPE command

The TYPE command has the function to select the device type (TYPE code, device name, device manufacturer).
First, set the type for the device which you will use.

Table 2 - 1 TYPE Sub-Command Function

Sub-command	Function
0	Sets with 6-digit TYPE code. See item A.1.1.
1	After the manufacturer name is selected, selects and sets the device name.
2	After the size (16K, 32K, 64K, etc.) is selected, selects and sets the device name.
4	At the time of device function execution, automatically Sets the type on the device containing ID code (manufacturer code and device code).
5	Automatically sets the type by reading the code of the device containing ID code (manufacturer code and device code).
F	Outputs the manufacturer code, manufacturer name, type code and device name with ASCII code to the serial or parallel interface.

(2) DEVICE command

The DEVICE commands have the functions to set and execute the copy of device (ROM) data to the buffer RAM (incorporated memory) and writing of data on the buffer RAM into the device.

Table 2 - 2 DEVICE Sub-Command Function

Sub-command	Function
0	P. R Actuates PROGRAM-READ continuously.
3	MODE Sets the allocation of the buffer RAM address to the device address when COPY or PROGRAM is executed.
4	B. P. R Actuates BLANK-PROGRAM-READ continuously.
7	ST/SP Sets the start address and stop address for executing COPY or PROGRAM.
8	COPY Copies data written in the device to the buffer RAM.
9	ERASE Changes the electrically-erasable device (EEPROM) to the no-written condition.
A	SECURITY Disables the data written in the security provided device only to be read out.
B	OPTION Available for adding the extension function for future.
C	BLANK Checks whether the device is in no-written condition.
D	PROGRAM Writes the data on the buffer RAM into the device.
E	READ Checks whether the data written on the device corresponds to the data on the buffer RAM.

(3) EDIT command

The EDIT command has the function to edit the content of the data on the buffer RAM (incorporated memory).

Table 2 - 3 EDIT Sub-Command Function

Sub-command	Function
0	Confirms and changes the data at arbitrary address.
1	Inserts the data in specified address or between specification addresses.
2	Delets the data in specified address or between specification addresses.
8	Indicates the sum value between arbitrary addresses or of the fuse data.
9	Sets the data in between specified addresses.
A	Moves the data between specified addresses.
B	Exchanges the data between specified addresses.
C	Reverses the data between specified addresses.
D	Retrieves a specified data in all the buffer RAM area.
F	Clears the data between the specified addresses of the buffer RAM.

(4) SELECT command

The SELECT command has the following functions.

① Setting and execution of the function when data is transmitted.
② Setting ON/OFF of the switch function (buzzer sound, pre-check, ID check, time-out)
③ Operation check function
④ Revision confirmation
⑤ This command has the functions to maintain the set parameter (parameter data) after the power is turned OFF.
⑥ Initialize the parameter data.

Table 2 - 4 SELECT Sub-Command Function

Sub-command	Function
0	Executes serial input.
1	Executes serial output.
2	Executes serial verification.
3	Sets the transmission format.
4	Executes parallel input.
5	Executes parallel output.
6	Executes parallel verification.
7	Sets I/O condition.
8	Sets the remote mode.
9	Sets the switch.
B	Executes debug RAM function.
C	Sets the device condition.
D	DC test
E	AC test
F	Confirms revision, and maintains and initializes the parameter data.

2.5 Description of the Display

The display equipment displays the currently set command and parameter, execution condition, normal termination and error content with 16 characters x 2 lines. The following displays are common to all the commands.

Table 2 - 5 Description of the display

Display	Content
P A S S	Normal termination
E R R 0 0 X X	Error occurrence 00: error code XX: error status
B U S ▒ (▒Blinks)	During operation
_	Current cursor position
[ ]	The parameter is selectable with the roll key.
N O N	An entered sub-command code is invalid.
N O - S U P P O R T	When the entered TYPE code does not exist.

NOTE

1. The BUSY blink position differs depending on the execution command.
2. Although no [ ] is provided on the setting of the sub-command, the sub-command can be set with the code and selected with the roll key.
3. Although the device name is provided with no [ ] at the time of type setting, only roll key selection is possible.

2.5.1 Display When the RESET is Pressed

● Operation

① When [RESET] is pressed, the currently set device function, TYPE code and device name are displayed.

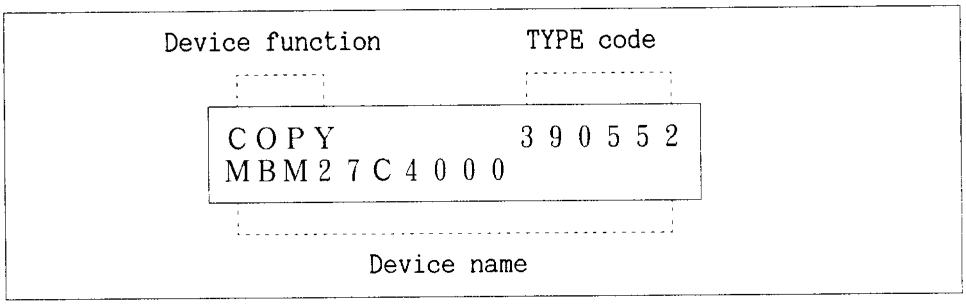


Figure 2 - 3 Example of the display when the RESET is pressed

② From this condition, the individual operations start with the main commands ([TYPE] , [DEVICE] , [EDIT] , [SELECT]).

2.5.2 Display When the Main Command is Pressed

When the main command is pressed, the main command, the currently set sub-command and the content are displayed.

● Operation

① If [TYPE] is pressed for example, the following message is displayed. The cursor is located at the sub-command code.

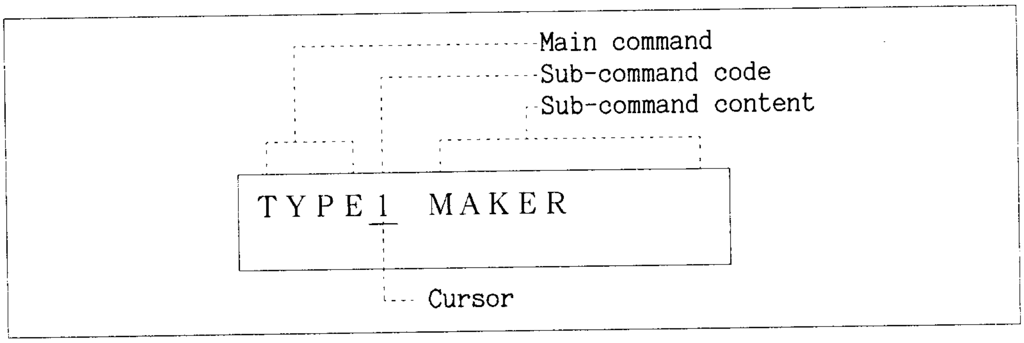


Figure 2 - 4 Example of display when the main command is pressed

② If the sub-command code is entered with [0] to [F] , the content of the sub-command changes.

③ When [▽] or [△] is pressed, the contents of the sub-command code and sub-command change.

2.5.3 Display When the Sub-command is Pressed

As for the display set by the parameter when the sub-command is pressed, the content differs depending on the combination of the main command and sub-command.
This section describes the typical displays and Chapter 4 through 11 explain the details.

● Operation

① Press [SELECT] [7] [SET], the multiple parameters are displayed as shown below.
The cursor is located at the position where the baud rate is set.

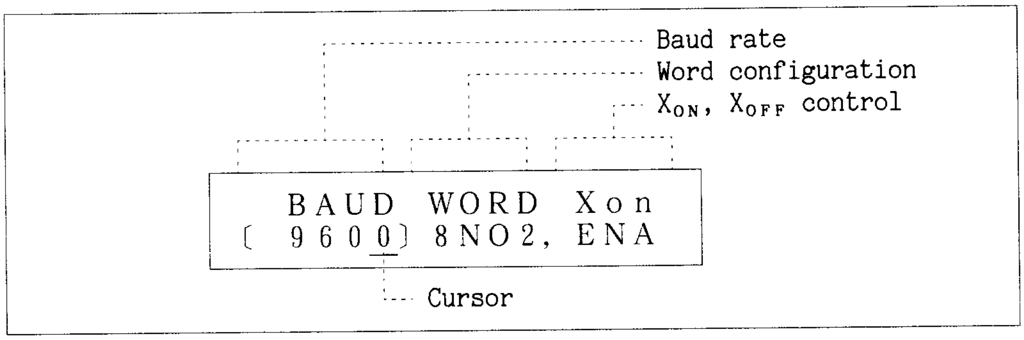


Figure 2 - 5 Example of display when the sub-command is pressed

② The baud rate is selectable by pressing [▽] or [△].

③ When [DEVICE] is pressed, the cursor moves to the position where the word configuration (WORD) is set.

```
 BAUD WORD Xon
19200 [8NO2] ENA
```

④ Word configuration is selectable by pressing [▽] or [△].

⑤ When [DEVICE] is pressed, the cursor moves to the position where $X_{ON/OFF}$ control is set.

```
 BAUD WORD Xon
19200, 8NO1 [ENA]
```

⑥ $X_{ON}/_{OFF}$ control is selectable by pressing [▽] or [△].

⑦ When [TYPE] is pressed, the cursor moves in reverse.

⑧ After all the settings of the displayed parameter items are terminated, press [SET].

⑨ If parameter set items still exist, the parameter is displayed and set in the same manner. If the initial condition is displayed by pressing the [SET], the parameter setting by the sub-command is terminated.

2.6 Explanation of buzzer sound

When the operation ends normally or the error occurs, the buzzer sounds as indicated below.

Buzzer sound	Number of times	Content
Long sound	1	The operation ends normally
Short sound	4	Warning of operation failed
Short sound	Continuous	Execution error

3. EXAMPLES OF OPERATION

This chapter describes the copy of the master device (ROM), remote control on PC9800, etc.

3.1 Copy of the Master Device (ROM)

The operation method to copy the same one as the device in which data was already written is shown below.

Example 3 - 1 : Copy the content of Fujitsu MBM27C256 to the MBM27C256.

● Operation

(1) Select the device type.

① Press [TYPE] [1]. Select manufacturer selection.

```
TYPE 1  MAKER
```

② Press [SET] .

③ Press [△] or [▽] until "Fujitsu" is displayed.

```
TYPE-MAKER
[Fujitsu          ]
```

④ Press [SET] .

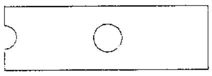
⑤ Press [△] or [▽] until the MBM27C256 is displayed.

```
21. 00V        39054E
MBM27C256
```

⑥ Press [SET] .

(2) Make this equipment read the content of the master device.

① Mount the master device on the socket whose LED lights.



② Press [DEVICE] [8] [SET] . Select COPY operation.

```
COPY          39054E
MBM27C256
```

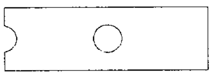
③ Press [DEVICE] [SET] . Execute COPY operation.

```
COPY   SUM    1234
MBM27C256
```

④ After termination, remove the master device.

(3) Write data into the no-written device.

① Mount a no-written device on the socket whose LED lights.



② Press [DEVICE] [4] [SET] . Select B.P.R continuous operation.

```
BPR.          39054E
MBM27C256
```

③ Press [DEVICE] [SET] . Execute the contiuous operation.

```
BPR.   SUM    1234
MBM27C256
```

④ After the termination, remove the device.

(4) The operation procedure is completed. To make some copies, repeat the step (3).

3.2 Comparison of the Master Device (ROM) with the Written Device (ROM)

This section describes how to verify whether the written device is equal to the master device.

Example 3 - 2 : Compare the master device (Intel 27512) with the written device (Intel 27512)

● Operation

(1) Select the device type.

① Press [TYPE] [2]. Select size selection.

```
TYPE2  SIZE
```

② Press [SET] .

③ Press [△] or [▽] until [512Kbit] is displayed.

```
TYPE-SIZE
    [   512  K  bit]
```

④ Press [SET] .

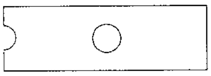
⑤ Press [△] or [▽] until the 27512 is diplayed.

```
12.50V         52254F
27512
```

⑥ Press [SET] .

(2) Make this equipment read the content of the master device.

① Mount the master device on the socket whose LED lights.



② Press [DEVICE] [8] [SET] . Select COPY operation.

```
COPY          52254F
27512
```

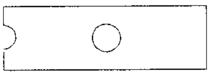
③ Press [DEVICE] [SET] . Execute COPY operation.

```
COPY   SUM   1234
27512
```

④ After the termination, remove the master device.

(3) Compare with the written device.

① Mount the written device on the socket whose LED lights.



② Press [DEVICE] [E] [SET] . Select READ operation.

```
READ          52254F
27512
```

③ Press [DEVICE] [SET] . Execute READ operation.

```
READ   SUM   0123
27512
```

If the sum value is displayed, it means that the device is equal to the master device.

or

```
READ   Err  74  01
 06E04     05    F5
```

If an error exists, the device is not equal to the master device.

④ Press [RESET] . Release the error and remove the device.

3.3 Copy to Different Manufacturer's Device

This section describes how to write the content of the written device into different manufacturer's device.

Example 3 - 3 : Copy the content of Fujitsu MBM27C256 to Toshiba TC57256A.

● Operation

(1) Select the master device type (Fujitsu MBM27C256).

① Press [TYPE] [1] [SET] . Select manufacturer selection.

② Press [△] or [▽] until "Fujitsu" is displayed.

③ Press [SET] .

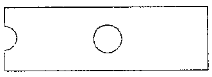
④ Press [△] or [▽] until the MBM27C256 is displayed.

```
21. 00V       39054E
MBM27C256
```

⑤ Press [SET] .

(2) Make this equipment read the data.

① Mount the MBM27C256 on the socket whose LED lights.



② Press [DEVICE] [8] [SET] . Select COPY operation.

③ Press [DEVICE] [SET] . Execute COPY operation.

```
COPY   SUM   1234
MBM27C256
```

④ After the termination, remove the MBM27C256.

(3) Select the no-written device (Toshiba TC57256A) type.

① Press [TYPE] [1] [SET] . Select manufacturer selection.

② Press [△] or [▽] until "Toshiba" is displayed.

③ Press [SET] .

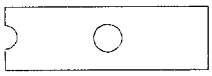
④ Press [△] or [▽] until the TC57256A is displayed.

```
12. 75V        AB654E
TC57256A
```

⑤ Press [SET] .

(4) Write data into the no-written device.

① Mount the TC57256A on the socket whose LED lights.



② Press [DEVICE] [4] [SET] . Select the B.P.R continuous operation.

③ Press [DEVICE] [SET] . Execute the B.P.R continuous operation.

```
BPR.     SUM    1234
TC57256A
```

④ After the termination, remove the device.

3.4 Combination of Two Device Data in a Device

This section describes how to write the data existing in two devices into a device.

Example 3 - 4 : Write data existing in two Fujitsu MBM27C256 into an MBM27C512.

● Operation

(1) Select the master device type (Fujitsu MBM27C256).

① Press [TYPE ◁] [1] [SET] . Select manufacturer selection.

② Press [△] or [▽] until "Fujitsu" is displayed.

③ Press [SET] .

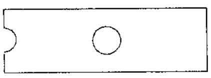
④ Press [△] or [▽] until the MBM27C256 is displayed.

```
21. 00V        39054E
MBM27C256
```

⑤ Press [SET] .

(2) Read the data of a device.

① Mount the MBM27C256 (No.1) on the socket whose LED lights.



② Press [DEVICE ▷] [8] [SET] . Select COPY operation.

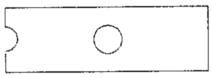
③ Press [DEVICE ▷] [SET] . Execute COPY operation.

```
COPY    SUM    1234
MBM27C256
```

④ After the termination, remove the device.

(3) Read the data of another device.

① Mount the MBM27C256 (No.2) on the socket whose LED lights.



② Press [DEVICE] [8] [SET] . Select mode setting.

③ Press [DEVICE] [1]. Select page selection and set the page 1.

```
RomRamModeLinPag
 08  08    n  00, 01
```

④ Press [SET] .

⑤ Press [DEVICE] [SET] . Execute COPY operation.

```
COPY   SUM   1234
MBM27C256
```

⑥ After the termination, remove the device.

(4) Select the write destination device (MBM27C512).

① Press [TYPE] [1] [SET] . Select manufacturer selection.

② Press [△] or [▽] until "Fujitsu" is displayed.

③ Press [SET] .

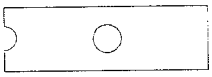
④ Press [△] or [▽] until the MBM27C512 is displayed.

```
12. 50V     39154F
MBM27C512
```

⑤ Press [SET] .

(5) Write data into the device (MBM27C512).

① Mount the MBM27C512 on the socket whose LED lights.



② Press [DEVICE] [4] [SET] . Select the B.P.R continuous operation.

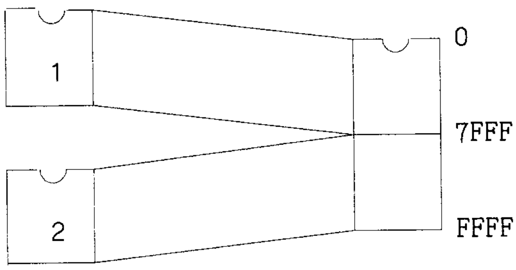
③ Press [DEVICE] [SET] . Execute the B.P.R continuous operation.

```
BPR.     SUM    1234
MBM27C512
```

④ After the termination, remove the de vice.

By this operation, data is written into the device as shown below.

MBM27C256 MBM27C512



3.5 Writing 16-bit Data into 8-bit Device (Split)

This section describes 16-bit data stored in the incorporated memory (buffer RAM) into two 8-bit devices in even and odd data each.

Example 3 - 5 : Write 16-bit data of the incorporated memory into two intel 27512s.

● Operation

(1) Select the device type.

① Press [TYPE] [2] [SET] . Select size selection.

② Press [△] or [▽] . Select the size.

③ Press [SET] .

④ Press [△] or [▽] . Select the device name.

```
12. 50V      52254F
27512
```

⑤ Press [SET] .

(2) Specify the write mode (operation mode).

① Press [DEVICE] [8] [SET] . Select the MODE setting.

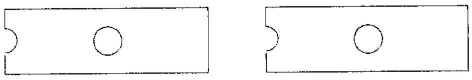
② Press [△] [△] [△] . Select 16-bit split mode simultaneous write.

```
RomRamModeLinPag
[08  16    n  m0] 00
```

③ Press [SET] .

(3) Write into the device.

① Mount the device on the EVEN and ODD sockets whose LED lights.



② Press [DEVICE] [4] [SET] . Select B.P.R continuous operation.

③ Press [DEVICE] [SET] . Execute the B.P.R continuous operation.

```
BPR.    SUM   1234
27512
```

④ After the termination, remove the device.

By the operation above, even data is written into the device on the EVEN socket and odd data is written into the device on the ODD device.

Note : The mode specified in (2) remains set as it is.

3.6 Writing 16-bit Data (68000 series) into 16-bit Device (Exchange)

The data output from the 68000 series compiler are stored in this equipment with the even data and odd data exchanged. This section describes how to write data into the 16-bit device by exchanging this data.

Example 3 - 6 : Write the output data of the 68000 series compiler into Hitachi HN27C1024.

● Operation

(1) Select the device type.

① Press [TYPE] [0] [SET] . Select code selection.

② Press [4][9][0][5][7][0]. Enter TYPE code to set the device name.

```
12. 50V       490570
HN27C1024/H
```

③ Press [SET] .

(2) Specify write mode (operation mode).

① Press [DEVICE] [3] [SET] . Select MODE setting.

② Press [△] . Select the setting.

```
RomRamModeLinPag
[16  16    x  00] 00
```

③ Press [SET] .

(3) Write into the device.

① Mount the HN27C1024 on the socket whose LED lights.

② Press [DEVICE] [4] [SET] . Select B.P.R continuous operation.

③ Press [DEVICE] [SET] . Execute the B.P.R continuous operation.

```
BPR.    SUM   1234
HN27C1024/H
```

④ After the termination, remove the device.

3.7 Transferring Data from the PC9800

The following explains how to transfer data already generated by PC9800 to the R4945 using RS-232C.

Example 3 - 7 : Specify transfer format as Intel hexadecimal, and transfer data from the FILE.HEX file on MS-DOS to the R4945.

● Operation

(1) Set the transfer format.

① Press [SELECT] [8] [SET] . Select the transfer format.

② Press [△] or [▽] . Select the Intel hexadecimal.

```
      FORMAT   TERM
 [   INTELLEC]   ↑Z
```

③ Press [DEVICE] .

④ Press [△] or [▽] . Select the terminator.

```
      FORMAT   TERM
     INTELLEC [  ↑Z]
```

⑤ Press [SET] .

(2) Set the I/O condition.

① Press [SELECT] [7] [SET] . Select the I/O condition.

② Press [△] or [▽] . Select the baud rate and 9600 baud.

```
  BAUD  WORD  Xon
[ 9600]
```

③ Press [DEVICE] .

④ Press [△] or [▽] . Set bit configuration of 8 bits, no-parity, 2 stop.

```
  BAUD  WORD  Xon
  9600 [8N02]
```

⑤ Press [DEVICE] .

⑥ Press [△] or [▽] . Set ENA (controlling X_{on} or X_{OFF}).

```
  BAUD  WORD  Xon
  9600  8N02 [ENA]
```

⑦ Press [SET] .

(3) Read data.

① Press [SELECT] [0] [SET] .

② Press [SET] . Start to read data from the RS-232C.

```
S-IN  BUSY
```

Read data from the PC9800.

(4) Send data from the PC9800.

(4)-1 How to operate the PC9800

The basic operation of PC9800 is explained below, but it depends on the model No. For the detail, refer to the PC9800 Operation Manual.

(a) Setting the I/O condition

Set the I/O under 9600 baud, 8-bit, no parity, and 2 stop.

Example :

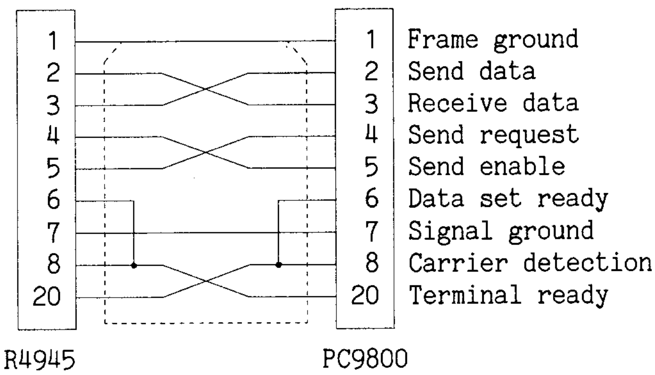
```
A>SPEED ↵
  -RS232C-0 9600 BITS-8 PARITY-NONE STOP-2 ↵
```

(b) Output data from serial port.

Example :

```
A>COPYA FILE.HEX AUX ↵
 or
A>COPY FILE.HEX AUX ↵
```

(4)-2 Example of connection of the R4945 to PC9800 (RS-232C)



3.8 Remote Control for PC9800

Set device type to MBM27C512, then enable blank, program, and read check. Put the R4945 in the initial state.

```
10 A$="" : B$="" : P=0
20 OPEN "COM:N82X" AS #1
30 ON COM GOSUB *REC
40 PRINT #1,CHR$(&H11);
50 COM ON : FOR I=0 TO 1000 : P=P :NEXT I
60 IF P=0 THEN 60
70 CLS : PRINT "**** R4945 ON LINE ****"
80 READ  A$
90 PRINT #1,A$ : IF A$="QU" THEN 160
100 PRINT "COMMAMD=";A$,"+++ Busy +++"
110 FOR I=1 TO 1000 : P=0 : NEXT I
120 COM ON
130 IF P=0  THEN GOTO 120
140 PRINT "ANSWER = ";B$
150 GOTO 80
160 END
170 !
180 *REC : COM OFF
190      IF LOC(#1)=0 THEN RETURN
200      FOR I=1 TO 1000 :A=A: NEXT I
210      B$=INPUT$(LOC(1),#1)
220      P=INSTR(B$,"*"+CHR$(&HD)+CHR$(&HA))
230 RETURN
240 !
300 DATA TY39154F,DEB,DEP,DER,QU
```

Example of PC9800 Remote Control

Explanation	
20	Open the RS-232C, and set bit structure.
30	Set an interrupt and routine for RS-232C.
40	Put the R4945 in the remote state (send DC1).
60	Wait until the R4945 is ready (wait until an asterisk comes).
80	Read command data.
90	Send the command to the R4945.
110	Wait for time.
130	Wait for the result of the R4945.
140	Wait for the result of command.
180	An interrupt subroutine. Disable an interrupt.
210	Read data from the RS-232C.
220	Search *+CR+LF.
300	Command data TY39154F : Specifies the MBM27C512 device. DEB, DEP, DER : Executes blank, program, and read check. QU : Leaves remote control.

4. SETTING THE ROM TYPE (TYPE COMMAND)

This chapter describes the function and operation method of the main command key [TYPE].

4.1 Outline of Type Setting

Set the type corresponding to the available device. The following five methods are available.

(1) Code input setting method : See the section 4.2.
(2) Setting method by manufacturer : See the section 4.3.
(3) Setting method by the size : See the section 4.4.
(4) ID AUTO mode setting method : See the section 4.5.1.
(5) ID READ mode setting method : See the section 4.5.2.

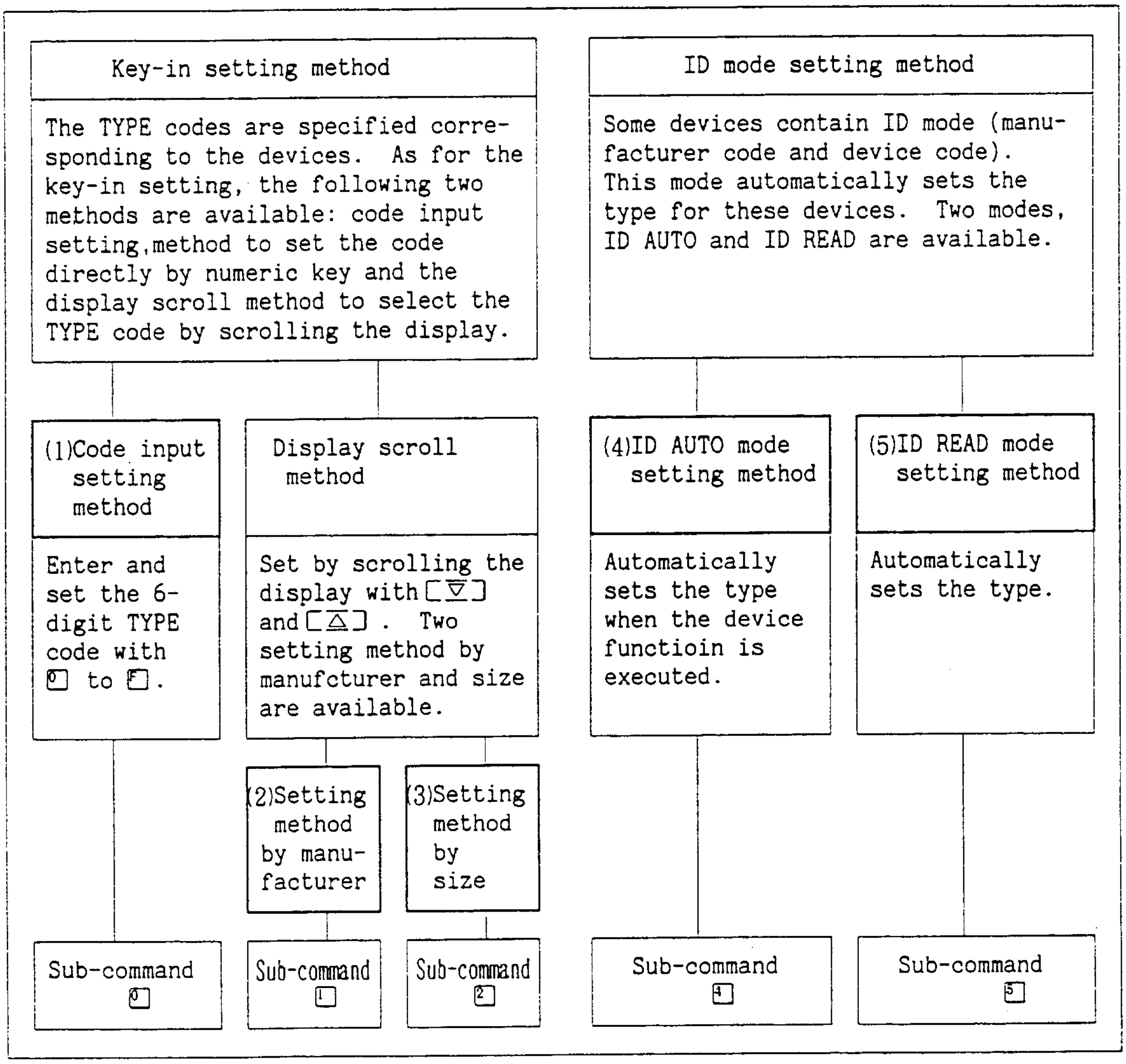


Figure 4 - 1 Description of Type Setting Methods

4.2 Type Setting by Code

(1) Code input setting method

With references to the type setting code of the section A.1, set the device code of the device with the numeric keys.

(2) Operation

(Initial condition)

↓

① Press [TYPE] [0] [SET] . Set the CODE method.

Program voltage — TYPE code

```
12.50V          100570
Am27C1024
```

Device name

With the currently set TYPE code, waits for the code setting.

② Press [1][0][1][5][4][B]. Specify the TYPE code "10154B".

```
21.00V          10154B
Am2732A
```

Program voltage : "21.00V"
Device name "Am2732A" is displayed.

③ Press [SET] . Terminates the setting.

↓

(Initial condition)

NOTE

If an inexistent TYPE code is entered, "NO-SUPPORT" is displayed on the screen and at the time, if [SET] is pressed, the error sound occours. In this case, enter a proper TYPE code again.

4.3 Type Setting by Manufacturer

(1) Setting method by manufacturer

First specify a manufacturer and set the type under the device name of a specified manufacturer.

(2) Operation

(Initial condition)

⇩

① Press [TYPE] [1] [SET] . Set the MAKER method.

```
TYPE-MAKER
[AMD                ]
```

Manufacturer name

Displays the currently set manufacturer and wait for the manufacturer name to be selected.

② Press [▽] or [△] until "Fujitsu" is displayed.

```
TYPE-MAKER
[Fujitsu            ]
```

③ Press [SET] . Set the manufacturer name.

```
21.00V        39154B
MBM2732A
```

Device name

Displays the device name of the manufacturer name "Fujitsu" and waits for the device name to be selected.

④ Press [▽] or [△] until the MBM27C4000 is displayed.

```
12.50V        390552
MBM27C4000
```

⑤ Press [SET] . Terminate the setting.

⇩

(Initial condition)

4.4 Type Setting by Size

(1) Setting method by size

First specify size and set the type under the device name of a specified size.

(2) Operation

Initial condition

⇩

① Press [TYPE] [2] [SET] . Set the SIZE method.

```
TYPE-SIZE
    [     1 M bit]
```

Size

Displays the currently set size and waits for the size to be selected.

② Press [▽] or [△] until [512Kbit] is displayed.

```
TYPE-SIZE
    [   512 K bit]
```

③ Press [SET] . Set the size.

```
13. 00V       10454F
Am27512
```

Device name

Displays the device name of the size "512Kbit" and waits for the device name to be selected.

④ Press [▽] or [△] until the MBM27C512 is displayed.

```
12. 50V       39154F
MBM27C512
```

⑤ Press [SET] . Terminate the setting.

⇩

Initial condition

4.5 Type Setting by ID Mode

The equipment automatically sets the type by reading the device ID code (manufacturer code and device code).

CAUTION

1. Some devices contain no ID code and depending on the manufacture year, some devices contain no ID code.

2. For whether type setting by ID is possible, see the device setting code list of the section A.1.

3. If the ID code is executed for these devices, they may be damaged.

4.5.1 Type Setting by ID AUTO Mode

● Operation

Initial condition

⇩

① Press [TYPE] [4] [SET] . Set ID AUTO.

⇩

Initial condition

⇩

② Insert the device.

③ Press [DEVICE] [SET] .
When the device function is executed, the TYPE is automatically set and then the device function is executed.

④ Press [RESET] .

⇩

Initial condition

NOTE

In executing the device function in ID AUTO mode, the operation mode and page are automatically set. For details, see the section 5.9.

4.5.2 Type Setting by ID READ Mode

● Operation

Initial condition

⇩

① Press [TYPE 4] [5]. Set ID READ.

```
TYPE5  ID-READ
```

② Insert the Am27C1024.

③ Press [SET] . Execute ID READ.

```
TYPE5  ID-READ
            01     8C
```

Manufacturer code   Device code

Reads the ID code.
Displays the manufacturer code and device code.

⇩

Initial condition

```
COPY          100570
Am27C1024
```

Initial condition.

5. WRITING INTO THE DEVICE (DEVICE COMMAND)

This chapter describes the function and operation method of the main command key [DEVICE].

5.1 Outline of the Device Function

The device functionis executed between the start address and stop address in the currently set operation mode and page.
However, the set value is neglected depending on the function.

<table>
<tr><th>Function Setting</th><th>Setting the operation mode and page</th><th>Setting start address and stop address</th></tr>
<tr><td>P.R.</td><td rowspan="5">The set value is valid.</td><td rowspan="6">The set value is valid.</td></tr>
<tr><td>B.P.R.</td></tr>
<tr><td>COPY</td></tr>
<tr><td>PROGRAM</td></tr>
<tr><td>READ</td></tr>
<tr><td>BLANK</td><td rowspan="3">The set value is negrected.</td></tr>
<tr><td>ERASE</td><td rowspan="2">The set value is negrected.</td></tr>
<tr><td>SECURITY</td></tr>
</table>

NOTE

Unless the setting of the operation mode, page, start address or stop address is changed, the previous set value is valid.
However, when the type is set, the condition is initialized.

5.1.1 Display of check sum value

After the execution device function, display the check sum value.

Check sum value

```
COPY   SUM   FA00
Am2732A
```

The check sum value adds the data every eight bits and one that the result was shown by the hexadecimal of four digits.

The control of the check sum value is a basic method of data management. The control of the check sum value can be achieved by taking the check sum value of the expectation and the check sum value after executing to agree.

When check sum value is contorolled :

- Whether the device function is correctly executed can be confirmed.
- A failure, a defective device, and a hard defect can be found.

5.2 Checking Device Blank Condition (BLANK CHECK)

BLANK CHECK is the function to check whether or not the device inserted in the MUP socket is blank and the condition between start address and stop address.

● Operation

(Initial condition)

⇩

① Press [DEVICE] [C] [SET] . Set the function to BLANK.

TYPE code

```
BLNK          10154B
Am2732A
```

Device name

The function (BLANK) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② As required, set start address and stop address. See the section 5.10.

③ Press [DEVICE] [SET] . Execute the BLANK.

```
BLNK  BUSY
Am2732A
```

On execution is displayed.

⇩

```
BLNK   SUM   F000
Am2732A
```

The result is displayed.

④ Press [RESET] .

⇩

(Initial condition)

5.3 Copy of the Master Device into the Memory (COPY)

COPY reads the data written in the device and stores into the incorporated memory (buffer RAM). After storage, this function reads the content of the device again, comparing with the content of the buffer RAM.
This function is executed between start address and stop address in the currently set operation mode and page.

● Operation

Initial condition

⇩

① Press [DEVICE] [8] [SET] . Set the function to COPY.

TYPE code

```
COPY          1 0 1 5 4 B
Am2732A
```

Device name

The function (COPY) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② As required, set the operation mode and page. See the section 5.9.

③ As required, set start address and stop addresses. See the section 5.10.

④ Press [DEVICE] [SET] . Execute the COPY.

```
COPY BUSY
Am2732A
```

COPY busy is displayed.

⇩

```
COPY  SUM   FA00
Am2732A
```

The result is displayed.

⑤ Press [RESET] .

⇩

Initial condition

5.4 Writing into the Device (PROGRAM)

PROGRAM is the function to write the data on the buffer RAM into the device inserted in the MUP socket. This function is executed between start address and stop address in the currently set operation mode and page.

● Operation

(Initial condition)

⇩

① Press [DEVICE] [D] [SET] . Set the function to PROGRAM.

TYPE code

```
PRGM          10154B
Am2732A
```

Device name

The function (PROG) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② As required, set the operation mode and page. See the section 5.9.

③ As required, set start and stop address. See the section 5.10.

④ Press [DEVICE] [SET] . Execute the PROGRAM.

```
PRGM BUSY
Am2732A
```

PROGRAM busy is displayed.

⇩

```
PRGM  SUM  FA00
Am2732A
```

The result is displayed.

⑤ Press [RESET] .

⇩

(Initial condition)

5.5 Comparison of the Device with the Memory Content (READ CHECK)

READ CHECK is the function to check whether the data written in the device coincides with the content of the incorporated memory (buffer RAM).
This function is executed between start address and stop address in the currently set operation mode and page.

● Operation

(Initial condition)

⇩

① Press [DEVICE] [E] [SET] . Set the function to READ.

TYPE code

```
READ          10154B
Am2732A
```

Device name

The function (READ) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② As required, set the operation mode and page. See the section 5.9.

③ As required, set start and stop addresses. See the section 5.10.

④ Press [DEVICE] [SET] . Execute the READ.

```
READ  BUSY
Am2732A
```

READ busy is displayed.

⇩

```
READ   SUM   FA00
Am2732A
```

The result is displayed.

⑤ Press [RESET] .

⇩

(Initial condition)

5.6 Restoring the Device into the Blank Condition (ERASE)

ERASE is the function to erase the data on the electrically erasable device (EEPROM) into the blank condition. After the erasing is terminated, BLANK CHECK is executed to check whether the data in the device is completely erased. This function erases on the entire ranges of the device size.

> **NOTE**
>
> Generally, erasing the data on the ROM is performed by ultraviolet ray radiation. ERASE function can not erase it.

● Operation

(Initial condition)

⇩

① Press [DEVICE] [9] [SET] . Set the function to ERASE.

TYPE code

```
ERAS            C8854C
X2864A
```

Device name

The function (ERAS) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② Press [DEVICE] [SET] . Execute the ERASE.

```
ERAS  BUSY
X2864A
```

ERASE busy is displayed.

⇩

```
ERAS   SUM   E000
X2864A
```

The result is displayed.

③ Press [RESET] .

⇩

(Initial condition)

5.7 Protecting the Device (SECURITY)

This function disables the read-out from the security attached device only.

● Operation

(Initial condition)

⇩

① Press [DEVICE] [A] [SET] . Set the function to SECURITY.

TYPE code

```
SECU            52374C
8752BH
```

Device name

The function (SECU) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② Press [DEVICE] [SET] . Execute the SECURITY.

```
SECU  BUSY
8752BH
```

SECURITY busy is displayed.

⇩

```
SECU   SUM   0000
8752BH
```

The result is displayed.

③ Press [RESET] .

⇩

(Initial condition)

5.8 Continuous Execution of the Individual Operation (B.P.R. etc.)

BLANK CHECK (B), PROGRAM (P) and READ CHECK (R) are combined and executed continuously.

B.P.R [4] --- BLANK CHECK, PROGRAM and READ CHECK are executed continuously.

P.R. [0] --- PROGRAM and READ CHECK are executed continuously.

The above two types of combinations are available. These combinations are executed between start address and stop address in the currently set operation mode and page.
If an error occurs, the operation is stopped at the function of that time.

● Operation

Initial condition

⇩

① Press [DEVICE] [4] [SET] . Set the function to B.P.R.

TYPE code

```
BPR.          10154B
Am2732A
```

Device name

The function (BPR.) and the currently set TYPE code and device name are displayed so that the initial condition is gained.

② Set the operation mode and page. See the section 5.9.

③ Set start and stop addresses. See the section 5.10

④ Press [DEVICE] [SET] . Execute B.P.R.

```
BLNK BUSY
Am2732A
```

BLANK busy is displayed.

⇩

```
PROG BUSY
Am2732A
```

PROGRAM busy is displayed.

⇩

⇩

```
READ  BUSY
Am2732A
```

READ busy is displayed.

⇩

```
BPR.    SUM    FE00
Am2732A
```

The result is displayed.

⑤ Press [RESET] .

⇩

Initial condition

5.9 Setting the Operation Mode and Page (MODE)

This function sets the mode to allocate the buffer RAM address to the device address when the device data is copied to the incorporated meory (buffer RAM) or the content of the buffer RAM is written into the device. The operation mode is as shown in Table 5-1 depending on the combination of the data width, buffer RAM data width, data edit mode and position line.
In addition, this mode is used for page specification to divide the buffer RAM by device size x 1, x 2 and x 4, combine several devices into a single device or divide a device into several parts.

5.9.1 Explanation of the Display

Press [DEVICE] [8] [SET] , displays the message as shown in Figure 5-1.

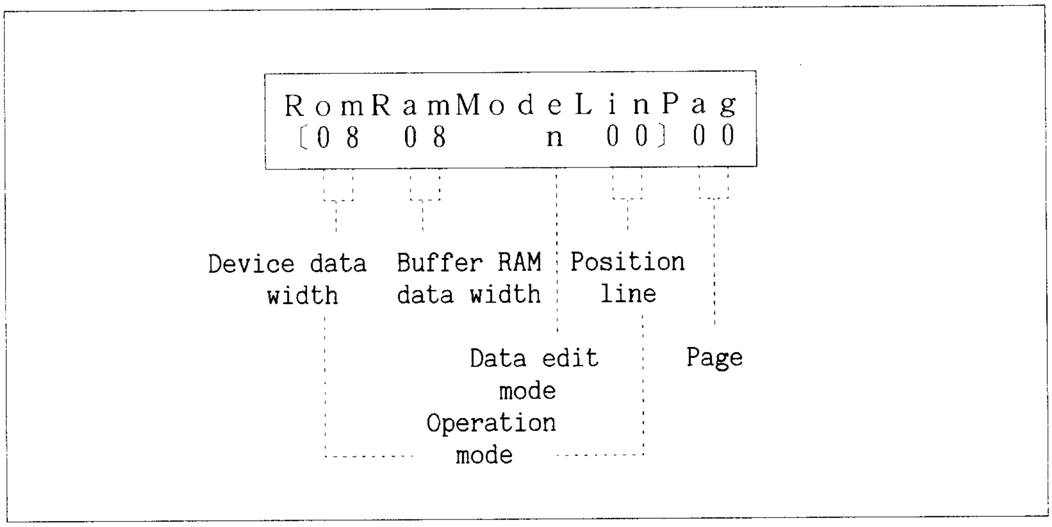


Figure 5 - 1 Display of the Operation Mode and Page

(1) Operation mode

Device data width : The device data width is indicated and automatically determined by type setting.
08 --- 8-bit device
16 --- 16-bit device

Buffer RAM data width : The data width in the buffer RAM is indicated.
08 --- 8 bits
16 --- 16 bits
32 --- 32 bits

Data edit mode : When the device data width is of 16 bits, the I/O method of the upper 8 bits and lower 8 bits are indicated.
n --- I/O stroke by stroke
x --- I/O by cross

Positioin line : Address specification of the buffer RAM in the form of split writing (every other data or every four data is written) or the form of two data simultaneous writing.
When the buffer RAM data width is more thant 16 bits and the device data width is smaller than the buffer RAM data width ([08 16] [08 32] [16 32]), the address No. increases as follows.

For [08 16]
00 --- address 0,2,4 At the time of execution
01 --- address 1,3,5 with a buffer
m0 --- address 0,2,4 At the time of execution with two buffers

For [08 32]
00 --- address 0,4,8
01 --- address 1,5,9 At the time of execution
02 --- address 2,6,A with a buffer
03 --- address 3,7,B
m0 --- address 0,4,8 At the time of execution
m1 --- address 2,6,A with two buffers

For [16 32]
00 --- address 1,4,8
01 --- address 2,6,A

Note : 02, 03 and m1 cannot be specified when the buffer RAM data width is 16 bits.

(2) Page

Divide the buffer RAM area (0 to FFFFF) and allocate from page 00. 00 to FF can be set. However, the maximum value of the page varies depending on the device size.

(3) Setting procedure of operation mode and page

① The type is set.
② When the [DEVICE], [8] , and [SET] keys are pressed, the message as shown in Figure 5-1 is displayed.
③ The combination (refer to Table 5-1) of operation modes is selected with [△] or [▽] .
(For 8-bit and 16-bit devices, any number of ① to ⑯ and ⑪ to ⑯ in Table 5-1 are selected.)

④ When [DEVICE] or [TYPE] is pressed, the following message is displayed.

```
ROM Ram Mode Lin Pag
 08   08    n    00   00
```

⑤ The page is specified by the key input.
⑥ Press [SET] to terminate the setting.
(NOTE) Be sure to select the operation mode or the page after the type setting.

Table 5 - 1 Operation Mode List

No.	Device data width	Buffer RAM data width	Data edit mode	Position line	Remark
①	08	08	n	00	※1
②	08	16	n	00	EVEN
③	08	16	n	01	ODD
④	08	16	n	m0	
⑤	08	32	n	00	
⑥	08	32	n	01	
⑦	08	32	n	02	
⑧	08	32	n	03	
⑨	08	32	n	m0	
⑩	08	32	n	m1	
⑪	16	16	n	00	※1
⑫	16	16	x	00	
⑬	16	32	n	00	
⑭	16	32	n	01	
⑮	16	32	x	00	
⑯	16	32	x	01	

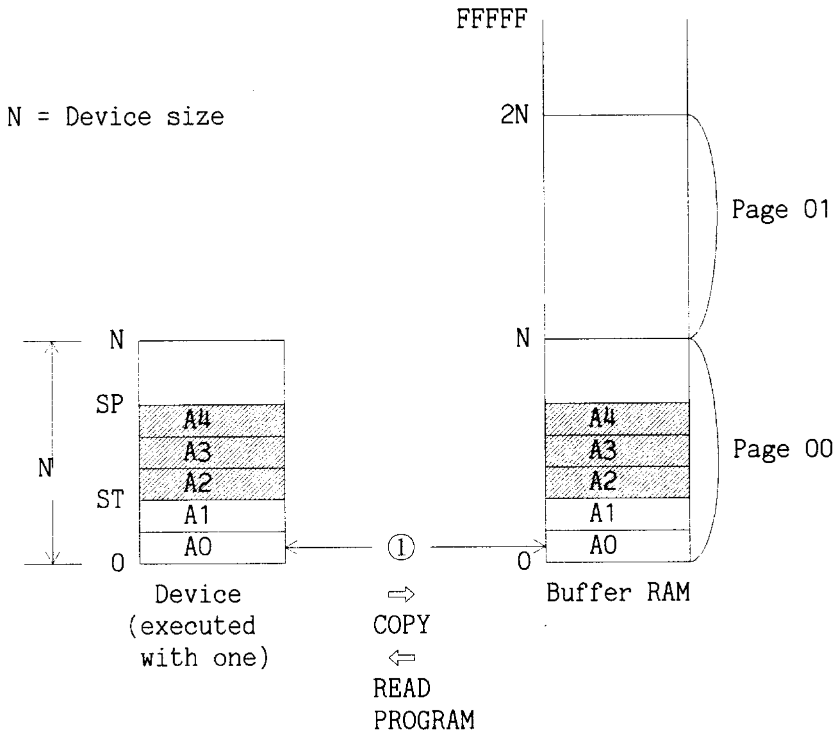
※1 : When the type is set, the operation mode is [08 08 n 00] and [16 16 n 00] for the 8-bit device and 16-bit device respectively, and the page is initialized to 00 in any case. Because in the case of ID-AUTO (See the section 4.5), the type is set when the device function is executed, the device function is executed in initialized operation mode and page.

5.9.2 Functions of the Operation Mode and Page

The content of the operation mode list in Table 5-1 is described in page 00.

(1) Description of ①

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
①	08	08	n	00



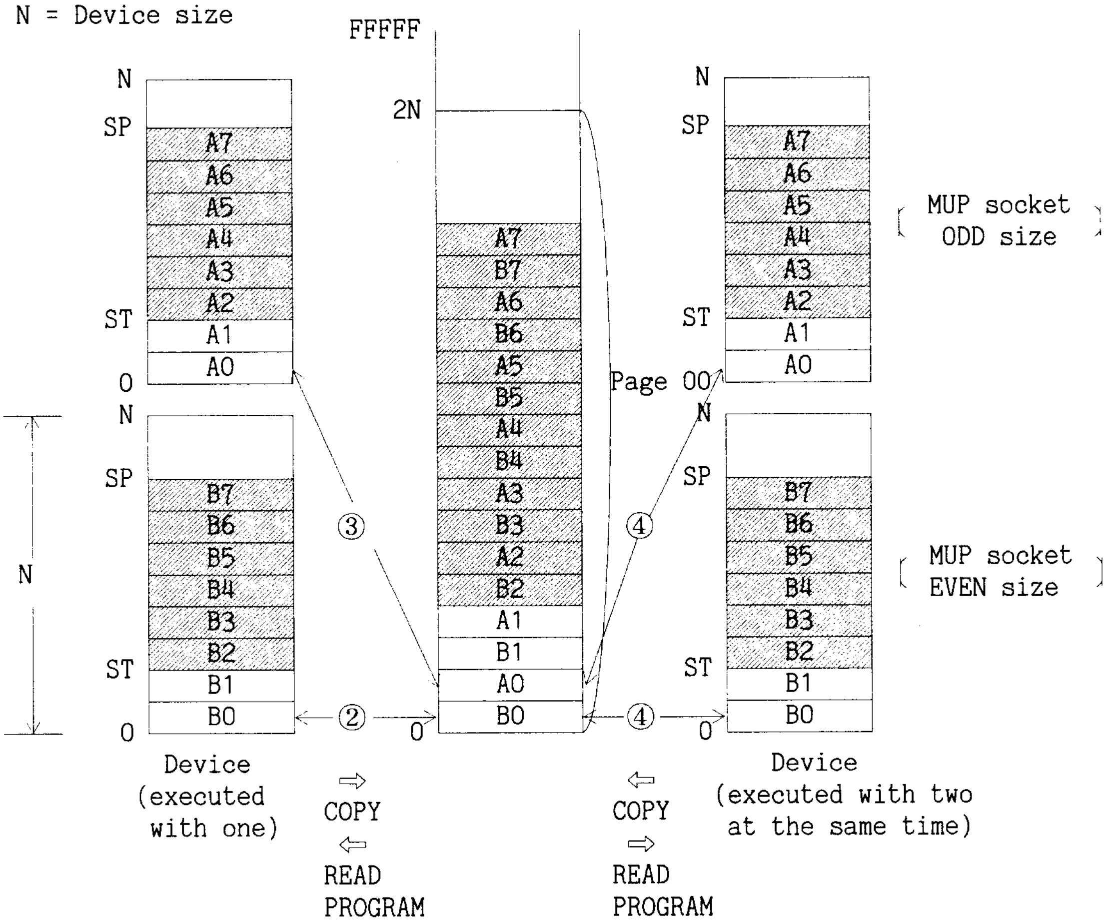
(a) For the page, the buffer RAM area is divided by each device size.

(b) If the start address and stop address are set, only the ▩ is executed.

(2) Description of from ② to ④

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
②	08	16	n	00
③	08	16	n	01
④	08	16	n	m0

N = Device size



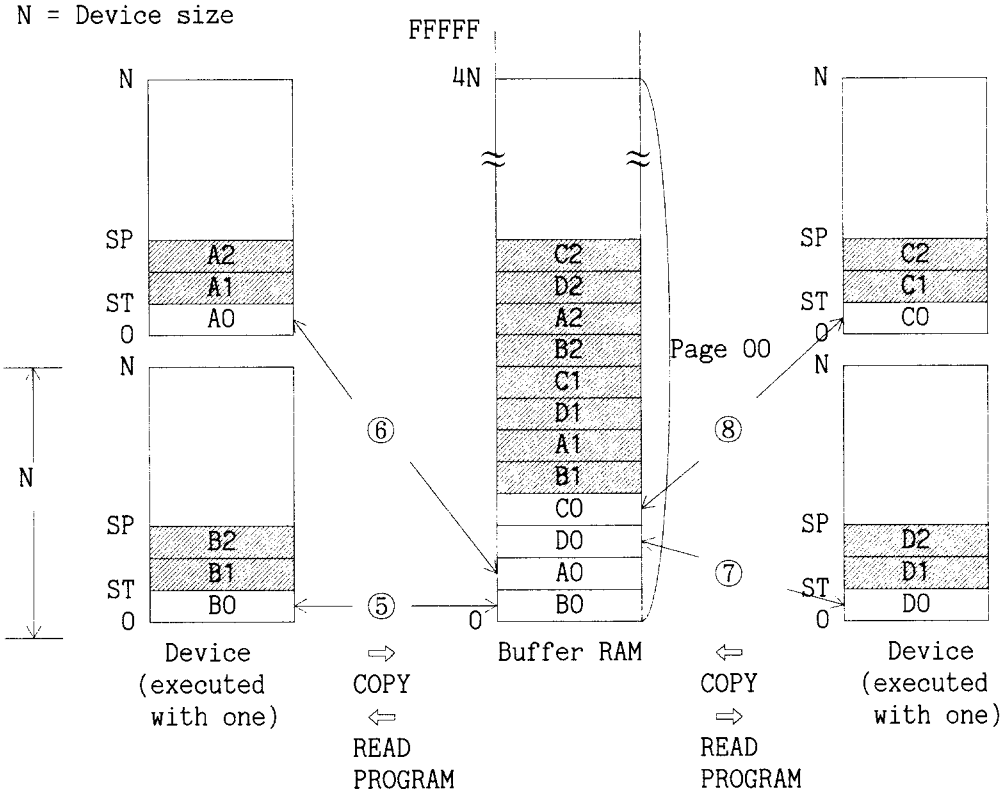
(a) For the page, the buffer RAM area is divided by device size x 2 each.

(b) If the start address and stop address are set, only the is executed.

(3) Description of from ⑤ to ⑧

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
⑤	08	32	n	00
⑥	08	32	n	01
⑦	08	32	n	02
⑧	08	32	n	03

N = Device size

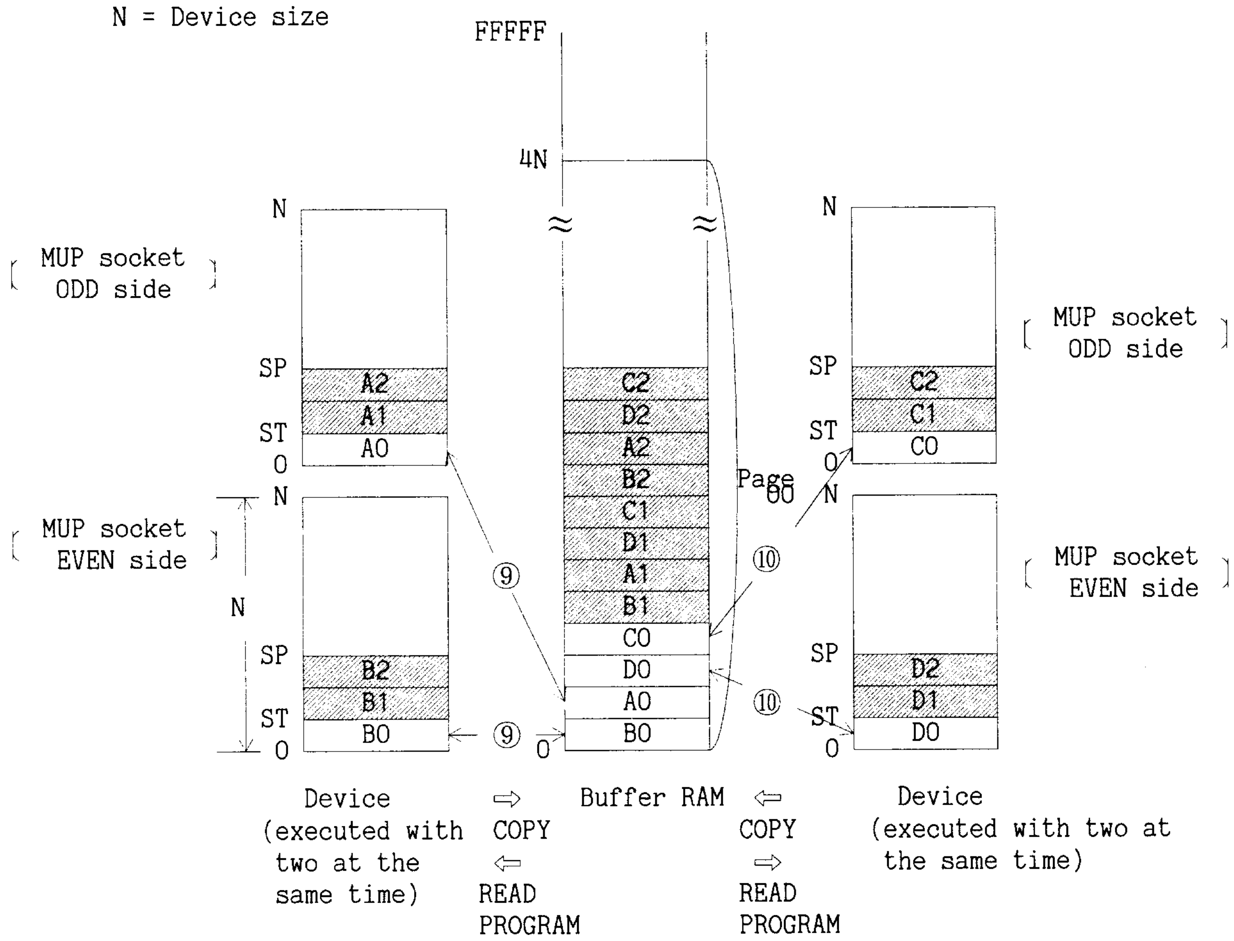


(a) For the page, the buffer RAM area is divided by device size x 4 each.

(b) If the start address and stop address are set, only the ▨ is executed.

(4) Description of from ⑨ to ⑩

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
⑨	08	32	n	m0
⑩	08	32	n	m1



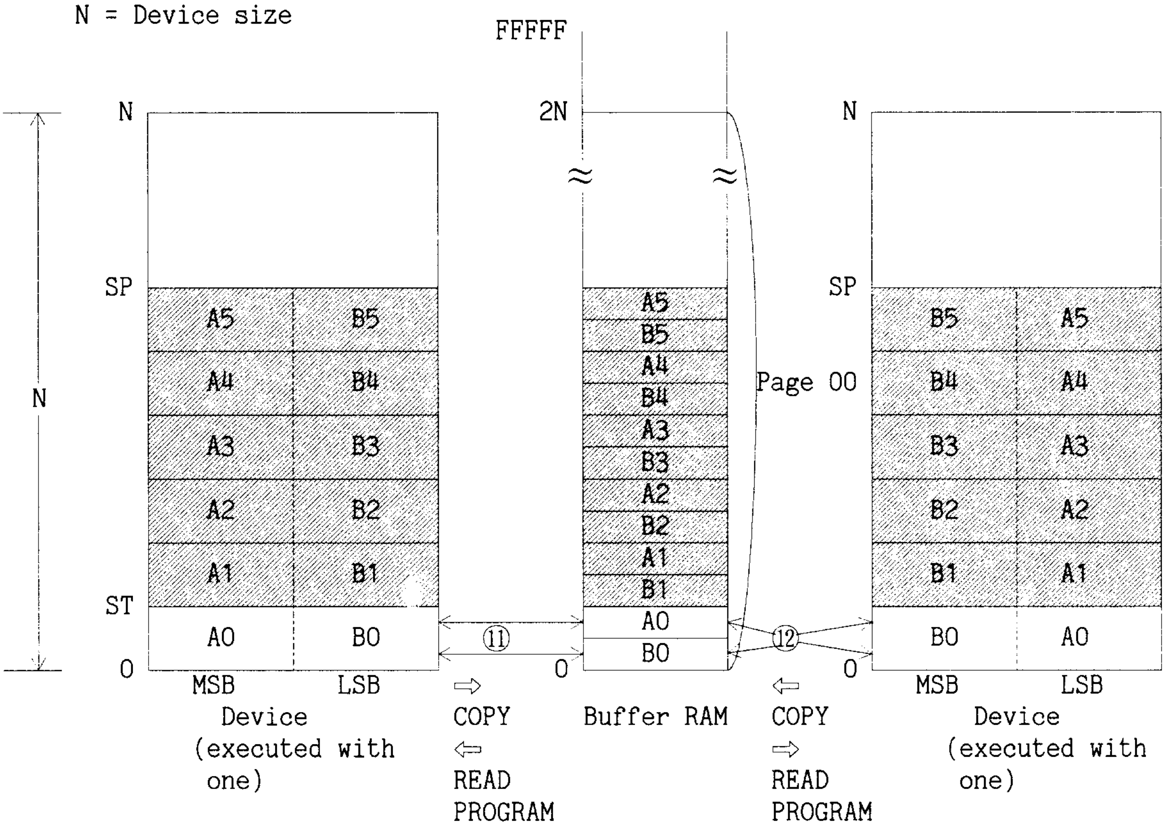
(a) For the page, the buffer RAM area is divided by device size x 4 each.

(b) If the start address and stop address are set, only the is executed.

(5) Description of from ⑪ to ⑫

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
⑪	16	16	n	00
⑫	16	16	x	00

N = Device size



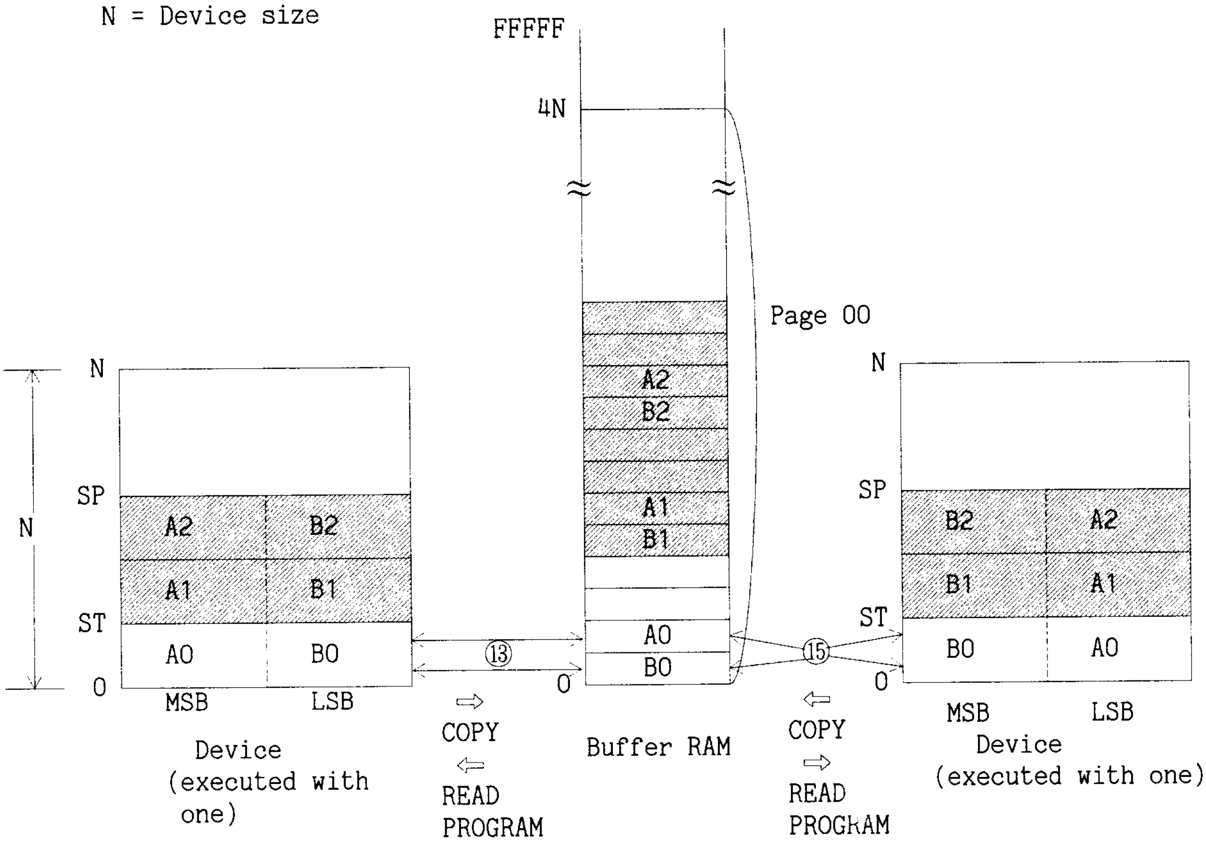
(a) For the page, the buffer RAM area is divided by device size x 2 each.

(b) If the start address and stop address are set, only the is executed.

(6) Description of ⑬ and ⑮

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
⑬	16	32	n	00
⑮	16	32	x	00

N = Device size



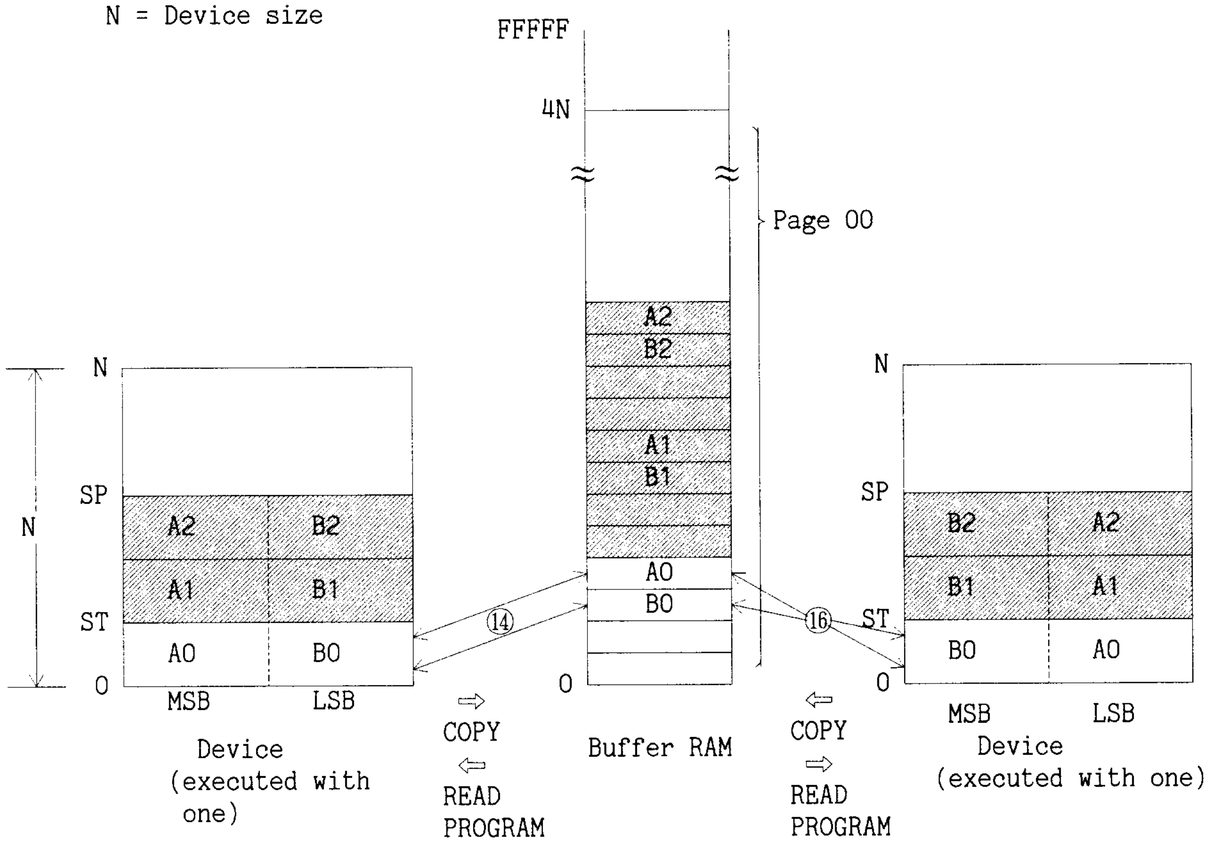
(a) For the page, the buffer RAM area is divided by device size x 4 each.

(b) If the start address and stop address are set, only the is executed.

(7) Description of ⑭ and ⑯

No.	Device data width	Buffer RAM data width	Data edit mode	Positon line
⑭	16	32	n	01
⑯	16	32	x	01

N = Device size



(a) For the page, the buffer RAM area is divided by device size x 4 each.

(b) If the start address and stop address are set, only the is executed.

5.10 Partial Writing (ST/SP ADDRESS)

When executing the device function, it is possible to execute COPY or PROGRAM mode partially between specified addresses instead of COPY or PROGRAM of all the addresses of the device.

NOTE

> When the type is set, the start address and stop address are initialized to the address size of the device. Change the start address and stop address after setting the type.

Depending on the operation mode of the device function, the correspondence between the device address and buffer address differs. See the section 5.9.

● Operation

Initial condition

⇩

① Setting the device type. See Chapter 4.

② Setting the function. See the sections 5.2 to 5.8.

③ Setting the operation mode and page. See the section 5.9.

④ Press [DEVICE] [7] [SET] . Set the start address/stop address.

```
start / stop
    0 /  FFF
   ST     SP
```

(Example)
The start address (0) and stop address (FFF) of TYPE code 1015B device name Am2732A are displayed to wait for ST input.

⑤ Press [1][0] [DEVICE] . Change the ST from 0 to 10.

```
start / stop
   10 /  FFF
```

(Example)
The ST is changed from 0 to 10 to wait for SP input.

⑥ Press [F][1][0]. Change the SP from FFF to F10.

```
start / stop
   10 /  F10
```

⑦ Press [SET] . The setting of start address/stop address is terminated.

⇩

(Initial condition)

⇩

⑧ Press [DEVICE] [SET] . Execute the device function between start address/stop address specified addresses (10 to F10).

⇩

(Initial condition)

6. DATA EDIT (EDIT COMMAND)

This chapter describes the data edit function and operation method of the main command key [EDIT].

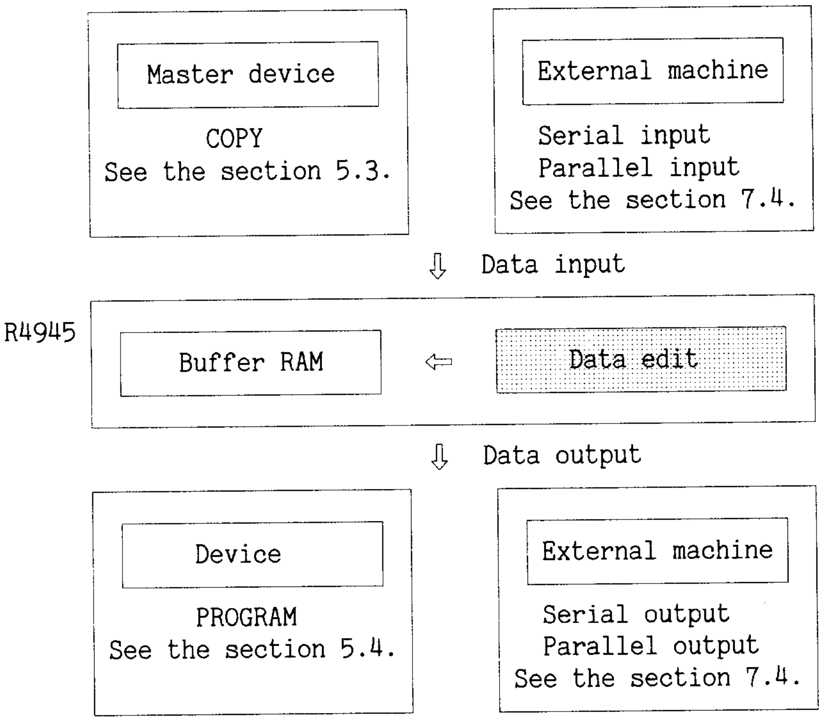
6.1 Outline of Data Edit

(1) Data edit function

The data entered in this equipment can be edited and written into the device. This function is called data edit function.

NOTE

The address of the data to be edited is the address on the buffer RAM. When copying data from the device to the buffer RAM, the device address differs from the buffer RAM address depending on the operation mode. See the section 5.9.



(2) Operation

Initial condition

⇩

① Press [EDIT] .

② Select the sub-command is selected with [0] to [F] or [▽] / [△] .

EDIT0 RAM-EDIT	[0] ··· See the section 6.2.
EDIT1 INSERT	[1] ··· See the section 6.3.
EDIT2 DELETE	[2] ··· See the section 6.4.
EDIT8 CHECK-SUM	[8] ··· See the section 6.5.
EDIT9 BLOCK-STOR	[9] ··· See the section 6.6.
EDITA BLOCK-MOVE	[A] ··· See the section 6.7.
EDITB BLOCK-CHEN	[B] ··· See the section 6.8.
EDITC COMPLEMENT	[C] ··· See the section 6.9.
EDITD DATA-SEARC	[D] ··· See the section 6.10.

The disply changes whenever [▽]

The disply changes whenever [△]

(Continued to next page)

```
EDITF  DATA-CLEAR
```

[F]··· See the section 6.11.

When [EDIT] command operation is terminated, the result is displayed.

③ Pressing the [RESET] restores the condition to the initial condition.
It is possible to perform data edit by pressing [EDIT] without pressing [RESET] .

6.2 Confirmation and Change of Data (RAM EDIT)

(1) RAM EDIT

Confirms and Changes the data of arbitrary address.

(2) Operation

Initial condition

⇩

① Press [EDIT] [0] [SET] . Set RAM EDIT.

Figure 6-1 is displayed.	Wait for the input to a specified address.

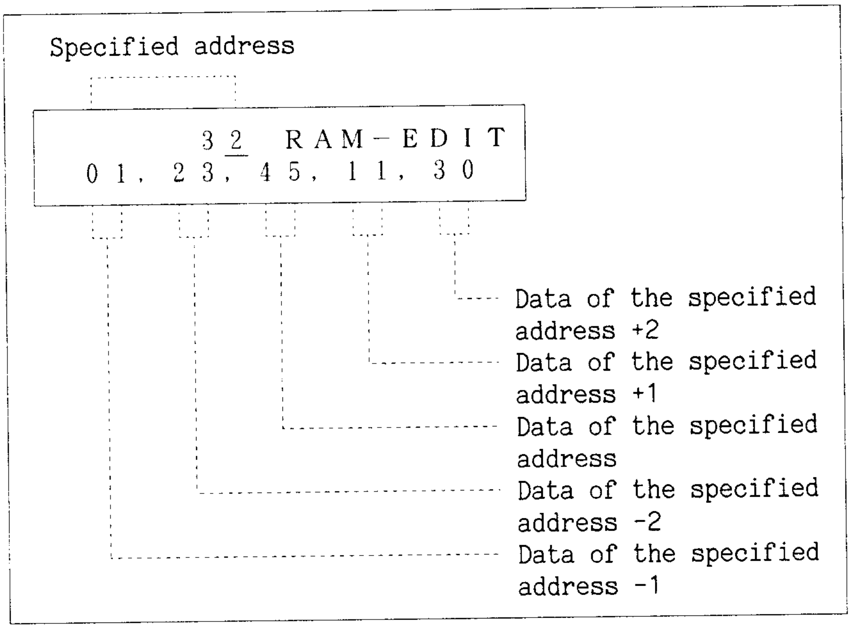


Figure 6 - 1 Display of RAM EDIT

② To (a) or (b) or (c). ......

(a) Confirm the data of the specified address and addresses back and forth.
(b) Change the data of the specified address, and confirm and change the data by incrementing the address (+1).
(c) After the data of a specified address is changed, specify the address again and confirm and change the data.

(a) Confirmation of data

(a-1) Press [△] . Increment the specified address by 1.

```
          33  RAM-EDIT
  23, 45, 11, 30, 01
```

The address of the specified address plus 1 and data are displayed.

(a-2) Press [▽] or [▽] . Decrement the specified address by 2.

```
          31  RAM-EDIT
  05, 01, 23, 45, 11
```

The address of the specified address minus 2 and data are displayed.

(a-3) When the data confirm, Press [▽] or [△] .

(a-4) When the data change, Press [SET] . (See (b) or (c) mentioned later.)

(b) Change of data 1.

(b-1) Press [2] [SET] . Specify the address 2.

```
           2  RAM-EDIT
  00, 01, 02, 03, 04
```

The specified address and data are displayed to wait for data input.

(b-2) Press [2] [2] [SET] . Change the data of the address 2 from 02 to 22.

```
           3  RAM-EDIT
  01, 22, 03, 04, 05
```

The data of the address 2 is changed to 22, the specified address is incremented by 1 and then the data is displayed to wait for data input.

(b-3) Press [SET] . Only confirm the data of the address 3 but not change it.

```
           4  RAM-EDIT
  22, 03, 04, 05, 06
```

Increment the specified address by 1, and the data is displayed to wait for data input.

(b-4) When the terminate, press [RESET] .

(b-5) When the change repeatedly, press [0] to [F] [SET] .

(c) Change of data 2

(c-1) Press [5] [SET] . Specify the address 5.

```
          5  RAM-EDIT
03, 04, 05, 06, 07
```

The specified address and data are displayed to wait for data input.

(c-2) Press [5] [5] [SET] . Change the data of the address 5 from 05 to 55.

```
          6  RAM-EDIT
04, 55, 06, 07, 08
```

The data of the address 5 is changed to 55, the specified address is incremented by 1 and the data is displayed to wait for data input.

(c-3) Press [TYPE ◁] . Data is not changed and the system waits for the address to be specified again.

```
          6  RAM-EDIT
04, 55, 06, 07, 08
```

(c-4) Press [F] [0] [5] [6] [SET] . Specify the address F056.

```
       F056  RAM-EDIT
26, 83, 9A, B7, 6F
```

The specified address and data are displayed to wait for data input.

(c-5) Press [A] [A] [SET] . Change the data of the address F056 from 9A to AA.

```
       F057  RAM-EDIT
83, AA, B7, 6F, 56
```

The data of the address F056 is changed to AA, the specified address is incremented by 1 and then the data is displayed to wait for data input.

(c-6) When the terminate, press [RESET] .

(c-7) When the change repeatedly, press [0] to [F] [SET] .

6.3 Data Insertion (Insertion)

(1) Insertion

① Address insertion

Insert one-byte data BD_0 into specified address FA.
Insert data by specifying FA at first, and BD only after that.
After insertion, data exceeding address FFFFF is not kept.

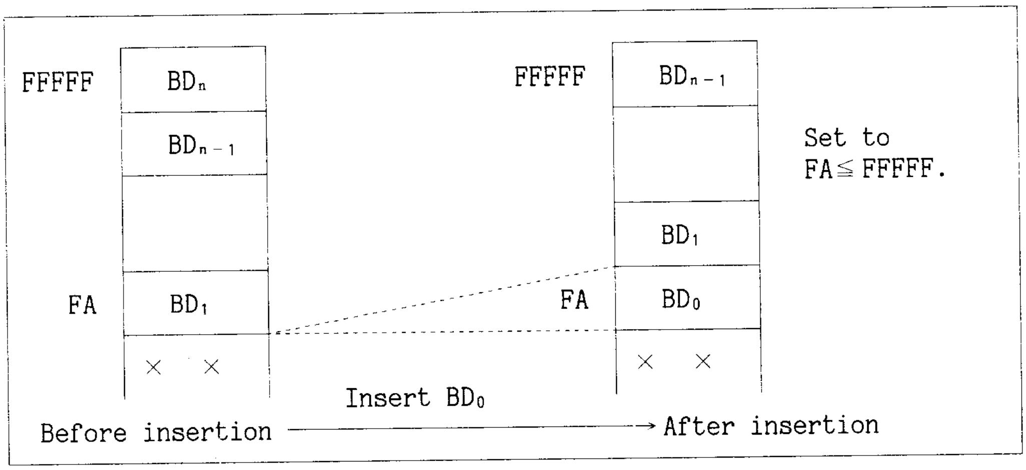


Figure 6 - 2 Description of Address Insertion

② Block insert

Insert data BD_0 between specified addresses (between FA and LA).
After insertion, data exceeding address FFFFF is not kept.

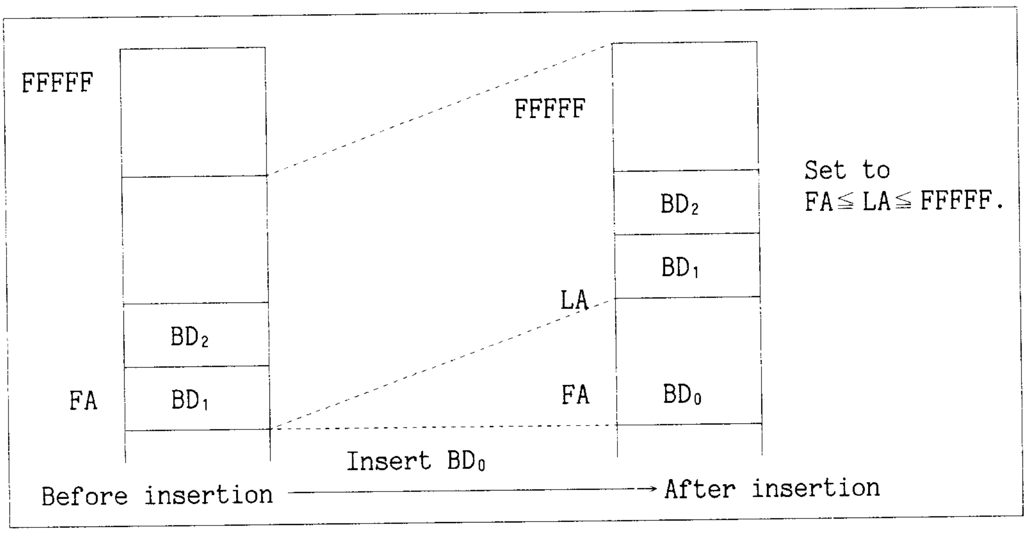


Figure 6 - 3 Description of Block Insertion

(2) Operation

Initial condition

⇩

① Press [EDIT] [1] [SET] . Set insertion.

```
EDIT1  INSERT
ADRS, BLOCK
```

Wait for selecting address insert or block insert.

② To (a) or (b). .... (a) Address insertion
(b) Block insertion

(a) Address insertion

(a-1) Press [SET] .

Data

```
ADRS-INSERT      00
              12345
```

FA

Display FA set at present, and wait for FA input.

(a-2) Press [1] [0] [DEVICE] . Change FA to 10.

```
ADRS-INSERT      00
                 10
```

Set FA to 10, and wait for insert data input.

(a-3) Press [A] [A]. Set insertion data to AA.

(a-4) Press [SET] . Execute address insertion.

```
ADRS-INSERT      AA
00               10
```

Count Value

Display during execution

⇩

```
ADRS-INSERT      AA
01               11
```

Result display

(a-5) When the terminate insertion, to (a-6).
When the insertion repeatedly, continuously insert data 55 into FA11.
Then, execute insertion.

```
ADRS-INSERT     55
02              12
```

Result display

Insertion can be executed repeatedly.

(a-6) Press [RESET] . Terminate insertion.

⇩

Initial condition

(b) Block insertion

(b-1) Press [SET] .

Data

```
INST                     00
   12345  -   12345
```

FA LA

Display FA and LA set at present, and wait for FA input.

(b-2) Press [0] [DEVICE] . Set FA to 0.

```
INST                     00
       0  -   12345
```

Set FA to 0, and wait for LA input.

(b-3) Press [1][0] [DEVICE] . Set LA to 10.

```
INST                     00
       0  -      10
```

Set LA to 10, and wait for insert data input.

(b-4) Press [5][5]. Set insertion data to 55.

```
INST                     55
       0  -      10
```

(b-5) Press [SET] . Execute block insertion.

```
INST  BUSY               55
       0  -      10
```

Display during execution

```
INST  PASS               55
       0  -      10
```

Result display

(b-6) Press [RESET] .

⇩

Initial condition

6.4 Data Deletion (Deletion)

(1) Deletion

① Address deletion

Delete one-byte data on specified address FA.
Specify FA at first and press the [SET] after that to delete data by one byte. When data is deleted, data FF_H is inserted into FFFFF.

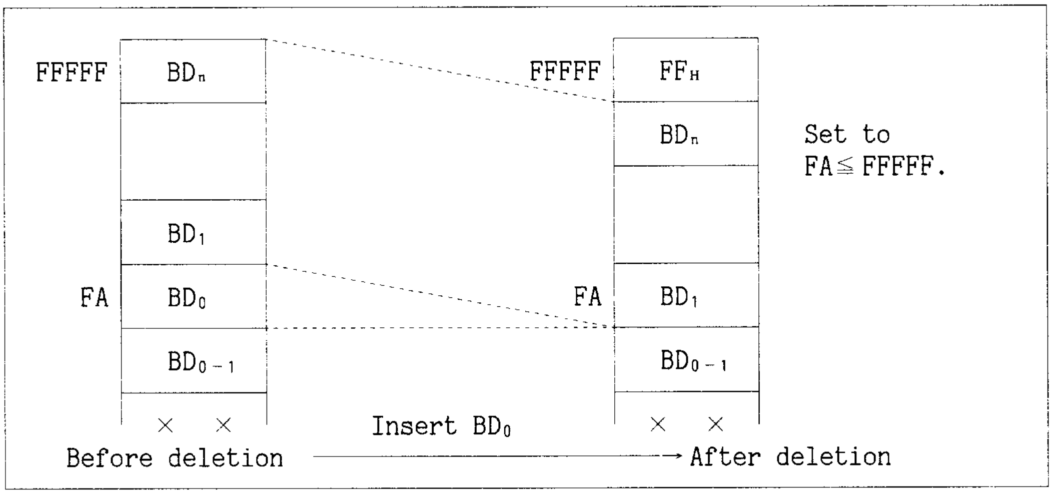


Figure 6 - 4 Description of address deletion

② Block deletion

Delete data between specified addresses (between FA and LA).
After insertion, data FF_H for deleted byte is inserted from FFFFF.

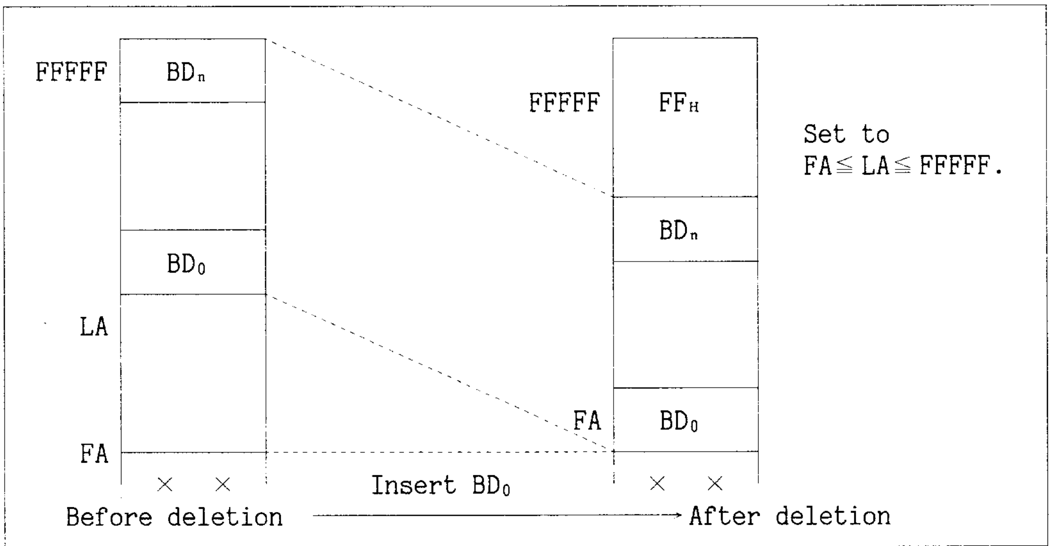


Figure 6 - 5 Description of Block Deletion

(2) Operation

(Initial condition)

⇩

① Press [EDIT] [2] [SET] . Set deletion.

```
EDIT2  DELETE
ADRS, BLOCK
```

Wait for selecting address delete or block delete.

② To (a) or (b). .... (a) Address deletion
(b) Block deletion

(a) Address deletion

(a-1) Press [SET] .

```
ADRS-DELETE
          12345
```

FA

Display FA set at present, and wait for FA input.

(a-2) Press [1][0]. Set FA to 10.

```
ADRS-DELETE
             10
```

(a-3) Press [SET] . Execute block deletion.

```
ADRS-DELETE
00           10
```

Count Value

Display during execution

⇩

```
ADRS-DELETE
01           10
```

Result display

(a-4) When the terminate delete, to (a-5).
When the contimuously delete data of FA10, Press [SET] .

```
ADRS-DELETE
02                10
```

Result display

Deletion can be executed repeatedly.

(a-5) Press [RESET] . Terminate deletion.

⇩

(Initial condition)

(b) Block deletion

(b-1) Press [SET] .

```
DELE
    12345  -   12345
    FA         LA
```

Display FA and LA set at present, and wait for FA input.

(b-2) Press [0] [DEVICE] . Set FA to 0.

```
DELE
        0  -   12345
```

Set FA to 0, and wait for LA input.

(b-3) Press [1][0]. Set LA to 10.0

```
DELE
        0  -      10
```

(b-4) Press [SET] . Execute block deletion.

```
DELE  BUSY
        0  -      10
```

Display during execution

⇩

```
DELE  PASS
        0  -      10
```

Result display

(b-5) Press [RESET] .

⇩

(Initial condition)

6.5 Confirmation of Data by Check Sum (CHECK SUM)

(1) CHECK SUM

Displays the check sum value between arbitrary addresses (FA to LA) of the buffer RAM or fuse data.

(2) Operation

(a) Display of the check sum value of the buffer RAM

The check sum value adds the data every eight bits and one that the result was shown by the hexadecimal of four digits.

Initial condition

⇩

① Press [EDIT] [8] [SET] . Set CHECK SUM.

```
EDIT8  CHECK-SUM
 RAM, FUSE
```

The system waits for the selection of the buffer RAM of fuse data.

② Press [SET] . Set the check sum of the buffer RAM.

```
RAM      SUM
   12345  -    12345
```

FA LA

The currently set FA (first address) and LA (last address) are displayed to wait for FA input.

③ Press [0] [DEVICE] . Change FA to 0 and set.

```
RAM      SUM
         0  -   12345
```

After FA is set to 0, the system waits for LA input.

④ Press [F][F] [SET] . Change LA to FF and set.

```
RAM      SUM      BUSY
         0  -       FF
```

CHECK SUM busy is displayed.

⇩

⇩

Check sum value

RAM SUM 1234 0 – FF	The check sum value is displayed.

⑤ Press [RESET] .

⇩

(Initial condition)

(b) Display of the check sum value of the fuse data

(Initial condition)

⇩

① Press [EDIT] [8] [SET] . Set CHECK SUM.

EDIT8 CHECK-SUM RAM, FUSE	The system waits for the selection of the buffer RAM of fuse data.

② Press [DEVICE] [SET] . Set the check sum of the fuse data.

FUSE SUM BUSY	CHECK SUM busy is displayed.

⇩

Check sum value

FUSE SUM 1234	The check sum value is displayed.

③ Press [RESET] .

⇩

(Initial condition)

NOTE

The fuse data check sum is executed only when the TYPE code is PLD.

6.6 Setting Data (Block Store)

(1) Block store

Sets data in between the specified addresses (FA to LA). If data is four digits, it is set in the unit of the word and if data is two digits, it is set in the unit of byte.

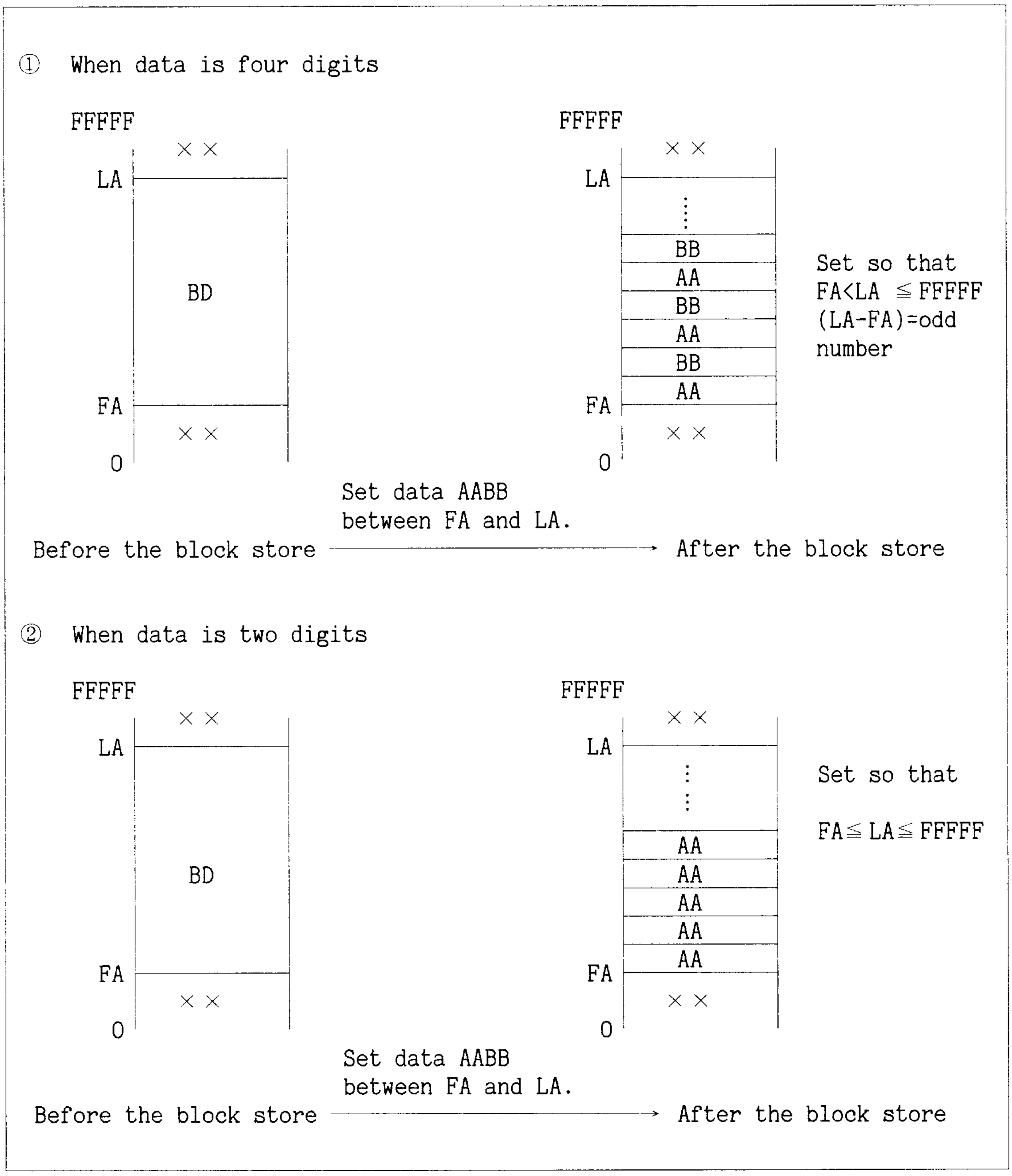


Figure 6 - 6 Description of Block Store Function

(2) Operation

Initial condition

⇩

① Press [EDIT] [9] [SET] . Set block Store.

```
                        Data
STOR                    0 0
    1 2 3 4 5  -  1 2 3 4 5
    FA            LA
```

The currently set FA and LA are displayed to wait for FA input.

② Press [0] [DEVICE] . Set FA to 0.

```
STOR                    0 0
            0  -  1 2 3 4 5
```

After FA is set to 0, the system waits for LA input.

③ Press [1][1] [DEVICE] . Set LA to 11.

```
STOR                    0 0
            0  -        1 1
```

After LA is set to 11, the system waits for data entry.

④ Press [A][A][B][B]. Set the data AABB. (When three digits such as ABB are set, 0ABB is set.)

```
STOR                A A B B
            0  -        1 1
```

⑤ Press [SET] . Execute block store.

```
STOR   B U S Y      A A B B
            0  -        1 1
```

STORE busy is displayed.

⇩

```
STOR   P A S S      A A B B
            0  -        1 1
```

The result is displayed.

⑥ Press [RESET] .

⇩

Initial condition

6.7 Copy of Data (BLock Move)

(1) Block move

Copies the data of n byte from FA to the area of n byte from LA.
When FA = LA, n = 0, an error occurs.

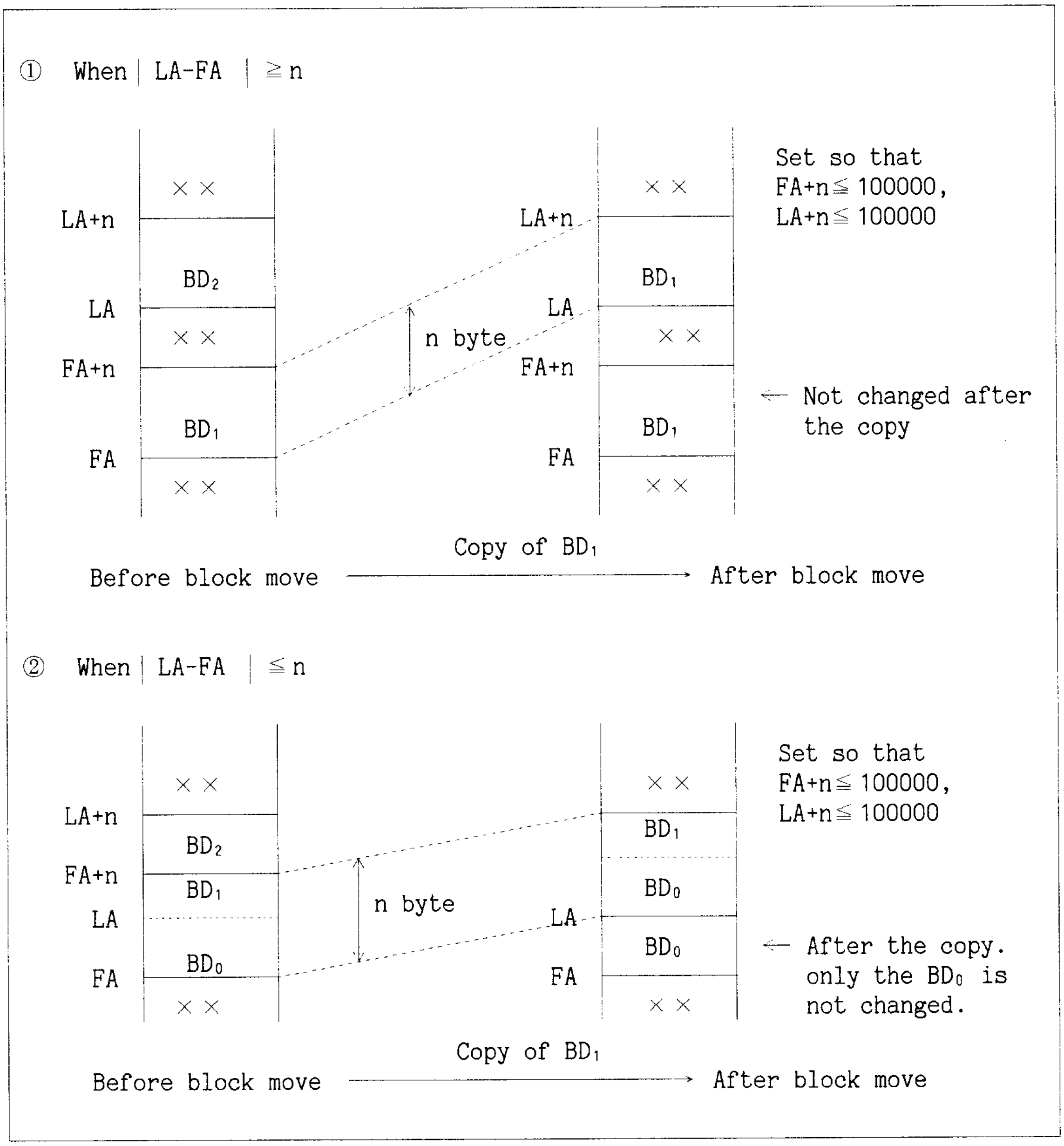


Figure 6 - 7 Description of the Block Move Function

(2) Operation

Initial condition

⇩

① Press [EDIT] [A] [SET] . Set block move.

Byte count

```
MOVE                 0
   1 2 3 4 5  -  1 2 3 4 5
```

FA LA

The currently set FA and LA are displayed to wait for FA input.

② Press [0] [DEVICE] . Set FA to 0.

```
MOVE                 0
          0  -  1 2 3 4 5
```

After FA is set to 0, the system waits for A input.

③ Press [F][F] [DEVICE] . Set LA to FF.

```
MOVE                 0
          0  -       F F
```

After LA is set to FF, the system waits for byte count entry.

④ Press [5][5]. Set the byte count to 55.

```
MOVE               5 5
          0  -       F F
```

⑤ Press [SET] . Execute block move.

```
MOVE  BUSY         5 5
          0  -       F F
```

MOVE busy is displayed.

⇩

```
MOVE  PASS         5 5
          0  -       F F
```

The result is displayed.

⑥ Press [RESET] .

⇩

Initial condition

6.8 Data Exchange (Block Change)

(1) Block change

Exchanges data of n bytes from FA with the data of n bytes from LA.
If FA = LA, n = 0, an error occurs.

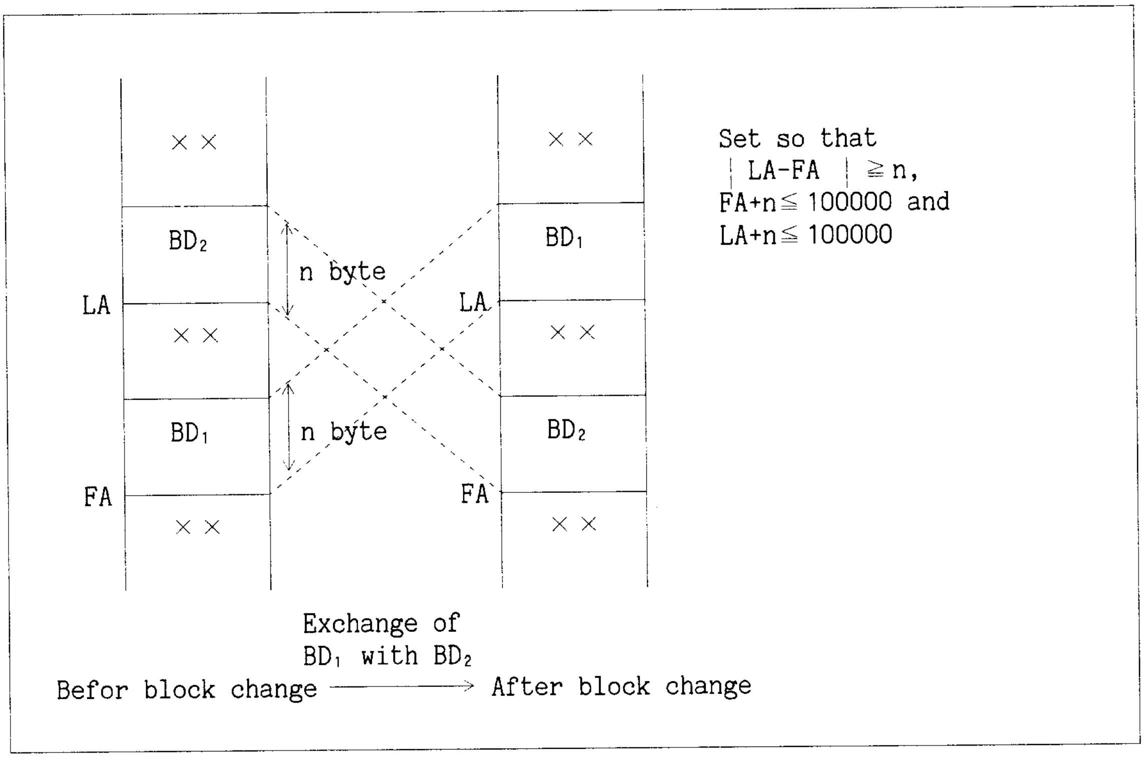


Figure 6 - 8 Description of the Block Change Function

(2) Operation

Initial condition

⇩

① Press [EDIT] [B] [SET] . Set block change.

Byte count

```
CHEN                    0
  1 2 3 4 5  -  1 2 3 4 5
```

FA LA

The currently set FA and LA are displayed to wait for FA input.

② Press [0] [DEVICE] . Set FA to 0.

```
CHEN                    0
        0  -    1 2 3 4 5
```

After FA is set to 0, the system waits for LA input.

③ Press [F][F] [DEVICE] . Set LA to FF.

```
CHEN                    0
        0  -          F F
```

After LA is set to FF, the system waits for input of byte count.

④ Press [5][5]. Set 55 bytes.

```
CHEN                  5 5
        0  -          F F
```

⑤ Press [SET] . Execute block change.

```
CHEN   BUSY           5 5
        0  -          F F
```

On block change is displayed.

⇩

```
CHEN   PASS           5 5
        0  -          F F
```

The result is displayed.

⑥ Press [RESET] .

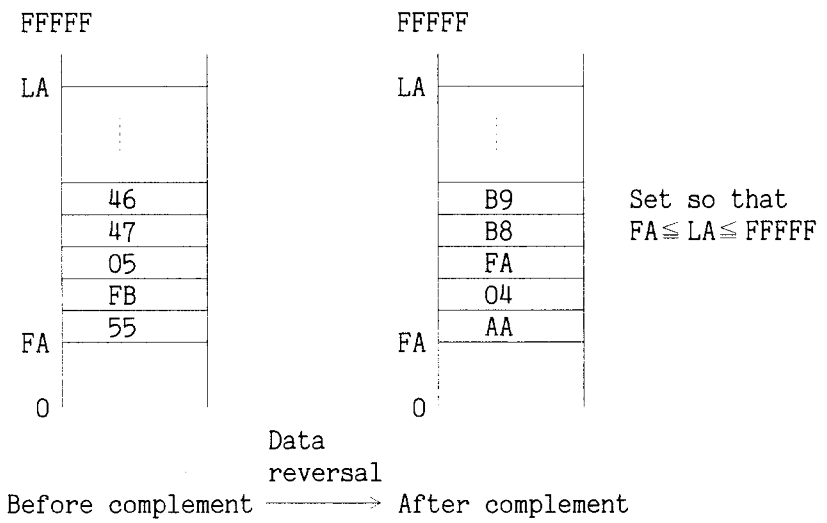
⇩

(Initial condition)

6.9 Data Reversal (Complement)

(1) Complement

Reverses the data between arbitrarily specified addresses (FA to LA).



Data reversal refers to reversing the binary data 0 and 1 in the data area.

Example of data reversal

Data before reversal			Data after reversal	
Binary data	Hexadecimal data		Binary data	Hexadecimal data
01000110	46		10111001	B9
01000111	47	⇨	10111000	B8
00000101	05	Rever-sal	11111010	FA
11111011	FB		00000100	04
01010101	55		10101010	AA

Figure 6 - 9 Description of the Complement Function

(2) Operation

Initial condition

⇩

① Press [EDIT] [C] [SET] . Set complement.

```
CMPR
   1 2 3 4 5  -   1 2 3 4 5
```

FA LA

The currently set FA and LA are displayed to wait for FA input.

② Press [0] [DEVICE] . Set FA to 0.

```
CMPR
          0  -   1 2 3 4 5
```

After FA is set to 0, the system waits for LA input

③ Press [F][F]. Set LA to FF.

```
CMPR
          0  -         F F
```

④ Press [SET] . Execute complement.

```
CMPR  B U S Y
          0  -         F F
```

On execution is displayed.

⇩

```
CMPR  P A S S
          0  -         F F
```

The result is displayed.

⑤ Press [RESET] .

⇩

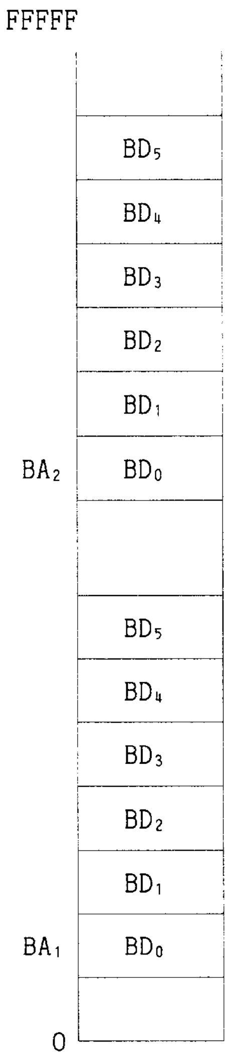
Initial condition

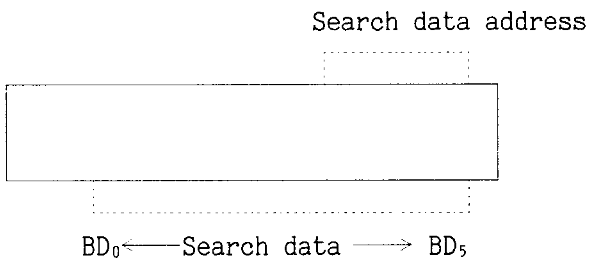
6.10 Data Search

(1) Data search

Indicates the head address of the search data in all the buffer RAM area.

The search data string (BD_0 to BD_5) is in the unit of 1 byte (8 bits) and can be up to 6 bytes. If only 4 bits of BD_0 is specified, the upper 4 bits are recognized to be 0.





The addresses (BA_1 or BA_2) of the continuous search data (BD_0 to BD_5) and head data (BD_0) are indicated.

Figure 6 - 10 Description of Data Search

(2) Operation

Initial condition

⇩

① Press [EDIT] [D] [SET] . Set data search.

```
SERC
                0 0
```

Search data

The system waits for search data input.

② Press [5][A][B]. Enter the search data 5AB.

```
SERC
             0 5 A B
```

③ Press [SET] . Execute data search.

```
SERC  BUSY
             0 5 A B
```

On search is indicated.
(In this case, the search data is set on 05AB.)

④ To (a) or (b). .... (a) When search data exists.
(b) When no search data exists.

(a) When search data exists.

Search data address

```
SERC                1 0
                0 5 A B
```

(Example)
The search data address (the head address of the search data) 10 is displayed.

(a-1) Press [△] . Display other search data address.

```
SERC                2 0
                0 5 A B
```

(Example)
The search data address 20 is displayed.

(a-2) Press [△] . Display other search data address. The search data exists until PASS is displayed.

SERC PASS 30 05AB	The last search data address and PASS are displayed.

(a-3) Press [RESET] .
Initial condition.

(b) When no search data exists.

SERC PASS 05AB	If no search data address is displayed but PASS is displayed, it means that no search data exists.

(b-1) Press [RESET] .

⇩

Initial condition

6.11 Initialization of Data (Data Clear)

(1) Data Clear

Changing the content between buffer RAM specified addresses to FF (or 00). Clears all the fuse area. (For the fuse area, see the terminology description of the section A.9.)

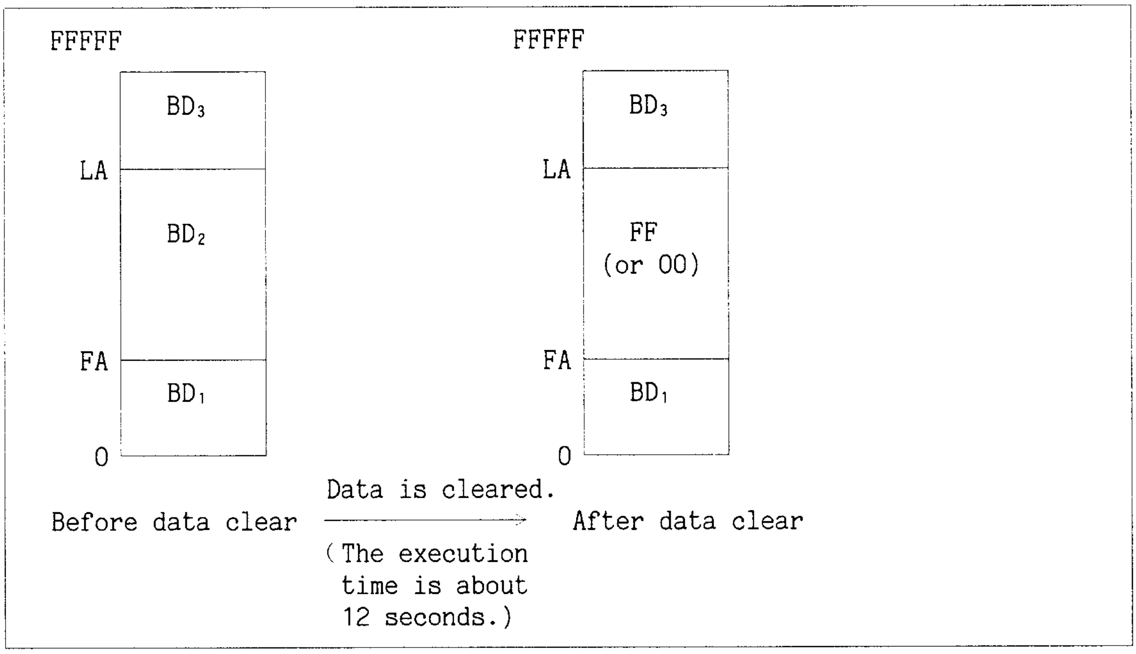


Figure 6 - 11 Description of the Data Clear Function

(2) Operation

Initial condition

⇩

① Press [EDIT] [F] [SET] . Set data clear.

```
EDITF  DATA-CLEAR
 RAM, FUSE
```

The system waits for the selection of RAM clear of fuse clear.

② To (a) or (b). .... (a) When the RAM is cleared.
(b) When the fuse is cleared.

(a) When the RAM is cleared

(a-1) Press [SET] .

```
RAM    CLEAR
    12345  -    12345
```

FA LA

The currently set FA (first address) and LA (last address) are displayed to wait for the input to FA.

(a-2) Press [0] [DEVICE] . Change and set FA to 0.

```
RAM    CLEAR
         0  -    12345
```

After FA is set to 0, the system waits for the input to LA.

(a-3) Press [F][F]. Change LA to FF.

(a-4) Press [SET] . Execute RAM clear.

```
RAM    CLEAR    BUSY
```

On clearing is displayed.

⇩

```
RAM    CLEAR    PASS
```

The result is displayed.

(a-5) Press [RESET] .

⇩

Initial condition

(b) When the fuse is cleared

(b-1) Press [DEVICE] [SET] . Execute fuse clear.

FUSE CLEAR BUSY	On clearing is displayed.
⇩	
FUSE CLEAR PASS	The result is displayed.

(b-2) Press [RESET] .

⇩

Initial condition

NOTE

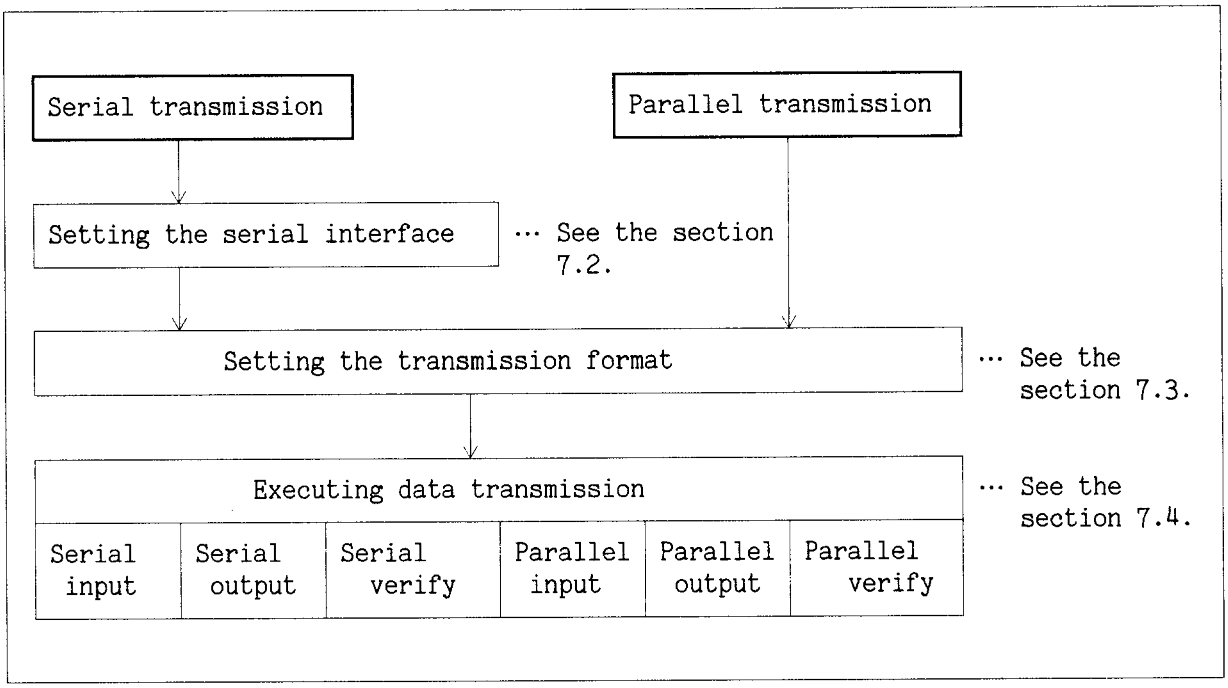
Fuse clear is executed only when the TYPE code is PLD.

7. DATA TRANSMISSION (SELECT COMMAND)

This chapter describes the data transmission function and operation method of the main command key [SELECT].

7.1 Data Transmission

This equipment is provided with the RS-232C specification based serial interface and Centronics specification based parallel interface as the interface with the external equipment.
For transmitting data through these interfaces, operate the equipment as follows.



7.2 Setting the Serial Interface (I/O condition)

(1) Setting the I/O condition

The following three types of the I/O condition settings are available.

① Transmission speed (baud rate)

Adjust the baud rate corresponding to the external equipment. Table 7-1 shows the relation between the baud rate and display.

② Word configuration (bit configuration)

Table 7-2 shows the relation between the word configuration and display.

③ X_{ON}, X_{OFF} control

Set whether X_{ON}, X_{OFF} contrl is used by the band shake of the serial interface. Table 7-3 shows the relation between X_{ON}, X_{OFF} control and display.

Table 7 - 1 Relation between the baud rate and display

Baud rate (bps)	Display
110	110
300	300
600	600
1200	1200
2400	2400
4800	4800
9600	9600
19200	19200

Table 7 - 2 Relation between the word configration and display

Word configuration			Display
Word length	Parity	Stop bit	
7	Even	2	7EV2
7	Odd	2	7OD2
7	Even	1	7EV1
7	Odd	1	7OD1
8	None	2	8NO2
8	None	1	8NO1
8	Even	1	8EV1
8	Odd	1	8OD1

Table 7 - 3 Relation between X_{ON}, X_{OFF} control and display

X_{ON} , X_{OFF} control	Display
X_{ON}, X_{OFF} control is performed.	ENA
No X_{ON} , X_{OFF} control is performed.	DIS

(2) Operation

Initial condition

⇩

① Press [SELECT] [7] [SET] . Set I/O condition.

```
  BAUD  WORD  Xon
[ 9600] 8N02, ENA
```

Baud rate / Word configuration / X_{ON}, X_{OFF} control

The currently set I/O condition is displayed to wait for the selection of the baud rate.

② Press [△] or [▽] . Select baud rate.
(The display changes as shown in Table 7-1.)

```
  BAUD  WORD  Xon
[19200] 8N02, ENA
```

(Example)
Select 19200.

③ Press [DEVICE] .

```
  BAUD  WORD  Xon
 19200 [8N02] ENA
```

After the baud rate 19200 is set, the system waits for the selection of the word configuration.

④ Press [△] or [▽] . Select word configuration.
(The display changes as shown in Table 7-2.)

```
  BAUD  WORD  Xon
 19200 [8EV1] ENA
```

(Example)
Select 8EV1.

⑤ Press [DEVICE] .

```
  BAUD  WORD  Xon
 19200, 8EV1 [ENA]
```

Set the word configuration 8EV1 and the system waits for the selection of X_{ON},X_{OFF} control.

⑥ Press [△] or [▽] . The system waits for the selection of X_{ON} ,X_{OFF} control. (The display changes as shown in Table 7-3.)

```
  BAUD  WORD  Xon
 19200, 8EV1 [DIS]
```

(Example)
Select DIS.

⑦ Press [SET] .

⇩

Initial condition

7.3 Setting the Transmission Format

(1) Setting the transmission format

Set the translation format and the terminator for the time of output. If the format is ASCII-HEX or JEDEC, it is necessary to set the sub-format code.
For details, refer to the translation format of the section A.2.
Table 7-4 shows the relation between the translation format and display, Table 7-5 shows the sub-format code and Table 7-6 shows the terminator display and set content.

Table 7 - 4 Relation between the translation format and display

Translation format	Display	Remark
INTELLEC HEX	INTELLEC	
MOTOROLA S RECORD	MOTOROLA	
TEKTORONIX HEXADECIMAL	TEKTRONIX	
EXTENDED TEKHEX	EX-TEKHEX	
ASM-86 HEXADECIMAL	ASM-86	
ASCII-HEX	TR-HEX/10	TR-HEX (without stop mark)
	TR-HEX/18	TR-HEX (with stop mark)
	ASCII:**	with sub-format specification
DG BINARY	DG-BIN:**	with sub-format specification
DEC BINARY	DEC-BIN	
HP64000ABS	HP64000ABS	
JEDEC	JEDEC:**	with sub-format specification
OPTION	OPTION 0	No used

** Sub-format code

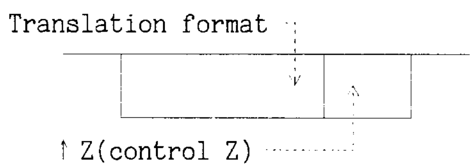
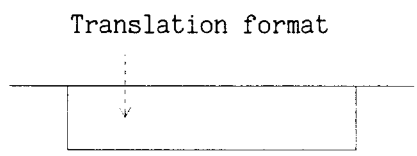
Note : The JEDEC format is available only when the TYPE code is PLD type code.

The sub-format code is as follows in the case of JEDEC format.
For the DG BINARY and ASCII-HEX sub-format, see the translation format of the section A.2.

Table 7 - 5 Sub-format code and functional content

Bit configuration								Sub-format code	Functional content
D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0		
0	0	0	0	0	0	0	0	0 0	Checks data check sum and transmission check sum (input).
0	0	0	1	0	0	0	0	1 0	Checks data check sum only (input).
0	0	1	0	0	0	0	0	2 0	Checks transmission check sum only (input).
0	0	1	1	0	0	0	0	3 0	Does not check data check sum or transmission check sum (input).

Table 7 - 6 Terminator display and set content

<table>
<tr><th colspan="2">Terminator display</th></tr>
<tr><th>↑Z</th><th>NON</th></tr>
<tr><td>↑ Z(control Z)(1A_H) is output after the output of translation format
</td><td>Nothing is output before and after the output of translation format.
</td></tr>
</table>

(2) Operation

Initial condition

⇩

① Press [SELECT] [3] [SET] . Set transmission format.

```
     FORMAT  TERM
[   INTELLEC]   ↑Z
```

Translation format   Terminator

The currently set translation format and terminator are displayed to wait for format input.

② Press [▽] or [△] . Select JEDEC format.
(The display changes as shown in Table 7-4.)

```
     FORMAT  TERM
[   JEDEC:00]   ↑Z
```

The system waits for the input of the sub-format code.

③ Press [3][0]. Change the sub-format code from 00 to 30 (See Table 7-5).

```
     FORMAT  TERM
[   JEDEC:30]   ↑Z
```

④ Press [DEVICE] .

```
     FORMAT  TERM
    JEDEC:30 [  ↑Z]
```

Set the format to JEDEC:30 and the system waits for the selection of the terminator.

⑤ Press [▽] or [△] . Select a terminator.
(The display changes as shown in Table 7-6.)

```
     FORMAT  TERM
    JEDEC:30 [NON]
```

(Example)
Select NON.

⑥ Press [SET] .

⇩

Initial condition

7.4 Data Transmission Method

For data transmission, the serial port or parallel port is used.
Data transmission method includes data input, data verify and data output.
Table 7-7 shows the functional content.

Table 7 - 7 Functional content of data transmission

Function	Function display	Sub-command	Functional content
Serial input	S-IN	0	Inputs data through the serial port.
Serial output	S-OU	1	Outputs data to the serial port.
Serial verify	S-VE	2	Compares serial port input data with buffer RAM data.
Parallel input	P-IN	4	Inputs data through the parallel port.
Parallel output	P-OU	5	Outputs data to the parallel port.
Parallel verify	P-VE	6	Compares parallel port input data with buffer RAM data.

Table 7 - 8 Content of Parameters to Transfer Data

Function	Translation format	Parameter set			Remarks
		OA	FA	LA	
Serial input, Serial verify, Parallel input, Parallel verify	INTELLEC HEX MOTOROLA S TEKTRONIX HEX EXTENDED TEK ASM-86 HP64000 ABS	○	X	X	Operates BA = TFA - OA
	ASCII-HEX	○	X	○	
	DG binary DEC binary	X	○	○	Operates no BA = TFA - OA
	JEDEC	X	X	X	All parameters are not disabled.
Serial output, Parallel output	INTELLEC HEX MOTOROLA S TEKTRONIX HEX EXTENDED TEK ASM-86 HP64000 ABS ASCII-HEX DG binary DEC binary	X	○	○	Outputs data between FA and LA.
	JEDEC	X	X	X	All parameters are not disabled.

○ : Parameter set enable
X : Parameter set disable

The number of the OA effective digits differs depending on the translation format.
Table 7-9 shows the number of the OA effective digits.

Table 7 - 9 Number of OA Effective Digits

Translation format	Number of OA digits
INTELLEC HEX	5 digits
MOTOROLA S RECORD	8 digits
TEKTORONIX HEXADECIMAL	4 digits
EXTENDED TEKHEX	8 digits
ASM-86 HEXADECIMAL	5 digits
ASCII-HEX (TR-HEX/10, TR-HEX/18 inclusive)	6 digits
BINARY (DG BINARY, DEC BINARY)	-
HP64000ABS	8 digits
JEDEC	-

If OA over the number of effective digits is specified, the address exceeding the effective digits is recognized to be 0.

In the case of BINARY and JEDEC format. OA cannot be set.

7.4.1 Functions of FA, LA and OA

This section describes the functions of the parameter FA (first address), LA (last address) and OA (offset address) used at the time of data I/O.

(1) At the time of data input

① When BA = TFA - OA is operated

The OA has the following function to the buffer RAM address (BA). The set OA value serves as subtracting from the address on the input translation format as **BA = TFA - OA** .

② When BA = TFA - OA is not operated

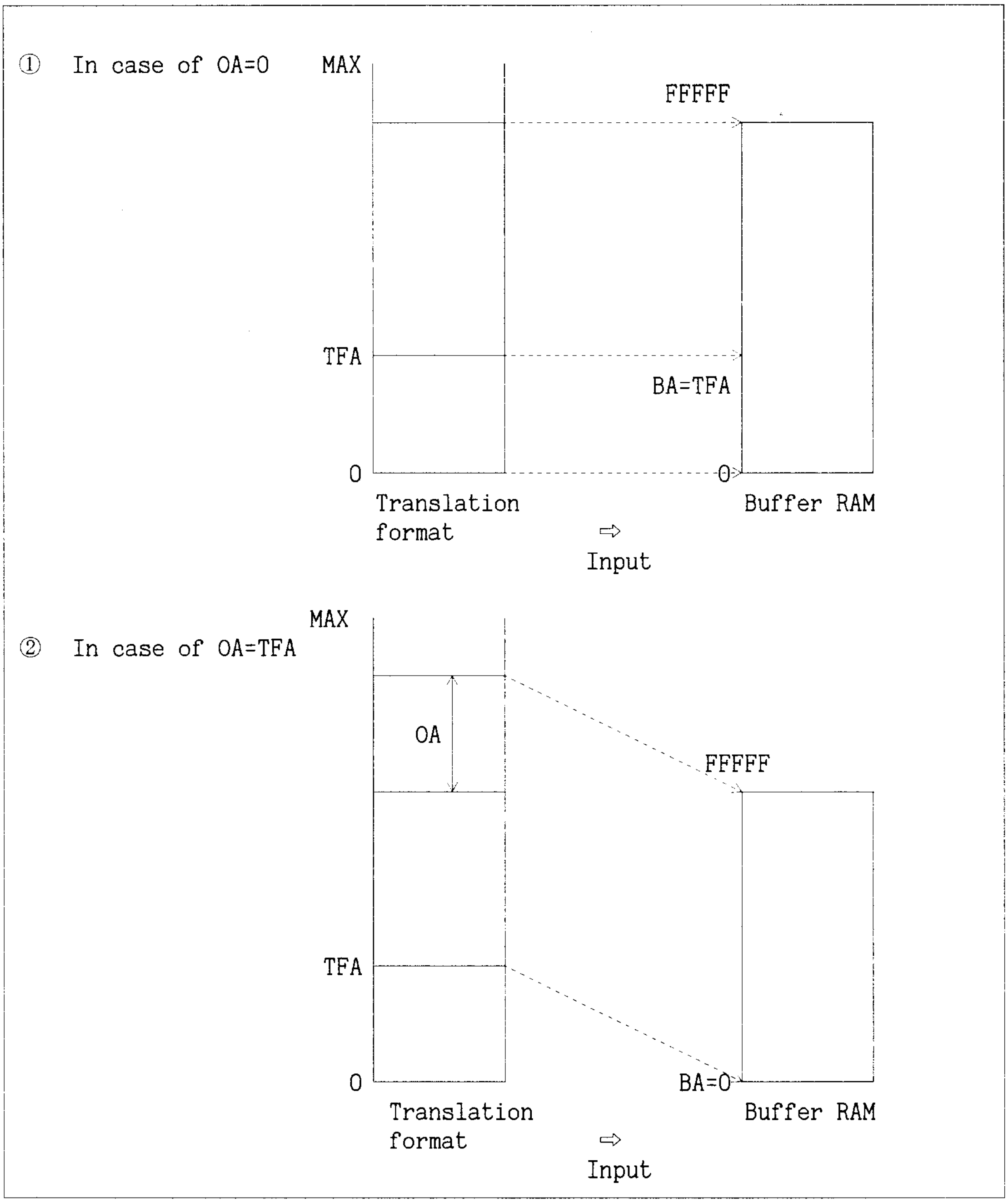
DG binary and DEC binary do not operate the BA = TFA - OA. The address set by FA inputs data in the buffer RAM at first.

③ When the address stop function is enabled

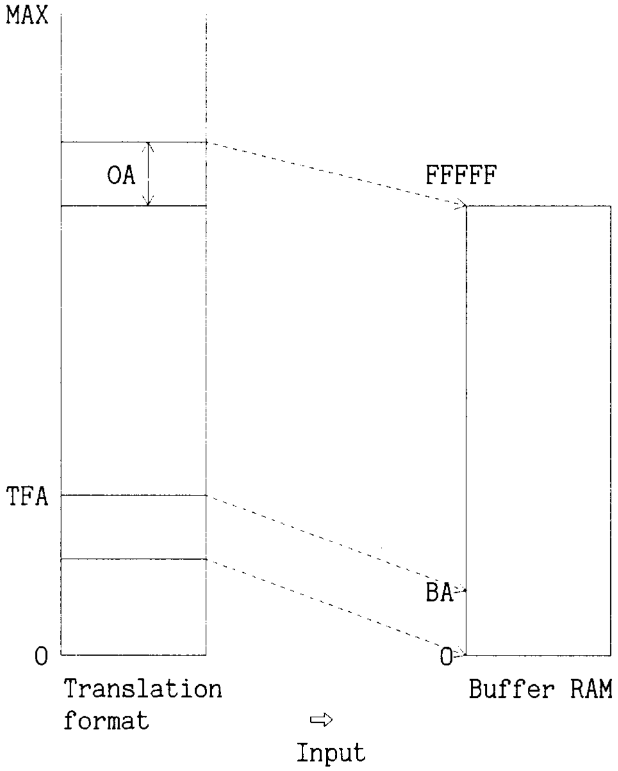
In the format with last address stop function (DG binary, DEC binary, ASCII-HEX), data is input to the address set to the LA set value and data input is completed when the last address stop function is enabled. The last address stop function is turned ON or OFF by setting switch function ([SELECT] [9] command).

(2) Data Input Method

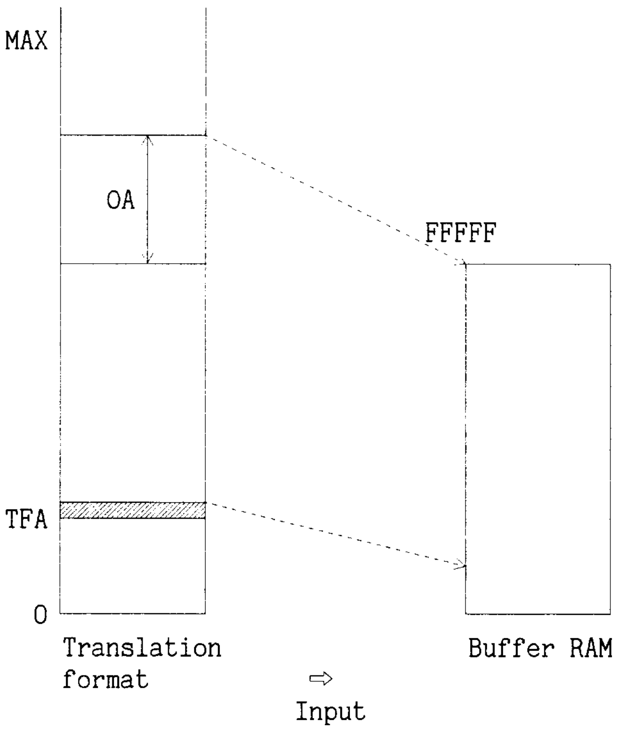
① Inputting data to operate BA = TFA - OA



③ In case of OA<TFA



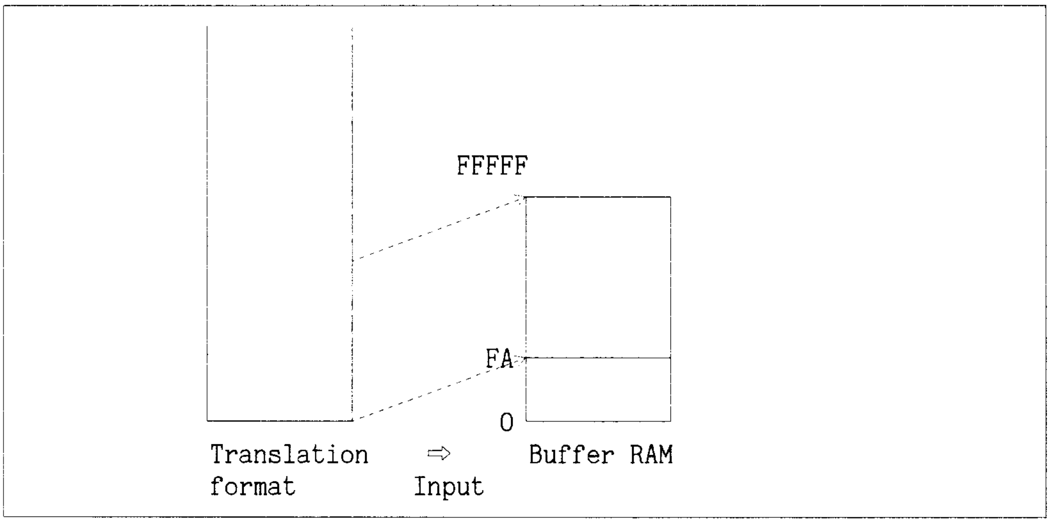
④ In case of OA>TFA



The part is not entered.

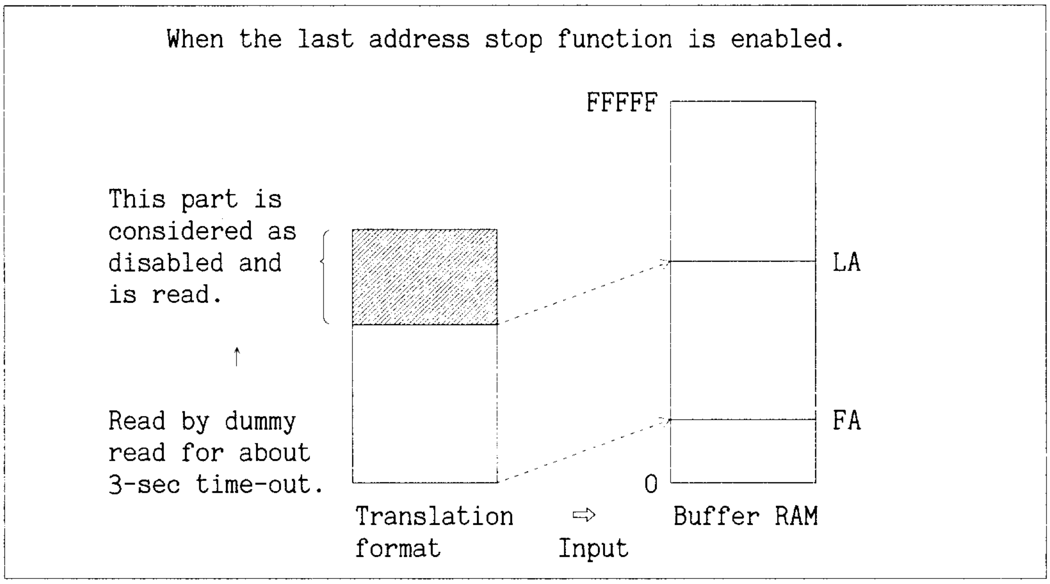
② Inputting data to operate no BA = TFA - OA

Set FA instead of OA in the binary format. Input the first data in the binary format to the FA of buffer RAM.



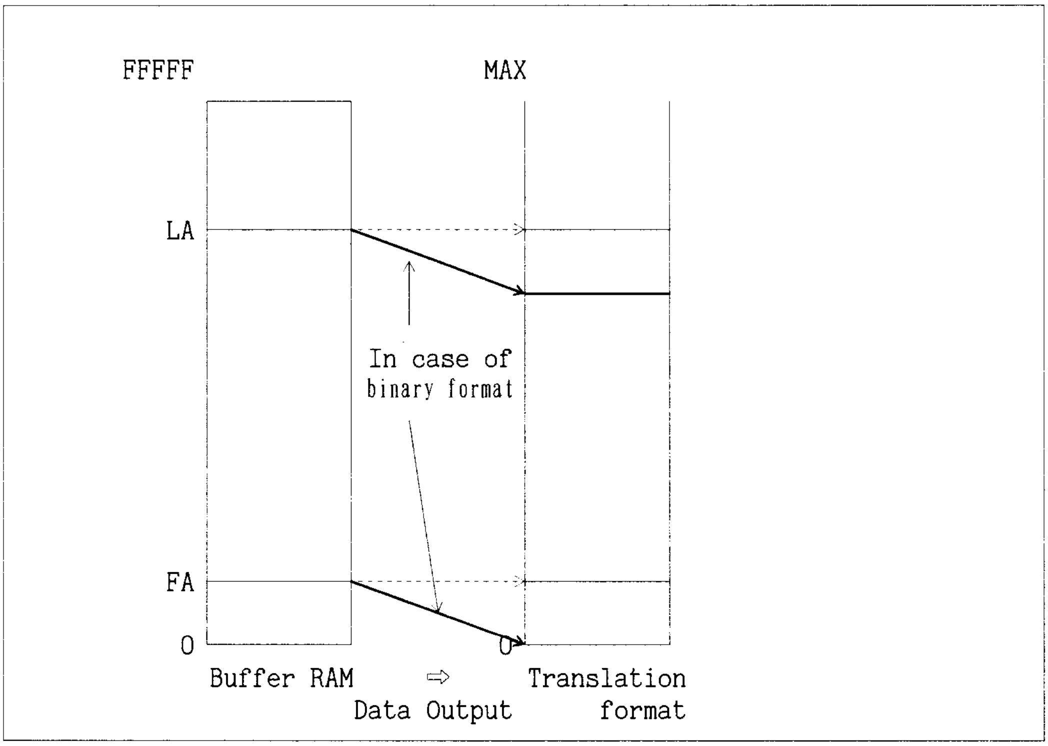
③ Inputting data when the last address stop function is enabled

When the last address stop function is ON in the binary format and ASCII-HEX format, input data to the LA set value and end data input (the last address stop function is turned ON or OFF by switch set command).

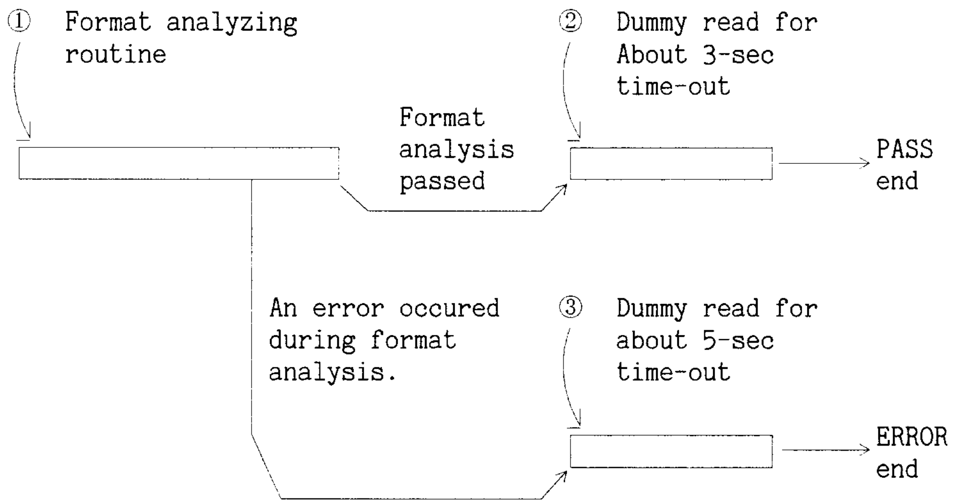


(3) At the time of data output

FA and LA indicate the address on the buffer RAM outputting data.
The first address on the output translation format is FA set value.
However, in the case of binary format, no address exists on the format. By incrementing the address by 1 gradually, output data up to LA.
The initial values of FA and LA are set in device size.
In the case of JEDEC format, FA and LA cannot be set.



7.4.2 Ending Data Input



(1) Formats are analyzed by analyzing routine ① and data input is enabled.

(2) When the format analyzing routine ends (passes), dummy read routine ② for about three-second time-out is enabled. Because it is done in order to read disabled data that may be added to the end of a format file. When time between characters to be input exceeds about three seconds, the routine ends and passes.

(3) When an error occurs in the format analyzing routine, format analysis is interrupted and dummy read routine ③ for about five-second time-out is executed. When time between characters to be input exceeds about five seconds, the routine ends to cause an error.

Note: The format analyzing routine requires about 30-second time-out.
The time-out can be ON or OFF by switch set.

7.4.3 Data Input Method

● Operation

(Initial condition)

⇩

① Press [SELECT] [0] [SET] . Set serial input.

In the case of JEDEC format, to ③.
In the case of binary format, to (a).
In the case of ASCII-HEX format, to (b).

OA

S－IN　　　12345678

The currently set OA is displayed and the system waits for OA input.

② Press [0]. Set OA to 0.

S－IN　　　0

③ Press [SET] . Execute serial input.

S－IN BUSY

On execution is indicated.

⇩

Check sum value

S－IN PASS

The result is displayed.
In the case of JEDEC format only, the check sum value is displayed.

④ Press [RESET] .

⇩

(Initial condition)

(a) In the case of binary format

```
S-IN
   12345  -   20000
```

FA LA

The currently set FA and LA is displayed and the system waits for FA and LA input.

(a-1) Press [F][F]. Set FA to FF.

```
S-IN
        FF  -   20000
```

(a-2) To ③.

(b) In the case of ASCII-HEX format

OA

```
S-IN            80000
                12345
```

LA

The currently set OA and LA is displayed and the system waits for OA and LA input.

(b-1) Press [1][0][0][0] [DEVICE] . Set OA to 1000.

```
S-IN            10000
                12345
```

(b-2) Press [F][F]. Set LA to FF.

```
S-IN            10000
                   FF
```

(b-3) To ③.

7.4.4 Data Output Method

● Operation

Initial condition

⇩

① Press [SELECT] [1] [SET] . Set serial output.
In the case of JEDEC format, to ④.

S－OU 12345 － 12345	The currently set FA and LA are displayed to wait for FA input.

FA LA

② Press [0] [DEVICE] . Set FA to 0.

S－OU 0 － 12345	After FA is set to 0, the system waits for LA input.

③ Press [F][F]. Set LA to FF.

S－OU 0 － FF

④ Press [SET] . Execute serial output.

S－OU BUSY	On execution is indicated.

⇩

S－OU PASS	The result is displayed.

⑤ Press [RESET] .

⇩

Initial condition

8. DEBUG FUNCTION AND SETTING

8.1 Debug RAM Function

R4945 can debug ROM of 512 Kbits or less at real time by connecting debug RAM of the option.
If debug RAM is used, it is possible to debug like inserting ROM in the socket on the target which inserts ROM usually programed.

(1) Operation

Initial condition

⇩

① Press [SELECT] [B] [SET] . Set the debug RAM mode.

② Press [△] or [▽] . Select the input/output mode.

```
SELCB  DEBUG-RAM
 256k [SEND] NORM
```

for SEND : The data of buffer RAM is transfered debug RAM.
for LOAD : The data of debug RAM is read buffer RAM.

③ Press [DEVICE] .

④ Press [△] or [▽] . Select the operate mode.

```
SELCB  DEBUG-RAM
 256k  SEND [NORM]
```

for NORM : Normal mode is set.
for SPLI : Split mode is set.

⑤ Press [SET] . The data is transferred between debug RAMs.

(2) Applicable TYPE

Refer to the device set code list for TYPE to which debug RAM function can correspond.

(3) The remarks in data transfer

Only the data for the size of two times TYPE is transferred to debug RAM (TR49403) when the I/O mode is set to SEND.
Encluding the case of 512 K.
All data of debug RAM is read to buffer RAMs for LOAD.

NOTE

1. When the power sources are turned on connecting R4945 with debug RAM, turn on the power source of R4945 before.

2. Debug RAM function corresponds to the revision of system ROM since Rev. F00.

9. FUNCTION AND SETTING OF THE SWITCH (SELECT COMMAND)

This chapter describes the switch function and operation method of the main command key [SELECT]. The individual functions are described from the section 9.1 to the section 9.5, and the setting method is explained in the section 9.6.

9.1 Precheck (insertion error preventing) Fuction

Precheck function checks whether device insertion error or non-insertion occurs before the execution of the device function (execution of the program) and if such an error exists, notifies of the error with the alarm.

NOTE

1. The precheck function sometimes dispatches an error even if the device is inserted properly or dispatches no error if insertion error or non-insertion occurs. Insert the device carefully.
2. The precheck judgement level can be adjusted. See the section 13.3.1.
3. The objective of the precheck function is not to judge whether the device is good or not.

9.2 ID-CHECK Function

This function checks whether the funtion of the device containing ID code (manufacturer code and device code) is executable with the TYPE code currently set on the device inserted in the socket.

CAUTION

Although the device setting code list shows the devices enabling ID-AUTO and ID-READ, there is a device without ID code depending on the shipment year. If ID-AUTO or ID-CHECK is executed to this kind of device, it may be damaged. See the device setting code list of the section A.1.

9.3 Time-out Function

This fuction dispatches an error unless the next character is entered or output within the specified time of about 30 seconds at the time of I/O of the translation format (when executing [SELECT], [0], [1], [2], [4], [5] and [6]).

9.4 Key Tone Function

This function sets the key tone ON/OFF when the key is pressed.

9.5 Pass, Fail Tone Function

This function sets the ON/OFF of the buzzer sound notifying of an error during command execution or termination of command execution.

9.6 Last Address Stop Function

When the address inputting data in the buffer RAM corresponds to the last address to input translation format (execute [SELECT], [0], [2], [4], [6] and command), this function ignores the continuous data and ends inputting translation format. The translation format for the function is listed below.

DG BINARY
DEC BINARY
ASCII-HEX (TR-HEX/10 and TR-HEX/18 inclusive)

9.7 Setting Switch ON/OFF

(1) Switch setting content

Table 9-1 shows the switch setting content.

Table 9 - 1 Switch Setting Content

Function		Setting	
Content	Display	Display	Content
Precheck	PRE-CHECK	ON	Performs precheck. *
		OFF	Performs no precheck.
ID-CHECK	ID-CHECK	ON	Performs ID-check.
		OFF	Performs no ID-check. *
Time-out	TIME-OUT	ON	Performs time-out check. *
		OFF	Performs no time-out check.
KEY tone	KEY-TONE	ON	Dispatches key click sound. *
		OFF	Dispatches no key click sound.
PASS, FAIL sound	ALARM	ON	Dispatches PASS, FAIL sound. *
		OFF	Dispatches no PASS, FAIL sound.
Last address stop	LA-STOP	ON	Ends data input by last address.
		OFF	Ends no data input by last address.

* Initial value (Set at the time of shipment)

(2) Operation

Initial condition

⇩

① Press [SELECT] [9] [SET] . Set the switch.

② Press [△] [▽] . Select ID function.
(The function display changes as shown is Table 9-1.)

SWITCH
[ID-CHECK] OFF

③ Press [DEVICE] .

ID-CHECK [OFF]

After ID CHECK is set, the system waits for the setting of ON/OFF.

④ Press [△] [SET] . Set ID CHECK to ON.

⇩

Initial condition

9.8 Change of Device Condition

Changes the Vcc voltage level in device function READ to ±5% or ±10%.

● Operation

① Press [SELECT] [C] [SET] .

```
SELCC  DEV-COND
 R-Vcc   [+-   5%]
```

② Change the voltage level to ±5% or ±10% with [△] or [▽] and press the [SET].

NOTE

When the TYPE is set by TYPE command, the Vcc voltage level is set to ±5%.

10. SET VALUE BACKUP AND CONFIRMATION OF THE REVISION (SELECT COMMAND)

This chapter describes the set value backup, revision confirmation function and operation method of the main command key [SELECT].

10.1 Backup of the Parameter Set Value

(1) Backup Function

This equipment is equipped with the backup function to enable it to be used under the set condition when the power is turned ON.

The following contents are backed up.

① Device type
② Device function
③ I/O condition (baud rate, word configuration, etc.)
④ Translation format
⑤ Device condition
⑥ Switch function

(2) Operation

Initial condition

⇩

① Press [SELECT] [F] [SET] .

```
     INITIAL
REV, INIT, Mset
```

The system waits for the selection of paremeter setting backup.

② Press [DEVICE] [DEVICE] . Select parameter setting backup.

```
     INITIAL
REV, INIT, Mset
```

③ Press [SET] . Execute parameter setting backup.

```
Mset  INITIAL
      BUSY
```

On execution is displayed.

⇩

```
Mset  INITIAL
      PASS
```

The result is displayed.

④ Press [RESET] .

⇩

Initial condition

10.2 Initialization of the Parameter

(1) Initialization of the parameter

The initialization of the parameter refers to changing the parameter set value to the same set value as at the time of shipment.

Table 10-1 shows the initial parameter value (value set at the time of shipment).

Table 10 - 1 Initial Parameter Value

Setting item	Initial Parameter value
Device type TYPE code Device manufacturer Device name	 390552 Fujitsu MBM27C4000
Device fuction Function Operation mode Page Start address (ST) Stop address (SP)	 COPY 0808N00 (8-bit normal condition) 00 0 7FFFF
Transmission format Translation format Offset address Terminator	 INTELLEC HEX 0 Z (control Z)
I/O condition Baud rate Word configuration X_{ON}, X_{OFF} control	 9600bps 8N02 (8-bit without parity, 2 stop bit) ENA (Performs X_{ON}, X_{OFF} control.)
Remote control	OFF
Switch fuction Precheck ID-CHECK Time-out Key tone PASS/FAIL sound (alarm sound) Last Address Stop	 ON OFF ON ON ON OFF

(2) Operation

Initial condition

⇩

① Press [SELECT] [F] [SET] .

INITIAL REV, INIT, Mset	The system waits for the selection of parameter initialization.

② Press [DEVICE] .

INITIAL REV, INIT, Mset	Select parameter initialization.

③ Press [SET] . Execute parameter initialization.

INIT INITIAL BUSY	On execution is displayed.
⇩	
INIT INITIAL PASS	The result is displayed.

④ Press [RESET] .

⇩

Initial condition

10.3 Confirmation of the Revision

It is possible to confirm the revision of this equipment.

● Operation

Initial condition

⇩

① Press [SELECT] [F] [SET] .

I N I T I A L R E V, I N I T, M s e t	The system waits for the selection of the revision confirmation.

② Press [SET] . Execute revision confirmation.

I N I T I A L R 4 9 4 5 R e v. A 0 0	The revision is displayed.

Revision

11. ERROR TREATMENT

When an error occurs, the [ERR], error code and error status are displayed, indicating how to treat the error.
For the content, see section A.10.

11.1 Error Treatment During the Execution of the Device Function

As for the errors during the execution of the device function, one type stops the operation, indicating the error and another type interrupts the operation temporarily.

(1) Error during the execution of PROGRAM, ERASE or SECURITY

When an error during the execution of PROGRAM, ERASE or SECURITY occurs, the operation is interrupted. Release the condition with [RESET].

```
( Error occurrence )
        ⇩
Function on           Error   Error
 execution            code    status
+--------------------------------------+
| P R O G    E R R   7 2    0 0        |
|                                      |
+--------------------------------------+
Press [RESET] . Release the error.
        ⇩
( Initial condition )
```

(Example)
Display of an error in PROGRAM

(2) Error during the execution of BLANK, READ

When an error during the execution of BLANK or READ occurs, the operation is interrupted.
Treat as follows.

(Error occurrence)

Function on execution / Error code / Error status

```
READ   ERR  70  00
 12345       55   AA
```

Device address / RAM data / Device data

(Example)
Display of an error during the execution of READ

① When the execution chancel, to②.
When the execution continue, Press [△] .

Check sum value

```
READ   SUM  1234
 12345       55   AA
```

Device address / RAM data / Device data

Last error data on the execution

With the check sum value and error data displayed, the execution is terminated.

② Press [RESET] .

(Initial condition)

11.2 Treatment of Error at the time of Data Transmission

The errors at the time of data transmission are divided into error at the time of data input/output and error at the time of data verify.

(1) Errors at the time of data input/output

Error occurrence

Serial input		Error code	Error status
S-IN	ERR	44	20

(Example)
Display of time-out error during serial input

Press [RESET] .

Initial condition

(2) Error at the time of data verify

If the input data does not coincide with the buffer RAM data, an error occurs. The error indication is displayed after all the data are entered. The displayed data is the first data which does not coincide.

(Error occurrence)

① Input of all data.

```
Serial              Error  Error
verify              code   status

S-VE     ERR   48    00
  12345        55      AA

Buffer RAM        RAM    Input
address           data   data
```

(Example)
Indication of an error during serial verify execution

Indication of other error than JEDEC format error

or

```
S-VE     ERR   48    00
  1234

Fuse address
```

Indication of an error in JEDEC format

② Press [RESET] .

(Initial condition)

11.3 Treatment of Error at the time of Power ON

When the POWER switch is turned ON, the self-diagnosis function is actuated and automatically checks the following items. If an error occurs, the check items are displayed and the operation is stopped or interrupted.
If this error occurs, notify the nearest dealer or the sales/support office of the error condition.

① POWER Switch ON.

Display	Description
Initial Test R4945 Rev. A00	Indication of on initial test

Error occurrence

⇩

Display	Description
Initial Test system ram error	Error Indication : Error indication during system RAM check (to (a).)
Initial Test system rom error	Error indication during system ROM check (to (a).)
Initial Test buffer ram error	Error indication during buffer RAM check (to (a).)
Initial Test system hard err	Error indication during program circuit check (to (b).)

(a)

① Contact the dealer.

② Power switch OFF.

(b)

NOTE

When [backup error] is displayed, the parameter is initialized. Set the parameter again.

① Press [RESET] . The parameter is initialized.

② Set the parameter again.

Press [SELECT] [F] [SET] [DEVICE] [DEVICE] [SET] .

The parameter is backed up. (See the section 10.1.)

③ When PASS is displayed, the equipment can be used normally.

④ When Error indication.

```
Mset   INITIAL
 Err  05  00
```

Error indication

④-1 Contact the dealer.

④-2 Press [RESET] .

⇩

(Initial condition) ········ Other functions than the parameter set value backup can be used.

12. REMOTE CONTROL

The remote control is the function enabling the control from outside using the serial port (RS-232C) of this equipment.
This chapter describes how to transfer to the remote control mode and what is different between the remote control command and the basic control sequence.

12.1 Transition to Remote Control Mode

The following two ways are available for transferring to remote control mode.

(1) By key setting

Operation

Press [SELECT] [8] [SET].

Response

* ($2A_H$), CR ($0D_H$) and LF ($0A_H$) are output to the serial port and the system waits for the command input.

(2) By the serial port

Operation

Enter the control code DC1 (11_H) to the serial port from outside.

12.2 Response Character

When the product is placed in the remote control mode, it outputs the following response characters and waits for a command to be input.

Table 12 - 1 Response Character

<table>
<tr><th>Response character</th><th>Description</th><th>Remarks</th></tr>
<tr><td>* CR LF</td><td>Waiting for a command to be input.
The execution of a command was normally completed.
An ESC($1B_H$) was input while a command was being input.
A BEL(07_H) was input while a command was being input.
A BREAK signal was input in the middle of serial input or output in the translation format.</td><td>If an ESC or BEL is input while a command is being input, the command is ignored.
If a BEL code is input the buzzer of the product sounds once.</td></tr>
<tr><td>? CR LF</td><td>A syntax error exists in the command input.</td><td rowspan="3">After returning these response characters, the product outputs an asterisk, a CR, or LF and waits for the next command to be input.</td></tr>
<tr><td>F CR LF</td><td>An error has occurred during the command execution.</td></tr>
<tr><td>! …CR LF</td><td>A response character after the command execution. (It starts with an exclamation mark (!) and ends with CR or LF.</td></tr>
</table>

12.3 Remote Control Command

Each remote control command consists of the header followed by parameters, which determines the function of the command.

General input format of each command is shown below.

```
□ □ · · · [CR]
□ □ · · · [LF]
```

Command header   Terminator ([CR] ($0D_H$) and [LF] ($0A_H$) are available.

Table 12 - 2 List of the Remote Control Command Codes

Command header	Description	Format	Response
TY	Setting of the device TYPE code	TY dddddd dddddd: TYPE code (6 digits)	
TD	Execution of the TYPE dump	TD Pdd 00: Serial output 20: Parallel output	
DE	Setting and execution of the device functions	DE d C: Execution of COPY B: Execution of BLANK P: Execution of PROGRAM R: Execution of READ E: Execution of ERASE S: Execution of SECURITY 0: Execution of P.R. continuation mode 1: Execution of B.P.R continuation mode	

(cont'd)

Command header	Description	Format	Response
DM	Setting of the operation mode and page of a device function	DM Mdddddddd Pee Page: 00 to FF Operation mode Operation mode: Mdddddddd Position line Data edition mode Buffer RAM data width Device data width Device data width: 08 8bit 16 16bit Buffer RAM data width: 08 8bit 16 16bit 32 32bit Data edition mode: 00 n 10 x Position line: 00 00 01 01 02 02 03 03 10 m0 11 m1 Note: For the operation modes, see Table 2-3. The other format will cause an error.	

(cont'd)

Command header	Description	Format	Response
DS	Setting of the start address (ST) and stop address (SP).	DS Rdddddd Ldddddd ST SP dddddd: 000000 to FFFFFF Note: If setting of the ST and SP are omitted, the previous settings are assumed. If the type is set, ST and SP are initialized to the values that match the device size	
SU	Confirmation of the checksum	SU Md Reeeeee Leeeeee First address(FA) Last address (LA) 0: Confirm the checksum of the buffer RAM. 5: Confirm the fuse checksum. eeeeee: 000000 to FFFFFF Note: FA and LA are valid in case of MO. <Response character> ! dddd CR LF Checksum value dddd: 0000 to FFFF	○

(cont'd)

Command header	Description	Format	Response
RC	Data clear	RC Md Reeeeee Leeeeee First address(FA) / Last address (LA) d: 0: Clear the data of the buffer RAM. 5: Clear the data of the FUSE. eeeeee: 000000 to FFFFFF Note: FA and LA are valid in case of M0.	
BI	Block insert	BIS2 Reeeeee Leeeeee Tdd First address(FA) / Last address(LA) / dd: Data eeeeee: 000000 to FFFFFF	
BD	Block delete	BDS2 Reeeeee Leeeeee First address(FA) / Last address(LA) eeeeee: 000000 to FFFFFF	
CM	Compliment	CMS2 Reeeeee Leeeeee First address(FA) / Last address(LA) eeeeee: 000000 to FFFFFF	

(cont'd)

Command header	Description	Format	Response
BS	Block store (BYTE set)	BSS2 Reeeeee Leeeeee Tdd Data Last First address(LA) address(FA) eeeeee: 000000 to FFFFFF	
BM	Block move	BMS2 Reeeeee Leeeeee Yeeeeee Byte Last count First address(LA) address(FA) eeeeee: 000000 to FFFFFF	
BC	Block change	BCS2 Reeeeee Leeeeee Yeeeeee Byte Last count First address(LA) address(FA) eeeeee: 000000 to FFFFFF	

(cont'd)

Command header	Description	Format	Response
SI	Serial input	SIOdddddddd Offset address (OA) dddddddd : 00000000 to FFFFFFFF (For DG, DEC-BINARY format) SIReeeeeeLeeeeee First address (FA) Last address(Note) (LA) eeeeee : 000000 to FFFFFF (For ASCII-HEX format) SIOddddddddLeeeeee Offset address (OA) Last address(Note) (LA) dddddddd : 00000000 to FFFFFFFF eeeeee : 000000 to FFFFFF Note: If OA, FA and LA are omitted, the previous settings are assumed.	

Note: The last address setup in DG/DEC-BINARY format and ASCII-HEX format corresponds to Rev. C00 and after.

(cont'd)

Command header	Description	Format	Response
SO	Serial output	SO Reeeeee Leeeeee Last address (LA) First address (FA) dddddddd: 00000000 to FFFFFFFF eeeeee : 000000 to FFFFFF Note: If OA, FA, and LA are omitted, the previous settings are assumed.	
PI	Parallel input	PIOdddddddd Offset address (OA) dddddddd : 00000000 to FFFFFFFF - - - - - - - - - - (For DG, DEC-BINARY format) PIReeeeeeLeeeeee First address (FA) Last address(Note) (LA) eeeeee : 000000 to FFFFFF - - - - - - - - - - (For ASCII-HEC format) PIOddddddddLeeeeee Offset address (OA) Last address(Note) (LA) dddddddd : 00000000 to FFFFFFFF eeeeee : 000000 to FFFFFF - - - - - - - - - - Note: If OA, FA and LA are omitted, the previous settings are assumed.	

Note: The last address setup in DG/DEC-BINARY format and ASCII-HEX format for execution of parallel entry corresponds to Rev. C00 and after.

(cont'd)

Command header	Description	Format	Response
PO	Parallel output	PO Reeeeee Leeeeee Last address (LA) First address (FA) eeeeee : 000000 to FFFFFF Note: If OA and FA are omitted, the previous settings are assumed.	
IC	Setting of the serial port conditions	IC Xd Te Te — 0: Disable time-out function 1: Enable time-out function Xd — 0: $X_{ON/OFF}$ control is not available. 1: $X_{ON/OFF}$ control is available.	

(cont'd)

Command header	Description	Format	Response
TF	Setting of the translation format	TFMdd See Tn Pn Pn: Last address stop 0: OFF 1: ON Tn: Terminator 0: NON 1: ↑Z See: Subformat code *1 *2 *3 dd: Translation format dd: 10 DG binary *1(Note) 11 DEC binary 30 ASCII-HEX *2 31 TR-HEX (without a stop mark) 32 TR-HEX (with a stop mark) 40 INTELLC HEX 48 ASM-86 HEXADECIMAL 50 MOTOROLA S RECORD 60 TEXTRONIX HEXADECIMAL (Note) 64 EXTENDED TEKHEX 70 HP68000ABS 90 JEDEC *3	

*1: A subformat code should bespecified. For subformat codes. See item 3.1.1, DG BINARY format.

*2: A subformat code should be specified. For subformat codes, see item 3.1.3, ASC to HEX format.

*3: A subformat code should bespecified. For subformat codes, refer to the manual.

Note : Specification of DG binary subformat corresponds to Rev. C00 and ofter.

The TEXTRONIX HEXADECIMAL format corresponds to Rev. B00 and ofter.

(cont'd)

Command header	Description	Format	Response
PH	Setting of the precheck function	PH Sd 0: Disable precheck function. 1: Enable precheck function.	
ID	Setting of the ID-check function	ID Sd 0: Disable ID-CHECK function. 1: Enable ID-CHECK function.	
BZ	Setting of the buzzer conditions	BZ TD Le Le: 0: Disable the PASS/FAIL sound. 1: Enable the PASS/FAIL sound. TD: 0: Disable the key click sound. 1: Enable the key click sound.	
DC	Setting of the device conditions	DC POON dd dd: 00: ±5% 01: ±10% POON: device function READ Vcc Voltage Set	
RV	Confirmation of the revision	RV Nd 0: Confirm the software revision number of the main body. <Response character> ! d ee CR LF ee: 00 to 99 d: A to Z	○

(cont'd)

Command header	Description	Format	Response
GR	Execution of the debug RAM function	GR Md Se (Note) Se: 0: NORMAL mode set 1: SPLITL mode set Md: 0: SEND mode set 1: LOAD mode set	○
FQ	Confirmation of errors	FQ <Response character> ! dd ee CR ee: Error status 00 to FF dd: Error code 00 to FF **CAUTION** If an error occurs during the execution of a command, the error code and status of the command can be checked by the FQ command. Execute the FQ command before the next command is executed. If the execution of a command completed normally, both error code and error status are set to 00.	○
QU	Release of the remote control	QU	
TS	Adjustment	This command is for adjustment. Do not use it.	

Note: The GR command corresponds to Rev.F00 and after.

Table 12 - 3 List of the Operation Modes

Operation mode	Format
08 08 n 00	08080000
08 16 n 00	08160000
08 16 n 01	08160001
08 16 n m0	08160010
08 32 n 00	08320000
08 32 n 01	08320001
08 32 n 02	08320002
08 32 n 03	08320003
08 32 n m0	08320010
08 32 n m1	08320011
16 16 n 00	16160000
16 16 x 00	16161000
16 32 n 00	16320000
16 32 n 01	16320001
16 32 x 00	16321000
16 32 x 01	16321001

For the details of each operation mode, refer to the Section 5.9

12.4 Communication Flowchart

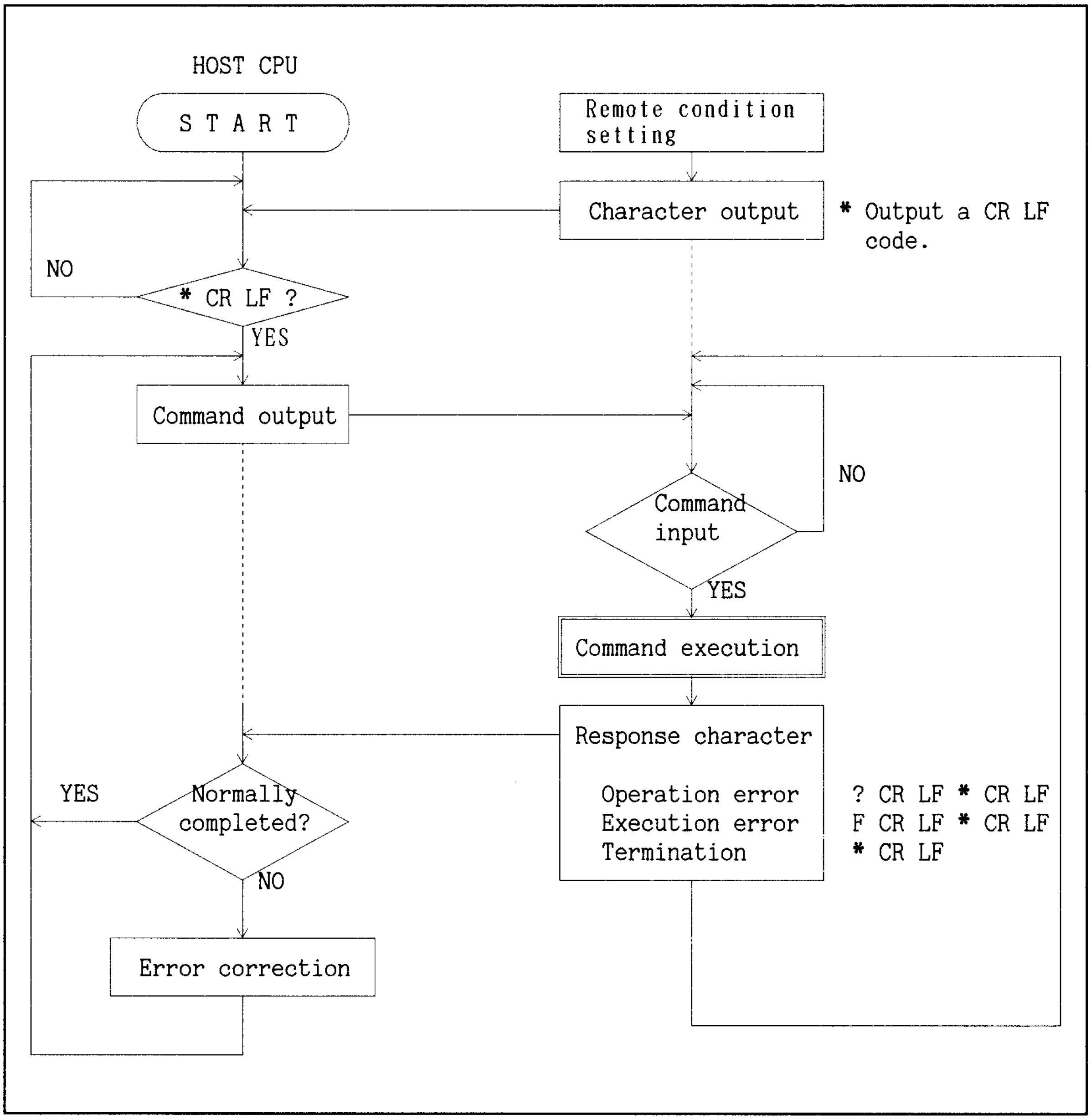
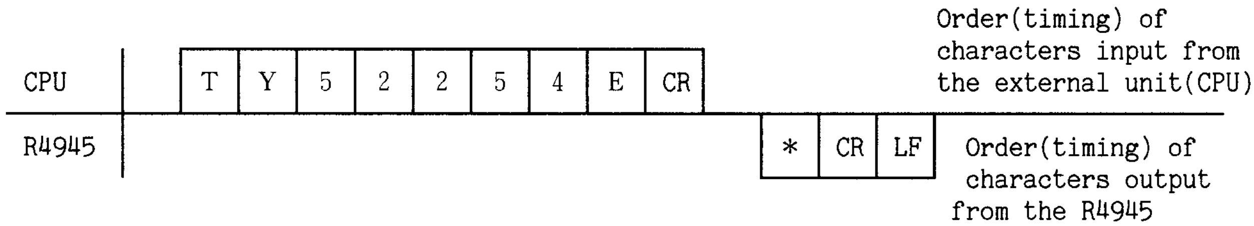


Figure 12 - 1 Communication Flowchart

After a command is input, the device executes the command then outputs the response character. If an error is detected during the execution, the response character indicates the error. Subsequently, the device checks whether any command is input. Therefore, two or more commands cannot be input continuously. Do not input a command until the response character of the previous command is output.

12.5 Sequence table

(1) How to read sequence table



The sequence proceeds from the left to the right. When inputting the command from the external unit, be sure to check that the prompt'*CR LF' is output from the R4945.

(2) Remote control

Connect the external unit to the R4945, control the keyboard of the R4945, then input the control code DC1 (11_H) from the external unit. The prompt '* CR LF' is output, and the R4945 is put in the remote control state. This is called 'Remote initial state'.

Every sequence table starts with the initial state and ends in the state.

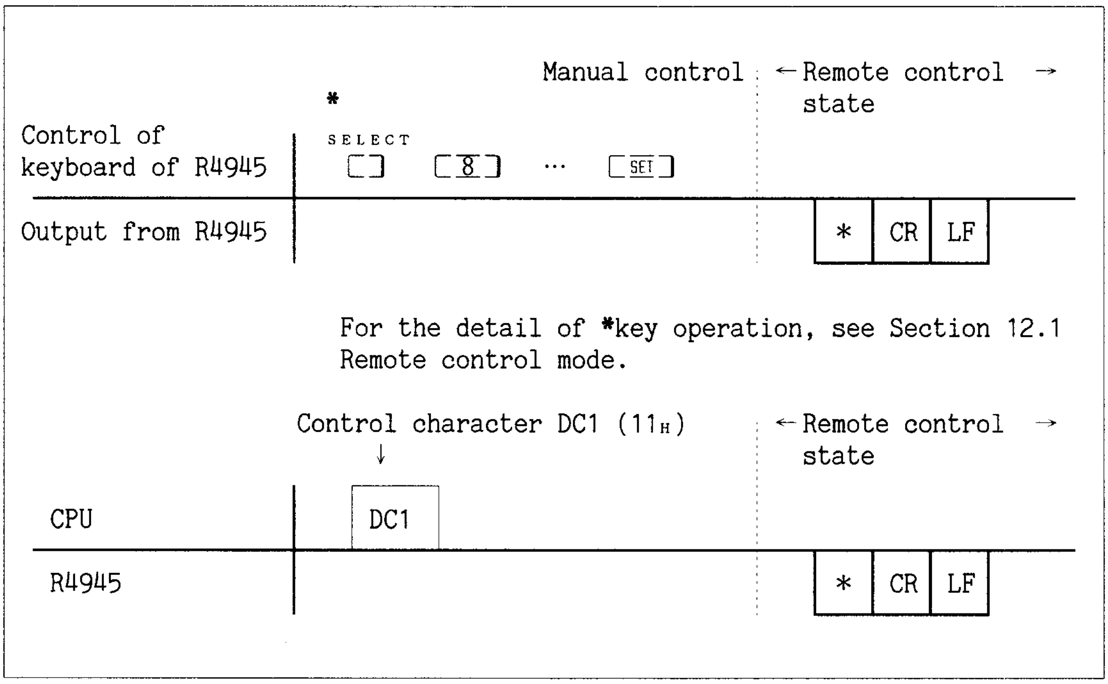


Figure 12 - 2 Remote control mode setting

(3) ROM type setting

Set Intel 27C256.

CPU	T	Y	5	2	2	5	4	E	CR			
R4945										*	CR	LF

Set ID-AUTO type.

CPU	T	Y	0	0	0	0	0	0	CR			
R4945										*	CR	LF

Figure 12 - 3 ROM type setting

(4) ID-CHECK setting

Turn on ID-CHECK.

CPU	I	D	S	1	CR			
R4945						*	CR	LF

Figure 12 - 4 ID-CHECK setting

(5) Pre-check setting

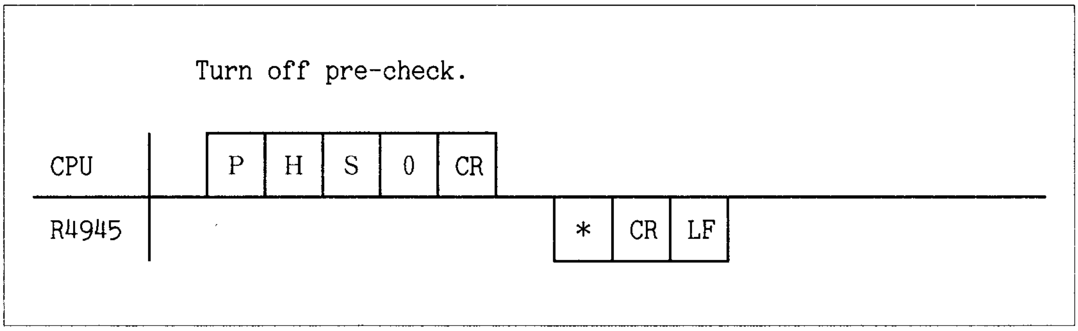


Figure 12 - 5 Pre-check setting

(6) Device fnuction operate mode and page setting

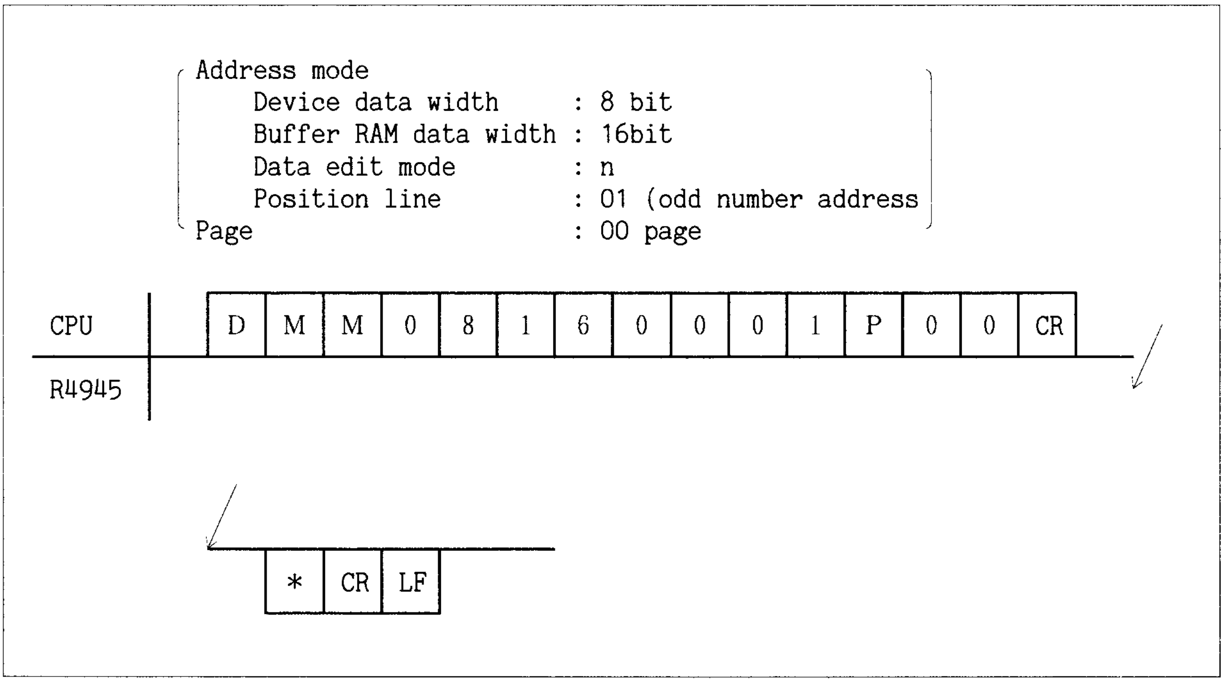
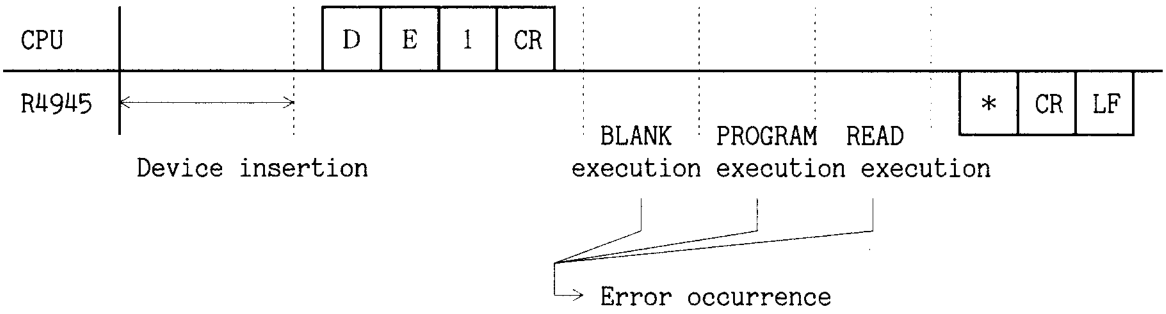


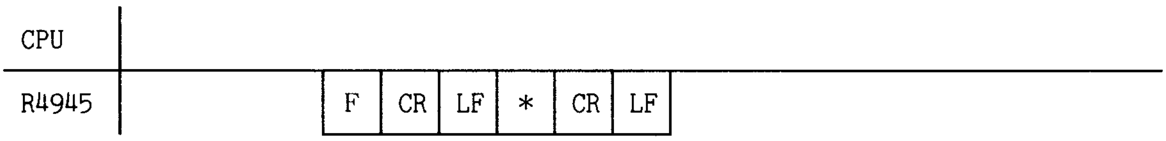
Figure 12 - 6 Device function address mode and page setting

(7) Device function setting and execution.

Execute the B.P.R. continuous mode.



Error occurrence



If an error occurs, the R4945 outputs F CR LF a* CR LF and puts in the initial state.

If the error check command is input after F CR LF * CR LF is output, the error code status can be checked.

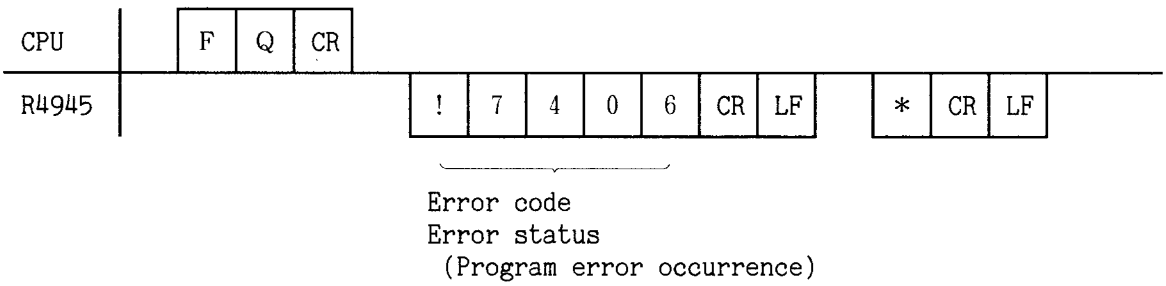


Figure 10 - 8 Device function setting and execution

(8) Transfer format setting

Translation format	:	MOTOROLA	
Sub-format	:	00	
Terminator	:	↑ Z	Set the transfer
Last address stop	:	OFF	format as follows.

CPU	T	F	M	5	0	S	0	0	T	1	P	0	CR			
R4945														*	CR	LF

The parameter that is disabled on the translation format can be omitted.
In the example, the sub-format, last address, and address stop can be omitted.

Figure 12 - 8 Transfer format setting

(9) Serial port condition setting

Time out	:	ON	
XON/OFF control	:	ON	Set the transfer format as follows.

CPU	I	C	X	1	T	1	CR			
R4945								*	CR	LF

Figure 12 - 9 Serial port condition setting

(10) Serial input execution

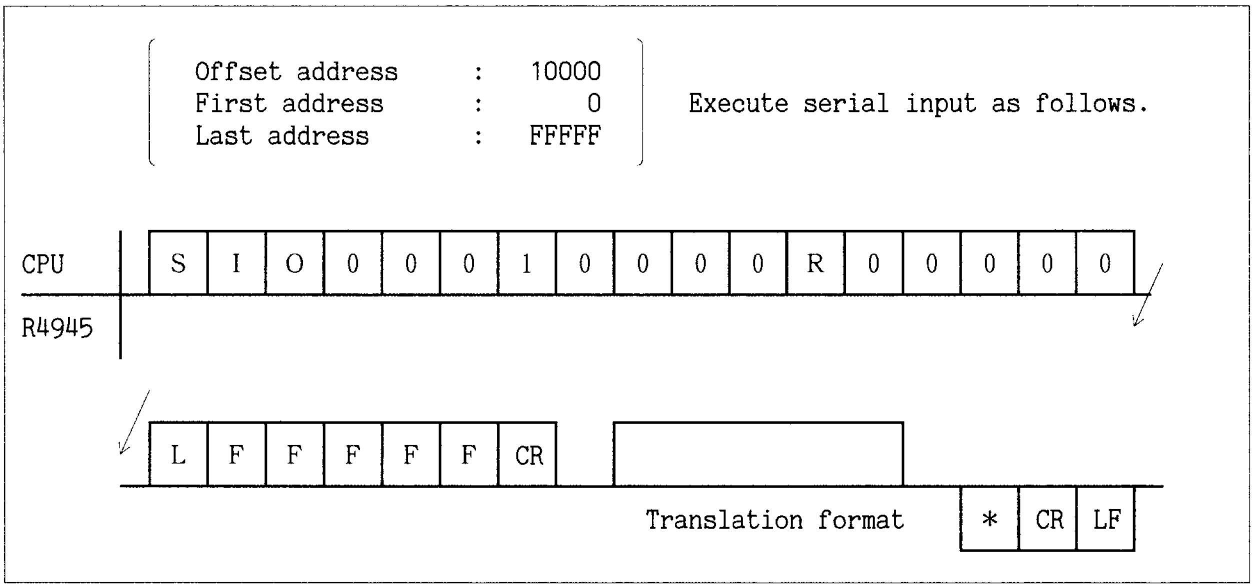


Figure 12 - 10 Serial input execution

(11) Serial output execution

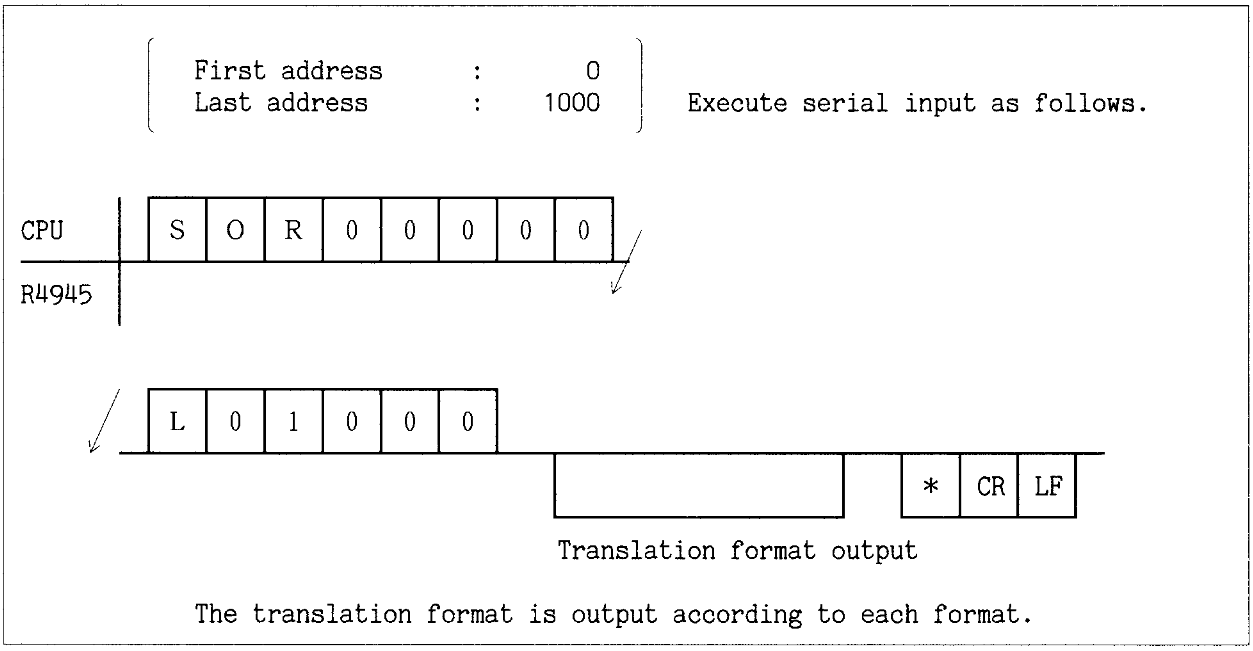
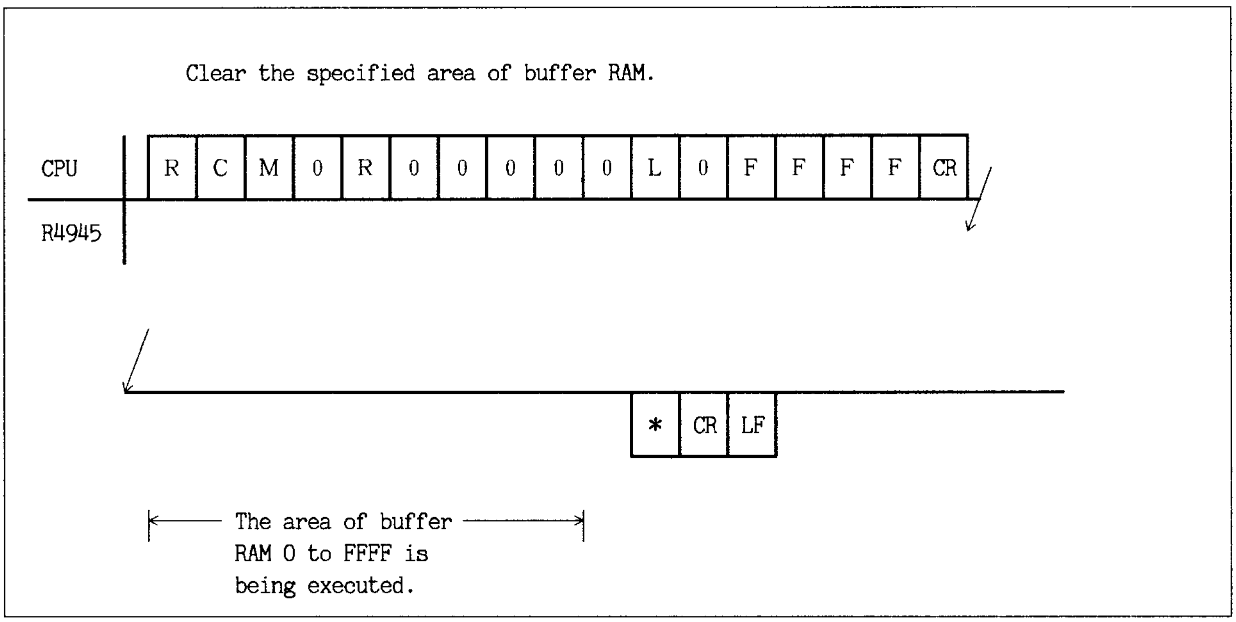


Figure 12 - 11 Serial output execution

(12) Data clear execution (buffer RAM clear execution)



Figuer 12 - 12 Data clear execution

(13) Check sum value check

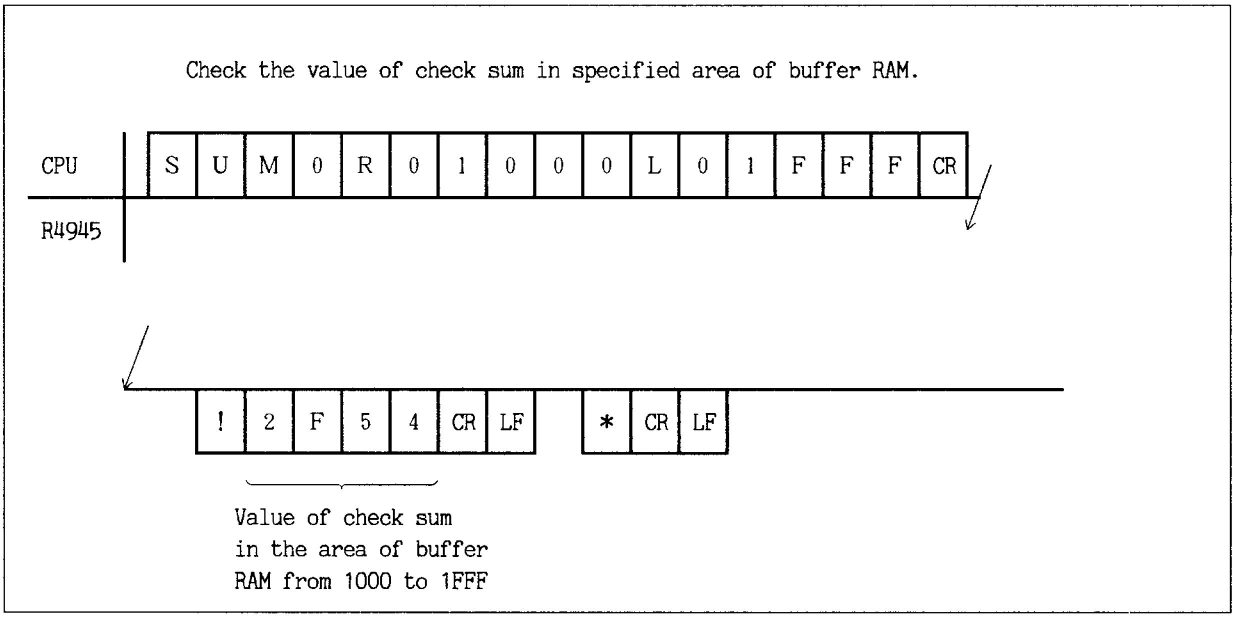


Figure 12 - 13 Check sum value check

12.6 Remote control from personal computer

File data on the floppy disk in the personal computer can be transferred to the R4945 and be written in the device by remote control from the personal computer.

Operation

① Transfer data file MOTO.HEX written in the MOTOROLA S RECORD format to the R4945.

② Set device type to Intel 27C256.

③ Set device function to B.P.R. to execute.

● When the R4945 is executed, the command in which an error occurs is displayed and execution is interrupted if an error occurs.

① Remote control for PC9800

```
100     '*****************************************************
110     '*      R4945  REMOTE CONTROL
120     '*             PC9801
130     '*             8 BIT NON PARITY 2 STOP BIT XON
140     '*             FILE NAME = MOTO.HEX
150     '*             TYPE CODE = Intel 27C256
160     '*             DEVICE FANCTION = B.P.R
170     '*****************************************************
180     '
190     'START
200     A$="" : B$="" : C$="" : P=Q=0
210     CLS                                 ' PC9800 CRT crear
220     '---------------------------------- RS232C Mode set
230     OPEN "COM:N83X" AS #1               ' 8 BIT NON PARITY 2 STOP BIT XON
240     ON COM GOSUB 680                    ' RS-232C Input
250     COM ON
260     '---------------------------------- Remote on !!
270     PRINT #1,CHR$(&H11);
280     IF NOT P=1 THEN 280
290     PRINT "===== R4945 ON LINE ====="
300     '---------------------------------- Transration format set
310     A$="TFM50T1"
320     P=Q=0
330     PRINT #1,A$
340     IF Q=2 THEN 810
350     IF P<>1 THEN 340
360     '---------------------------------- Data input execution !!
370     A$="SI"
380     P=Q=0
390     PRINT #1,A$
400     '
410     OPEN "B:MOTO.HEX" AS #2             ' MOTE.HEX File open
420     '
430     IF EOF(2) THEN 480                  ' End of file ?
440     D$ = INPUT$(1,#2)                   ' File data read
450     PRINT #1 , D$;                      ' File data output
460     GOTO 430                            ' Loop !!
470     '
480     CLOSE #2                            ' File close
490     IF Q=2 THEN 810
500     IF P<>1 THEN 490
510     '---------------------------------- ROM TYPE set "27C256"
520     A$="TY52254E"
530     P=Q=0
540     PRINT #1,A$
550     IF Q=2 THEN 810
560     IF P<>1 THEN 550
570     '---------------------------------- Device fanction set = B.P.R
580     A$="DE1"
590     P=Q=0
600     PRINT #1,A$
610     IF Q=2 THEN 810
620     IF P<>1 THEN 610
630     '---------------------------------- Remote off !!
640     PRINT #1,"QU"
650     PRINT "===== END !! ====="
660     END
670     '
680     '---------------------------------- Response read sub.
690       IF LOC(1) = 0 THEN RETURN
700       B$ = INPUT$(1,#1)                 ' 1 chacter input
710       IF B$="F" THEN 760                ' F Error end ?
720       P=INSTR(B$,"*")
730       B$ = INPUT$(1,#1)                 ' 1 chacter input
740       IF B$=CHR$(&HA) THEN RETURN
750       GOTO 730
```

(cont'd)

```
760   '---------------------------------- Error response check
770    Q=2
780     B$ = INPUT$(1,#1)              ' 1 chacter input
790     IF B$=CHR$(&HA) THEN 730
800     GOTO 780
810   '-------------------------------- Error operation
820    P=0
830    PRINT "ERROR COMMAND=";A$
840    PRINT #1,CHR$(&H1B);           ' Programma reset
850    IF P=0 THEN 850
860    PRINT #1,"QU"                  ' Remote off !!
870    CLOSE
880  END
```

Explanation	
230	Open the RS-232C, and set bit configuration.
240 - 250	Interrupts RS-232C, and set the sub-routine.
270 - 280	Put the R4945 in the remote state, and wait until it is in the ready state.
310 - 350	Set the translation format to MOTOROLA S RECORD .
370 - 500	Open file MOTO.HEX, and send data to the R4945. After data transfor is completed, close the file.
520 - 560	Set device type Intel 27C256.
580 - 620	Set the device function B.P.R. to execute.
640	Release the reomte state of the R4945.
690 - 800	Sub-routine checking the response to the R4945.
690 - 750	Judge whether the processing of the R4945 is terminated by the response from the R4945.
770 - 800	When the R4945 does not end normally, set the Q flag.
820 - 880	Measuer for error. Print the command that does not end the R4945, and release the remote state of the R4945.

② Remote control for IBM-PC

```
100   '*********************************************************
110   '*      R4945  REMOTE CONTROL
120   '*             IBM PC
130   '*             8 BIT NON PARITY 2 STOP BIT XON
140   '*             FILE NAME = MOTO.HEX
150   '*             TYPE CODE = Intel 27C256
160   '*             DEVICE FANCTION = B.P.R
170   '*********************************************************
180   '
190   'START
200   A$="" : B$="" : C$="" : P=Q=0
210   CLS                                ' IBM PC CRT crear
220   '---------------------------------- RS232C Mode set
230   OPEN "COM1:9600,n,8,2" AS #1       ' 8 BIT NON PARITY 2 STOP BIT XON
240   ON COM(1) GOSUB 680                ' RS-232C Input
250   COM(1) ON
260   '---------------------------------- Remote on !!
270   PRINT #1,CHR$(&H11);
280   IF NOT P=1 THEN 280
290   PRINT "===== R4945 ON LINE ====="
300   '---------------------------------- Transration format set
310   A$="TFM50T1"
320   P=Q=0
330   PRINT #1,A$
340   IF Q=2 THEN 810
350   IF P<>1 THEN 340
360   '---------------------------------- Data input execution !!
370   A$="SI"
380   P=Q=0
390   PRINT #1,A$
400   '
410   OPEN "A:MOTO.HEX" FOR INPUT AS #2 ' MOTE.HEX File open
420   '
430   IF EOF(2) THEN 480                 ' End of file ?
440   D$ = INPUT$(1,#2)                  ' File data read
450   PRINT #1 , D$;                     ' File data output
460   GOTO 430                           ' Loop !!
470   '
480   CLOSE #2                           ' File close
490   IF Q=2 THEN 810
500   IF P<>1 THEN 490
510   '---------------------------------- ROM TYPE set "27C256"
520   A$="TY52254E"
530   P=Q=0
540   PRINT #1,A$
550   IF Q=2 THEN 810
560   IF P<>1 THEN 550
570   '---------------------------------- Device fanction set = B.P.R
580   A$="DE1"
590   P=Q=0
600   PRINT #1,A$
610   IF Q=2 THEN 810
620   IF P<>1 THEN 610
630   '---------------------------------- Remote off !!
640   PRINT #1,"QU"
650   PRINT "===== END !! ====="
660   END
670   '
680   '---------------------------------- Response read sub.
690     IF LOC(1) = 0 THEN RETURN
700     B$ = INPUT$(1,#1)                ' 1 chacter input
710     IF B$="F" THEN 760               ' F Error end ?
720     P=INSTR(B$,"*")                  '
730     B$ = INPUT$(1,#1)                ' 1 chacter input
740     IF B$=CHR$(&HA) THEN RETURN
750     GOTO 730
```

(cont'd)

```
760   '--------------------------------- Error response check
770   Q=2
780    B$ = INPUT$(1,#1)              ' 1 chacter input
790    IF B$=CHR$(&HA) THEN 730
800    GOTO 780
810   '--------------------------------- Error operation
820   P=0
830   PRINT "ERROR COMMAND=";A$
840   PRINT #1,CHR$(&H1B);           ' Programma reset
850   IF P=0 THEN 850
860   PRINT #1,"QU"                   ' Remote off !!
870   CLOSE
880  END
```

Explanation	
230	Open the RS-232C, and set bit configuration.
240 - 250	Interrupts RS-232C, and set the sub-routine.
270 - 280	Put the R4945 in the remote state, and wait until it is in the ready state.
310 - 350	Set the translation format to MOTOROLA S RECORD.
370 - 500	Open file MOTO.HEX, and send data to the R4945, After data transfer is completed, close the file.
520 - 560	Set device type to Intel 27C256.
580 - 620	Set the device function B.P.R. to execute.
640	Release the remote state of the R4945.
690 - 800	Seb-routine checking the responese to the R4945.
690 - 750	Judge whether the processing of the R4945 is terminated by the response from the R4945.
770 - 800	When the R4945 does not end normally, set the Q flag.
820 - 880	Measure for error. Print the command that does not end the R4945, and release the remote state of the R4945.

Relational IBM-PC : IBM PC/AT
IBM PS/55
IBM PS/2
J3100 (Toshiba)

13. MAINTENANCE

This section describes how to replace the MUP socket and fuse and how to check the operation.

13.1 How to Replace the MUP Socket

Take the following steps to replace the MUP socket of the standard socket adapter (R49451A). (See Figure 13-1.)

● Operation

① Remove the board fixing screws (4) of the socket adapter.

② Remove the socket adapter board from the socket case.
In this case, keep the socket lever raised.

③ Remove the fixing screws (2) of the MUP socket to be replaced and extract the MUP socket just upward gently.

④ Insert a new MUP socket from above gently and tighten the two screws removed in ③.

⑤ Fit the socket adapter board to the socket adapter.

⑥ Fit the board to the socket adpater with the four screws removed in ①.

Table 13 - 1 Standard and Service Life of the MUP Socket

Socket pin	Stock No.	Service life	Remark
32-pin socket	232-1285-00-0602J	Approx. 5000 times	Sumitomo 3M
40-pin socket	240-1280-00-0602J		

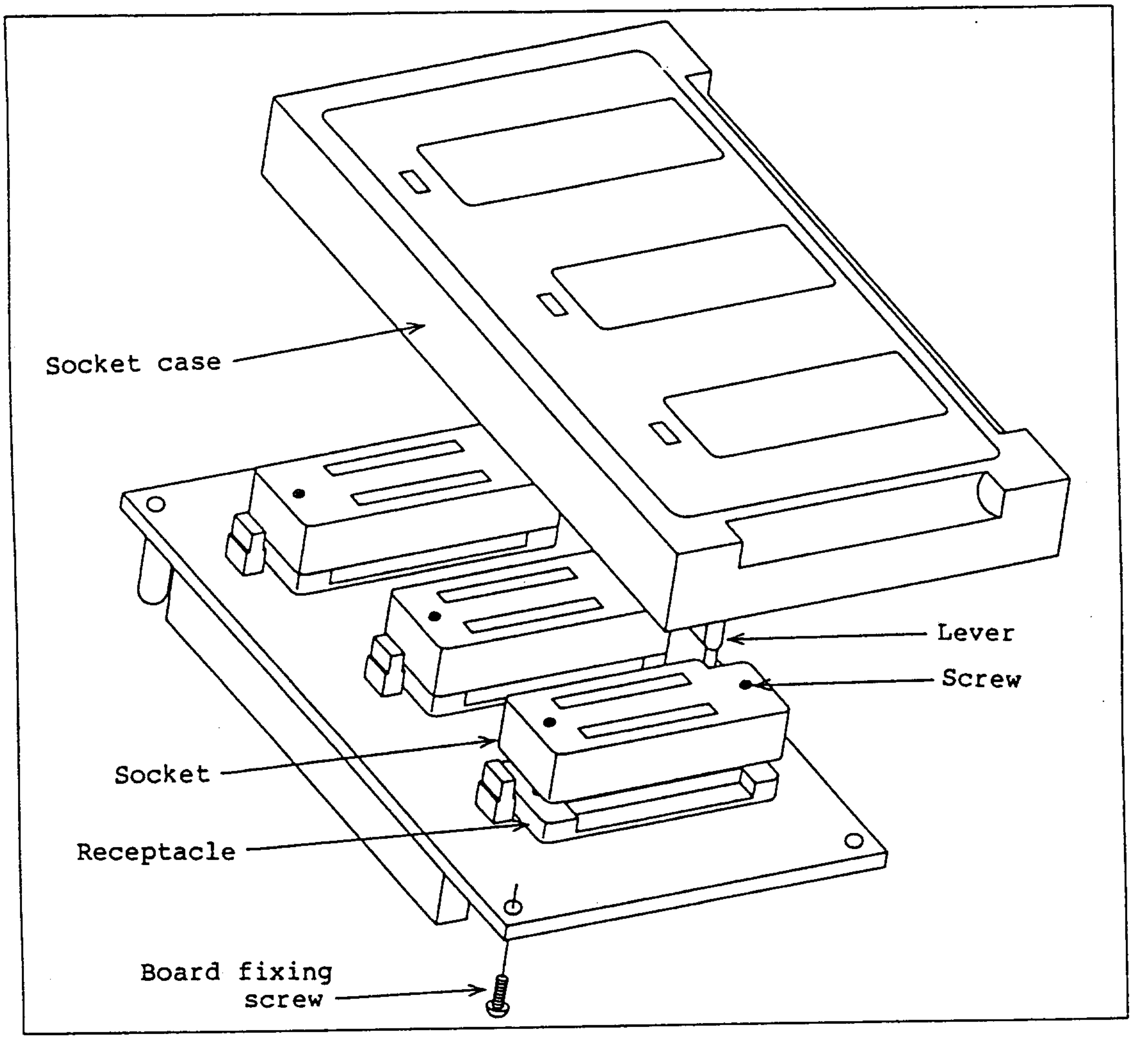


Figure 13 - 1 Deal drawing of the socket adapter (R49451A)

13.2 How to Replace the Fuse

How to replace the fuse of the power supply is mentioned below.
The power supply fuse is incorporated in the fuse holder on the rear panel of the main body.

● Operation

① Turn the cap of the fuse holder by about 60 degrees counterclockwise with the slotted screw driver pressed slightly and take off the screw driver. The rotation part is protruded by about 3 mm.

② By pulling out this rotation part, remove the fuse and replace it with the specified fuse.

③ Fit the rotation part by turning it by about 60 degrees clockwise with the screw driver pressed.

Table 13 - 2 R4945 AC power supply fuse

Power supply	Fuse
AC90 to 250V	EAWK 0.4A

WARNING

1. Do not replace the fuse until the POWER switch is turned OFF and the power cable is removed from the receptacle.

2. For the protection against a fire, be sure to use a fuse of the same type and rating upon the replacement.

13.3 Operation Check

13.3.1 Adjustment of the Precheck Level

● Operation

① Press [SELECT] [D] [SET] [DEVICE] [SET] .

```
PRE        DC-TEST
LEVEL           [NG]
```

② Insert the device into the MUP socket. Turn the V_{REF} of the side panel so that the [NG] indication turns to [OK] indication.

③ To terminate the adjustment, press [RESET] .

NOTE

1. Some types of the devices cannot be adjusted by the V_{REF} volume of the side panel so that [NG] or [OK] remains indicated.
   In the case of [NG], set PRE-CHECK to OFF with the switch setting command ([SELECT], [9] , [SET]).
2. In some cases, by the adjustment of the V_{REF} volume, the [OK] indication may turn to the [NG] indication or the precheck function may not function properly.
3. It is impossible to check the device insertion conditon completely by the precheck function. Upon the insertion of the device, confirm the insertion condition carefully.

13.3.2 How to Check MUP Voltage

(1) Instruments necessary for the operation check

Table 13 - 3 Instruments necessary for the operation check

Instrument	Performance	Recommend model
Digital multi-meter	Measuring range : 0 to ±50V Measuring precision : ±0.1% (with the full case) Input impedance : 10MΩ or more	TR6845 (ADVANTEST)

(2) The MUP socket DC/AC test and hardware check method

● Operation

① Press [SELECT] [0] [SET] [DEVICE] [DEVICE] [SET].

```
SELCD DC-TEST
TEST NO-00
```

② Set the test No. of 00 to FF with [0] to [F] and press [SET].
The content of the individual test No. is checked.

```
TEST NO-00   BUS▒
```

③ You can advance the test No. using [△] or [▽]. Refer to the (3) mentioned later.

④ To terminate the check, press [RESET].

(3) Description of the test items

Table 13 - 4 Test Items List

Test No.	Content
00	System ROM test
01	Buffer RAM test
10	Display test
30	V_{CC}, V_{PP}, V_{REF} adjustments
40	V_{PP} voltage test
50	V_{PP} output pin test
60	V_{CC} voltage test
70	V_{CC} output pin test
80	V_{ID} voltage test
90	V_{REF} voltage test
A0	Address output test
D0	Data line test
E0	Backup EEPROM test

(3-1) Test No. 00

Reads the content of the system ROM to make a test.

(3-2) Test No. 01

Writes data into the buffer RAM to make a read test.

(3-3) Test No. 10

Displays data on the LCD display to terminate.

(3-4) Test No. 30

Adjusts the Vcc, Vpp and V_{REF} adjustments.

Table 13 - 5 Vcc, Vpp, V_{REF} Adjustment Values

No.	Test item	Test point	Adjustment value
①	V_{PP} voltage	24 pins of the 32-pin socket	12.7V± 10mV
②	V_{CC} voltage	32 pins of the 32-pin socket	7.013V± 10mV
③	V_{REF} voltage	V_{REF} terminal on the side	-0.75V± 10mV

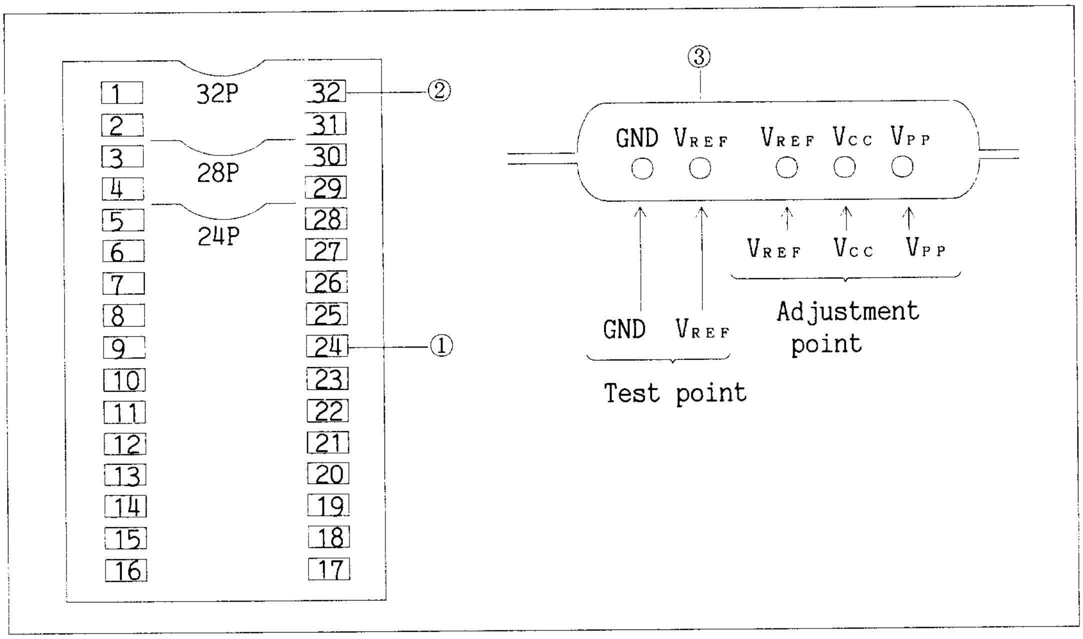


Figure 13 - 2 Test Points Diagram

(3-5) Test No. 40 to 90

Check the individual output pins. Confirm on the 32-pin socket and the V_{REF} terminal on the side.

Table 13 - 6 DC Test List

Test No.	Content	24 pin	1 pin	31 pin	3 pin	25 pin	32 pin	30 pin	28 pin	26 pin	V_{REF}
40 41 42 43 44 45	Confir-mation of V_{PP}	25.5V 25.0V 21.0V 13.0V 12.7V 5.0V	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	-0.75V
50 51 52 53 54	Confir-mation of V_{PP}	TTL-L	12.7V	12.7V	12.7V	12.7V	TTL-L	TTL-L	TTL-L	TTL-L	-0.75V
60 61 62 63	Confir-mation of V_{CC}	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	7.01V 6.50V 5.00V 4.50V	TTL-L	TTL-L	TTL-L	-0.75V
70 71	Confir-mation of V_{CC}	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	6.50V	6.50V	TTL-L	-0.75V
80	Confir-mation of V_{ID}	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	12.0V	-0.75V
90 91 92 93 94 95	Confir-mation of V_{REF}	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	TTL-L	2.35V 2.00V 1.50V 0.60V 0.50V -0.75V

(3-6) Test No. Ax

The address is output to the socket. (See Figure 13-3.)

Test No.	Output data
A1	55555
A2	AAAAA
A3	01248
A4	12480
A5	24801
A6	48012
A7	80124
A8	24800
A9	48010
AA	81240
AB	01240
AC	00000
AD	FFFFF

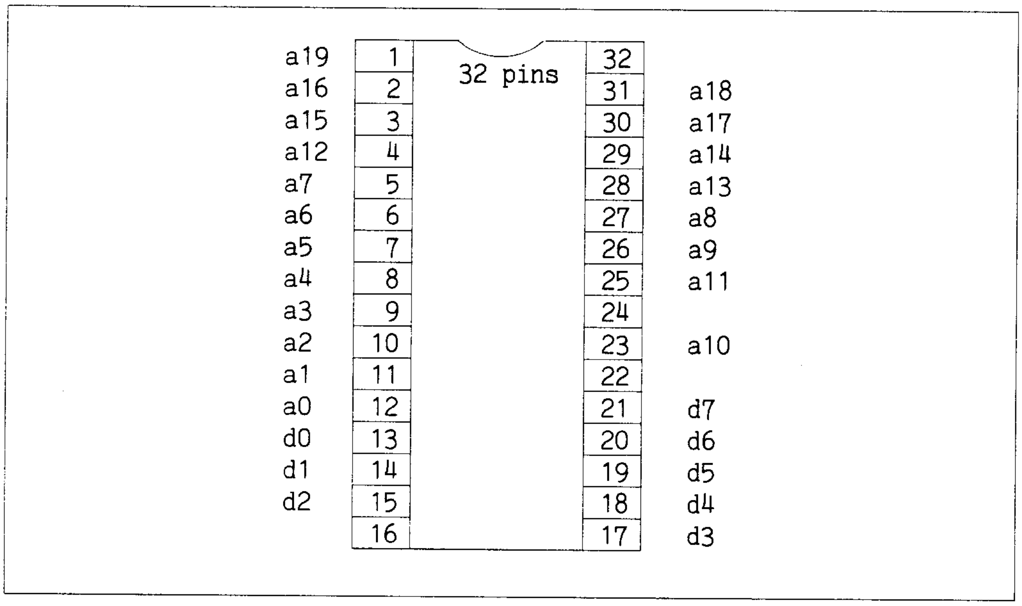


Figure 13 - 3 Address Test Point Diagram

(3-7) Test No. Dx

For D0, the input of the data line is checked.
Short-circuits between each pin as shown is Figure 13-4(a).
Pass is displayed and the buzzer is rung if no error occurs.

NOTE

Note that when the tests between each pin are executed without short-circuiting, System Hard Err is displayed.

The data is output from D1 to D9 on the socket. (See Figure 13-4(b).)

Test No.	Output data
D1	5555
D2	AAAA
D3	0124
D4	1248
D5	2480
D6	4801
D7	8012
D8	0000
D9	FFFF

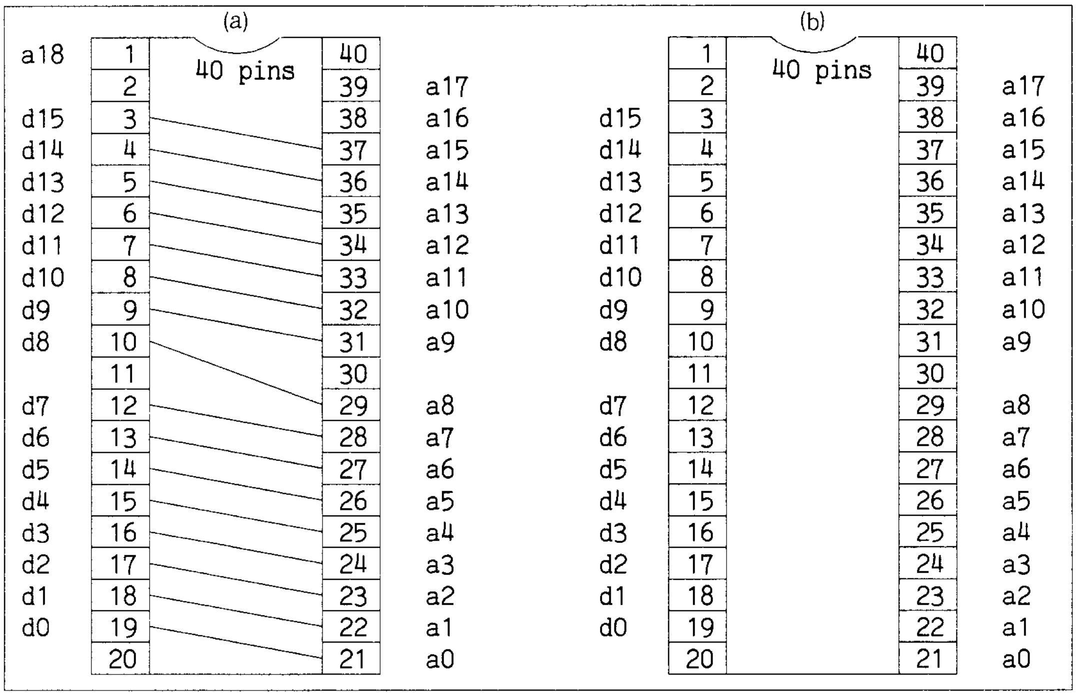


Figure 13 - 4 Data Test Point Diagram

(3-8) Test No. E0

The write/read tests of the backup EEPROM are performed.
The currenct backup data is not deleted.

13.3.3 How to Check MUP Waveform

The set device function outputs the program voltage, address and data repeatedly to the MUP by the timing of the device specified by the TYPE code.

(1) Instrument necessary for the operation check

Use the oscilloscope with the frequency range of DC to 100MHz and input sensitivity of 10mV/DIV or more.

(2) The MUP waveform check method

● Operation

① **Initial condition**

TYPE code

```
PRGM          3 9 1 5 4 F
MBM 2 7 C 5 1 2
```

② **Key in** [SELECT] **and** [E] **.**

```
S E L C E   A C - T E S T
P R O G ,   S E R I   P A R A
```

Currently set device function

The device function is set to PRGM.

③ **Press** [SET]**.**

```
P R G M   B U S Y
```

On execution is indicated.

Confirm the waveform output to the individual pins of the MUP socket. For the ROM signal waveform, refer to the ROM specification of manufacturer.

④ After the timing check of each pin is terminated, **press** [RESET] and the display returns to the initial condition.

13.3.4 Serial I/O Check (AC-TEST) Method

For the check of the serial port, connect the connector according to Figure 13-5.

(1) How to check I/O data

● Operation

① Press [RESET] , [7] and [SET] to set the work length to 8 bits.

② Press [RESET] , [E], [SET] ,and [DEVICE] to enter the check output data and press [SET] .

```
SERI    AC-TEST
S-OUT:55, S-IN:55
```

Output data : 55 is output.
Input data : 55 is entered.

Output data   Input data

③ If you check with different data again, **press** [RESET] and execute the step ②.

(2) Output voltage level check method

● Operation

① Take the same procedure as (1).

② Measure the connector check point shown in Table 13-7 using the oscilloscope to check the level.

NOTE

Because the check point signal changes between HIGH and LOW, it cannot be checked with the digital multi-meter.
Use this oscilloscope.

(3) Baud rate, parity, stop bit check methods

● Operation

① Set the baud rate and parity for the check with [SELECT], [7] and [SET].

② Take the same procedure as (1).
At the time, change the set data to 00.

③ Measure between the connectors 2 and 7 (GND) with the oscilloscope to check whether the serial I/O timing (See Figure 13-6.) is matched. The expression of tB in this Figure is as follows.

$$1\ tB = \frac{1000 \pm 10}{\text{Set baud rate}}\ (\text{ms})$$

Table 13 - 7 Serial I/O Check Point

Interface	Connector check point	Check level
RS-232C	2 - 7 (GND)	High level : +3V or more Low level : -3V or more
	4 - 7 (GND)	
	20 - 7 (GND)	

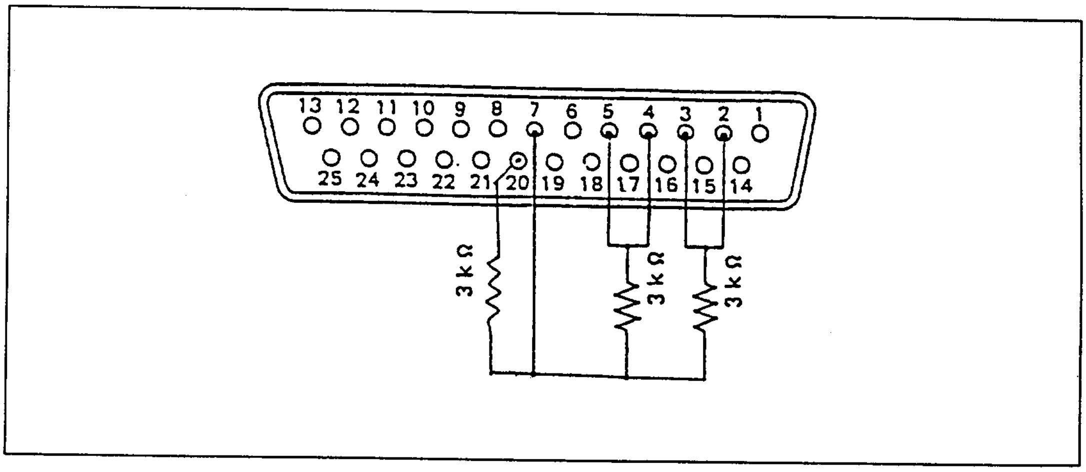
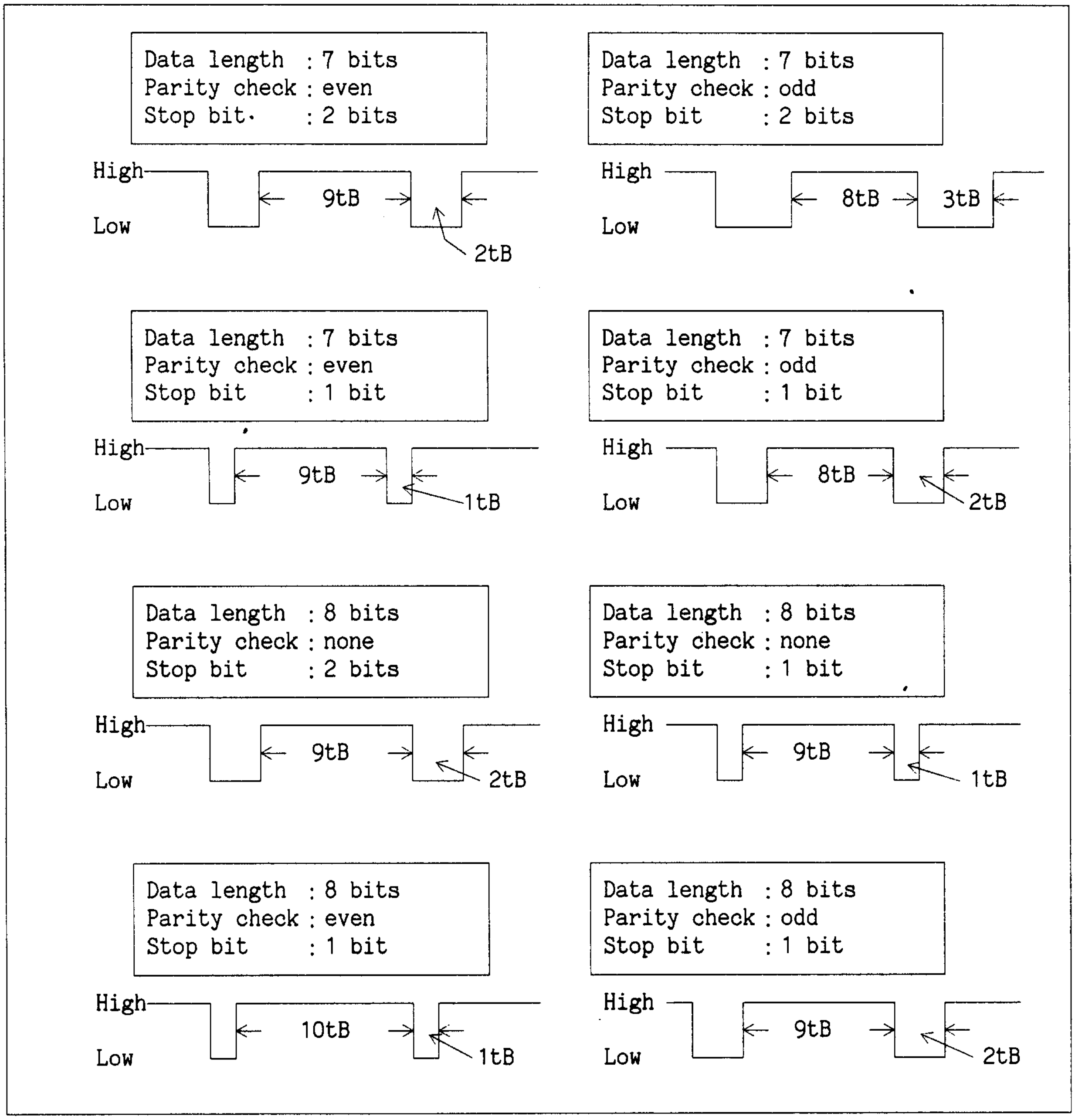


Figure 13 - 5 RS-232C Check Circuit



Fiugure 13 - 6 Serial I/O Timing

13.3.5 Parallel I/O Check (AC-TEST) Method

Data I/O and data check are performed at the parallel port.

(1) Parallel port data input test

● Operation

① **Press [SELECT] [E] [SET] [DEVICE] [DEVICE] [SET].**

```
PARA   AC-TEST
  IN,  OUT
```

② **Press [SET] with the cursor positioned at IN.**

③ **Enter ASCII code (20_H to $7F_H$) through the parallel port.**

```
PARA   AC-TEST
  !"#$%&'()*+,-./
```

Entered character display

④ **After the $7F_H$ code is entered, PASS is displayed to wait for the input in ③.**

```
PARA   AC-TEST
       PASS
```

⑤ **To cancel the input, press [RESET].**

(2) Parallel port data output test

● Operation

① Press [SELECT], [E], [SET], [DEVICE ▷], [DEVICE ▷] and [SET].

② Press [DEVICE ▷] and press [SET] with the cursor positioned at OUT.

```
PARA   AC-TEST
  IN,  OUT
```

```
PARA   AC-TEST
 !" #$%&' () *+, -./
```

Output character display

The output character outputs ASCII code (20_H to $7F_H$).
CR and LF are output by every 16 characters.
After the final ASCII code ($7F_H$) is output, CR and LF are output twice and the ASCII code (20_H) is output repeatedly.

③ To cancel the output, press [RESET].

Referring to the codes of the individual printers, check that the characters output to the printer are ASCII codes 20_H to $7F_H$.

NOTE

Turn ON/OFF the SELECT switch of the printer during the output to check that no character is neglected.

Note: For the printer character and operation method, see the operation manuals of the individual printers.

13.3.6 Key Input Check Method

The key input check is performed.

① **Press** [SELECT] [D] [SET] [SET] .

```
KEY     DC-TEST
in  key->[      _]
```

The indication above is displayed to wait for key input. The indication corresponding to the input key is displayed.

Input key	Indication	Input key	Indication
[0]	0	[C]	C
[1]	1	[D]	D
[2]	2	[E]	E
[3]	3	[F]	F
[4]	4	[△]	UP
[5]	5	[▽]	DOWN
[6]	6	[SET]	SET
[7]	7	[DEVICE]	DEVICE
[8]	8	[TYPE]	TYPE
[9]	9	[EDIT]	EDIT
[A]	A	[SELECT]	SELECT
[B]	B		

② To terminate the check, press [RESET] .

13.4 How to Revice

13.4.1 Replacing the ROM

● Operation

① Power off the R4945 and remove the power cable from the receptacle.

② Remove the socket adapter from the R4945 (remove the rubber cap if it is installed on the socket grill).

③ Use the screwdriver to turn counter-clockwise the screw in front of the socket of system ROM. Remove the system ROM horizontally.

④ Set the new system ROM in the direction of socket pin, and insert it horizontally.

⑤ Use the screwdriver to turn clockwise the screw loosened in ③, and fix the system ROM.

⑥ Connect the socket adapter.

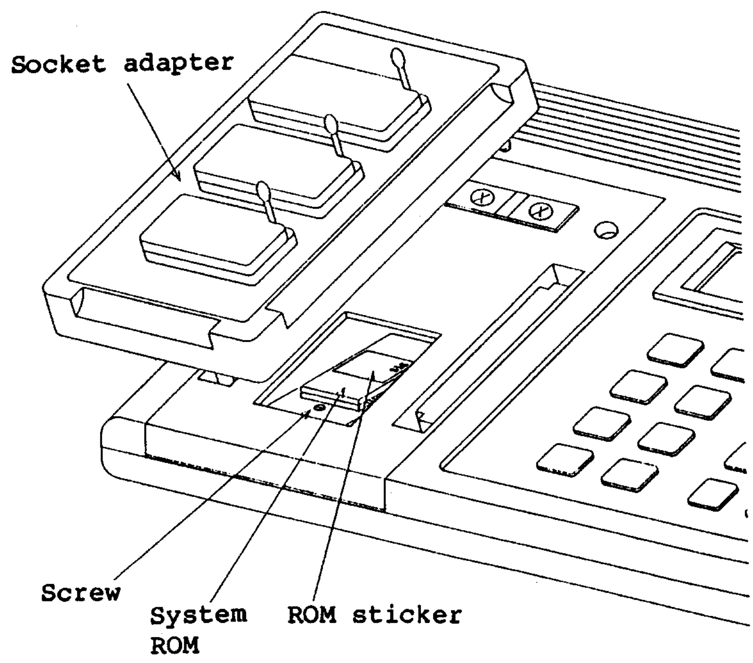


Figure 13 - 7 Replacing the ROM

13.4.2 Initializing the Parameter

● Operation

① Connect the power cable, and power on the R4945.

```
Initial  Test
backup  error
```

Display an error during backup EEPROM check.

② Press [RESET] .

(Initial condition)

⇩

③ Press [SELECT] [F] [SET] .

```
      INITIAL
REV, INIT, Mset
```

Put in the wait state until parameter initialization is selected.

④ Press [DEVICE] .

```
      INITIAL
REV, INIT, Mset
```

Select parameter initialization.

⑤ Press [SET] . Execute parameter initialization.

```
INIT   INITIAL
      BUSY
```

Display execution.

⇩

```
INIT   INITIAL
      PASS
```

Display the result.

⑥ Press [RESET] .

⇩

(Initial condition)

13.4.3 Backupping the Parameter Set Value

● Operation

After parameter initialization is completed, follw the next steps.

(Initial condition)

⇩

① Press [SELECT] [F] [SET] .

```
      INITIAL
REV, INIT, Mset
```

Put in the wait state until parameter set backup is selected.

② Press [DEVICE] [DEVICE] . Select parameter set backup.

```
      INITIAL
REV, INIT, Mset
```

③ Press [SET] . Execute parameter set backup.

```
Mset   INITIAL
      BUSY
```

Display the duration of execution.

⇩

```
Mset   INITIAL
      PASS
```

Display the result.

④ Press [RESET] .

⇩

(Initial condition)

13,4.4 Check the Revision and Power ON Initial Display

● Operation

① Power OFF the R4945 once, and power ON again.

```
POWR ON
   ⇩
Initial   Test  ▒
R4945     Rev. C00
```

Display the duration of initial test

Check the revision.

② The initial test is ended, and the initial display is enabled if a buzzer (PASS sound) sounds.

```
COPY          390552
MBM27C4000
```

14. DESCRIPTION OF THE OPERATION

14.1 Outline of the Configuration

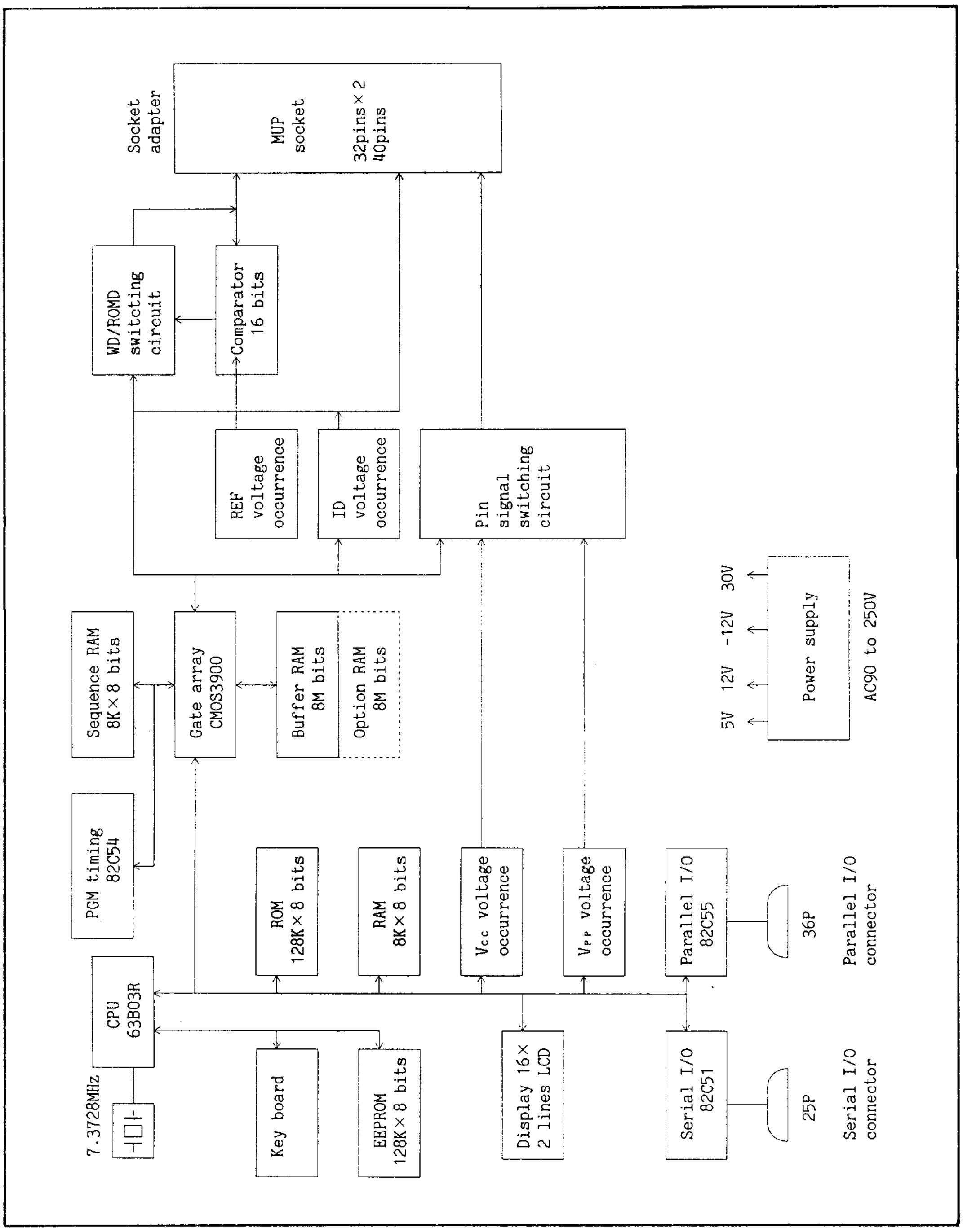


Figure 14 - 1 Outline of the Configuration

14.2 Outline of the Operation

(1) This equipment is controlled by the micro processor through the CPU bus.

(2) The system software is written in the ROM (128K x 8 bits) and as the work RAM, the RAM incorporated in the CPU and external RAM (8K x 8 bits) are used.

(3) For the buffer RAM, the dynamic RAM is used and controlled by the gate array.

(4) The address output of the MUP socket is generated by the gate array and the voltages Vcc and Vpp suitable for each device are generated by the pin signal switching circuit.

(5) The data I/O of the MUP socket is switched by the WD/ROMD switching circuit. At the time of data input, the comparator checks it with the comparative voltage output by the REF voltage generating circuit.

(6) In the case of the parallel I/O, data I/O is performed through the parallel I/O.

(7) In the case of the serial I/O, data I/O is performed through the serial I/O.

(8) The display screen is an LCD with 16 columns x 2 lines.

(9) The EEPROM backs up the settings.

15. SPECIFICATIONS

15.1 Specification for Write

- Write destination ROM :

- Device function : Blank check (continued operation enalbled)
  Programming
  Read check (continued operation enabled)
  Blank program read (B.P.R) continuous operation
  Program read (P.R) continuous operation
  Copy read check
  Erase blank check (EEPROM only)
  Option
  Security

- Address mode : Normal mode
  Page mode

- Data mode : 8-bit width ROM
  Normal
  16-bit split (two split simultaneous write enabled)
  32-bit split (two split simultaneous write enabled)
  16-bit width ROM
  Normal (data exchange enabled)
  32-bit split (data exchange enabled)

- Write style : Intel method
  Intel quick method
  Fujitsu methods
  Other rapid programming methods

- Buffer memory capacity: 1M byte
  2M bytes (when +80 optionally)

- ROM Vcc power supply : +4.75V ±0.25V 300mA max
  +5.00V ±0.25V 300mA max
  +5.25V ±0.25V 300mA max
  +6.00V ±0.25V 300mA max
  +6.25V ±0.25V 300mA max
  +6.50V ±0.25V 300mA max

- ROM Vpp power supply : +21.00V ±0.50V 100mA max
  +13.00V ±0.30V 200mA max
  +12.75V ±0.30V 200mA max
  +12.50V ±0.30V 200mA max
  + 5.00V ±0.25V 50mA max

- Output voltage comparison level
  : V_{OL} --- +0.50V±50mV (I_{OL} = 1.8mA±0.2mA)
  V_{OH} --- +2.35V±100mV

- EPROM protection fuction : Power down at the time of device insertion, reverse insertion and insertion failure are checked.

- Reliability check function: Vcc margin check (2 points)
  Vo_L, Vo_H level check
  Data check sum

- Self-diagnosis function : Internal memory check
  System memory check

- Manual diagnosis function : MUP address check
  MUP data check
  Program voltage check
  Program timing check
  Serial I/O check

- Alarm function : Key tone of the key switch (ON/OFF enabled)
  Pass/fail alarm (ON/OFF enabled)

- Data edit function : Check sum
  Complement
  Block store
  Block move
  Block search
  Block change
  RAM clear

- Automatic setting function: Backup by EEPROM
  ROM type
  I/O condition
  Translation format
  Various settings (precheck, time-out, ID check, alarm ON/OFF)

- ID mode : ID auto mode
  ID read mode
  ID check mode

15.2 I/O Specifications

- Standard interface : Serial I/O interface
  - Based on RS-232C
  - Baud rate --- 110 to 19200bps
  - Parity --- none, even, odd
  - X_{ON}, X_{OFF} enabled

  Parallel I/O interface
  - Based on Centronics

- Translation format : DG binary
  DEC binary
  ASCII-HEX
  INTELLEC HEX
  MOTOROLA S RECORD
  EXTENDED TEKHEX
  ASM-86 HEXADECIMAL
  HP64000ABS
  JEDEC

- Remote control function : Computer remote control

15.3 General Specifications

Display	: 16 characters x 2 lines, LCD
Power supply	: AC90V to 250V
Frequency	: 48Hz to 66Hz
Environmental condition:	temperature 0°C to +40°C humidity 85% or less
Storage temperature range	: -15°C to +60°C
Power consumption	: 37VA or less
External dimensions	: approx. 280 (width) x 59 (height) x 210 (depth) mm (exculuding the socket adapter) approx. 280 (width) x 78 (height) x 210 (depth) mm (when R49451A is mounted)
Weight	: 1.5kg or less (excluding the socket adapter) 1.7kg or less (when R49451A is mounted)

APPENDIX

A.1 LIST OF DEVICE SETTING CODES AND SOCKET ADAPTER

The following covers reading the ROM type setting list and notes to be taken.

(1) Company names and given in an abbreviated form.

(2) The Device name is given without the speed code and package code.

(3) The o mark for the ID mode means possible.

(4) Compatible Rev. shows a system ROM corresponding with the main unit.

-indicates the Rev.A00 is corresponding.

(5) The o mark for the debug RAM means possible.
The System ROM corresponds to Rev.F00 and after.

(6) The remarks show a packge and comments.

OPT : One time PROM
DIP : Dual In-line Package
QFP : Quad Flat Package
SOP : Small Outline Package
LCC : Leadless Chip Carrier
PLCC : Plastic Leaded Chip Carrier
CLCC : Ceramic Leaded Chip Carrier
JLCC : J-Bend Leaded Chip Carrier

(note) Pin arrangement for the device of 1M bit : Mask pin arrangement
: JEDIC pin arrangement
Those pin arrangement is different. When the list is used, confirm the device name and set the type code.

NOTE

The program error might occur if setting the type code is mistaken.
Insert the device of the same pin arrangement.

A.1.1 Applicable Device Setting Codes

This section shows the list of PROM-type setting codes in the sequeuce of the following ROM manufacturers.

(1)	AMD	(Advanced Micro Device)
(2)	ATMEL	(Atmel Corp.)
(3)	EXEL	(Microelectronics Inc.)
(4)	FUJITSU	(Fujitsu, Ltd.)
(5)	HITACHI	(Hitachi, Ltd.)
(6)	ICT	(International Cmos Technology Inc.)
(7)	INTEL	(Intel Corp.)
(8)	MITSUBISHI	(Mitsubishi Electric Corporation)
(9)	MATSUSHITA	(Matsushita Electronics CORPORATION)
(10)	MICROCHIP	(Microchip Technology)
(11)	MOTOROLA	(MOTOROLA)
(12)	N.S	(National Semiconductor)
(13)	NEC	(NEC Corporation)
(14)	OKI	(Oki Electric Industry Co.,Ltd.)
(15)	RICOH	(Ricoh Co.,Ltd.)
(16)	SIGNETICS	(Signetics Corp.)
(17)	SEEQ	(Seeq Technology Inc.)
(18)	SGS-THOMSON	(SGS-THOMSON MICROELECTRONICS)
(19)	SHARP	(Sharp Corporation)
(20)	T.I	(Texas Instruments)
(21)	TOSHIBA	(Toshiba Corporation)
(22)	WSI	(WaferScale Integration Inc.)
(23)	XICOR	(Xicor Inc.)
(24)	SONY	(Sony Corporation)
(25)	SII	(Selko Electronic Industry Co.,Ltd)
(26)	MACRONIX	(MACRONIX INC.)
(27)	SANYO	(SANYO Electric Co.,Ltd.)

manufac-turer	Device name	TYPE code	R4945				Description
			Socket adapter	ID	Applica-ble Rev	DB	
(1) AMD	Am2716B	10154A	R49451A	○		○	
	Am2732A	10154B				○	
	Am2732B	10254B		○		○	
	Am2764	10054C				○	
	Am2764A	10154C		○		○	
	Am27C64(Flash)	10354C		○	B00	○	
	Am27C64	10254C		○	B00	○	
	Am27128	10054D				○	
	Am27128A	10154D		○		○	
	Am27C128(Flash)	10354D		○	B00	○	
	Am27C128	10254D		○	B00	○	
	Am27256	10054E		○		○	
	Am27C256(Flash)	10254E		○		○	
	Am27C256	10154E		○		○	
	Am27512	10454F		○		○	
	Am27C512(Flash)	10654F		○	G00	○	
	Am27C512	10554F		○	B00	○	
	Am27C1024(Flash)	101570		○			
	Am27C1024	100570		○			
	Am27C010(Flash)	101550		○			
	Am27C010	100550		○			
	Am27H010	102550		○	G00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(1) AMD (cont'd)	Am27C100	104550	R49451A	○	B00		
	Am27C2048	100571		○	G00		
	Am27C020	100551		○	E00		
	Am27C040	100552		○	G00		
	Am27C49	10064C	R49449C				
	Am27C191	10064A					
	Am27C291	10064A					
	Am8751H	10174B	R49442D				
	Am8753H	10174C					
	Am27C64	10254C	R49444A	○	B00		(LCC)
	Am27C128	10254D		○	B00		(LCC)
	Am27C256	10154E		○			(LCC)
	Am27C512	10554F		○	B00		(LCC)
	Am27C64	10254C	R49446A	○	B00		(PLCC)
	Am27C128	10254D		○	B00		(PLCC)
	Am27C256	10154E		○			(PLCC)
	Am27C512	10554F		○	B00		(PLCC)
	Am27C010	100550	R49446C	○			(PLCC)
(2) ATMEL	AT27C256	13154E	R49451A	○		○	
	AT27C512	13054F		○		○	
	AT27HC64	13154C		○		○	
	AT27HC256	13254E		○		○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(2) ATMEL (cont'd)	AT27HC256R	13454E	R49451A	○	G00	○	
	AT27C256R	13354E		○	D00	○	
	AT27C010	130550		○	D00		
	AT27CL010	131550		○	G00		
	AT27C1024	130570		○	G00		
	AT27HC1024	131570		○	G00		
	AT27C040	130552		○	G00		
	AT28C16	13C54A				○	
	AT28HC16	13D54A			B00	○	
	AT28C17	13E54A				○	
	AT28C64	13A54C				○	
	AT28HC64	13C54C				○	
	AT28PC64	13B54C				○	
	AT27HC641	13064C	R49449C				
	AT27HC642	13064C					
	AT28HC191	13864A					
	AT28HC291	13864A					
	AT27C256R	13354E	R49446A	○	D00		
	AT27HC256	13254E		○			
	AT27C512	13054F		○			
(3) EXEL	XL2816A	30B54A	R49451A			○	
	XL2864A	30C54C				○	
	XL2865A	30C54C				○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(4) FUJITSU	MB8516	39054A	R49451A		B00	○	
	MB8532	39054B			B00	○	
	MBM2716	39054A			B00	○	
	MBM2732	39054B			B00	○	
	MBM2732A	39154B				○	
	MBM27C32A	39354B				○	
	MBM2764	39454C				○	
	MBM27C64	39554C				○	
	MBM27128	39454D		○		○	
	MBM27C128	39554D		○		○	
	MBM27256	39154E		○		○	
	MBM27C256	39054E		○		○	
	MBM27C256A	39254E		○		○	
	MBM27C256H	39254E		○		○	
	MBM27C256A-HW	39454E		○	G00	○	
	MBM27C512	39154F		○		○	
	MBM27C512-HW	39454F		○	G00	○	
	MBM27C1000	394550		○			
	MBM27C1000A	395550		○	G00		
	MBM27C1001	390550		○			
	MBM27C1001A	391550		○	G00		
	MBM27C1024	390570		○			
	MBM27C1024A	391570		○	G00		

manufacturer	Device name	TYPE code	R4945 Socket adapter	ID	Applicable Rev	DB	Description
(4) FUJITSU (cont'd)	MBM27C2000	394551	R49451A	○	G00		
	MBM27C2001	390551		○	G00		
	MBM27C2048	390571		○	G00		
	MBM27C4000	390552		○			
	MBM27C4001	391552		○			
	MBM27C4096	390572		○	E00		
	MBM28C64	39B54C				○	
	MBM28C65	39C54C				○	
	MB8541P	390504	R49449A		E00		
	MB8541P	391504	R49449B				
	MB8541P(test)	391501					
	MBL8742H	39174A	R49442C				
	MBL8749H	39274A					
	MB89P715	39174D	R49443F		B00		
	MB89W715	39174D			B00		
	MB89P715A	39174D			B00		
	MB89W715A	39174D			B00		
	MB89P785	39174D			B00		
	MB89W785	39174D			B00		
	MB89P718A	39274E			F00		
	MB89W718A	39274E			F00		
	MB89P715	39174D	R49447A		B00		(QFP)
	MB89W715	39174D			B00		(QFP)

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(4) FUJITSU (cont'd)	MB89P715A	39174D	R49447A		B00		(QFP)
	MB89W715A	39174D			B00		(QFP)
	MB89P785	39174D			B00		(QFP)
	MB89W785	39174D			B00		(QFP)
	MB89P718A	39274E			F00		(QFP)
	MB89W718A	39274E			F00		(QFP)
	MB89P765A	39274D	R49447B		D00		(QFP)
	MB89W765A	39274D			D00		(QFP)
	MB89P768A	39174E			F00		(QFP)
	MB89W768A	39174E			F00		(QFP)
	MBM27C128P	39554D	R49445D	○			(SOP)
	MBM27C256AP	39254E		○			(SOP)
	MBM27C512P	39154F		○			(SOP)
	MBM28C64	39B54C					(SOP)
	MBM28C65	39C54C					(SOP)
	MBM2764	39454C	R49444A				(LCC)
	MBM27128	39454D		○			(LCC)
	MBM27256	39154E		○			(LCC)
	MBM27C64	39554C					(LCC)
	MBM27C128	39554D		○			(LCC)
	MBM27C256A	39254E		○			(LCC)
	MBM27C256H	39254E		○			(LCC)
	MBM27C512	39154F		○			(LCC)

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(4) FUJITSU (cont'd)	MBM27C1000	394550	R49444B	O			(LCC)
	MBM27C1001	390550		O			(LCC)
	MBM27C1001	390550	R49446C	O			(PLCC)
(5) HITACHI	HN462716	49054A	R49451A		B00	O	
	HN462732	49054B			B00	O	
	HN482732A	49154B				O	
	HN482764	49454C				O	
	HN27C64	49054C				O	
	HN4827128	49054D				O	
	HN27128A	49154D		O		O	
	HN27256	49054E		O		O	
	HN27C256	49154E		O		O	
	HN27C256A	49254E		O		O	
	HN27C256H	49454E				O	
	HN27512	49054F		O		O	
	HN27C101	490550					
	HN27C301	494550					
	HN27C101A	490550		O	B00		
	HN27C301A	494550		O	B00		
	HN27C1024	490570					
	HN27C1024H	490570		O			
	HN27C4001	491552		O	F00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(5) HITACHI (cont'd)	HN27C4096	491572	R49451A	○	D00		
	HN58064	49B54C				○	
	HN58C65	49C54C				○	
	HN58C256	49A54E			D00		
	HN29C101	49B550		○	F00		
	HN28F101P	49C550		○	F00		
	HD63701V0	49174B	R49442A				
	HD63701X0	49274B	R49443A				
	HD63701Y0	49174D	R49443B				
	HD63705V0	49374B	R49442B				
	HN27C1024HCC	490570	R49446B	○			(JLCC)
	HN27C4096CC	491572		○	D00		(JLCC)
(6) ICT	27CX161	53064A	R49449C		B00		
	27CX162	53064A			B00		
	27CX321	53064B					
	27CX322	53064B					
	27CX641	53064C					
	27CX642	53064C					
(7) INTEL	2716	52054A	R49451A		B00	○	
	2732	52054B			B00	○	
	2732A	52154B		○		○	
	2764	52054C		○		○	
	27C64	52254C		○		○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(7) INTEL (cont'd)	87C64	52454C	R49451A	○		○	
	2764A	52154C		○		○	
	27128	52054D		○		○	
	27128A	52254D		○		○	
	27128B	52454D		○		○	
	27C128	52554D		○		○	
	27256	52054E		○		○	
	27C256	52254E		○		○	
	27C256-xxxV	52454E		○	D00	○	
	27512	52254F		○		○	
	27010	520550		○			
	27011	528550		○			
	27210	520570		○			
	27C512	52354F		○	B00	○	
	27C010	521550		○	B00		
	27C100	524550		○	D00		
	27C010A	522550		○	D00		
	27C210	521570		○	B00		
	27C020	521551		○	B00		
	27C220	521571		○	B00		
	27C240	521572		○	B00		
	27C040	521552		○	D00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(7) INTEL (cont'd)	27C202	52056E	R49451A	○	B00		
	68C257	52954E		○			
	87C257	52A54E		○			
	27513	52854F		○			
	2816A	52B54A				○	
	2817A	52E54A				○	
	28F512	52C54F		○	F00		
	28F010	52C550		○	F00		
	28F020	52C551		○	F00		
	8751H	52174B	R49442D				
	87C51	52274B					
	8752BH	52374C					
	87C51FA	52474C			B00		
	87C51FB	52174D			B00		
	8751BH	52374B			B00		
	P2764A	54354C	R49451A	○		○	(OTP)
	P27C64	54254C		○	B00	○	(OTP)
	P87C64	54454C		○	B00	○	(OTP)
	P27128A	54354D		○		○	(OTP)
	P27256	54354E		○		○	(OTP)
	P27512	54354F		○		○	(OTP)
	N27C64	52254C	R49446A				(PLCC)

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(7) INTEL (cont'd)	N87C64	52454C	R49446A				(PLCC)
	N27128A	52254D					(PLCC)
	N27C256	52254E					(PLCC)
	N27011	528550					(PLCC)
	N27210	520570	R49446B				(PLCC)
	N27C210	521570			B00		(PLCC)
	N27C220	521571			B00		(PLCC)
	N27C010	521550	R49446C		B00		(PLCC)
	N27C020	521551			B00		(PLCC)
(8) MICROCH-IP	27C64	41054C	R49451A	○	B00	○	
	27C128	41054D		○	B00	○	
	27C256	41154E		○	B00	○	
	27C512	41054F		○	B00	○	
(9) MITSUBI-SHI	M5L2716	71054A	R49451A		C00	○	
	M5L2732	71054B			C00	○	
	M5L2764	71054C				○	
	M5L27128	71054D				○	
	M5M27C128	71454D				○	
	M5L27256	71054E		○		○	
	M5M27C256	71154E		○		○	
	M5L27512	71054F		○		○	
	M5M27C512A	71154F		○		○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(9) MITSUBI-SHI (cont'd)	M5M27C100	714550	R49451A	○			
	M5M27C101	710550		○			
	M5M27C102	710570		○			
	M5M27C201	710551		○	C00		
	M5M27C202	710571		○	C00		
	M5M27C401	710552		○	C00		
	M5M27C402	710572		○	C00		
	M5M27C256A	71254E		○	C00	○	
	M5M28F101	71C550		○	F00		
	M50747E	71174C	R49443C				
	M50746E	71274C					
	M5M27C256FP	71154E	R49445B	○			(SOP)
	M5M27C256AFP	71254E		○	C00		(SOP)
	M5M27C512FP	71054F		○			(SOP)
	M5M27C512AFP	71154F		○			(SOP)
	M5M27C102J	710570	R49446B	○			(PLCC)
	M5M27C102JK	710570		○			(CLCC)
	M5M27C202J	710571		○	C00		(PLCC)
	M5M27C202JK	710571		○	C00		(CLCC)
	M5M27C100J	714550	R49446C	○			(PLCC)
	M5M27C101J	710550		○			(PLCC)
	M5M27C201J	710551		○	C00		(PLCC)

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(9) MITSUBI-SHI (cont'd)	M5M27C100FP	714550	R49445E	○			(SOP)
	M5M27C101FP	710550		○			(SOP)
	M5M27C201FP	710551		○	C00		(SOP)
(10) MATSUSH-ITA	MN2764	70054C	R49451A			○	
(11) MOTOROLA	MCM2833	74854B	R49451A			○	
(12) N.S	NMC27C16	78254A	R49451A		B00	○	
	NMC27C16B	78354A		○	G00	○	
	NMC27C32	78054B			B00	○	
	NMC27C32B	78354B		○	G00	○	
	NM27LC64	78754C		○	G00	○	
	NMC27C64	78454C		○		○	
	NMC27C256	78054E				○	
	NM27C512	78654F		○	G00	○	
	NM27P512	78754F		○	G00	○	
	NMC27C512A	78554F		○		○	
	NM27C128	78554D		○	G00	○	
	NMC27CP128	78454D					
	NMC27C128B	78554D		○	B00	○	
	NM27C256	78254E		○	G00	○	
	NM27LC256	78354E		○	G00	○	
	NMC27C256B	78154E		○	B00	○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(12) N.S (cont'd)	NM27C010	781550	R49451A	○	G00		
	NMC27C010	780550		○	B00		
	NM27C210	782570		○	F00		
	NM27C020	780551		○	G00		
	NM27C040	782552		○	F00		
	NMC27C256	78054E	R49446A				(PLCC)
	NMC27C256B	78154E		○	B00		(PLCC)
	NMC27C512A	78554F		○			(PLCC)
(13) NEC	μPD2716	79054A	R49451A		B00	○	
	μPD2732	79054B			B00	○	
	μPD2732A	79154B				○	
	μPD2764	79054C				○	
	μPD27128	79054D				○	
	μPD27256	79054E		○		○	
	μPD27256A	79254E		○		○	
	μPD27C256	79154E		○		○	
	μPD27C256A	79354E		○		○	
	μPD27512	79054F		○		○	
	μPD27C512	79154F		○		○	
	μPD27C1000	794550		○			
	μPD27C1001	790550		○			
	μPD27C1024	790570		○			
	μPD27C1000A	796550		○	B00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(13) NEC (cont'd)	μPD27C1001A	795550	R49451A	○			
	μPD27C1024A	791570		○			
	μPD27C2001	790551		○			
	μPD27C4001	790552		○			
	μPD27C4096	790572		○	F00		
	μPD27HC65	79064C	R49449C				
	μPD28C64	79B54C	R49451A	○		○	
	μPD28C256	79B54E		○	D00		
	μPD27C256AG	79354E	R49445B	○			(SOP)
	μPD27C512G	79154F		○			(SOP)
	μPD27C1001AB	795550	R49445E	○			(SOP)
	μPD27C2001B	790551		○			(SOP)
	μPD8748H	790749	R49442C				
	μPD8749H	79074A					
(14) OKI	MSM2716	80054A	R49451A		B00	○	
	MSM2764	80054C				○	
	MSM27128	80054D				○	
	MSM27512	80254F				○	
	MSM2764A	80254C			D00	○	
	MSM27128A	80354D			B00	○	
	MSM27256	80054E			B00	○	
	MSM27C256H	80154E			B00	○	

manufacturer	Device name	TYPE code	R4945 Socket adapter	ID	Applicable Rev	DB	Description
(14) OKI (cont'd)	MSM271000	800550	R49451A		B00		
	MSM27C2000	800551		○	D00		
	MSM2816A	80C54A			B00	○	
	MSM6323	80050F	R49449B		B00		DIP ﾊﾟｯｹｰｼﾞ のみ
(15) RICOH	RD27C64	9A054C	R49451A			○	
	RD27C256	9A054E				○	
(16) SIGNETICS	27C64A	AA054C	R49451A	○		○	
	27C64A (OTP)	AA054C		○		○	
	27C256	AA054E		○		○	
	27C512	AA054F		○	B00	○	
	27C210	AA0570	R49451A	○	D00		
	27C010	AA0550		○	F00		
	27HC641	AA064C	R49449C				
(17) SGS-THOMSON	M2716	A2054A	R49451A		G00	○	
	M2732A	A2054B			G00	○	
	M2764A	A2054C		○	B00	○	
	M27128A	A2054D		○	B00	○	
	M27256	A2054E		○	B00	○	
	M27512	A2054F		○	B00	○	
	M27C256B	A2354E		○	D00	○	
	M27C512	A2154F		○	D00	○	
	M27C1000	A20550		○	D00		
	M27C1001	A21550		○	D00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(17) SGS -THOMSON (cont'd)	M27C1024	A20570	R49451A	○	D00		
	M27C2001	A21551		○	F00		
	M27C4001	A21552		○	F00		
	M27C4002	A20572		○	F00		
	TS27C64A	A2154C		○	D00	○	
	TS27C256	A2154E		○	B00	○	
	ST27C256	A2154E		○	B00	○	
(18) SEEQ	52B13	A0854A	R49451A			○	
	52B23	A0854B				○	
	52B33	A0854C				○	
	2816A	A0B54A				○	
	5516A	A0B54A				○	
	2764	A0154C				○	
(19) SHARP	LH5762J	A3054C	R49451A			○	
	LH5763J	A3154C				○	
	LH5764J	A3254C				○	
	LH57126J	A3054D				○	
	LH57127J	A3154D				○	
	LH57128J	A3254D				○	
	LH57254J	A3254E				○	
	LH57255J	A3054E				○	
	LH57256J	A3154E				○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(19) SHARP (cont'd)	LH57257J	A3354E	R49451A	○	G00	○	
	LH57512J	A3054F		○	B00	○	
	LH571000J	A30550			B00		
	LH571001J	A31550			B00		
	LH5749J	A3064C	R49449C				
	LH57191J	A3064A					
(20) T.I	TMS2732A	A9154B	R49451A			○	
	TMS2764	A9054C				○	
	TMS27128	A9054D				○	
	TMS27C128	A9254D		○		○	
	TMS27PC128	A9354D		○	B00	○	
	TMS27256	A9054E		○		○	
	TMS27C256	A9154E				○	
	TMS27PC256	A9354E			G00	○	
	TMS27C512	A9154F		○		○	
	TMS27PC512	A9354F		○	G00	○	
	TMS27C010	A90550		○	B00		
	TMS27C010A	A91550		○	D00		
	TMS27C210	A90570		○			
	TMS27C210A	A91570		○	G00		
	TMS27C020	A90551		○	G00		
	TMS27C040	A90552		○	F00		
	TMS27C240	A90572		○	G00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(20) T.I (cont'd)	TMS27C292	A9064A	R49449C	○			
	TMS27C291	A9064A		○			
(21) TOSHIBA	TMM323	AB054A	R49451A		B00	○	
	TMM2732	AB054B			B00	○	
	TMM2764A	AB254C		○		○	
	TMM27128	AB054D		○		○	
	TMM27128A	AB254D		○		○	
	TMM27256	AB054E		○		○	
	TMM27256A	AB454E		○		○	
	TMM27256B	AB454E		○		○	
	TC57256	AB254E	R49451A	○		○	
	TC57256A	AB654E		○		○	
	TC57H256	AB854E		○	D00	○	
	TMM27512	AB254F		○		○	
	TMM27512A	AB254F		○		○	
	TC57512A	AB454F		○		○	
	TC571024	AB0570		○			
	TC57H1024	AB1570		○			
	TC57H1024A				G00		
	TC57H1025A	AB3570		○	D00		
	TC571000	AB0550		○			

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(21) TOSHIBA (cont'd)	TC571001	AB4550	R49451A	○			
	TC571000A	AB0550		○	D00		
	TC571001A	AB4550		○	D00		
	TC57M1000A	AB2550		○	F00		
	TC57M1001A	AB6550		○	F00		
	TC574000	AB0552		○			
	TC574096	AB0572		○	F00		
	TMM28257	ABB54E				○	
	TC58257A(12.5V)	ABC54E		○		○	
	TC58257A(12.0V)	ABD54E		○		○	
	TC58F1001	ABC550		○	D00		
	TMP47P860E	AB174C	R49443D				
	TMM2464	AB154C	R49451A	○		○	
	TMM2464A	AB354C		○		○	
	TMM24128	AB154D		○		○	
	TMM24128A	AB354D		○		○	
	TMM24256	AB154E		○		○	
	TMM24256A	AB554E		○		○	
	TMM24256B	AB554E		○		○	
	TC54256	AB354E		○		○	
	TC54256A	AB754E		○		○	
	TC54H256	AB954E		○	D00	○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(21) TOSHIBA (cont'd)	TMM24512	AB354F	R49451A	○		○	
	TMM24512A	AB354F		○		○	
	TC54512A	AB554F		○	B00	○	
	TC541000	AB1550		○			
	TC541001	AB5550		○			
	TC54H1024	AB2570		○	D00		
	TMM2464AF	AB254C	R49445C	○			(SOP)
	TMM24128AF	AB254D		○			(SOP)
	TMM24256BF	AB454E		○			(SOP)
	TMM24512AF	AB254F		○			(SOP)
	TC54256AF	AB654E		○			(SOP)
	TC54512AF	AB454F		○	B00		(SOP)
	TC58257AF	ABC54E		○			(SOP)
	TC58257AF-LV	ABD54E		○			(SOP)
(22) WSI	WS27C64F	C0454C	R49451A			○	
	WS57C64F	C0554C				○	
	WS27C128F	C0454D				○	
	WS57C128F	C0554D				○	
	WS27C64L	C0654C			B00	○	
	WS27C128L	C0654D			B00	○	
	WS27C256L	C0254E			B00	○	
	WS27C512L	C0054F		○	B00	○	

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(22) WSI (cont'd)	WS27C010L	C00550	R49451A	○	B00		
	WS57C65	C0056C		○			
	WS57C257	C0056E		○			
	WS57C191	C0064A	R49449C				
	WS57C191B	C0064A			B00		
	WS57C291	C0064A					
	WS57C43	C0064B					
	WS57C43B	C0064B			B00		
	WS57C49	C0064C					
	WS57C49B	C0064C					
	WS27C64F	C0454C	R49446A				(PLCC)
	WS57C64F	C0554C					(PLCC)
	WS27C128L	C0654D	R49446A		B00		(PLCC)
	WS27C256L	C0254E			B00		(PLCC)
(23) XICOR	X2816A	C8854A	R49451A			○	
	X2864A	C8854C				○	
	X28C256	C8B54E			B00		
(24) SONY	CXK27C256	E1054E	R49451A		D00	○	
	CXK27C512	E1054F			D00	○	
	CXK27C1000	E10550			D00		
	CXK27C1001	E11550			D00		
	CXK27C2001	E11551			G00		

manufac-turer	Device name	TYPE code	R4945 Socket adapter	ID	Applica-ble Rev	DB	Description
(24) SONY	CXK27C4001	E11552	R49451A		G00		
	CXK27C4002	E10572			G00		
(25) SII	S28F512R	E2C54F	R49451A	○	F00		
(26) MACRONIX	MX27C256	75054E	R49451A	○	G00	○	
	MX27C512	75054F		○	G00	○	
	MX27C1000	750550		○	G00		
(27) SANYO	LE27C256F	E0054E	R49451A		G00	○	
	LE27C512F	E0054F			G00	○	
	LE27C1000F	E00550			G00		
	LE27C1001F	E01550			G00		
	LE27C1024F	E00570			G00		
	LE27C2001F	E01551			G00		
	LE27C4001F	E01552			G00		
	LE27C4002F	E00572			G00		

A.1.2 List of SMD Package Socket Adapter

The socket adapters applicable to SOP, LCC, and PLCC of PROM are listed as follows.

Note : The socket adapters in the following table are designated by the device maker.
Use an applicable socket adapter to the device. Using inapplicable socket adapter may cause loose connection failure or device pin bending.

(1) SOP

Socket adapter	Description	Manufacturers	Device name
R49445B	Conform to DIP (28p)	NEC	μPD27C256AG/C512G
		MITSUBISHI	M5M27C256FP/C256AFP/C512AFP, M5M27512FP
R49445C	Conform to DIP (28p)	TOSHIBA	TMM246AF/128AF/256BF/512AF TC54256AF/512AF, TC58257AF, TC58257AF-LV
R49445D	Conform to DIP (28p)	FUJITSU	MBM27C128P/C256AF/C512P
R49445E	Conform to DIP (32p)	NEC	μPD27C1001AB/C2001B
		MITSUBISHI	M5M27C100FP/C101FP/C201FP

(2) LCC

Socket adapter	Description	Manufacturers	Device name
R49444A	Conform to DIP (32p)	FUJITSU	MBM2764/128/256 MBM27C64/C128/C256A/C256H MBM27C512
		AMD	Am27C64/C128/C256/C512
R49444B	Conform to DIP (36p)	FUJITSU	MBM27C1000 MBM27C1001

(3) PLCC

Socket adapter	Description	Manufacturers	Device name
R49446A	Conform to DIP (32p)	INTEL	N27C64/N87C64/N27128A N27C256/N27011
		AMD	Am27C64/C128/C256/C512
		ATMEL	HN27C1024HCC/C4096CC
		N.S	NMC27C256/C256B/C512A
		WSI	WS27C64F/57C64F WS27C128L/27C256
R49446B	Conform to DIP (44p)	INTEL	N27210/N27C210/N27C220
		MITSUBISHI	M5M27C102J/C102JK M5M27C202J/C202JK
		HITACHI	HN27C1024HCC/C4096CC
R49446C	Conform to DIP (32p)	FUJITSU	MBM27C1001
		AMD	Am27C010
		INTEL	N27C010/N27C020
		MITSUBISHI	M5M27C100J/C101J M5M27C201J

A.2 Translation Format

A combination of a data format, data configuration, and data transfer process is called a translation format. Translation formats include the following:

(1) DG BINARY format .... See subsection A.2.1.

(2) DEC BINARY format .... See subsection A.2.2.

(3) ASCII-HEX format .... See subsection A.2.3.
(including TR-HEX/10, TR-HEX/18)

(4) INTELLEC HEX format .... See subsection A.2.4.

(5) ASM-86 HEXADECIMAL format .... See subsection A.2.5.

(6) MOTOROLA S RECORD format .... See subsection A.2.6.

(7) TEKTRONIX HEXADECIMAL format .... See subsection A.2.7.

(8) EXTENDED TEKHEX format .... See subsection A.2.8.

(9) HP64000ABS format .... See subsection A.2.9.

(10) JEDEC format .... See subsection A.2.10.

Note: The TEXTRONIX HEXADECIMAL format corresponds to Rev. B00 and after.

The following table shows each translation format and the other formats included in it.

No	Translation format	Formats included
(1)	DG BINARY	——
(2)	DEC BINARY	——
(3)	ASCII-HEX	——
(4)	INTELLEC HEX	Intel Intellec 8/MDS Intel MCS-86 Hexadecimal Object
(5)	ASM-86 HEXADECIMAL	Intel Intellec 8/MDS Intel MCS-86 Hexadecimal Object Digital Research hex
(6)	MOTOROLA S RECORD	Motorola Exorciser (S1 record) Motorola Exormax (S2 record) (S3 record)
(7)	TEKTRONIX HEXADECIMAL	——
(8)	EXTENDED TEKHEX	——
(9)	HP64000ABS	Hewlett-Packard 64000 Absolute
(10)	JEDEC	——

A.2.1 Translation Format I/O Specification

(1) I/O Specification I

Limit of data transfer format (MS-DOS)

Data transfer / Translation format	Data transmission directioion PC9801 ⇨ R4945 (Others)		Data transmission directioion PC9801 ⇦ R4945 (Others)		Data transmission directioion IBM-PC ⇨ R4945 (J3100)		Data transmission directioion IBM-PC ⇦ R4945 (J3100)	
	RS232C Specification	Centronics Specification	RS232C Specification	Centronics Specification	RS232C Specification	Centronics Specification	RS232C Specification	Centronics Specification
DG BINARY	Not applicable*1	Not applicable*2	Not applicable*1		Not applicable*1	Not applicable*2	Not applicable*1	
DEC BINARY	Not applicable*1	Not applicable*2	Not applicable*1		Not applicable*1	Not applicable*2	Not applicable*1	
ASCII HEX	Applicable	Applicable	Applicable*3		Applicable	Applicable	Applicable*4	
INTELLEC HEX	Applicable	Applicable	Applicable		Applicable	Applicable	Applicable	
ASM86	Applicable	Applicable	Applicable		Applicable	Applicable	Applicable	
MOTOROLA S	Applicable	Applicable	Applicable		Applicable	Applicable	Applicable	
TEKTORO	Applicable	Applicable	Applicable		Applicable	Applicable	Applicable	
EXT TEK	Applicable	Applicable	Applicable*3		Applicable	Applicable	Applicable*4	
HP 64000	Not applicable*1	Not applicable*2	Not applicable*1		Not applicable*1	Not applicable*2	Not applicable*1	

(NOTE) *1 : The data can not be transferred by COPYA.
It is necessary to generate the programs (such as BASIC) originally.
*2 : The data can not be transferred by PRINT.
It is necessary to generate the programs (such as BASIC) originally.
*3 : The use of X control is required.
*4 : The data can be transferred by COPYA.
It is necessary to generate the programs (such as BASIC) originally.

(2) I/O Specification II

Limit of data transfer format

Translation format \ Data transmission direction	Data transmission directioion R4945 ⇨ Printer		Data transmission directioion R4945 ⇦ Printer	
	RS232C Specification	Centronics Specification	RS232C Specification	Centronics Specification
DG BINARY	Not applicable*1	Not applicable*2		
DEC BINARY	Not applicable*1	Not applicable*2		
ASCII HEX	Applicable	Applicable		
INTELLEC HEX	Applicable	Applicable		
ASM 86	Applicable	Applicable		
MOTOROLA S	Applicable	Applicable		
TEKTORO	Applicable	Applicable		
EXT TEK	Applicable	Applicable		
HP 64000	Not applicable*1	Not applicable*2		

(NOTE) *1 : The data can not be transferred by COPYA.
It is necessary to generate the programs (such as BASIC) originally.
*2 : The data can not be transferred by PRINT.
It is necessary to generate the programs (such as BASIC) originally.

A.2.2 Input Termination Condition on the R4945 of Translation Formats

Translation format *1	Input termination condition
DG BINARY	LA recognition switch setting At turning OFF : Time out ERROR/termination At turning ON : Time out PASS/termination However, data is input up to LA.
DEC BINARY	LA recognition switch setting At turning OFF : Time out ERROR/termination At turning ON : Time out PASS/termination However, data is input up to LA.
ASCII HEX	Tape stop mark Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination LA recognition switch setting At turning OFF : Time out ERROR/termination At turning ON : Time out PASS/termination However, data is input up to LA.
INTELLEC HEX	End record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination
ASM-86 HEXADECIMAL	End record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination
MOTOROLA S RECORD	End record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination When the S1 data record is used, the S9 data record is required. When the S2 data record is used, the S8 data record is required. When the S3 data record is used, the S7 data record is required. The S9 end record can be used instead of the S8 record.
TEKTORONIX HEXADECIMAL	End record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination
EXTENDED TEKHEX	Terminate record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination
HP64000ABS	End record Not supplied : Time out ERROR/termination Supplied : Time out PASS/termination

(NOTE) *1 : Be sure to refer to Instruction Manual for the content of the translation format.

A.2.3 DG BINARY Format

【Configuration】

Any record consists of 8-bit binary data.

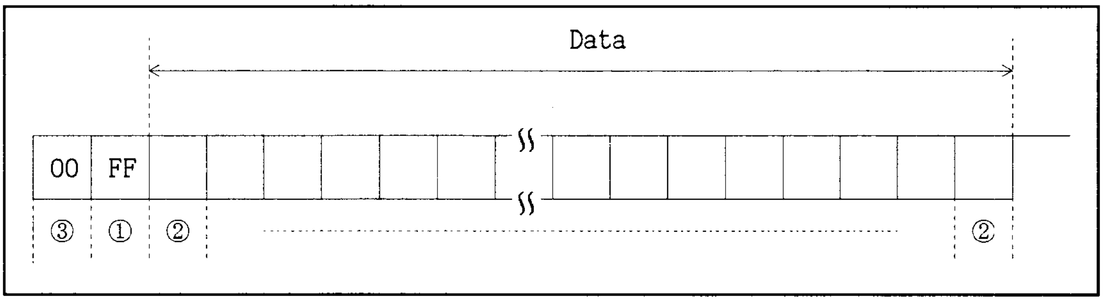
【Record】

①: Start mark
FF$_H$
The pattern followed by the start mark is assumed data.

②: Data
Binary data

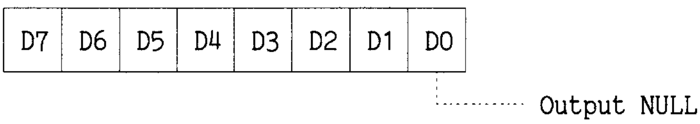
③: Ten characters of NULL code (00$_H$) is output just before FF$_H$.
(The subformat function is provided.)

【Record configuration】



【Subformat Code】

Set up of subformat codes
Because subformat codes adapt bit configuration, corresponding functions are set up in bits.
For how to set up subformats, refer to the instruction manual.



Output NULL bit
0: Does not output 10-character NULL bits.
1: Outputs 10-character NULL bits.

Note: Setup of format corresponds to Rev. C00 and after.

A.2.4 DEC BINARY Format

【Configuration】

Any record consits of 8-bit binary data.

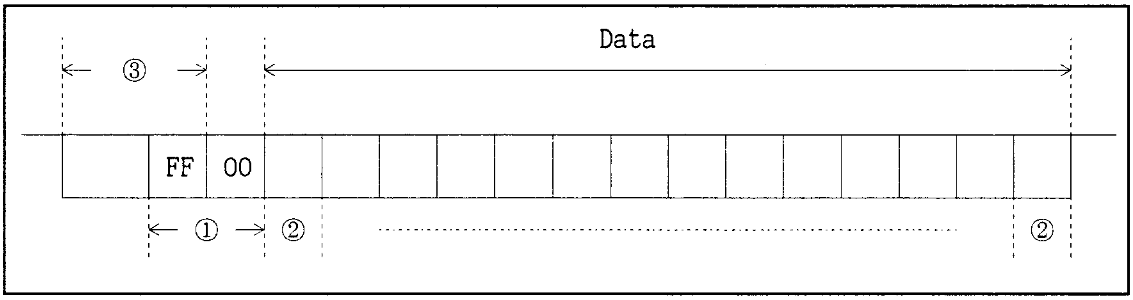
【Record】

①: Start mark
A code 00_H immediately after FF_H is recognized as the start mark and the following bits are considered data.

②: Data
Binary data

③: FF_H
The output data is preceded by 10 FF_H codes.

【Record configuration】



A.2.5 ASCII-HEX Format

【Configuration】

Any codes consists of ASCII characters.
(However, control codes CR($0D_H$), LF($0A_H$), STX(02_H), ETX(03_H) are excluded.)

The ASCII-HEX format allows specification of the subformat code. Subformat code 10 is equivalent to TR-HEX/10. Subformat code 18 is equivalent to TR-HEX/18.

【Record】

①: Start mark
STX(02_H), "[" or none.
Specified with a subformat code.

②: Address mark
"#" or "$A"
Specified with a subformat code.

③: Address
An address is enclosed between the address mark and address terminator mark. It is output in 4 or 6 digits.

④: Address terminator mark
Indicates the characters preceding this mark is the address. It is specified with a subformat code.

⑤: Data

⑥: Data terminator mark
Indicates the characters preceding this mark is the data.

⑦: Comment mark
The characters enclosed between this mark and LF($0A_H$) are recognized as a comment.

⑧: Comment terminator mark
The characters enclosed between the comment mark and comment terminator mark LF($0A_H$) are recognized as a comment.

⑨: End mark
ETX(03_H) or none.
Specified with a subformat code.
After the end mark is recognized, data loading is terminated if the start mark is not recognized within 64 characters.

⑩ : Tape stop mark
")" or "%" or none.
Specified with a subformat code.

⑪ : CR, LF
CR($0D_H$), LF($0A_H$)
These codes can be omitted in the record to be input.
They are output following in the end of a data record.

【Example】

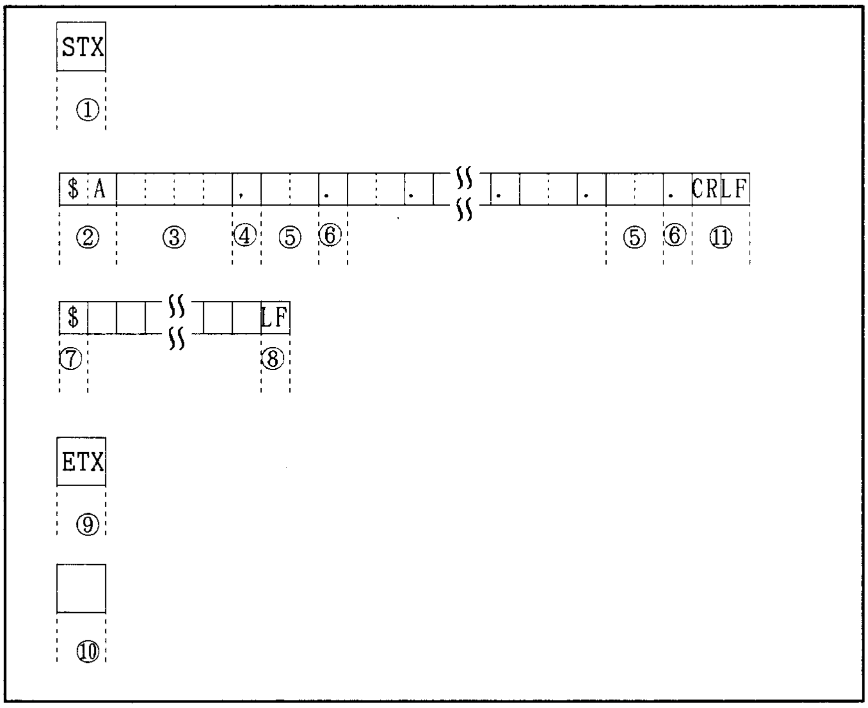
Subformat code 2A

```
[#0000,FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
#0010,FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
#0020,FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  ]
```

Subformat code 80

```
$A0000,FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.
$A0010,FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.
$A0020,FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.FF.
```

【Record configuration】



【Subformat code】

Setting of the subformat codes

A subformat consists of some combinations of bits and the functions associated with the subformat are set with bit combinations.
For bit combinations available in subformats, see table A-1. For the setting of the subformats, refer to the manual of R4945.

Bit configuration of subformat code

Bits	Function	Setting
D1 D0	Start mark	00: None 01: "STX" 10: "[" (The stop mark should be "] ".) 11: None
D2	End mark	0: None 1: "ETX"
D3	Tape stop mark	0: None 1: ")" or "%"
D4	Comment mark	0: None 1: "$"
D6 D5	Data terminator mark	00: "," or "." 01: "," or "␣" 10: "," or "%" 11: "," or "'"
D7	Address mark	0: "#" 1: "$A"

"STX" (02_H) "ETX" (03_H)
"," (comma $2C_H$) "." (point $2E_H$)
"␣" (blank space 20_H) "'" (apostrophe 27_H)

Table A - 1 Example of Subformat Code Combination

Sub-format code	① Start mark	② Address mark	④ Address terminator mark	⑥ Data terminator mark	⑦ Comment mark	⑧ Comment terminator mark	⑨ End mark	⑩ Tape stop mark	Remarks
10	None	"#"	"," or "."	"," or "."	"$"	"LF"	None	None	TE-HEX/10
18	None	"#"	"," or "."	"," or "."	"$"	"LF"	None	")" or "%"	TE-HEX/18
2A	" ["	"#"	"," or "."	"," or " "	None	None	None	"] "	
80	None	"$A"	"," or "."	"," or "."	None	None	None	None	
85	"STX"	"$A"	"," or "."	"," or "."	None	None	"ETX"	None	
A0	None	"$A"	"," or "."	"," or " "	None	None	None	None	
A5	"STX"	"$A"	"," or "."	"," or " "	None	None	"ETX"	None	
C0	None	"$A"	"," or "."	"," or "%"	None	None	None	None	
C5	"STX"	"$A"	"," or "."	"," or "%"	None	None	"ETX"	None	
E0	None	"$A"	"," or "."	"," or "'"	None	None	None	None	
E5	"STX"	"$A"	"," or "."	"," or "'"	None	None	"ETX"	None	

"STX"(02_H), "ETX"(03_H), "LF"($0A_H$), "," (Comma $2C_H$), "." (Point $2E_H$), " " (Blank space 20_H),
"'" (Apostrophe 27_H)

Note: If the start mark is " [", the stop mark should be "] ".
If both the comment mark ($) and the address mark ($A) are used, the comment mark is prior to the address mark.
If the end mark ETX is used, the program is terminated at time-out.

A.2.6 INTELLEC HEX Format

【Configuration】

Any code consists of ASCII characters. (However, control codes CR($0D_H$) and LF($0A_H$) are excluded.)
Any code other than the start mark (colon (:)) consists of 2 hexadecimal digits (ASCII characters 0 to 9 and A to F).

【Record】

①: Start mark
〔Colon (:)〕
Indicates the beginning of a record.

②: Byte count
〔Two hexadecimal digits〕
Indicates the number of bytes after the record type and before the checksum. For an expansion address record, it is set to 02. For an end record, it is set to 00.

③: Address
〔Four hexadeciaml digits〕
Indicates the address where the data is to be stored.
For an expansion address record, it is set to 0000. For an end record, 0000 or the start address is set.

④: Record type
〔Two hexadecimal digits〕
02: Specifies the expansion address record.
00: Specifies the data record.
01: Specifies the end record.

⑤: Data
〔Two hexadecimal digits〕
This data is stored in the buffer RAM. The storage address is incremented one by one.

⑥: Checksum
〔Two hexadecimal digits〕
The complement of the sum of the hexadecimal digits between the byte count and the character before the checksum is set. The least significant 8 bits are valid.

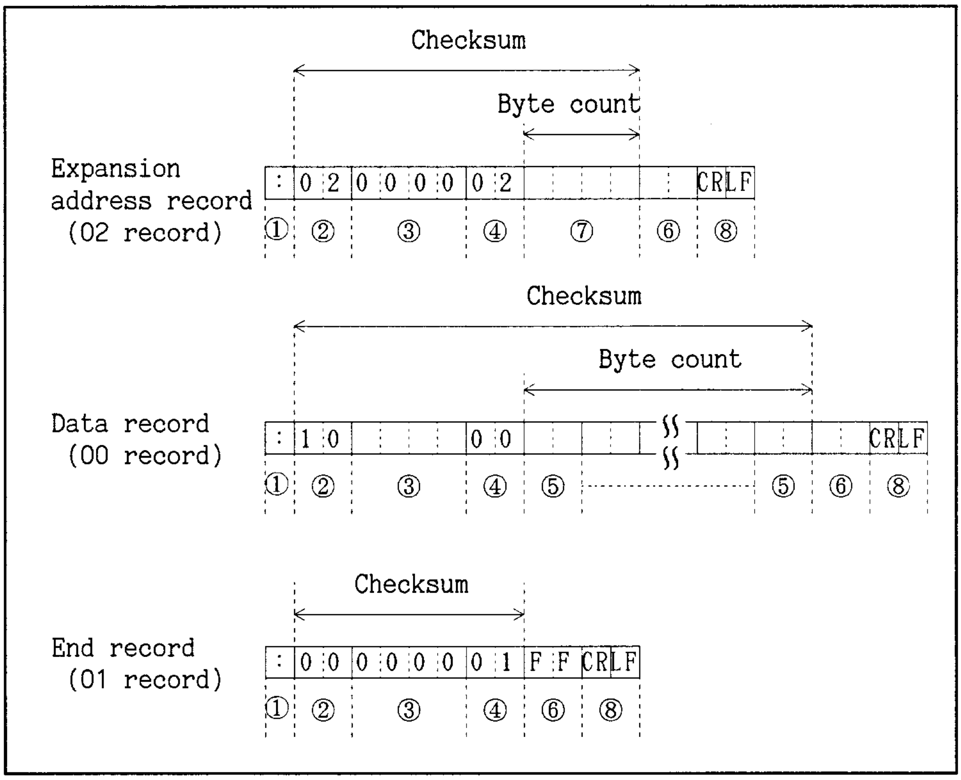
⑦: Expansion address
〔Four hexadecimal digits〕
Indicates the segment address of the data record. The expansion address is added to the data record as bits 19 to 4 of the address.

⑧: CR, LF
CR($0D_H$), LF($0A_H$)
These codes can be omitted in the record to be input.
An output record should be followed by these code.

【Example】

```
:020000021000EC
:10000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF00
:00000001FF
```

【Record configuration】



A.2.7 ASM-86 HEXADECIMAL Format

【Configuration】

Any code consists of ASCII characters. (However, control codes CR($0D_H$) and LF($0A_H$) are excluded.)
The ASM-86 HEXADECIMAL format is established by combining the INTELLEC HEX format with the DIGITAL RESERACH HEX format.

The difference between the INTELLEC HEX format and the ASM-86 HEXADECIMAL format is that the larger number of records types are used in the ASM-86 HEXADECIMAL format. The items other that the record type are the same between the two formats.
For the format, see Subsection A.2.4, INTELLEC HEX format.

The available record types of the INTELLEC HEX format and the DIGITAL RESEARCH HEX format are shown below.

INTELLEC HEX format		DIGITAL RESEARCH HEX format	
Record type	Contents	Record type	Contents
02	Expansion address record	85 86 87 88	Code segment address record Data segment address record Stack segment address record Extra segment address record
00	Data record	81 82 83 84	Code segment data record Data segment data record Stack segment data record Extra segment data record
01	End record	01	End record

For input : 02 and 85 to 88, and 00 and 81 to 84 are recognized as the same code, respectively.

For output: The following codes are output for record types:

Expansion address record type: 85
Data record type : 81
End record type : 01

【Example】

```
:02000085100069
:10000081FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF7F
:00000001FF
```

【Record configuration】

The record configuration is the same as that of the INTELLEC HEX format.
See the record configuration shown in Subsection A.2.4, INTELLEC HEX Format.

Note: The difference of the ASM-86 HEXADECIMAL format from the INTELLEC HEX format is that some record types are added.

A.2.8 MOTOROLA S RECORD Format

【Configuration】

Any code consists of ASCII characters. (However, control codes CR($0D_H$) and LF($0A_H$) are excluded.)
Any code other than the start mark (S) consists of one or two hexadecimal digits (ASCII characters 0 to 9 and A to F).

【Record】

①: Start mark
〔"S"〕
Indicates the beginning of a record.

②: Record type
〔One hexadecimal digit, 0 to 9〕
Indicates the record type.

1: Indicates the data record where the address is 4 digits.
2: Indicates the data record where the address is 6 digits.
3: Indicates the data record where the address is 8 digits.
7: Indicates the end record for record type "3" where the address is 8 digits.
8: Indicates the end record for record type "2" where the address is 6 digits.
9: Indicates the end record for record type "1" where the address is 4 digits.

③: Byte count
〔Two hexadecimal digits〕
Indicates the number of bytes between the character after the record type and the character before the checksum.

④: Address
〔Four, six, eight hexadecimal digits〕
Indicates the address where the data is to be stored.
For the size (length) of addresses, see item ②, Record type.

⑤: Data
〔Two hexadecimal digits〕
This data is stored in the buffer RAM.

⑥: Checksum
〔Two hexadecimal digits〕
The complement of the sum of the hexadecimal digits between the byte count and the character before the checksum is set.
The least significant 8 bits are valid.

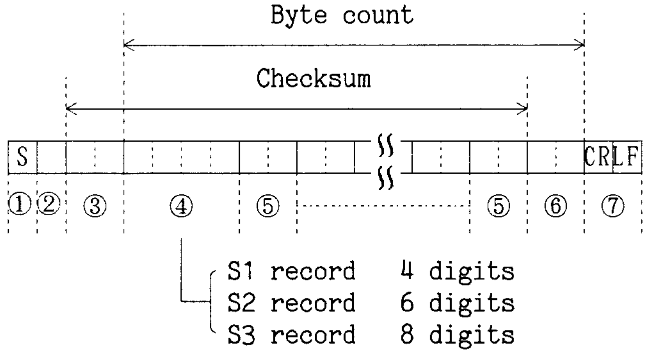
⑦: CR, LF
CR($0D_H$), LF($0A_H$)
These codes can be omitted in the record to be input.
An output record should be followed by these code.

【Example】

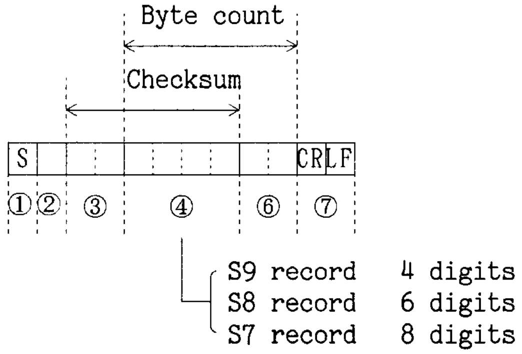
```
S113FFF0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0D
S2140100000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFA
S31501000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF8
S70500000000FA
S804000000FB
S9030000FC
```

【Record configuration】

S1, S2, and S3 record types (data record)



S9, S8, and S7 record types (end record)



A.2.9 TEKTRONIX HEXADECIMAL Format

【Configuration】

Any code consists of ASCII characters. (However, control codes CR($0D_H$) and LF($0A_H$) are excluded.)
Any code other than the start mark (slash "/") consists of 2 hexadecimal digits (ASCII characters 0 to 9 and A to F).

【Record】

①: Start mark
〔Slash (/)〕
Indicates the beginning of a record.
If two start marks are input one after another, the following characters are assumed as a comment until a CR ($0D_H$) is input.

②: Address
〔Four hexadecimal digits〕
Indicates the address where the data is to be stored.

③: Byte count
〔Two hexadecimal digits〕
Indicates the number of bytes in a record.
If the byte count of a record is 00, the record is recognized as an end record.

④: First checksum
〔Two hexadecimal digits〕
The sum of the hexadecimal digits between the address and the byte count is set. The least significant 8 bits are valid.

⑤: Data
〔Two hexadecimal digits〕
This data is stored in the buffer RAM.

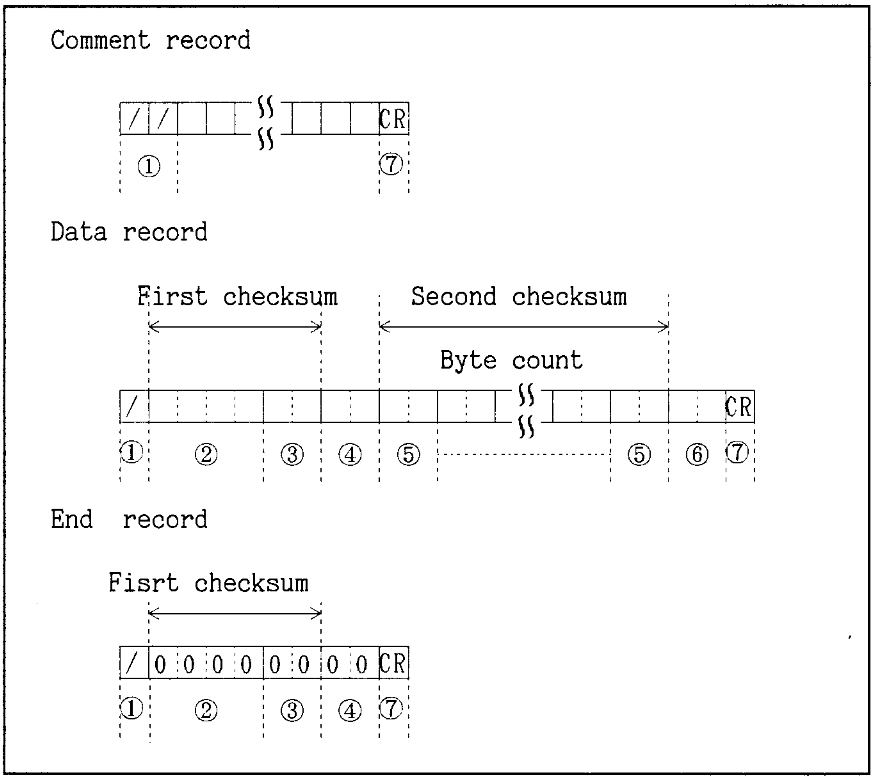
⑥: Second checksum
〔Two hexadecimal digits〕
The sum of the two hexadecimal digits that represent the data is set.
The least significant 8 bits are valid.

⑦: Record terminator
CR($0D_H$)
Indicates the end of a record.
A CR must be placed in the end of a record to be input.
This code is output as CR($0D_H$) and LF($0A_H$).

【Example】

```
//0123
/00001001FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFE0
/00000000
```

【Record configuration】



A.2.10 EXTENDED TEKHEX Format

【Configuration】

Any code consists of ASCII characters. (However, control codes CR($0D_H$) and LF($0A_H$) are excluded.)
Any code other than the start mark (percent "%") consists of hexadecimal digit(s) (ASCII characters 0 to 9 and A to F).

【Record】

In the EXTENDED TEKHEX format, one record is called a block.

①: Start mark
〔Percent (%)〕
Indicates the beginning of a block.

②: Block length
〔Two hexadecimal digits〕
In a data block, this code indicates the number of characters between the block length and the last character that represents the data.
In a terminator block, this code indicates the number of the characters between the block length and the address.

③: Block type
〔One hexadecimal digit〕
If this code of a block is "6", the block is recognized as a data block.
If this code of a block is "8", the block is recognized as a terminator block.

④: Checksum
〔Two hexadecimal digits〕
Sum of the all hexadecimal digits (0 to 9, A to F) in a block other than the checksum and the start mark is set.

⑤: Address length
〔One hexadecimal digit〕
Indicates the number of the digits of the address that follows this code.
If this code is "0", the address length is assumed to be 16 digits.

⑥: Address
〔One to 16 hexadecimal digits〕
Indicates the address where the data is to be stored. The address length is determined by the "address length" code placed before this code.

⑦: Data
〔Two hexadecimal digits〕
Indicates the data to be stored in the buffer RAM.

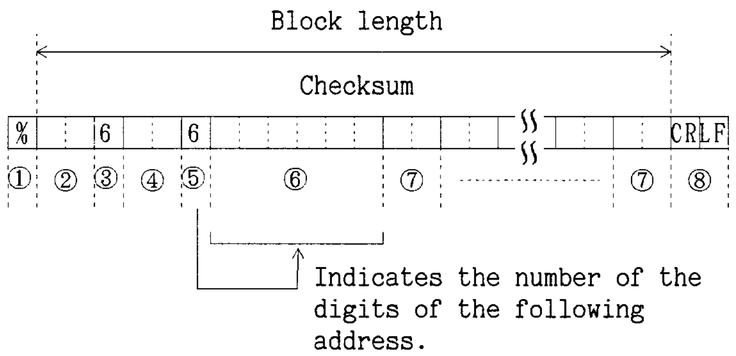
⑧: CR, LF
$CR(0D_H)$, $LF(0A_H)$
These codes can be omitted in an input block.
An output block must be followed by these code.

【Example】

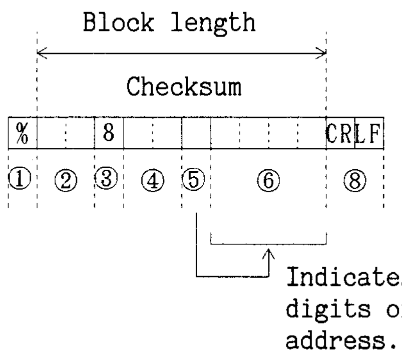
```
%2C6FA6000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
%0A81640000
```

【Record configuration】

Data block



Terminator block



A.2.11 HP64000ABS Format

【Configuration】

Any record consists of 8-bit binary codes.

【Record】

Start record

①: Word count
Start mark 04_H

②: Data bus width
0008_H is set in a output record.

③: Data word width
0008_H is set in a output record.

④: Address
00000000_H is set in a output record.

⑤: Checksum
The bytes that represent the above items ②, ③, and ④ are summed and the least significant 8 bits of the result is set.

Data record

⑥: Word count
Indicates the number of the words (each word is 16 bits) for items ⑦, ⑧, ⑨, and ⑩.

⑦: Byte count
Indicates the number of the bytes that represent the data (item ⑩).

⑧: The least significant 4 digits of the address are set.

⑨: The most significant 4 digits of the address are set.

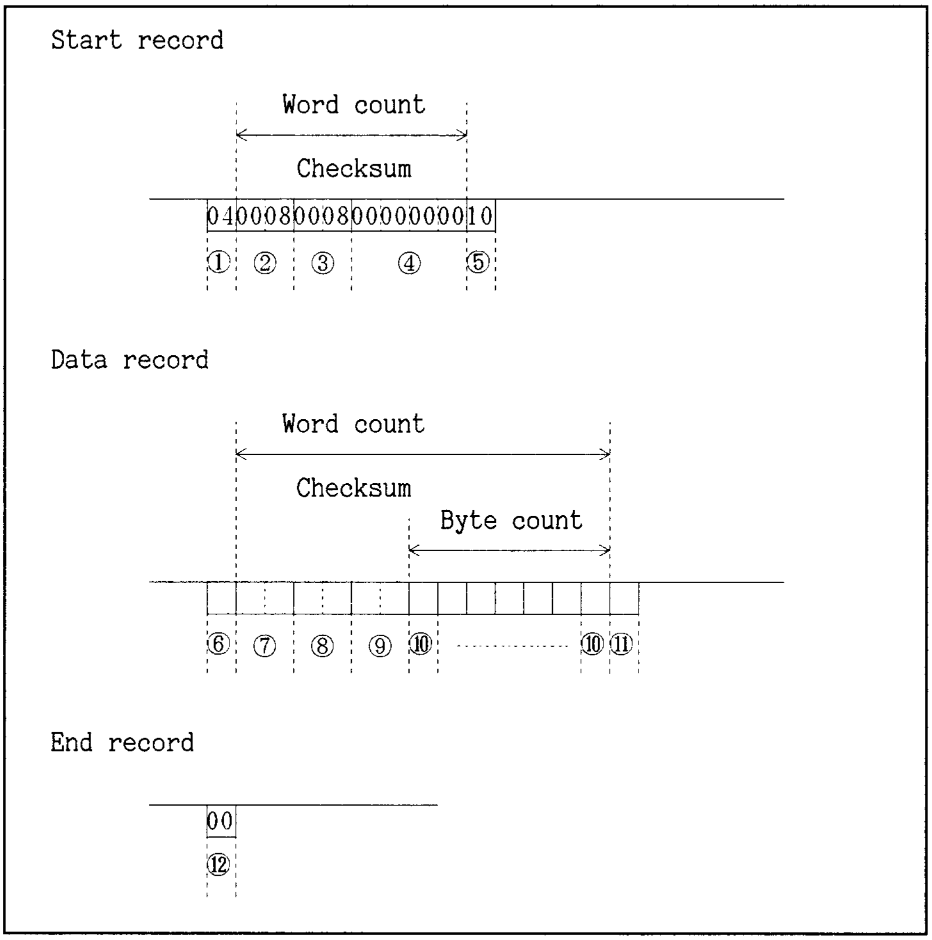
⑩: Data

⑪: Checksum
The bytes that represent the above itmes ⑦, ⑧, ⑨, and ⑩ are summed and the least significant 8 bits of the result is set.

End record

⑫: End mark
If the word count is 00_H, this is assumed an end record.

【Record configuration】



A.2.12 JEDEC Format

【Configuration】

The JEDEC format starts with a STX (02_H) and ends with an ETX (03_H).

STX ············ ①

| Comment | ············ ② |

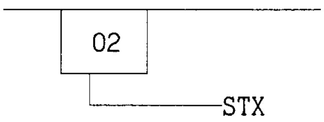
| Field | ············ ③ |

ETX · Transmission checksum ············ ④

The available characters are printable ASCII characters and the following four control characters: STX(02_H), ETX(03_H), LF($0A_H$) and CR($0D_H$).
In the field, however, only the capital letters can be used.

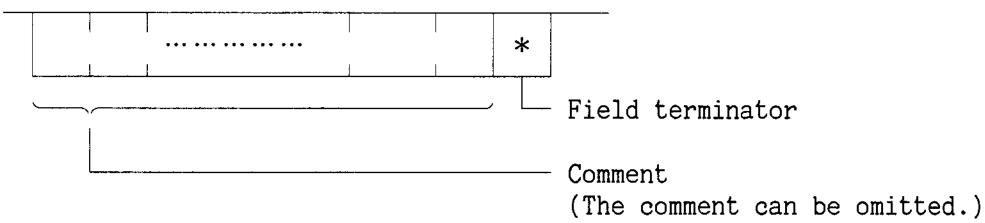
① STX(Start of Text)

Indicates the beginning of a JEDEC format. The code is represented with 02_H.



② Comment

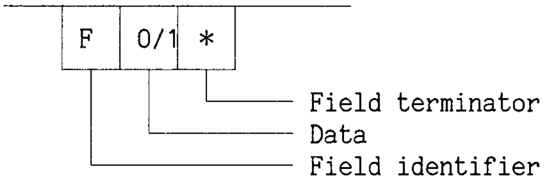
Describes the design information such as the designer, date, and revision.



③ Field

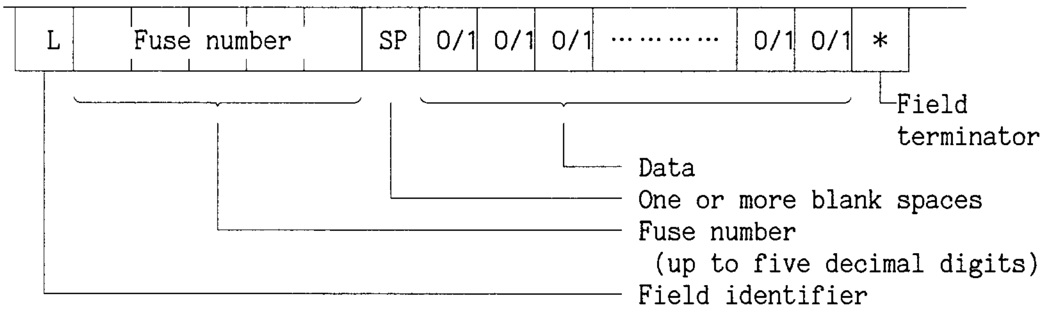
<Default fuse field (F field)>

Defines the fuse status that is not defined in the L field.
This field must always be defined prior to the L field.



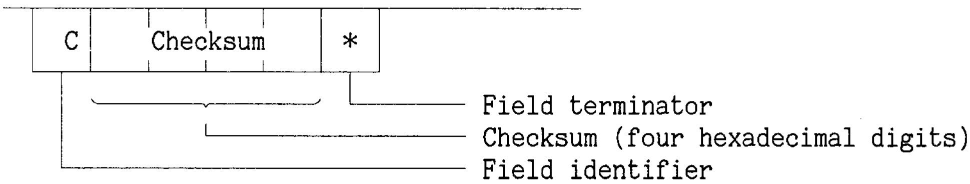
<Fuse link field (L field)>

Indicates the status of each fuse.



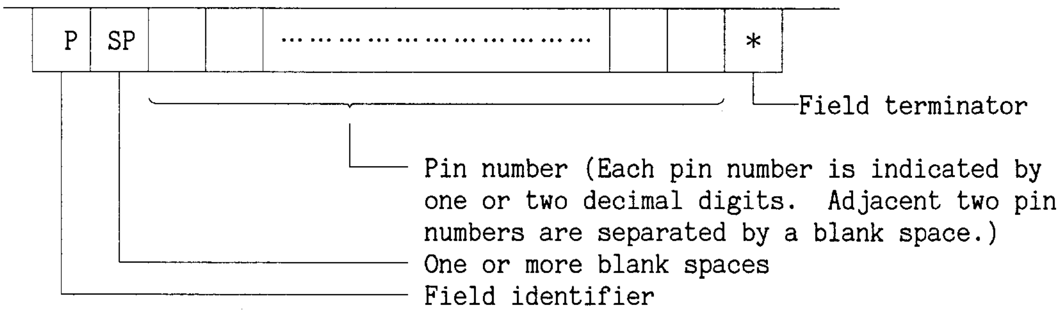
<Data checksum field (C field)>

The status of each fuse is indicated with a 8-bit code. The fuse status codes are then summed and repersented in 16 bits.
Fuse number 0 corresponds to the least significant bit, and fuse number 7 corresponds to the most significant bit. The last bit (unused) is assumed "0" when calculated.



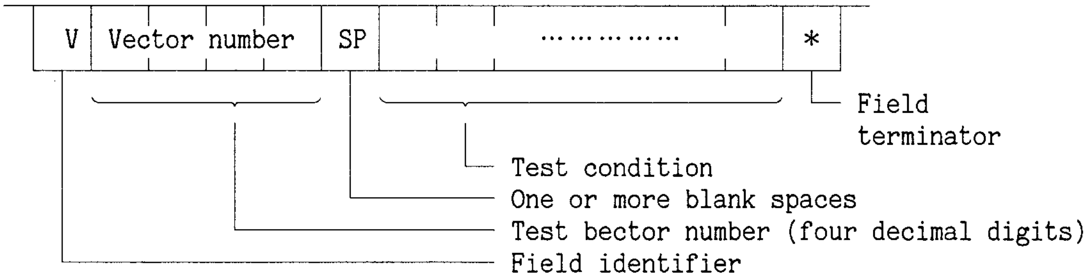
<Pin list field (P field)>

Defines the pin number of the test vector indicated by the V field.



<Test vector field (V field)>

Defines the test conditions for the logic verification.

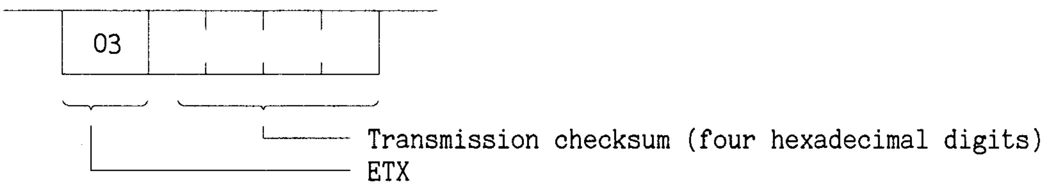


The test conditions are described according to the pin numbers defined in the P field. If the P field is omitted, the conditions are described sequentially beginning with pin 1.
The characters and their meanings used for test conditions are shown below.

0	···	Low level input
1	···	High level input
C	···	Clock input that changes low to high and returns to low.
K	···	Clock input that changes high to low and returns to high.
L	···	Low level output
H	···	High level output
N	···	Power pin (Vcc,GND), output not tested
P	···	Preload of the register
X	···	Unused input, output not tested
Z	···	Input or output of a high impedance
F	···	Floating input or output

④ ETX(End of Text), transmission checksum

Indicates the end of a JEDEC format and the transmission checksum.



The transmission checksum represents the sum of all characters from STX to ETX in 16 bits.

A.3 Serial I/O Interface

(1) Interface specification

Specification	: based on RS-232C
Transmission direction	: I/O
Synchronization direction	: start-stop system
Transmission speed	: 19200, 9600, 4800, 2400, 600, 300, 110 bps
Word configuration	: bit configuration : 8, 7 bit Parity : NONE, EVEN, ODD Stop bit : 2, 1 bit
Signal level	: RS-232C level
Main body connector	: RDBD-25S-LN (4-40)(Hirose Denki) or equivalent
Recommended plug	: DB-25P (Nippon Koku Denshi Kogyo) or equivalent
Recommended shell	: DB-24659-2 (Nippon Koku Denshi Kogyo) or equivalent
Recommended screw	: D20419-16 (Nippon Koku Denshi Kogyo) or equivalent
Fitting vase	: thread part, inch-screw No.4 40-UNC-2B

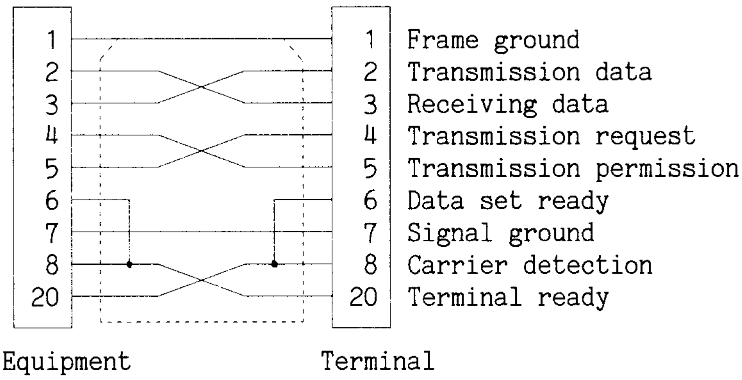
(2)Signal name

Table A - 2 Serial I/O Interface Signal Names

Pin No.	Signal name		Signal direction Equipment External	Content
1	Ground	FG		Frame ground used for protective grounding
2	Transmit Data	TXD	⟶	Sent data
3	Receive Data	RXD	⟵	Received data
4	Request to Send	RTS	⟶	Transmission request signal to the external eqipment High level: receiving enabled Low level : receiving inhibited
5	Clear to Send	CTS	⟵	Transmission permission signal from the external equipment High level: transmission enabled Low level : transmission inhibited
6	Data Set Ready	DSR		N.C.
7	Signal Ground	SG		Signal ground
8	Carrier Detector	CD		N.C.
9 to 19				N.C.
20	Data Terminal Ready	DTR	⟶	Terminal ready
21 to 25				N.C.

(3) Example of connection

In case when hand shake, RTS control, CTS supervision and X_{ON}/X_{OFF} control are provided.

<table>
<tr><th>Connection device</th><th>Connection</th></tr>
<tr><td>RS-232C
terminal</td><td>
</td></tr>
</table>

(4) Recommended cable

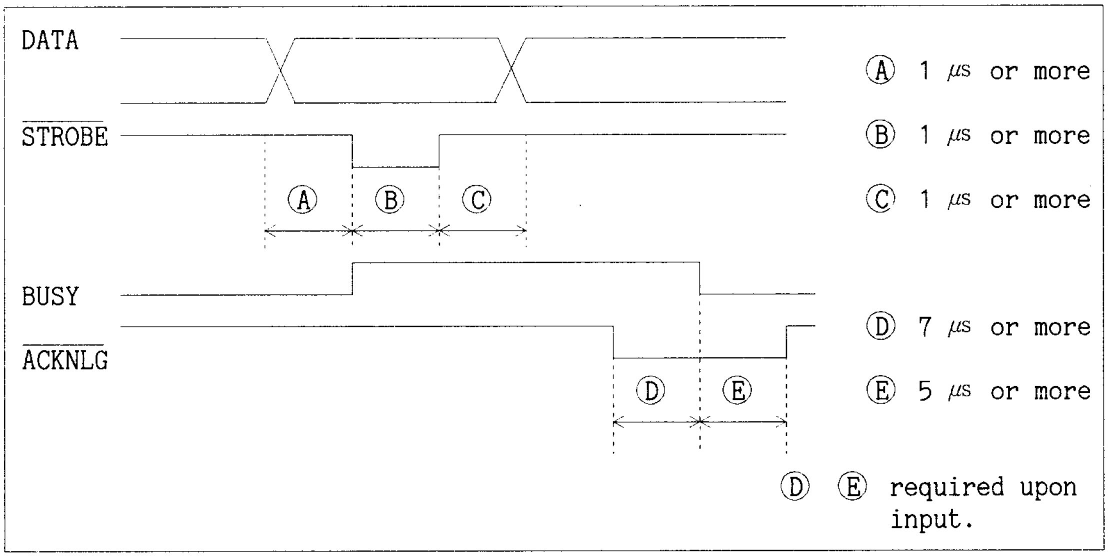
Product name : connection cable (25P-25P connector cable)
Product code : A01242-200

A.4 Parallel I/O Interface

(1) Interface specification

Specification	: based on Centronics
Transmission direction	: I/O
Data transmission type	: 8-bit parallel
Signal level	: TTL level
Hand shake	: ACKNLG, BUSY control
Main body connector	: 57LE-40360-77C0 (D12) (Daiich Denshi Kogyo) or equivalent
Recommended plug	: 57-30360 (Nippon Koku Denshi Kogyo) or equivalent

(2) Signal timing



(3) Signal name

Parallel I/O Interface Signal Name

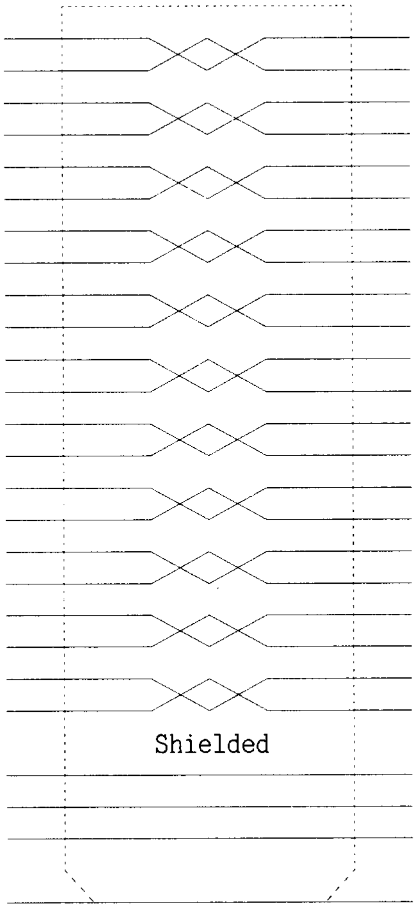
Pin No.	Return side pin No.	Signal name	Parallel input signal direction Equipment	 External	Parallel output signal direction Equipment	 External	Content
1	19	$\overline{\text{STROBE}}$	←			→	The strobe pulse is in HIGH in the normal condition. After this pulse is turned to Low, data is read out.
2 3 4 5 6 7 8 9	20 21 22 23 24 25 26 27	DATA 1 DATA 2 DATA 3 DATA 4 DATA 5 DATA 6 DATA 7 DATA 8	← ← ← ← ← ← ← ←			→ → → → → → → →	In parallel data, "HIGH" and "LOW" indicate that data are "1" and "0" respectively.
10	28	$\overline{\text{ACKNLG}}$		→	←		Confirmation pulse output after this equipment reads data. Or this pulse indicates that the external equipment received data and is ready for receiving the next data.
11	29	BUSY		→	←		Signal indicating whether this equipment or external equipment can receive data. "LOW"indicates that data can be received and "HIGH" indicates that no data can be received.
12		PE					Pulled down to GND at 330Ω
13							Never use.
14 to 16							N.C.

(cont'd)

Pin No.	Return side pin No.	Signal name	Parallel input signal direction Equipment	Parallel input signal direction External	Parallel output signal direction Equipment	Parallel output signal direction External	Content
17		FG					Frame ground
18							N.C.
19 to 29		GND					Signal ground
30							N.C.
31							Never use.
32		$\overline{\text{ERROR}}$					Pulled up to 3.3kΩ +5V
33		GND					Signal ground
34							Pulled up to 4.7kΩ +5V (Never use)
35							Pulled up to 4.7kΩ +5V (Never use)
36							N.C.

The return pins 19 to 29 are connected to the signal ground.

(4) Example of connection

Signal name	Pin No.	Connection diagram	Pin No.	Signal name
$\overline{\text{STROBE}}$	1		1	$\overline{\text{STROBE}}$
	19		19	
DATA 1	2		2	DATA 1
	20		20	
DATA 2	3		3	DATA 2
	21		21	
DATA 3	4		4	DATA 3
	22		22	
DATA 4	5		5	DATA 4
	23		23	
DATA 5	6		6	DATA 5
	24		24	
DATA 6	7		7	DATA 6
	25		25	
DATA 7	8		8	DATA 7
	26		26	
DATA 8	9		9	DATA 8
	27		27	
$\overline{\text{ACKNLG}}$	10		10	$\overline{\text{ACKNLG}}$
	28		28	
BUSY	11		11	BUSY
	29		29	
PE	12		12	PE
$\overline{\text{ERROR}}$	32		32	$\overline{\text{ERROR}}$
GND	33		33	GND
FG	17		17	FG
Applicable plug 57-30360 (Nippon Koku Denshi Kogyo)or equivalent				Applicable plug 57-30360

NOTE

Use the shielded twist paired cable less than 2m.

(5) Recommended cable

Product name : Connection cable (36P-36P connector cable)
Product code : A01224

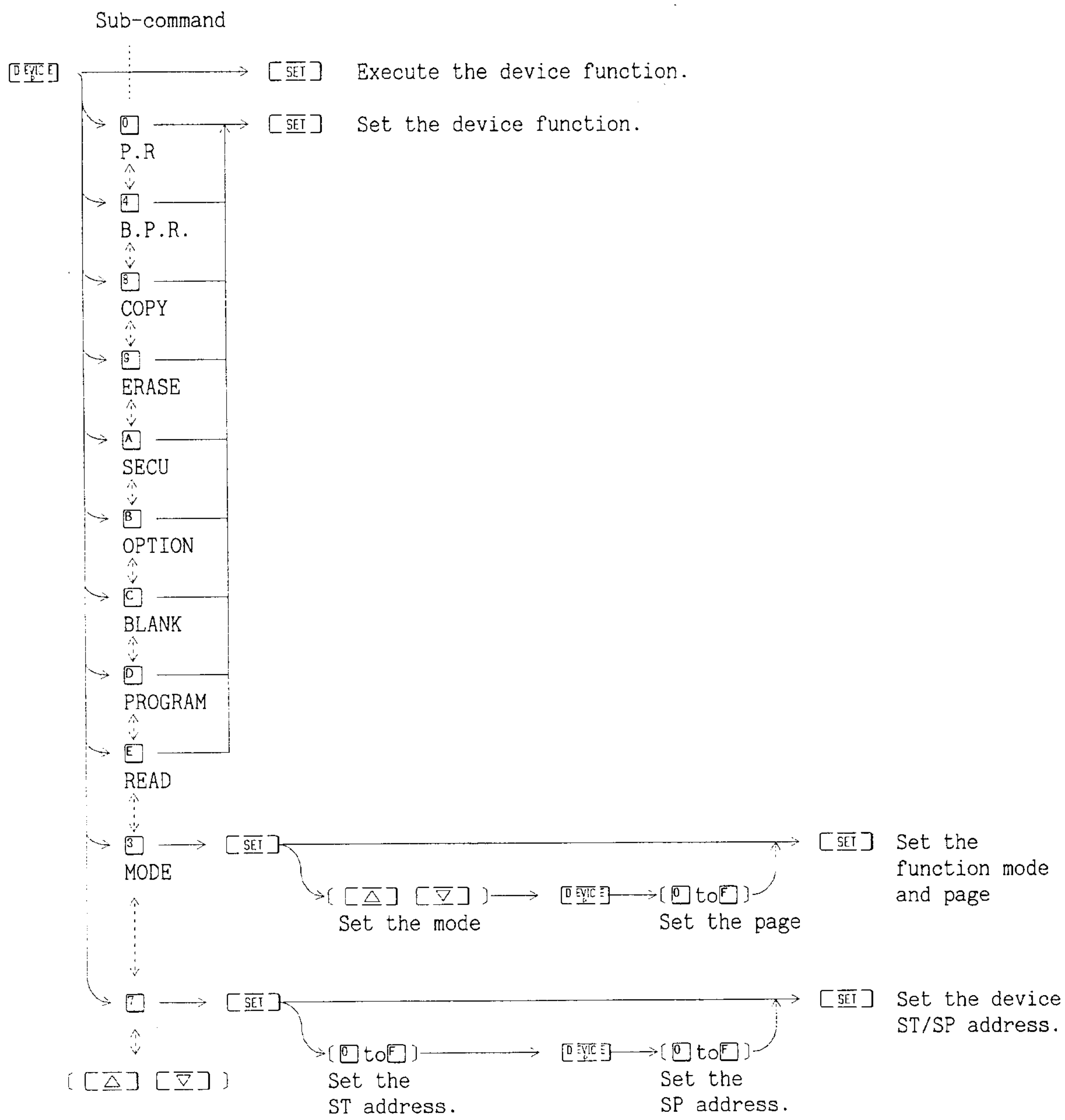
A.5 Command List

Table A - 3 Command List

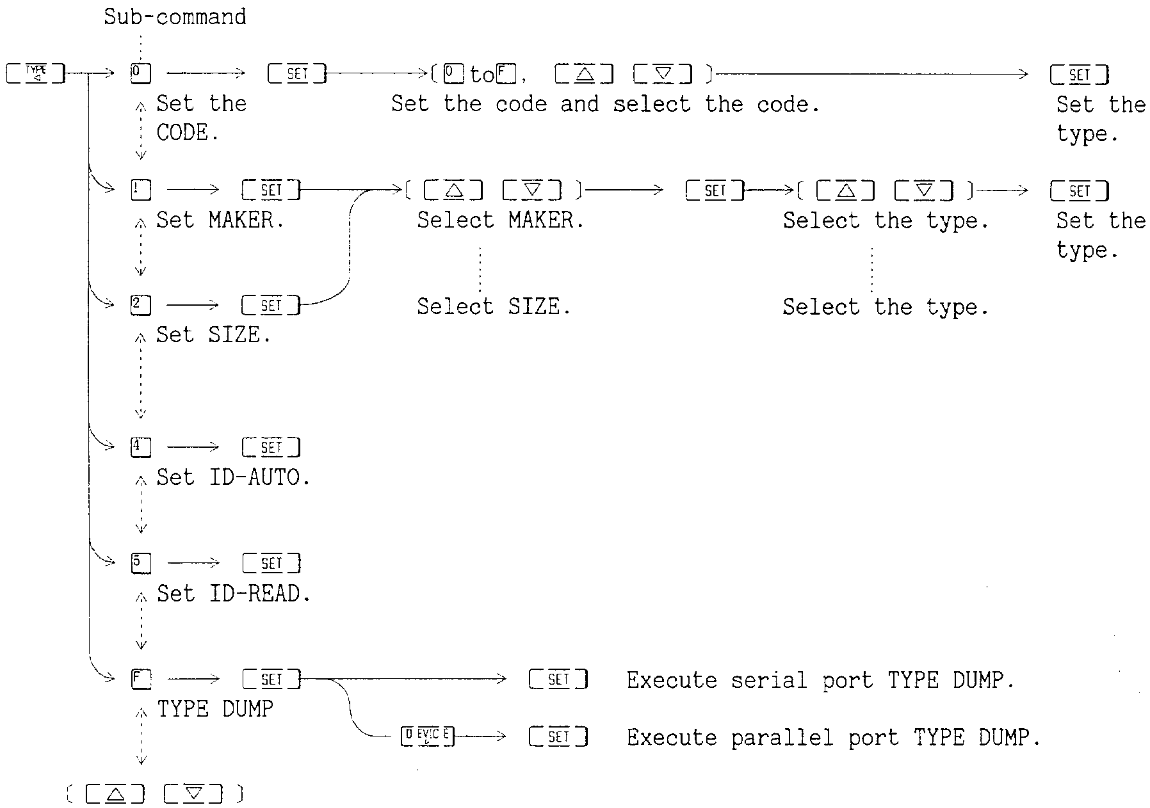
Sub-command / Main command	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[A]	[B]	[C]	[D]	[E]	[F]
[DEVICE]	P.R.			MODE [SET] Operation mode [▷] Page	B.P.R.			ST/SP [SET] ST [▷] SP	COPY	ERASE	SECURITY	OPTION	BLANK	PROGRAM	READ	
[TYPE]	CODE [SET] TYPE code	MAKER [SET] Manufac-ture name [SET] Device name	SIZE [SET] Size [SET] Device name		ID-AUTO	ID-READ										Type dump
[EDIT]	RAM Edit [SET] Address [SET] data	Insert [SET] Address /Block	Delete [SET] Address /Block						Check sum [SET] RAM/fuse [SET] FA [▷] LA	Block store [SET] FA [▷] LA [▷] Data	Block move [SET] FA [▷] LA [▷] Byte count	Block change [SET] FA [▷] LA [▷] Byte count	Complement [SET] FA [▷] LA	Data search [SET] Search data		Data clear [SET] RAM/fuse
[SELECT]	Serial input [SET] OA [▷] LA [▷] LA	Serial output [SET] FA [▷] LA	Serial verify [SET] OA [▷] LA [▷] LA	Trans-mission format [SET] format [▷] Termi-nator	Parallel input [SET] OA [▷] FA [▷] LA	Parallel output [SET] FA [▷] LA	Parallel verify [SET] OA [▷] LA [▷] LA	I/O conditon [SET] Baud rate [▷] word con-digration [▷] XON/OFF	Remote	Switch PRE-CHECK/ TIME-OUT/ KEY-TONE/ ALARM/ ID-CHECK [▷] ON/OFF			Device condition [SET] READ Vcc ±5%, ±10%	DC test [SET] PRE/KEY/DC [SET] test No.	Operaion check [SET] Program waveform [▷] Serial I/O [▷] Parallel I/O	System ROM [SET] Revision [▷] Clear [▷] Save

A.6 Command Flow Chart

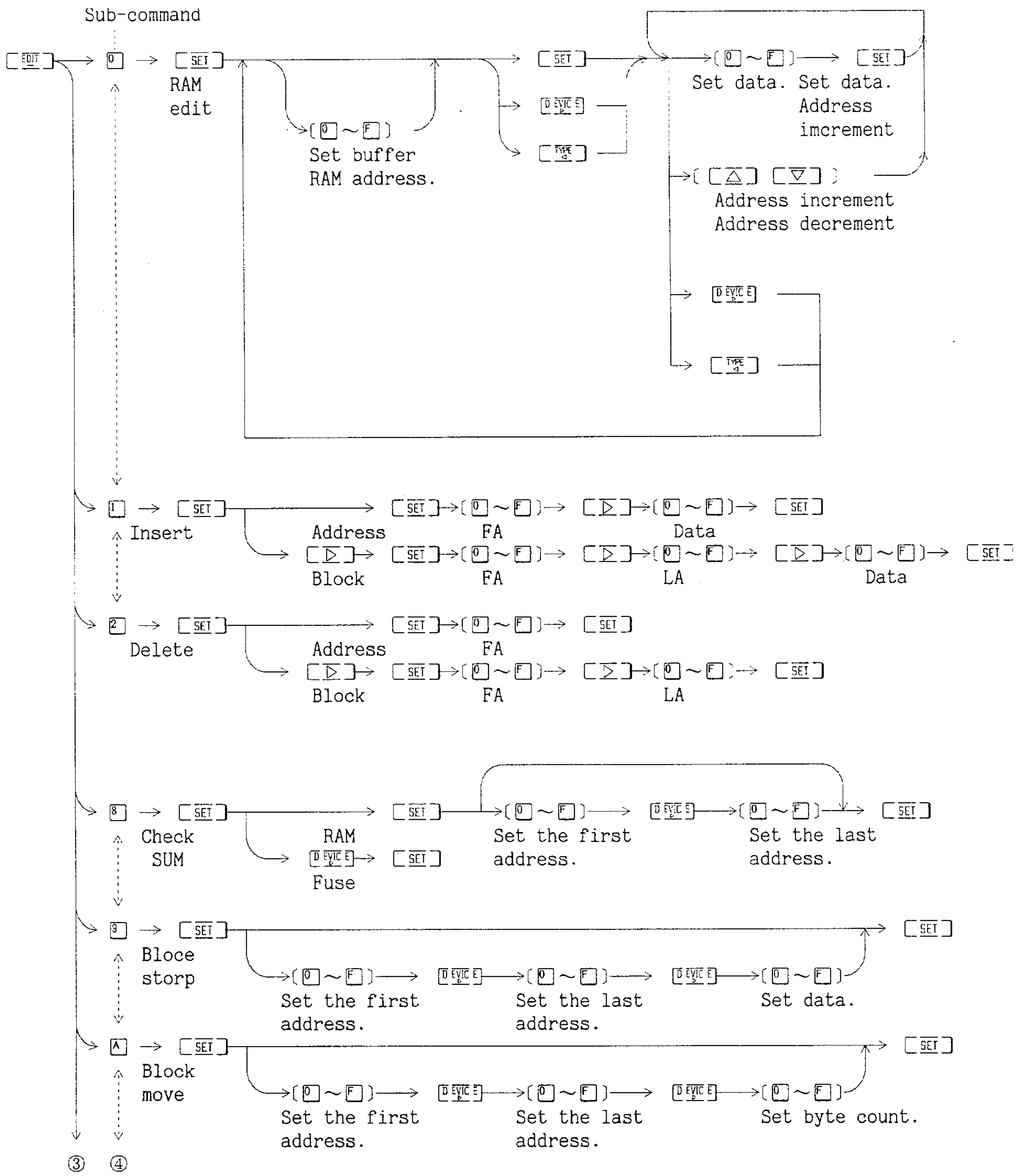
(1) DEVICE



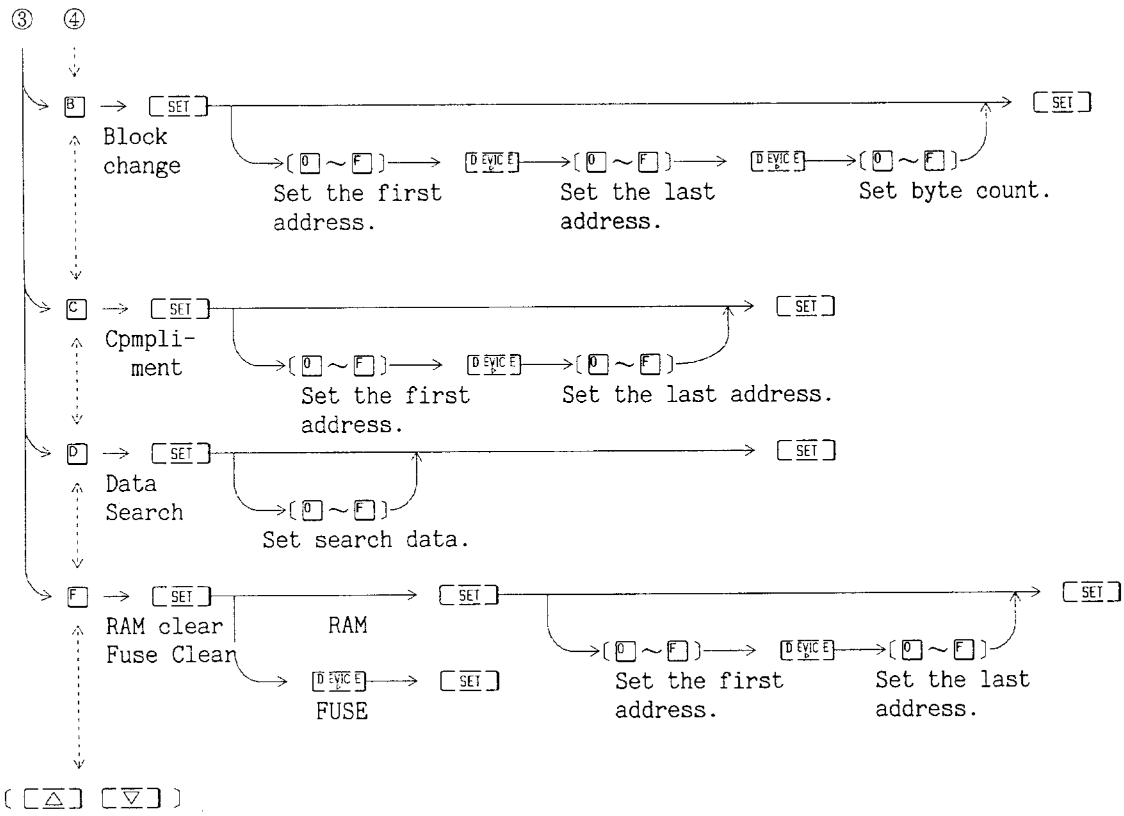
(2) TYPE


Sub-command
Set the CODE.
Set the code and select the code.
Set the type.
Set MAKER.
Select MAKER.
Select the type.
Set the type.
Set SIZE.
Select SIZE.
Select the type.
Set ID-AUTO.
Set ID-READ.
TYPE DUMP
Execute serial port TYPE DUMP.
Execute parallel port TYPE DUMP.

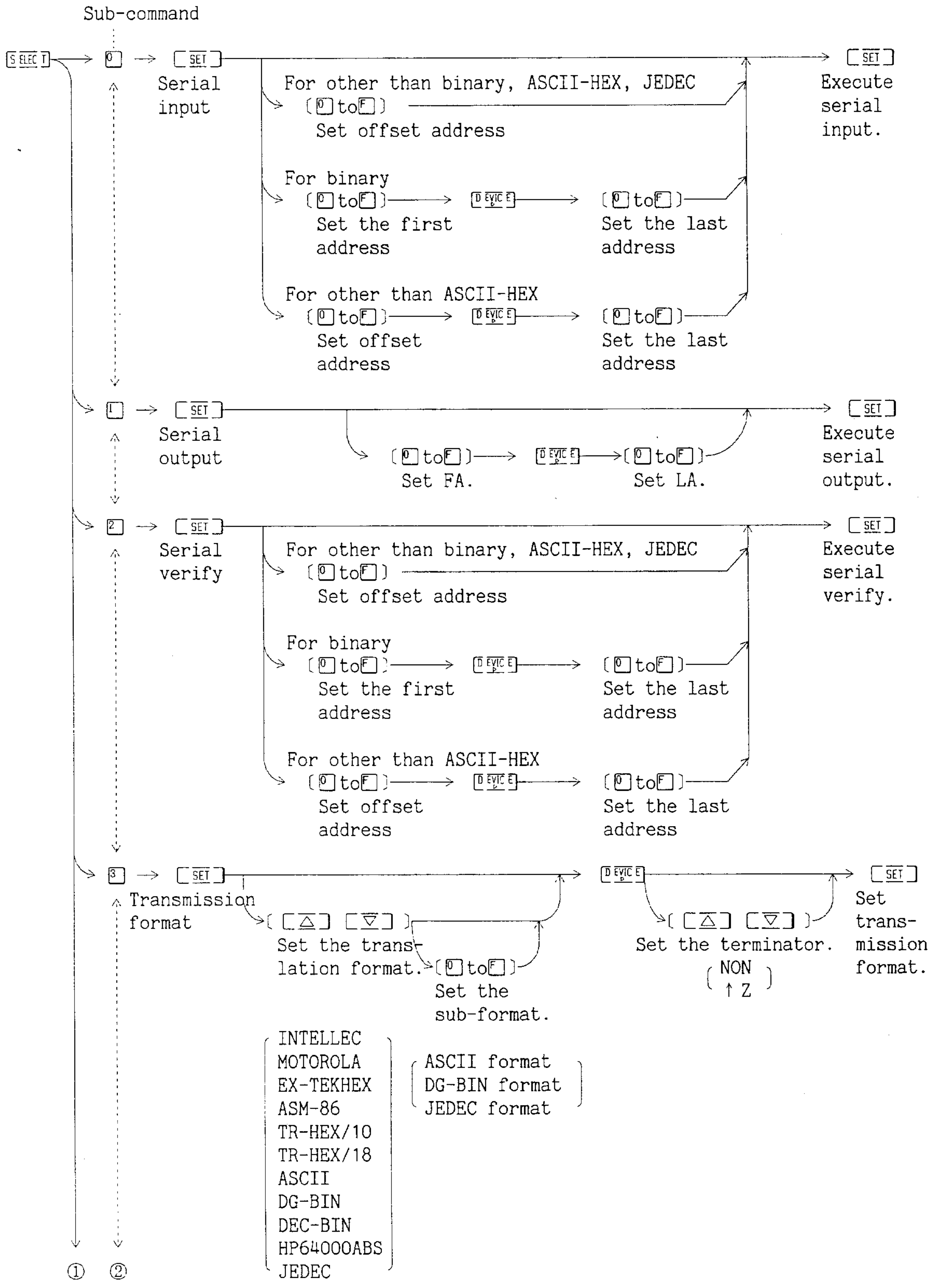
(3) EDIT



(Continued to next page)


③ ④
B → SET → SET
Block change
0 ~ F → DEVICE → 0 ~ F → DEVICE → 0 ~ F
Set the first address.
Set the last address.
Set byte count.
C → SET → SET
Cpmpli- ment
0 ~ F → DEVICE → 0 ~ F
Set the first address.
Set the last address.
D → SET → SET
Data Search
0 ~ F
Set search data.
F → SET → SET → SET
RAM clear
Fuse Clear
RAM
DEVICE → SET
FUSE
0 ~ F → DEVICE → 0 ~ F
Set the first address.
Set the last address.
(△ ▽)

(4) SELECT



(Continued to next page)

① ②

[4] → [SET] → [SET] Execute parallel input
Parallel input

For other than binary, ASCII-HEX, JEDEC
([0] to [F]) Set offset address

For binary
([0] to [F]) Set the first address → [DEVICE] → ([0] to [F]) Set the last address

For other than ASCII-HEX
([0] to [F]) Set offset address. → [DEVICE] → ([0] to [F]) Set the last address.

[5] → [SET] → [SET] Execute parallel output
Parallel output

([0] to [F]) Set FA. → [DEVICE] → ([0] to [F]) Set LA.

[6] → [SET] → [SET] Execute parallel verify
Parallel verify

For other than binary, ASCII-HEX, JEDEC
([0] to [F]) Set offset address

For binary
([0] to [F]) Set the first address → [DEVICE] → ([0] to [F]) Set the last address

For other than ASCII-HEX
([0] to [F]) Set offset address → [DEVICE] → ([0] to [F]) Set the last address

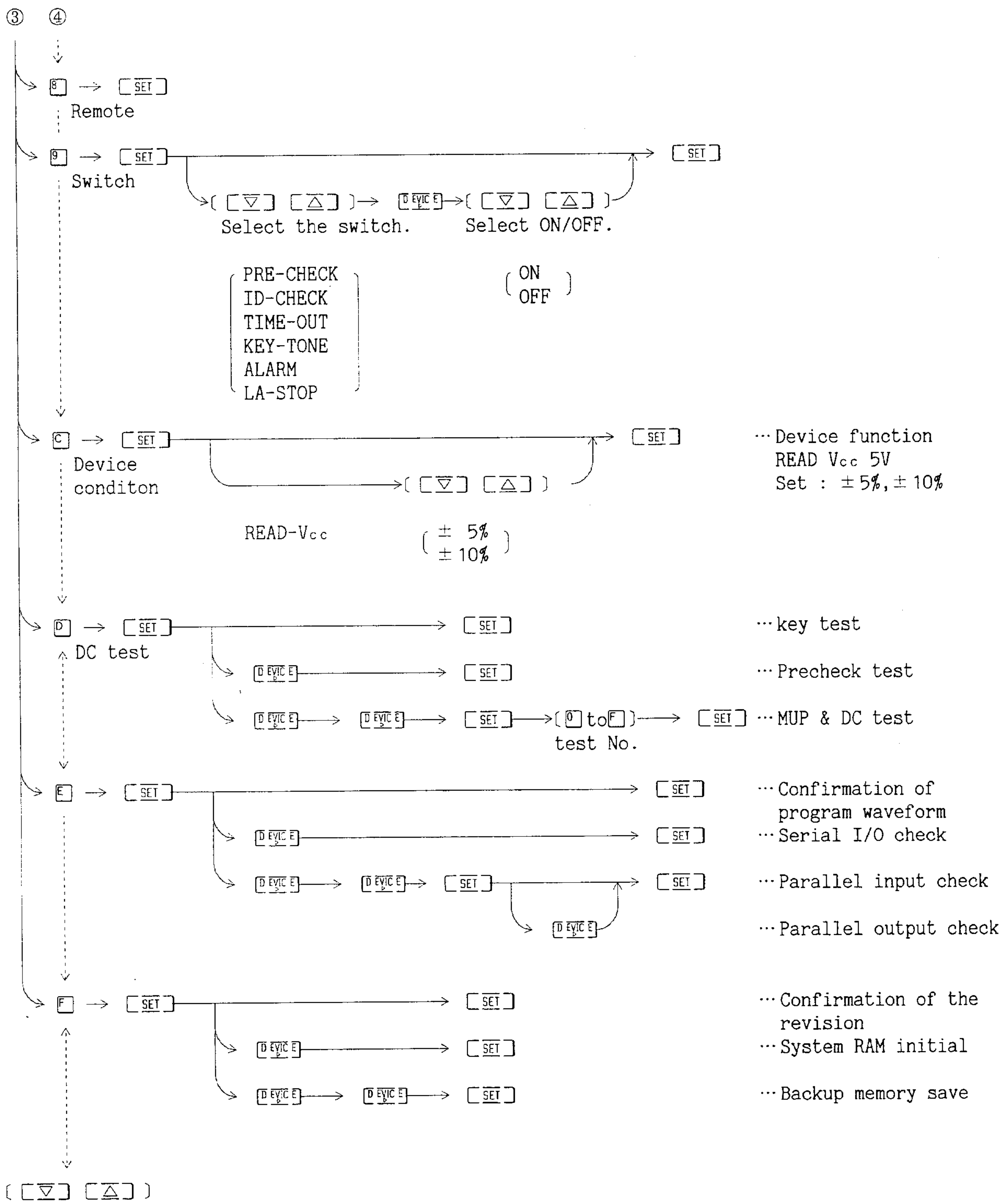
[7] → [SET] → [SET] Execute I/O conditio
I/O condition

([▽] [△]) Select the baud rate. → [DEVICE] → ([▽] [△]) Select the word cofiguration → [DEVICE] → ([▽] [△]) Select X_{ON}, X_{OFF}

Baud rate	Word configuration	X_{ON}, X_{OFF}
110	7EV2	ENA
300	7OD2	DIS
600	7EV1	
1200	7OD1	
2400	8NO2	
4800	8NO1	
9600	8EV1	
19200	8OD1	

③ ④

(Continued to next page)


③ ④
8 → SET
Remote
9 → SET → SET
Switch
(▽ △) → DEVICE → (▽ △)
Select the switch.
Select ON/OFF.
PRE-CHECK
ID-CHECK
TIME-OUT
KEY-TONE
ALARM
LA-STOP
ON
OFF
C → SET → SET
Device
conditon
(▽ △)
READ-Vcc
± 5%
± 10%
…Device function
READ Vcc 5V
Set : ±5%, ±10%
D → SET → SET
DC test
DEVICE → SET
DEVICE → DEVICE → SET → (0 to F) → SET
test No.
…key test
…Precheck test
…MUP & DC test
E → SET → SET
DEVICE → SET
DEVICE → DEVICE → SET → SET
DEVICE
…Confirmation of
program waveform
…Serial I/O check
…Parallel input check
…Parallel output check
F → SET → SET
DEVICE → SET
DEVICE → DEVICE → SET
…Confirmation of the
revision
…System RAM initial
…Backup memory save
(▽ △)

A.7 Compatible Command in Remote Control Mode

(1)Shift to the remote control mode

Shift method	Convential System	R4945
Key-in method	[SELECT] [C] [SET] or [SELECT] [C] [0] [SET] or [SELECT] [C] [1] [SET] Terminal remote Echo-back the input character. CPU remote Do not echo-back the input character.	[SELECT] [8] [SET] Do not echo-back the input character.
Serial port method	Input the control code DC1 (11_H) to the serial port.	Input the control code DC1 (11_H) to the serial port.

(2) Answering character

Contents	Convential System	R4945
Command execution is normally completed.	Terminal mode CR LF [PASS] CR LF [C] or CR LF [C] CPU mode *	* CR LF
Error occured.	Terminal mode CR LF [ERROR #xx] ↑ Error code CR LF [C] CPU mode F xx * ↑ Error code	Command input error ? CR LF * CR LF Command execution error F CR LF * CR LF Note:Input a error code confirmation command "FQ CR" to check the error code. — Answering character — ! XX YY CR LF ↑ ↑ Error status Error code

Symbols "CR", "LF" or "SP" indicates the ASCII code "CR($0D_H$)", "LF($0A_H$)" or "SP(20_H)" respectively.

(3) Remote control command

Contents	Convential System	R4945
Check or alter the data	Command exists	No command
Set and check the ROM TYPE.	Set the ROM TYPE R xxxx CR ↑ ROM TYPE code 3 to 4 digits Set the ID-AUTO TYPE R0000 CR Check the ROM TYPE R CR — Answering character — Terminal mode CR LF [XXXX] ↑ ROM TYPE CR LF [C] CPU mode CR LF [XXXX] * ↑ ROM TYPE	Set the ROM TYPE TY xxxxxx CR ↑ ROM TYPE code 6 digits Set the ID-AUTO TYPE TY 000000 CR Check the ROM TYPE No command
Type dump	No command	TD P00 CR Output the data to the serial port TD P20 CR Output the data to the parallel port

(cont'd)

Contents	Convential System	R4945
Device function	Set the device function P8 CR (COPY) P9 CR (ERASE) PA CR (P.R) PG CR (OPTION) PC CR (BLANK) PD CR (PROGRAM) PE CR (READ) PF CR (B.P.R) Execute the device function P CR Note:There are two commands. One is for setting the device function. The other is for executing the device function.	Set and execute the device function. DE C CR (COPY) DE B CR (BLANK) DE P CR (PROGRAM) DE R CR (READ) DE E CR (ERASE) DE S CR (SECURITY) DE 0 CR (P.R) DE 1 CR (B.P.R) Note:One command performs both setting and execution of the device function.
	Execute the page mode PX CR ↑ Number of pages Execute the offset mode PO xxxx CR ↑ OA Execute the split mode PB xxxx CR ↑ Split address	After the mode setting command is set, each mode sets the device function and executes the execution command. However, the offset mode is not included. Mode setting command DMM xxxxxxxx P xx CR LF ↑ ↑ Set the page Set the operating mode

"OA" indicates the offset address.

(cont'd)

Contents	Convential System	R4945
EDIT command	Complement Commnad exists Insert Commnad exists Delete Commnad exists Block store Commnad exists Block move Commnad exists Data search Commnad exists Block data search Commnad exists Block change Commnad exists Byte exchange Commnad exists (except TR4943)	Complement No command Insert No command Delete No command Block store No command Block move No command Data search No command Block data search No command Block change No command Byte exchange No command
	RAM clear OF CR Clear the all buffer RAM area.	Buffer RAM clear RC MO R$\underline{xxxxxx}$ L $\underline{xxxxxx}$ CR ↑ FA ↑ LA Clear the area between FA and LA.

"FA" Indicates the first address.
"LA" Indicates the last address.

(cont'd)

Contents	Convential System	R4945
Debug RAM command	SO x SP x CR	No command
Check SUM command	Check SUM command ALL mode S1 CR PAGE mode S1 x CR ↑ page BLOCK mode S1xxxx xxxx CR ↑ ↑ FA LA — Answering character — Terminal mode CR LF [xxxx] ↑ Check sum value CR LF [C] CPU mode CR LF [xxxx] * ↑ Check sum value	Check SUM command (RAM) SUM0 Rxxxxxx L xxxxxx CR ↑ ↑ FA LA Check SUM command (FUSE) SUM5 CR — Answering character — !xxxx CR LF ↑ Check sum value

"FA" indicates the first address.
"LA" indicates the last address.

(cont'd)

Contents	Convential System	R4945
Set and check the start address or stop address	Set the start address S2 xxxx CR ↑ Start address Check the start address S2 CR — Answering character — Terminal mode CR LF [xxxx] ↑ Start address CR LF * CPU mode CR LF [xxxx] * ↑ Start address	Set the start address or stop address DS R xxxxxx L xxxxxx CR ↑ ↑ Stop address Start address There is no start address checking command or stop address checking command.
	Set the stop address S3 xxxx CR ↑ Stop address Check the stop address S3 CR — Answering character — Same as the start address answering character.	

(cont'd)

Contents	Convential System	R4945
Serial input	S6 CR S2 xxxx CR (xxxx = OA)	SIO xxxxxxxx CR (xxxxxxxx = OA) SIR xxxxxx CR (xxxxxx = FA)
Serial verify	S7 CR S7 xxxx CR (xxxx = OA)	No command
Serial output	S8 CR S8 xxxx CR (xxxx = OA) S8 xxxx SP xxxx CR (FA, LA) S8 xxxx SP xxxx SP xxxx CR (FA, LA, OA)	SO R xxxxxx L xxxxxx CR (FA, LA)

"OA" indicates the offset address.
"FA" indicates the first address.
"LA" indicates the last address.

(cont'd)

Contents	Convential System	R4945
Parallel input	SG CR SG xxxx CR ↑ OA	PIO xxxxxxxx CR ↑ OA PIR xxxxxx CR ↑ FA
Parallel verify	SH CR SH xxxx CR ↑ OA	No command
Parallel output	SI CR SI xxxx CR ↑ OA SI xxxx SP xxxx CR ↑ ↑ FA LA SI xxxx SP xxxx SP xxxx CR ↑ ↑ ↑ FA LA OA	PO R xxxxxx L xxxxxx CR ↑ ↑ FA LA

"OA" indicates the offset address.
"FA" indicates the first address.
"LA" indicates the last address.

(cont'd)

Contents	Convential System	R4945
Set and check the offset address, translation format, sub format or terminator	Set the offset address, translation format or sub format S9 xxxx CR ↑ OA S9 xxxxxx SP xx CR ↑ OA ↑ Translation format S9 xxxxxx SP xx SP xx CR ↑ OA ↑ Translation format ↑ Sub format Check the offset address, translation format or sub format. S9 CR — Answering character — Applicable	Set the translation format, sub format or terminator TFM xx S xx T x CR ↑ Translation format ↑ Sub format ↑ Terminator Check the translation format, sub format or terminator No command
Set and check the terminator or ID CHECK	Set and check the terminator or ID CHECK SJ x CR Check the terminator or ID CHECK SJ CR — Answering character — CR LF [0 SP 0] ↑ Terminator ↑ ID CHECK	Set the ID CHECK IDS x CR ↑ ON/OFF code Check the ID CHECK No command

"OA" indicates the offset address.

(cont'd)

Contents	Convential System	R4945
Set and check the speaker (buzzer) or pre-check	Set the speaker or pre-check SB x CR ON/OFF code of the key tone, alarm or pre-check Check the speaker or pre-check SB C CR — Answering character — Applicable	Set the buzzer condition BZ T x L x CR Alarm ON/OFF Key tone ON/OFF Set the pre-check PHS x CR ON/OFF Check the buzzer condition No command
Set and check the serial port condition	Set the baud rate, parity time-out or SP recognition switch SA xx CR Baud rate code SA xx SP xx CR PM code Baud rate code Check the baud rate, parity time-out or SP recognition switch SA CR — Answering character — CR LF [xx SP zz] PM code Baud rate code	Set the serial port Condition IC Xx Tx CR Time-out X ON/OFF control Check the serial port condition. No command

(cont'd)

Contents	Convential System	R4945
Set and check the X ON /OFF	Set the X ON /OFF SKx CR ↑ ON/OFF (No command in R4943) Check the X ON /OFF SK CR — Answering character — CR LF [0 1] ↑ code	Included in the serial port condition setting command.
Debug RAM function	SO n SP m CR n =0 SEND n =1 LOAD m =0 NORMAL m =1 SPLIT	GRM x S y CR x = 0 SEND x = 1 LOAD y = 0 NORMAL y = 1 SPLIT
others	Set the ASCII format address dugut LS 1 CR ↑ code	Set the ASCII format address digit No command
	Set the device condition No command Check the revisions No command Check the error No command	Set the device condition Command exists Check the revisions No exists Check the error Command exists

A.8 ABBREVIATIONS

This manual and the manual for R4945 use the following abbreviations.

Abbreviations	Meaning
BA	(BUFFER RAM ADDRESS) The address of the buffer RAM.
BD	(BUFFER RAM ADDRESS DATA) The data that is stored at the buffer RAM address
FA	(FIRST ADDRESS) This address indicates the beginning of the buffer RAM address range. It is set during the data edition or the translation input and output.
LA	(LAST ADDRESS) This address indicates the end of the buffer RAM address range. It is set during the data edition or the translation input and output.
OA	(OFFSET ADDRESS) This value is subtracted from the address for translation format input.
SF	(TRANSLATION SUB FORMAT CODE) It is used for translation format (ASCII-HEX and JEDEC).
ST	(START ADDRESS) This address indicates the beginning of the device range when executing device functions.
SP	(STOP ADDRESS) This address indicates the end of the device range when executing device functions.
TF	(TRANSLATION FORMAT) It is used for data input and output at the I/O port.
TFA	(TRANSLATION FORMAT ADDRESS) Address on a translation format.

A.9 TERMINOLOGY

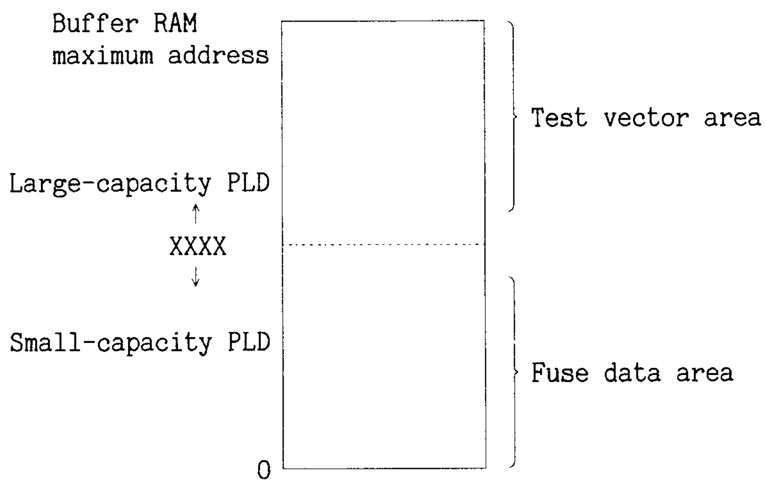
(1) Buffer RAM area and fuse data area

① If the type code is ROM

The buffer RAM area is used in bytes.
The RAM editor allows checking and modifying the RAM area in bytes.

② If the type code is PLD

When the buffer RAM area is used, it is divided into the two areas: fuse data area and test vector area.
The fuse data area stores the data to be actually written to the device; the test vector area stores the test data for the logic verification as the function test for the device where the data is already written.
The size of the fuse data area is determined by the number of the fuses of each device. First a part of the buffer RAM is assigned to the fuse area and then the remaining area is used as the test vector area.
The number of the test vectors that can be stored is determined by the test vector area and the number of the device pins.



Note: The test vector is not applicable to R4945.

The following two editors are used to modify the PLD data: the FUSE editor to check and modify the fuse data area and the VECTOR editor to check and modify the test vector area.

CAUTION

1. Neither fuse editor nor vector editor is applicable to R4945.
   Do not use the RAM editor when TYPE code is PLD. Use of the RAM editor destroys fuse data.

2. The test vector is not applicable to input output when the translation format is JGDEC.

(2) Fuse address, Fuse data

When the type code is PLD, the buffer RAM area is used as the fuse data area.
In the data written to a PLD-type device, one cell is associated with one fuse and an address is assigned to the fuse.
The buffer RAM is used in a special way. The fuse data is associated with the fuse data in the JEDEC format are used in this way.

The fuse address and fuse data in this JEDEC format are used in this way.

(3) Fuse SUM

If the type code is PLD, the sum of the fuse data is obtained as the fuse sum. The fuse sum matches the value indicated in the C field of the JEDEC format.

(4) Fuse clear

If the type code is PLD, the fuse data is set to 0. However, it is not placed in the same status as that of the device where no data is written.

A.10 Error Code and Error Status

When an error occurs, 2-digit error code and 2-digit erro status are displayed.

```
ERR XX XX
     |  |
     |  └──Error status
     └─────Error code
```

If no error status exists in an error, 00 is displayed as the error status. However, for part of errors, the error is displayed in character.

Table A - 4 Error Code List

Error code	Content
01	System ROM error
02	System RAM error
03	Buffer RAM error
04*	Hardware error
05	Backup error
20*	Serial I/O driver error A parity error, framing error or overrun error occurs. (If time-out occurs in data entry, error code 44 time-out error occurs.)
22*	Parallel I/O driver error
30	Operation error Command was set by mistake. Address data was by set mistake.
32	Operation error Not executable with the currently set TYPE code.
38	Type setting error A type code not corresponding was set.

For the error status of the error marked with the star, see Tables A-5 and A-6.

(cont'd)

Error code	Content
3E	Debug RAM error Debug RAM cable is not connected. Setting debug RAM mode is mistaken. (Example : The ROM TYPE setting does not correspond to the debug RAM yet. Setting SEND and LOAD data are mistaken.)
40	Format error There is an error in the grammer of the translation format.
41	Format sum error The sum value of the translation format does not match.
44*	Time-out error A time-out occurs during translation format I/O.
48	Verify error In the verify check by the translation format, does not match.
4C	Bit configuration 8-bit error In the translation format, the bit configuration of serial port in binary format is not 8 bits.
50	Adapter not installed The adapter is not installed or loose.
55	Improper adapter installation A different adapter from the set type is installed.
60	Function error The function not existing in the set type (ERASE,SECURITY, etc.) was executed.
62	Precneck error The device is not inserted at all or properly. CAUTION Even if the device is inserted properly, an error may occur depending on the device quality deviation. Upon use, set the precheck function to OFF.

For the error status of the error marked with the star, see Tables A-5 and A-6.

(cont'd)

Error code	Content
64	ID mode error If ID mode is executed by the TYPE code corresponding to ID mode, ID code cannot be read out properly.
66	ID check error The set TYPE code does not match with the ID code of the device inserted in the socket.
70*	Blank check error The device in not blank.
72*	Program error Programming is not enabled. The part not necessary to program was programmed.
74*	Read check error The device does not match with the buffer RAM.
7A*	Erase error Cannot be erased.
7C*	Security error An error occurs during the execution of the security program.
7E*	Option error An error occurs during the execution of an option.

For the error status of the error marked with the star, see Tables A-5 and A-6.

Table A - 5 Error Status List

Error code	Status bit 7	6	5	4	3	2	1	0	Content
04									A faulty location is indicated by the status. (record the content and notify us when you request maintenance service.)
20								1	The buffer overflows (input time)
						1			X_{OFF} remained input (output time, when a time-out occurs)
					1				Parity error occurs (input time)
				1					Overrun occurs (input time)
			1						Framing error occurs (input time)
	1								A time-out error occurs (input/output time)
22							1		$\overline{\text{STROB}}$ remains Low level.
				1					BUSY remains High level.
	1								A time-out error occurs.

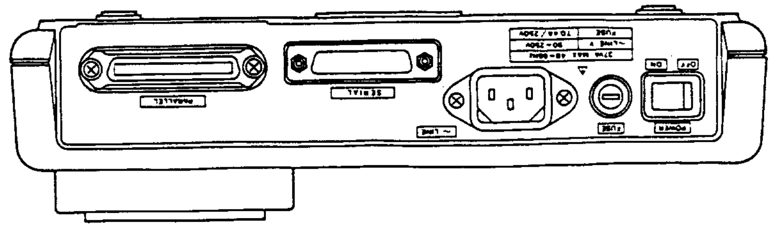
Table A - 6 Error Status List

(1 of 2)

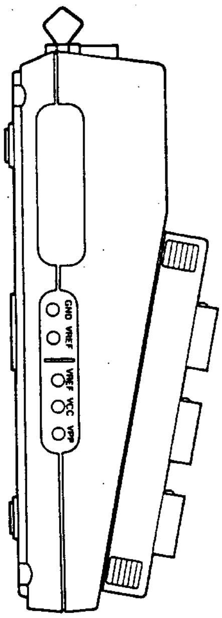
Error code	Error status	Content
44	20	A time-out error occurred in serial I/O.
	22	A time-out error occurred in parallel I/O. Input time : NO $\overline{\text{STROB}}$ is input. Output time : remaining BUSY.
70	01	ROM data is not blank (all 1)
	02	ROM data is not blank (all 0)
	03	If a check is tried to the device whose blank data is not turned to FF when erasing with the ultraviolet ray eraser.
72	01	Program verify error caused under V_{cc}=less than 4.5V
	02	Program verify error caused under V_{cc}=less than 4.5V to 4.75V
	03	Program verify error caused under V_{cc}=less than 4.75V to 5.0V
	04	Program verify error caused under V_{cc}=less than 5.0V to 5.25V
	05	Program verify error caused under V_{cc}=less than 5.25V to 5.5V
	06	Program verify error caused under V_{cc}=less than 5.5V to 5.75V
	07	Program verify error caused under V_{cc}=less than 5.75V to 6.0V
	08	Program verify error caused under V_{cc}=less than 6.0. to 6.25V
	09	Program verify error caused under V_{cc}=less than 6.25V to 6.5V

(2 of 2)

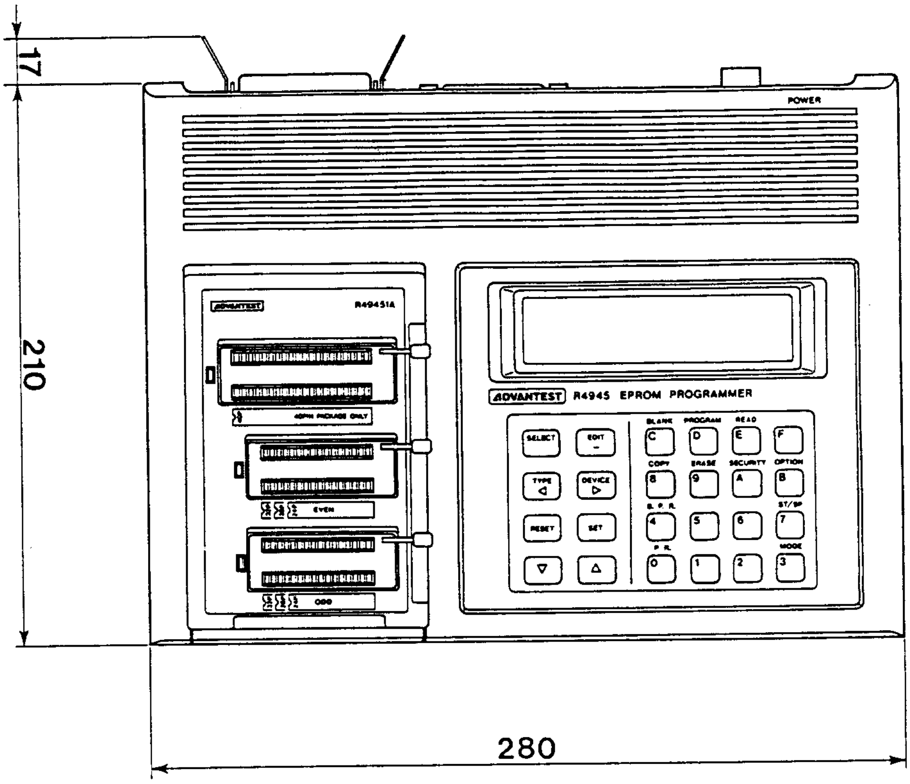
Error code	Error status	Content
74	01	Verify error by V_{CCL} on V_{OH}
	02	Verify error by V_{CCL} on V_{OL}
	03	Verify error by V_{CCM} on V_{OH}
	04	Verify error by V_{CCM} on V_{OL}
	05	Verify error by V_{CCH} on V_{OH}
	06	Verify error by V_{CCH} on V_{OL}
	07	Verify error by V_{CCHH} on V_{OH}
	08	Verify error by V_{CCHH} on V_{OL}
7A	01	Erase error that ROM cannot be erased
7C	01	Verify error at the time of security program
7E	01	Verify error at the time of option program



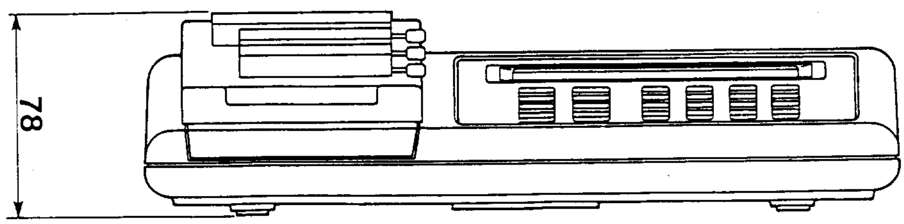
REAR VIEW



SIDE VIEW



TOP VIEW



FRONT VIEW

Unit: mm

4945EXT1-904-A

R4945
EXTERNAL VIEW

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