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RENESAS

User's Manual

PG-1500

PROM PROGRAMMER

Document No. U11940EJ4V0UM00 (4th edition)
(O.D.No. EEU-651B)
Date Published May 1997 N

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Fax: 011-889-1689

Major Revisions in This Version

Section	Description
Throughout	Target PROM devices for programming are added (75XL Series, 16- and/or 32-bit single chip microcontrollers, V851™, and V852™).
p.4	**Part I**, Description is added to the note of Section **1.3 Operating Mode**.
p.7	**Part I**, Devices are added and changed in **Table 1-1 List of PROM Adapters**.
p.18	**Part I**, Devices are added to **Table 2-1 Adapter Board Selection**. (V851, V852, and 75XL Series)
p.25	**Part II**, **Figure 2-1 Instruction System** is changed.
p.28	**Part II**, Description on Section **2.4 ROM control (DEVICE Mode)** is changed.
p.37	**Part II**, Devices (V851, V852, and 75XL Series) are added to **Table 2-4 Device Selecting Silicon Signature Compatibility**.
p.37	**Part II**, Devices are deleted or added in **Table 2-5 78K Series Silicon Signature Compatible Products**.
p.36	**Part II**, Description on Section **2.4.2 Device selection (SELECT) (2) Use of different selection methods** is changed.
p.61	**Part II**, Description on Section **2.5 Memory Edit (EDIT MODE)** is changed.
p.73	**Part II**, Description on Section **2.6 Interface Setting (FUNCTION MODE)** is changed.
p.85	**Part II**, Description and Command list of Section **3.1 Outline of Operation** are changed.
p.88	**Part II**, <Execution example> of Section **3.4.1 RS (ROM select) command** is changed.
p.92	**Part II**, <Execution example> in Section **3.4.2 RZ (ROM zero check) command** is changed.
p.95	**Part II**, Input format is added to Section **3.4.3 RR/RW/RV command input format**.
p.97	**Part II**, <Execution example> in Section **3.4.4 RR (ROM read) command** is changed.
p.103	**Part II**, <Execution example> and <Error control> in Section **3.4.5 RW (ROM write) command** is changed.
p.109	**Part II**, <Execution example> in Section **3.4.6 RV (ROM verify) command** is changed.
p.125	**Part II**, Description in Section **3.4.13 LI (Load Intel) command** is changed.
p.126	**Part II**, Description and caution in Section **3.4.14 LM (Load Motorola) command** are added.
p.127	**Part II**, Description and caution in Section **3.4.15 LI (Load TEK) command** are added.
p.128	**Part II**, Description is added and <Execution example> is changed in Section **3.4.16 SI (Serial Intel)**.
p.130	**Part II**, Description and caution in Section **3.4.17 SM (Serial Motorola)** are added.
p.132	**Part II**, Description and caution in Section **3.4.18 ST (Serial TEK)** are added.
p.157	**Part II**, Transfer procedure is added to Section **4.1.7 Data transfer from PG-1500 to external machine**.
p.177	**APPENDIX A**, Description on **Error Message List** is changed.

The mark ★shows major revised points.

Phase-out/Discontinued

[MEMO]

INTRODUCTION

The PROM programmer PG-1500 has the following features:

(1) Typical PROMs having a capacity of 256 Kbits to 4 Mbits can be programmed.
(2) Programming such as a single-chip microcontroller can be used as a separately available PROM programmer adapter.
(3) ROM-type automatic identification and setting can be carried out using the silicon signature read function.
(4) Memory edit such as data update and check can be carried out.
(5) The device is protected by the device reverse load and incorrect insert check functions.
(6) The internal power supply and internal memory are checked by the self-diagnostic function upon power-on.
(7) All keyboard operations can be remote controlled via an RS-232-C interface.
(8) Since this programmer is equipped with a typical data format according to standard specifications, it can be easily connected to a personal computer and development support tools.
(9) The power supply is an AC wide-range type of 90 V to 250 V for use throughout the world.

Read this manual carefully before operation and follow its contents to ensure maximum performance.

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[MEMO]

LIST OF FIGURES

LIST OF TABLES

PART I. INTRODUCTION

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[MEMO]

CHAPTER 1 PRODUCT OVERVIEW

The PG-1500 is a PROM programmer which performs PROM writing as a standalone unit or connected to a host machine.

The PG-1500 can write to the following devices.

- General-purpose NEC PROMs (256 K to 4 Mbits)
- The following devices with on-chip PROM[Note 1]
  - NEC 4-bit single-chip microcontrollers
    75X Series, 75XL Series, μPD7500 Series
  - NEC 8, 16 and 16/32-bit single-chip microcontrollers
    78K Series, 87AD Series, V25/35™, V851, V852
  - NEC Turbo Access Manager
  - NEC DSP (digital signal processor)[Note 2]
  - NEC speech synthesis LSI

Notes 1. PROM programmer adapter is required (sold separately).
2. Except μPD77P20

1.1 PG-1500 Hardware Specifications

The PG-1500 hardware consists of the following:

CPU	μPD70208 (8 MHz)
Data RAM	512 Kbytes
Monitor ROM	128 Kbytes
Work RAM	32 Kbytes
Serial interface	RS-232-C
Parallel interface	Conforming to Centronics

1.2 Operating Environment

Power voltage	90 VAC to 250 VAC
Power frequency	50 to 60 Hz
Temperature range	10 to 35°C
Humidity range	20 to 80%RH

1.3 Operating Modes

The following operating modes are available for the PG-1500.

Standalone mode	PG-1500 is used independently.
Remote control mode	PG-1500 is connected to and controlled by a host machine[Note].

Note When directly connected to the host machine, use the PG-1500 controller (separately available).

★ Connection to an NEC in-circuit emulator is possible. For details, refer to Part II, Section 4.2 Remote Control Mode.

1.4 Cautions

(1) Power supply

Power voltage	90 VAC to 250 VAC
Power frequency	50 to 60 Hz

- Strictly follow the above power specifications.
- Before connecting the power cable, check that the power switch on the side panel is set to OFF.

(2) Power cable

- The maximum input voltage of the standard accessory power cable is 125 V.
- The power cable is a 3-pin flag type and a round pin in the center serves as a ground. Thus, use the power supply with a 3-pin socket having a ground.
- If the power supply is used with a 2 pin socket, use an accessory power adapter. In this case, be sure to connect the grounding terminal of the adapter to an external ground.

(3) Operating environment

Temperature range	10 to 35°C
Humidity range	20 to 80%RH

- Strictly follow the above ambient conditions.
- Do not use the PG-1500 where it might be exposed to a lot of dirt or dust, corrosive gases and direct sunlight.
- Avoid condensation.

(4) Cooling and ventilation

- Cooling and ventilation of this unit is carried out by means of natural convection through a vent hole made in the upper panel. Thus, do not place anything on the upper panel of this unit.

(5) Vibrations

- An LCD is used for the display unit. Thus, do not use the unit where it might be exposed to mechanical shocks or vibrations.

(6) Noise

- Avoid device programming near noise sources.
- Do not connect noise producing equipment on the same AC line as with this unit.

Example: PROM eraser, fluorescent lamp, motor-driven equipment, equipment with high current switching functions, etc.

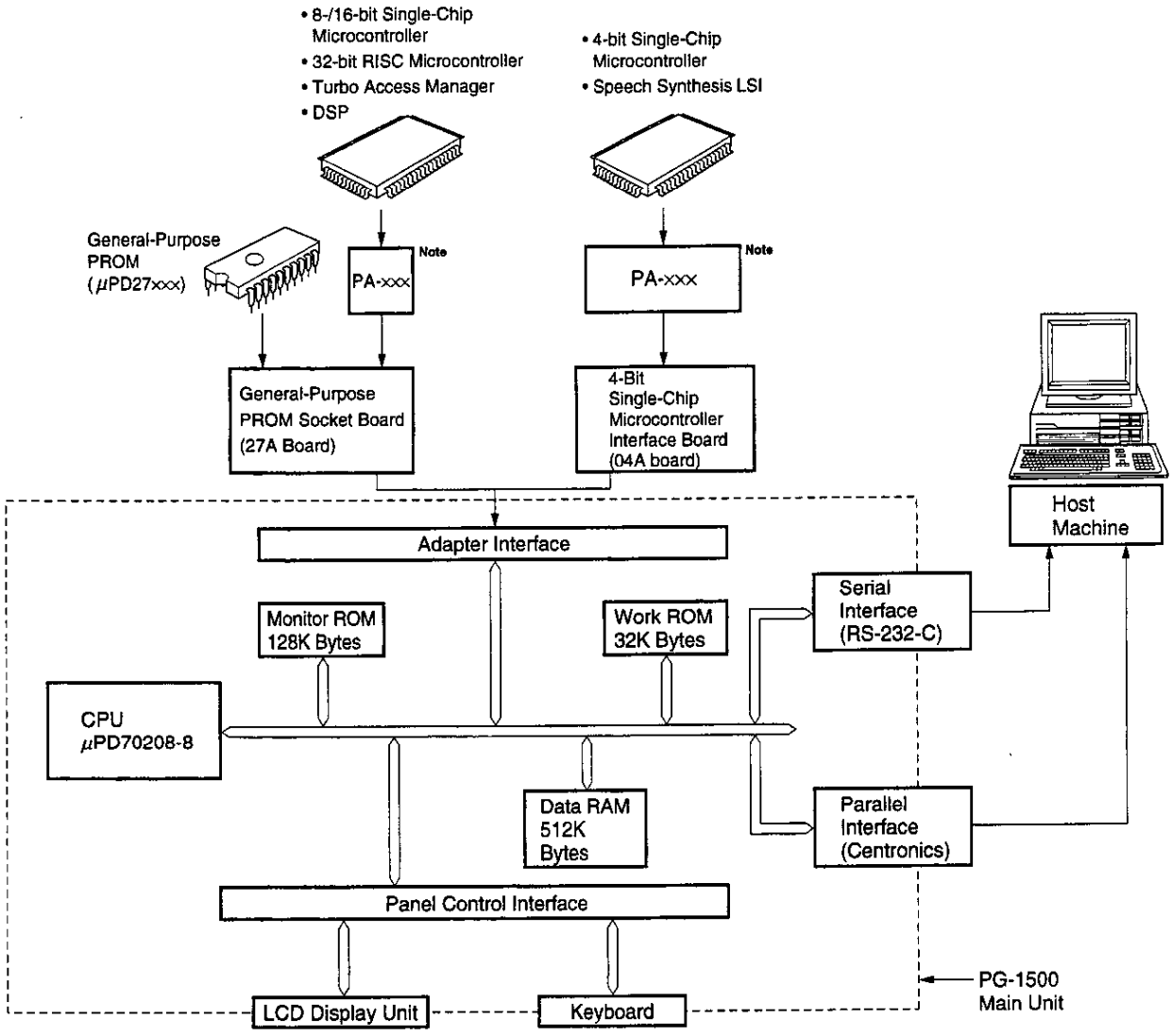
(7) Others

- Do not turn on/off the power supply if a device is mounted on a socket.
- Do not turn the calibration volumes.

1.5 Block Diagram

The PG-1500 block diagram is shown below.

★ **Figure 1-1 Block Diagram**



Note PROM programmer Socket adapters

Phase-out/Discontinued

★ **Table 1-1. List of PROM Programmer Adapters**

	PROM Programmer Adapter			
Adapters connected to 27A board	PA-70P322L	PA-78P018KK-S	PA-78P214GJ	PA-78P328GF
	PA-71P301GF	PA-78P024CW	PA-78P214GQ	PA-78P334GJ
	PA-71P301GQ	PA-78P024GF	PA-78P214L	PA-78P334KW (KE)
	PA-71P301KA	PA-78P048GF	PA-78P224GJ	PA-78P334LQ
	PA-71P301KB	PA-78P048KL-S	PA-78P224L	PA-78P334KM
	PA-71P301L	PA-78P054GC	PA-78P238GC	PA-78P352G
	PA-75P402CT	PA-78P054GK	PA-78P238GJ	PA-78P352KK
	PA-75P402GB	PA-78P054KK-T	PA-78P238KF	PA-78P356GC
	PA-77P230R	PA-78P064GC	PA-78P238LQ	PA-78P356GD
	PA-77P25C	PA-78P064GF	PA-78P312CW	PA-78P356KP
	PA-77P25GW	PA-78P064KL-T	PA-78P312GF	PA-78P364CW
	PA-77P25L	PA-78P078GC	PA-78P312GQ	PA-78P368GF
	PA-78CP14CW	PA-78P078GF	PA-78P312L	PA-78P368KL
	PA-78CP14GF	PA-78P078KL-T	PA-78P322GF	PA-78P372GC
	PA-78CP14GQ	PA-78P083CU	PA-78P322GJ	PA-78P372GF
	PA-78CP14KB	PA-78P083GB	PA-78P322K	PA-78P372KL
	PA-78CP14L	PA-78P0208GF	PA-78P322KC	PA-78P4026GC
	PA-78P014CW	PA-78P0208KL-T	PA-78P322KD	PA-78P4026KK
	PA-78P014GC	PA-78P138GF	PA-78P322L	PA-78P4038GK[Note]
	PA-78P044GF	PA-78P138K	PA-78P324GJ	PA-78P4916GF
	PA-78P044KL-S	PA-78P148GF	PA-78P324KC	PA-70P3000KP[Note]
	PA-78P018CW	PA-78P148K	PA-78P324KD	PA-70P3000GC[Note]
	PA-78P018GC	PA-78P214CW	PA-78P324LP	
	PP-78P018GK	PA-78P214GC	PA-78P328CW	
Adapters connected to 04A board	PA-75P54CS	PA-75P117GF	PA-75P308GF	PA-75P516K
	PA-75P56CS	PA-75P117GK	PA-75P308K	PA-77P56
	PA-75P008CU	PA-75P117KG	PA-75P316BGC	PA-75P0076CU
	PA-75P036CW	PA-75P216ACW	PA-75P316BGK	PA-75P3116GC[Note]
	PA-75P036GC	PA-75P218GF	PA-75P316BKK-T	PA-75P3116GK[Note]
	PA-75P036KG	PA-75P218KB	PA-75P328GC	PA-75P3216GT[Note]
	PA-75P108CW	PA-75P238GJ	PA-75P336GK	PA-75P4308GS[Note]
	PA-75P116GF	PA-75P238KF	PA-75P516GF	PA-17KCZ

(As of July '96)

Note Under development

1.6 Product Configuration

The PG-1500 consists of the following items. Items (2) through (8) are accessories and related documents.

(1) PG-1500

Main unit. Used connected to accessory adapter board.

(2) Adapter boards (2 types)

a. General-purpose PROM socket board (27A board)

The PG-1500 operates as a PROM programmer for general-purpose PROM by connecting it to the 27A board. It is also used for the 78K Series, DSPs, etc. When a device other than a general-purpose PROM is used, the PROM programmer adapter (separately available) for that device is required.

b. 4-bit single-chip microcontroller interface board (04A board)

The PG-1500 operates as a PROM programmer for the 75X Series and μPD7500 Series by connecting it to the 04 board. The program adapter (separately available) corresponding to the device used is required.

(3) Warranty

This document specifies a warranty for the PG-1500.

(4) PG-1500 User's manual

Read this manual to protect the unit from damage due to misoperation.

(5) Power cable

Power cable for the PG-1500. Strictly follow the operating voltage specifications marked on the rear panel.

(6) Power adapter

Adapter for the power cable for use with 2-pin socket.

(7) Spare fuse

Spare fuse for the PG-1500. The specification is 800 mA. Do not use any fuses other than 800-mA fuse.

(8) Attached documents

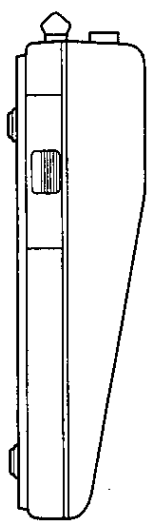
These are documents that list PG-1500 accessories and general-purpose PROMs for which the PG-1500 can be used.

Remark RS-232-C serial interface cable is not provided.

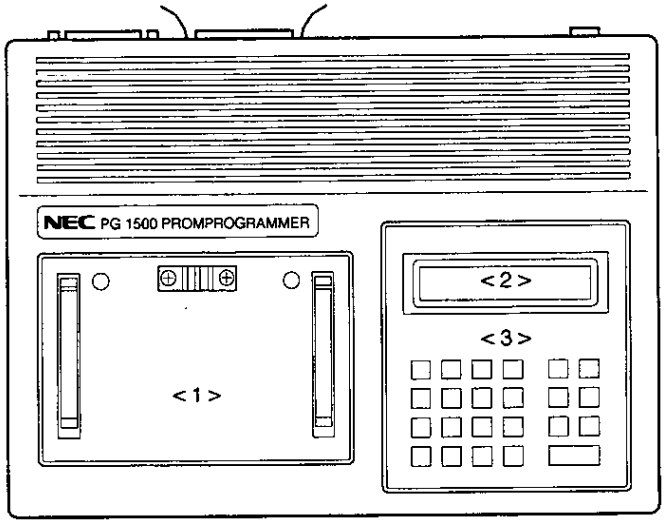
CHAPTER 2. DESCRIPTION OF APPEARANCE

This chapter describes the appearance of PG-1500 components and outlines PG-1500 functions. Figure 2-1 shows an external view of the main unit and the adapter board.

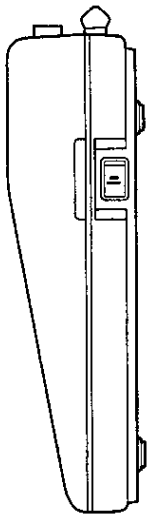
Figure 2-1. External View



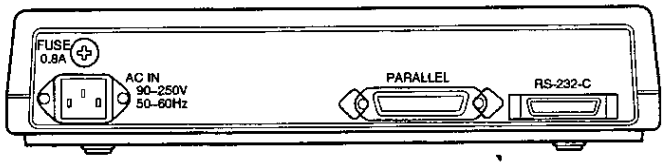
Left Side



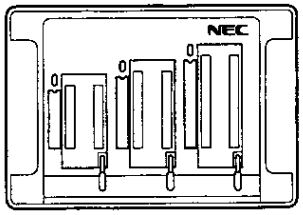
Front Panel



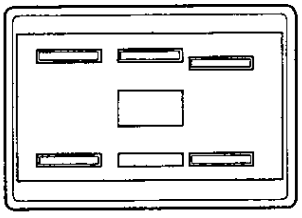
Right Side



Rear Panel



27A Board

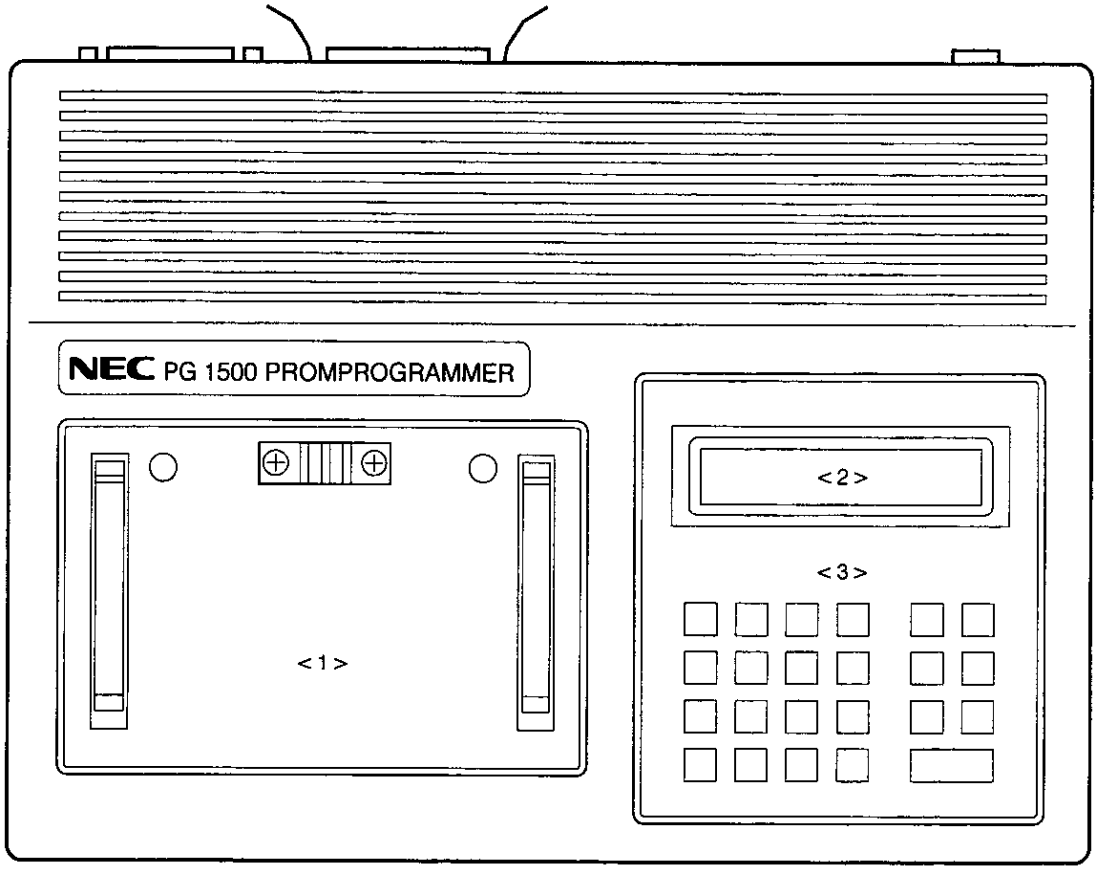


04A Board

2.1 Front Panel

Figure 2-2 shows the front panel.

Figure 2-2. Front Panel



<1> Adapter board connection unit
<2> LCD display unit
<3> Key switch unit

2.1.1 Adapter board connection unit

An adapter board of the PG-1500 accessories is connected to the adapter board connection unit.

The following two types of adapter boards are used:

- 27A board
- 04A board

For details of the adapter board, refer to **2.4 Adapter Boards** in **Part I.**

2.1.2 LCD Display unit

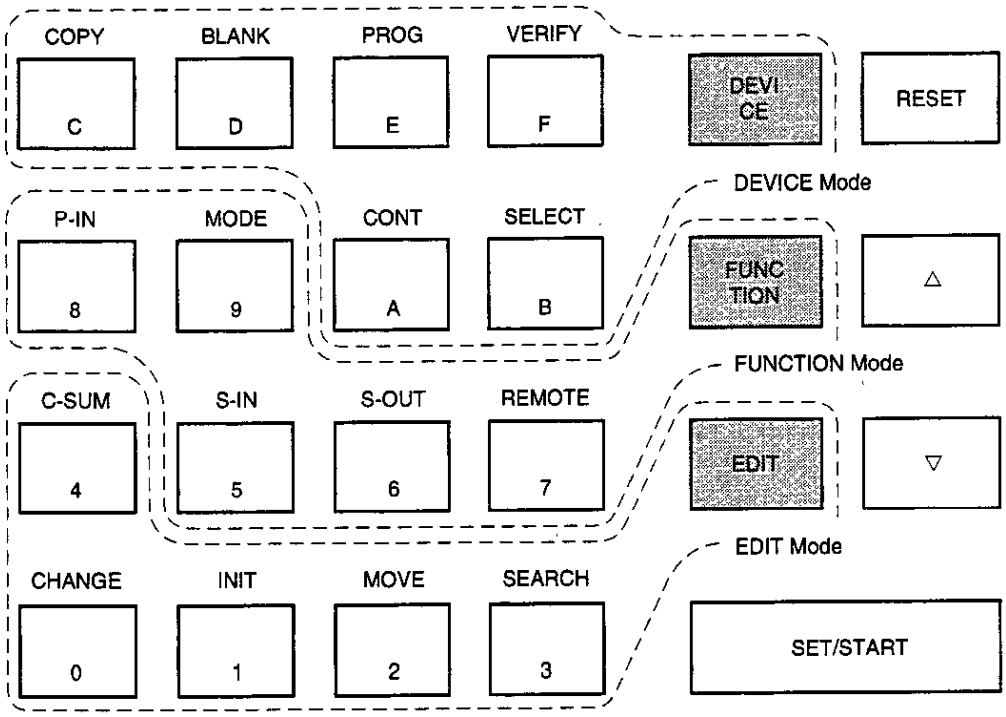
Data which is input and set using command and numeric keys are displayed on the LCD display unit.

For details of display in each mode, refer to **Part II. Operation.**

2.1.3 Key switch unit

Figure 2-3 shows the key switch unit.

Figure 2-3. Key Switch Unit



DEVICE mode..... Performs device access.
EDIT mode ..... Performs PG-1500 internal memory editing.
FUNCTION mode ..... Performs option function settings.

The key switch functions are as follows:

1. SET/START key

   Switch to start each command or set data. Used to execute or re-execute each command.

2. △ key

   Used to move the cursor to the right, and to change data.

3. ▽ key

   Used to move the cursor to the left, and to change data. Also used as a cancel key after numeric value input.

4. [RESET] key

Switch to reset in the idle state.

★ Used to suspend each instruction or release in the event of an error.

5. [DEVI CE] key

ROM control (DEVICE mode) select switch.

6. [EDIT] key

Memory edit (EDIT mode) select switch.

7. [FUNC TION] key

Interface set (FUNCTION mode) select switch.

CHANGE

8. [0] key

EDIT mode DATA CHANGE command select switch.
Used to change data in the PG-1500 internal memory.
Also used as a numeric value [0] input switch.

INIT

9. [1] key

EDIT mode INITIALIZE command select switch.
Used to initialize the contents of the PG-1500 internal memory. Also used as a numeric value [1] input switch.

MOVE

10. [2] key

EDIT mode BLOCK TRANSFER command select switch.
Used to move data in the specified range to different addresses in the PG-1500 internal memory.
Also used as a numeric value [2] input switch.

SEARCH

11. [3] key

EDIT mode DATA SEARCH command select switch.
Used to retrieve the specified data from the data in the PG-1500 internal memory.
Also used as a numeric value [3] input switch.

C-SUM

12. [4] key

EDIT mode CHECK SUM command select switch.
Used to calculate the checksum.
Also used as a numeric value [4] input switch.

S-IN

13. [5] key

FUNCTION mode SERIAL INPUT command select switch.
Used to input data from the serial interface.
Also used as a numeric value [5] input switch.

S-OUT

14. [6] key

FUNCTION mode SERIAL OUTPUT command select switch.
Used to output data from the serial interface.
Also used as a numeric value [6] input switch.

REMOTE

15. [7] key

FUNCTION mode REMOTE CONTROL command select switch.
Used to set the remote control mode.
Also used as a numeric value [7] input switch.

P-IN

16. [8] key

FUNCTION mode PARALLEL INPUT command select switch.
Used to input data from the parallel interface.
Also used as a numeric value [8] input switch.

MODE

17. [9] key

FUNCTION mode SERIAL INTERFACE SET command select switch.
Used to set the serial interface parameter.
Also used as a numeric value [9] input switch.

CONT

18. [A] key

DEVICE mode CONTINUOUS OPERATION command select switch.
Used to perform device blank check, write, and verify operations automatically.
Also used as a numeric value [A] input switch.

SELECT

19. [B] key

DEVICE mode DEVICE SELECT command select switch.
Used to set the device write conditions.
Also used as a numeric value [B] input switch.

COPY

20. [C] key

DEVICE and READ command select switch.
Used to copy data in the device to the PG-1500 internal memory.
Also used as a numeric value [C] input switch.

BLANK

21. [D] key

DEVICE mode BLANK CHECK command select switch.
Used to check whether the device is blank.
Also used as a numeric value [D] input switch.

PROG

22. [E] key

DEVICE mode WRITE command select switch.
Used to write data in the PG-1500 internal memory to the device.
Also used as a numeric value [E] input switch.

VERIFY

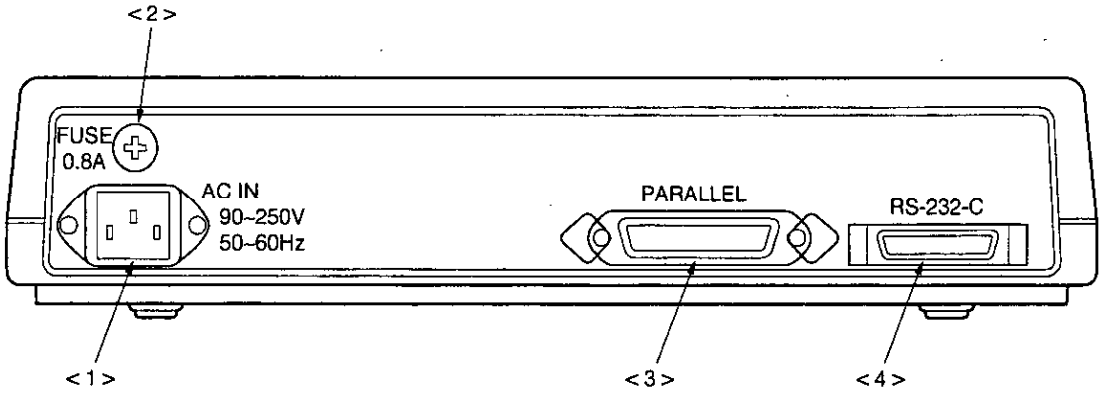
23. [F] key

DEVICE mode VERIFY CHECK command select switch.
Used to check whether the data written to the device matches the contents of the PG-1500 internal memory.
Also used as a numeric value [F] input switch.

2.2 Rear Panel

Figure 2-4 shows the rear panel.

Figure 2-4. Rear Panel



<1> AC input connector
Input voltage range from 90 to 250 V (50 to 60 Hz).

<2> Fuse holder
800-mA power line fuse holder

<3> Parallel interface connector
Connector for parallel interfaces. Conforming to Centronics.

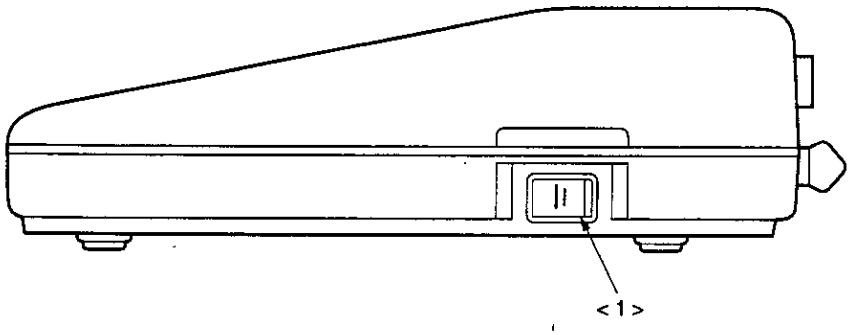
<4> Serial interface connector
Connector for serial interface (RS-232-C).

2.3 Sides

2.3.1 Right side

Figure 2-5 shows the right side viewed from the front.

Figure 2-5. Right Side



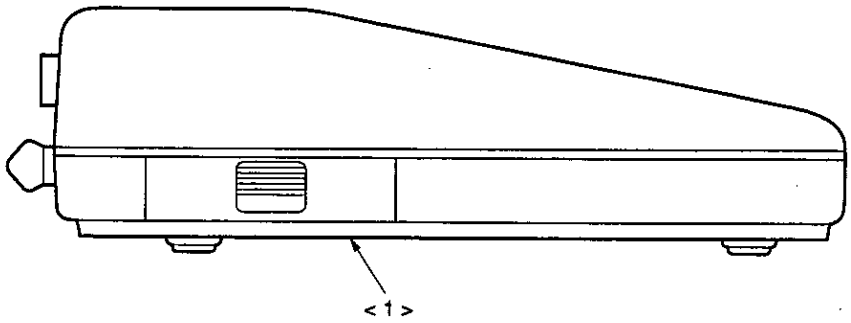
<1> Power switch

Seesaw switch. Setting this switch to the left position (toward the front side of the main unit) turns on the power supply. Setting this switch to the right position (toward the opposite side of the main unit) turns off the power supply.

2.3.2 Left side

Figure 2-6 shows the left side viewed from the front.

Figure 2-6. Left Side



<1> Calibration volume cover

Cover for the internal calibration volume for use by NEC.

Do not turn the internal calibration volume.

2.4 Adapter Board

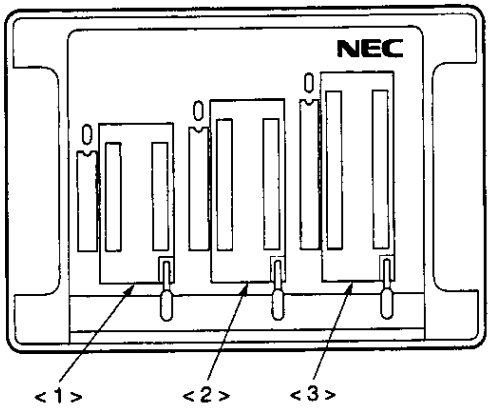
Two adapter boards are provided with the PG-1500, ad described below.

2.4.1 General-purpose PROM socket board (27A board)

The general-purpose socket board (27A board) is the adapter board for general-purpose PROM. It is also used for the 78K Series, DSPs, etc. When a device other than a general-purpose PROM is used, the PROM programmer adapter (sold separately) for that device is required.

Figure 2-7 shows the 27A board.

Figure 2-7. 27A Board



<1> 28-pin PROM socket
<2> 32-pin PROM socket
<3> 40-pin PROM socket

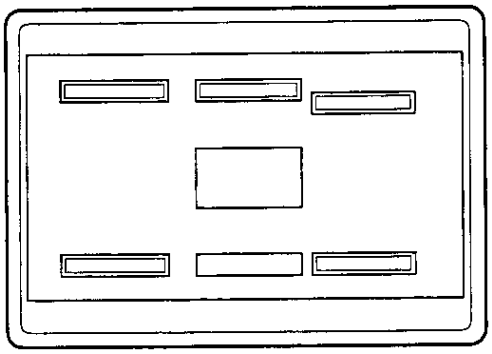
These sockets are equipped with an LED which lights up during use.

2.4.2 4-bit single-chip microcomputer interface board (04A board)

The 4-bit single-chip microcomputer interface board (04A board) is the adapter board for the μPD7500 Series. The PROM programmer adapter (sold separately) for the device used is required.

Figure 2-8 shows the 04A board.

Figure 2-8. 04A Board



2.5 Adapter Board Connection

When using the PG-1500, the adapter board for the device to be used is first mounted on the adapter board connection area. Select the adapter board in accordance with Table 2-1.

★ **Table 2-1. Adapter Board Selection**

Device Used	Adapter Board
General-purpose PROM	27A board
78K Series	
87AD Series	
V25/35 (μPD70P322)	
V851 (μPD70P3000)	
V852 (μPD70P3002)	
Turbo Access Manager (μPD71P301)	
DSP	
μPD75P402	
75X Series (except μPD75P402)	04A board
75XL Series	
μPD7500 Series	
Speech Processing Device (μPD77P56)	

The procedure of connecting the adapter board is described below.

<Connecting Procedure>

<1> Insert the two guide pins of the adapter board into the guide pin holes of the main unit.

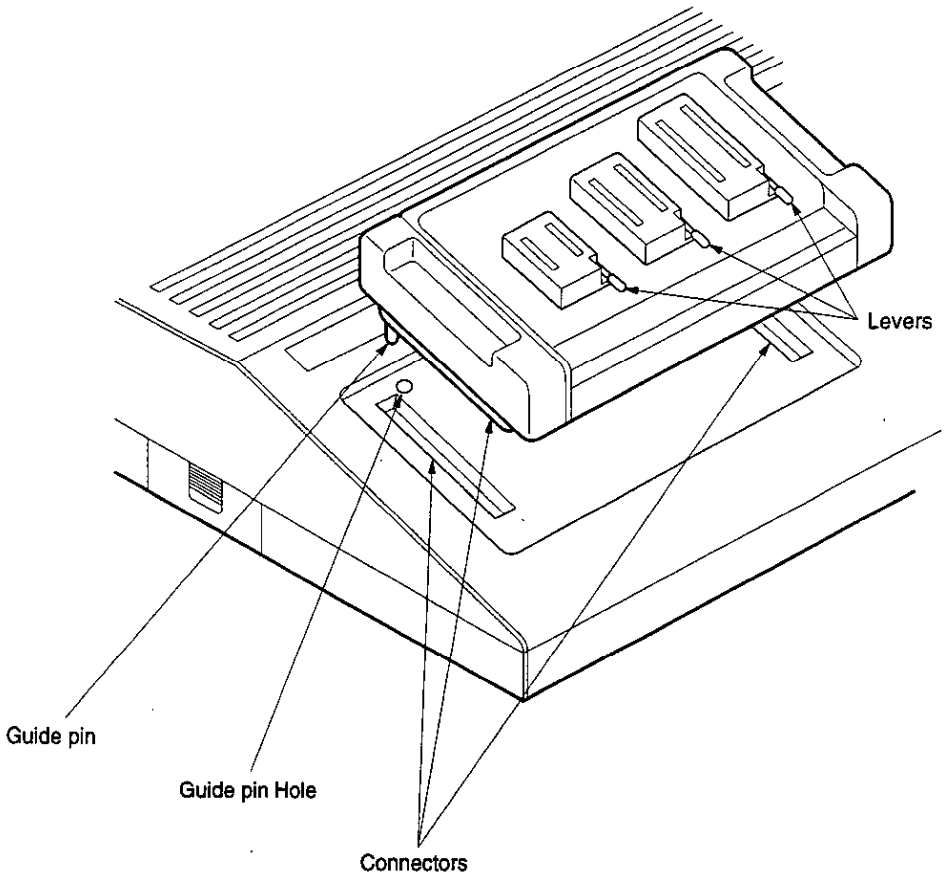
<2> Push the adapter board so that the two connectors are securely connected in parallel to the obliquely mounted main unit.

<3> Connection of the adapter board is completed after checking that there is no gap between the adapter board and the main unit.

<4> After the 04A board has been connected, connect a PROM programmer adapter (sold separately) onto the 04A board.
When the 27A board is used, a PROM programmer adapter (sold separately) should also be connected when using a device other than a general-purpose PROM.

Figure 2-9 shows an adapter board connection example.

Figure 2-9. Connection of Main Unit and Adapter Board



2.6 Device Insertion

2.6.1 When writing to a general-purpose PROM

Insert the device directly into the 27A board. The procedure is shown below.

(1) From the three sockets on the 27A board, select the one with the same number of pins as the device used, and raise the lever vertically.
(2) Insert the device into the socket, with pin 1 at the top left.
(3) Lower the lever.

Caution Do not turn the power on/off with the device inserted in the socket, as this may damage it.

2.6.2 When writing to a 78K Series device, DSP, etc.

Connect the PROM programmer adapter to the 27A board, and insert the device into the PROM programmer adapter. The procedure is shown below.

(1) From the three sockets on the 27A board, select the one with the same number of pins as the number of connection pins on the PROM programmer adapter used, and raise the lever vertically.
(2) Turn the PROM programmer adapter so that the words "NEC MADE IN JAPAN" on its base (the part to which the socket is not attached) can be seen, and insert it into the socket.
(3) Lower the lever.
(4) Insert the device into the PROM programmer adapter as shown in the relevant instruction manual.

The shape of the PROM programmer adapter varies according to the shape of the device package. If the PROM programmer adapter has a pin 1 indication, insert the device in accordance with that indication. If there is no indication, follow the directions given in the relevant instruction manual. Lower the lever if one is provided, and if there is a closing cover, check that this is locked securely. This completes device insertion.

Note Do not turn the power on/off with the device inserted in the socket, as this may damage it.

2.6.3 When writing to a 75K Series device (except the μPD75P402) or a μPD7500 Series device

Connect the PROM programmer adapter to the 04A board, and insert the device into the PROM programmer adapter. The procedure is shown below.

(1) Connect the connectors of the PROM programmer adapter used to the five sockets on the 04A board so that it is correctly aligned.
(2) Insert the device into the PROM programmer adapter as shown in the relevant instruction manual.

The shape of the PROM programmer adapter varies according to the shape of the device package. If the PROM programmer adapter has a pin 1 indication, insert the device in accordance with that indication. If there is no indication, follow the directions given in the relevant instruction manual. Lower the lever if one is provided, and if there is a closing cover, check that it is locked securely. This completes device insertion.

Caution Do not turn the power on/off with the device inserted in the socket, as this may damage it.

PART II. OPERATION

[MEMO]

CHAPTER 1. OUTLINE OF OPERATION

As described in Part I, the following operating modes are available for the PG-1500:

- Standalone mode
- Remote control mode

(1) Standalone mode

This mode is a PG-1500 single unit which is used for device copy and program patch operations. Since the serial and parallel interfaces are supported, input/output to/from an external device is possible (input only via the parallel interface).

(2) Remote control mode

This mode is the PG-1500 which can be controlled from a host machine (PC-9800 series, etc.) connected to the PG-1500.

1.1 Description of Terms

The terms used in this user's manual are outlined below.

(1) PROM start address

Start address to determine the address range of a device inserted into the socket.

(2) PROM end address

End address to determine the address range of a device inserted into the socket.

(3) PG-1500 internal memory

Memory in the PG-1500. This is for storage of data which is read from a device.

(4) Address divide

Only even or odd addresses of the PG-1500 internal memory are used.

(5) Initial test

PG-1500 internal circuit check operation to be automatically carried out upon power-ON.

(6) Silicon signature data

Product code which each device internally possesses.
This shows the device write conditions.

(7) Idle state

Mode set state to be generated upon power-ON or when the RESET key is pressed.

(8) Check sum width

This is the total resulting from data addition used to check whether the data is correct.

(9) Precheck

Function for checking incorrect device insertion or inverted device insertion. This function can only be used with an NEC general-purpose PROM.

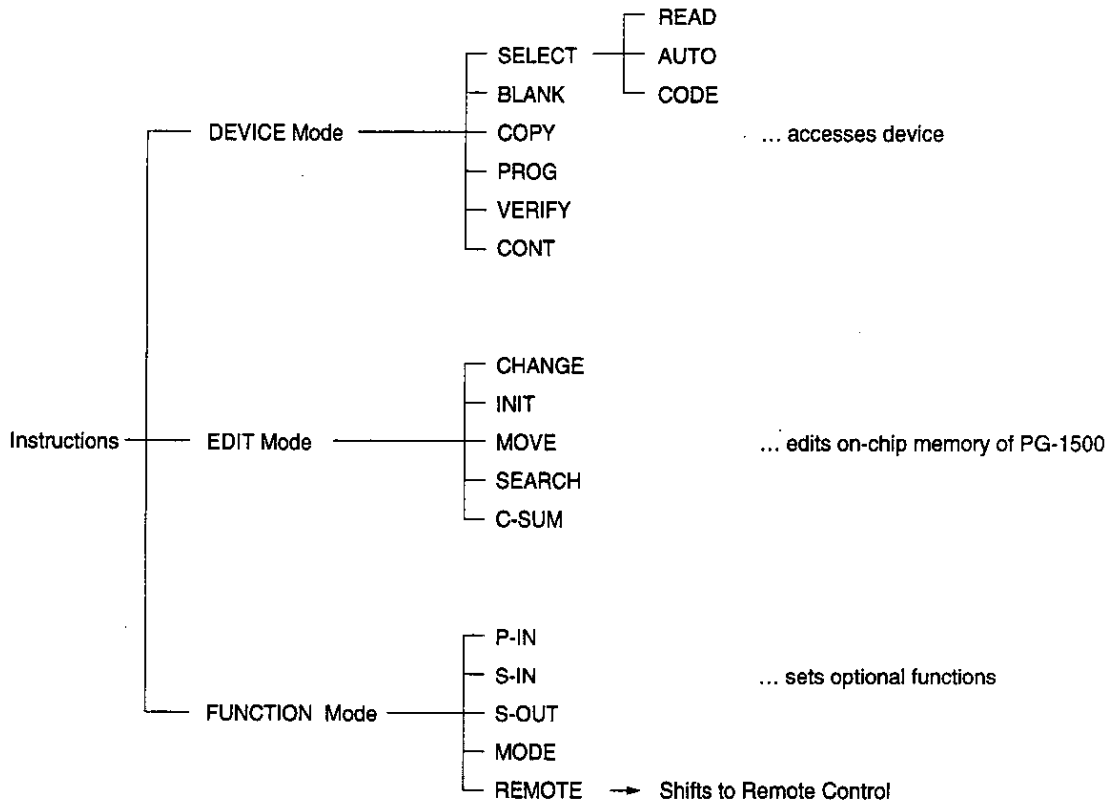
CHAPTER 2. STANDALONE MODE

2.1 Operation Overview

The standalone mode is the state in which the PG-1500 is used as a single unit and is not connected to other devices.

Figure 2-1 shows a STANDALONE mode instruction system.

★ **Figure 2-1. Instruction System**



Turning on the PG-1500 power supply automatically sets the mode to the STANDALONE mode.

2.2 Setting

An adapter board corresponding to the device used for the PG-1500 is connected. When using a device other than a general-purpose PROM, a PROM programmer adapter is connected to the adapter board.

Turn the power on, then insert the device in the socket.

See **Part I. 2.5 Adapter Board Connection** and **Part I. 2.6 Device Insertion** for details.

Caution Do not turn on/off the power supply with the device inserted into the socket. The device may be damaged.

2.3 Startup and Initial Test

When the PG-1500 is powered on, the following message is displayed, indicating that a test (initial test) is performed to check if the PG-1500 functions operate normally.

```
 PG-1500
*Initial Test Busy
```

↑

Blinks during initial test execution.

When the initial test terminates normally, the following message is displayed and the system waits for key input.

```
DEVICE EDIT FUNCTION
IDLE        V♦.♦
```

Idle status

PG-1500 Monitor ROM Version is displayed.

This status is called "idle status" in this manual.

If an error occurs during initial test, the following message is displayed on the LCD.

```
PG-1500
ERRXX
```

XX: Error number

Remark For details of error numbers, refer to **Appendix A. Error Message List.**

In this case, turn on the power supply again a few seconds after turning it off.

If the error is generated again the PG-1500 may be damaged, and you should therefore contact NEC or an authorized NEC dealer.

Table 2-1 lists the initial parameter values in each mode upon power-ON.

Table 2-1. Initial Values

Mode Parameter	Initial Value
PROM product name code	μPD27256
Code Number	1004
Device selection method	READ
PROM start address	00000H
PROM end address	07FFFH
Internal memory start address	00000H
Address divide mode	NORMAL
Internal memory data	FFH
Precheck	OFF
Data format	INTELLEC™

Note

Note [7FFFF] is displayed.

DEVICE

★ 2.4 ROM Control (DEVICE mode)

The DEVICE mode is a mode in which a device is directly controlled.

DEVICE

- SELECT[Note]: Device selection and a device write condition setting.
  - READ
  - AUTO
  - CODE

  } For details, refer to Section **2.4.2 Device selection (SELECT)**.
- BLANK: Check to see whether device is blank.
- COPY : Data read from device.
- PROG (PROGRAM): Data write to device.
- VERIFY: Data comparison between device and PG-1500 internal memory.
- CONT (CONTINUOUS): Continuous operations of BLANK, PROG, and VERIFY.

} Before operation, the following parameters should be set for these commands.
<1> PROM start address
<2> PROM end address
<3> PG-1500 internal memory start address
<4> Address divide mode

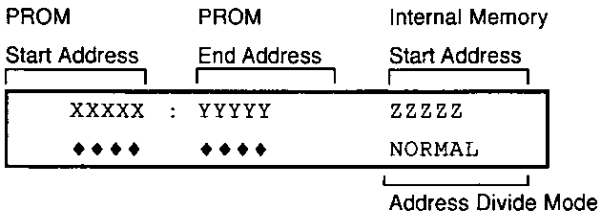
Note The SELECT command specifies write conditions specific to the device, and must be executed before executing a DEVICE mode command other than SELECT.

2.4.1 Parameter setting

The following parameters can be set for the execution of the COPY, PROG, VERIFY and CONT commands in the DEVICE mode.

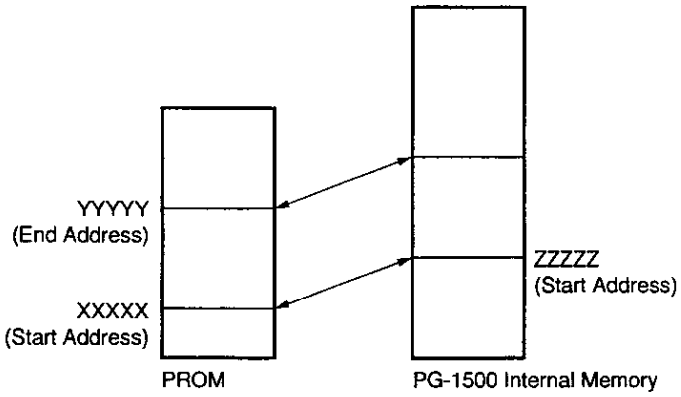
- PROM start address
- PROM end address
- PG-1500 internal memory start address
- Address divide mode

These parameters are displayed as follows:



The parameters are described below.

(1) PROM start address
PRM end address
PG-1500 internal memory start address



As shown in the figure above, the range in which device writing, reading, etc., is to be performed is set with the PROM start address and PROM end address. Also, the address in the internal memory from which the memory is to be used is set with the PG-1500 internal memory start address.

Caution An error will be caused by any of the following settings.

1. **PROM start address > PROM end address**
2. **PROM size < PROM start address**
3. **PG-1500 internal memory start address > 7FFFFH**

If an error occurs, see Appendix A.1 "List of Standalone Mode Errors".

DEVICE

(2) What is the address divide mode?

Address divide is used to divide data into a ROM for a 16-bit or 32-bit CPU.

Address divide mode specification is performed by means of the specified numeric keys shown in Table 2-2 when the parameters are set.

Table 2-2. Numeric Keys Specified in Address Divide Mode

Numeric Key	Description	Display
0	Normal (without address divide)	NORMAL
4	16-bit data divided into 2, applicable to even addresses	16EVN
7	16-bit data divided into 2, applicable to odd addresses	16ODD
C	32-bit data divided into 2, applicable to even addresses	32/2E
F	32-bit data divided into 2, applicable to odd addresses	32/2O
8	32-bit data divided into 4, applicable to the 1st even address	32/4E1
9	32-bit data divided into 4, applicable to the 1st odd address	32/4O1
A	32-bit data divided into 4, applicable to the 2nd even address	32/4E2
B	32-bit data divided into 4, applicable to the 2nd odd address	32/4O2

The address divide modes that can be specified depend on the device. The address divide modes that can be specified for each device are shown in Table 2-3.

Table 2-3. Specifiable Address Divide Modes

Product Name	Normal (No Division)	16 Bits, 2 Divisions	32 Bits, 4 Divisions	32 Bits, 2 Divisions
μPD27256	○	○	○	×
μPD27256A	○	○	○	×
μPD27C256	○	○	○	×
μPD27C256A	○	○	○	×
μPD27C512	○	○	○	×
μPD27C1000	○	○	○	×
μPD27C1000A	○	○	○	×
μPD27C1001	○	○	○	×
μPD27C1001A	○	○	○	×
μPD27C1024	○	×	×	○
μPD27C1024A	○	×	×	○
μPD27C2001	○	○	×	×
μPD27C4001	○	×	×	×
μPD27C4096	○	×	×	×
Devices other than general-purpose PROMs	○	×	×	×

Remark ○: Specifiable, ×: Not specifiable

Caution Do not specify a non-specifiable address division mode. If a device other than a general-purpose PROM is used, be sure to specify normal mode (no address division).

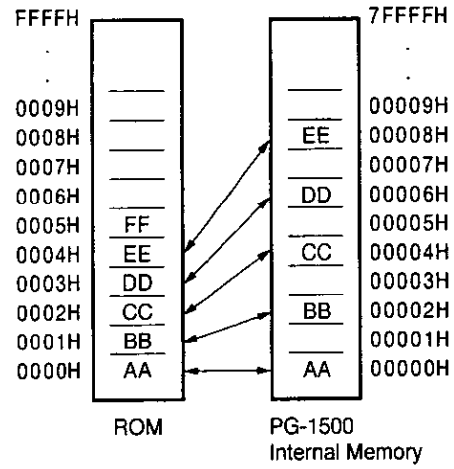
If a non-specifiable address division mode is specified, an error will result. See **Appendix A.1 List of Standalone Mode Errors**.

If an address division mode is not used, the correspondence between the device ROM and PG-1500 internal memory data is as follows (normal mode (no address division) is omitted).

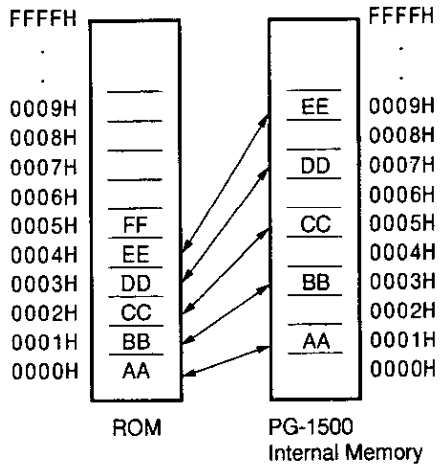
Phase-out/Discontinued

DEVICE

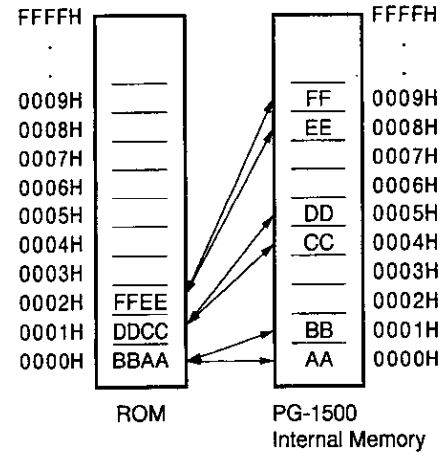
4 16EVN (16-Bit Even Address)



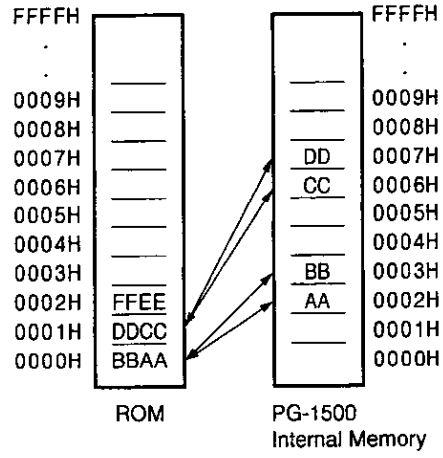
7 16ODD (16-Bit, Odd Address)



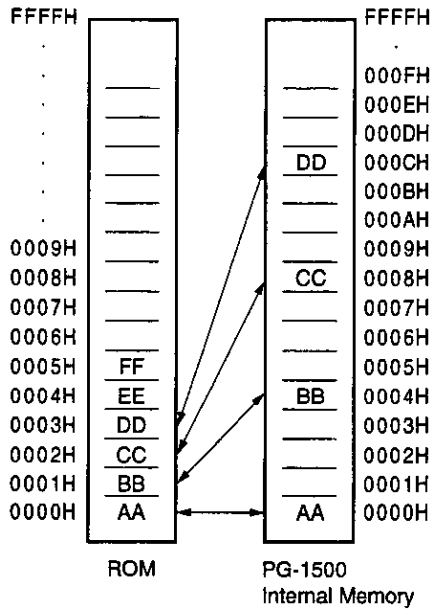
C 32/2E (32-Bit, 2-Divide Even Address)



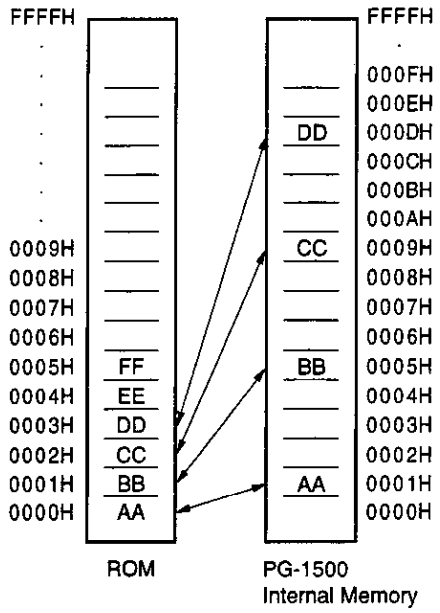
F 32/2O (32-Bit, 2-Divide Odd Address)



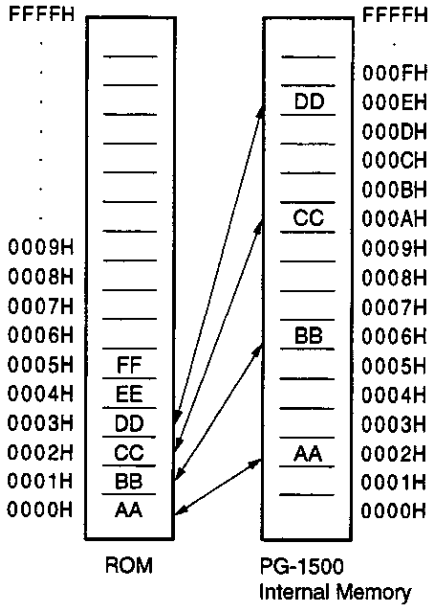
8 32/4E1 (32-Bit, 4-Divide Even Address-1)



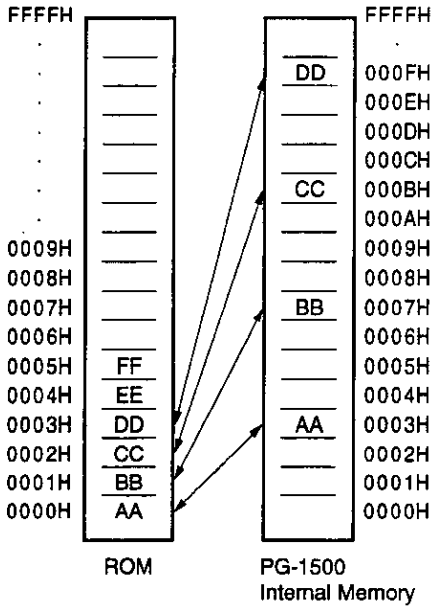
9 32/4O1 (32-Bit, 4-Divide Odd Address-1)



A 32/4E2 (32-Bit, 4-Divide Even Address-2)



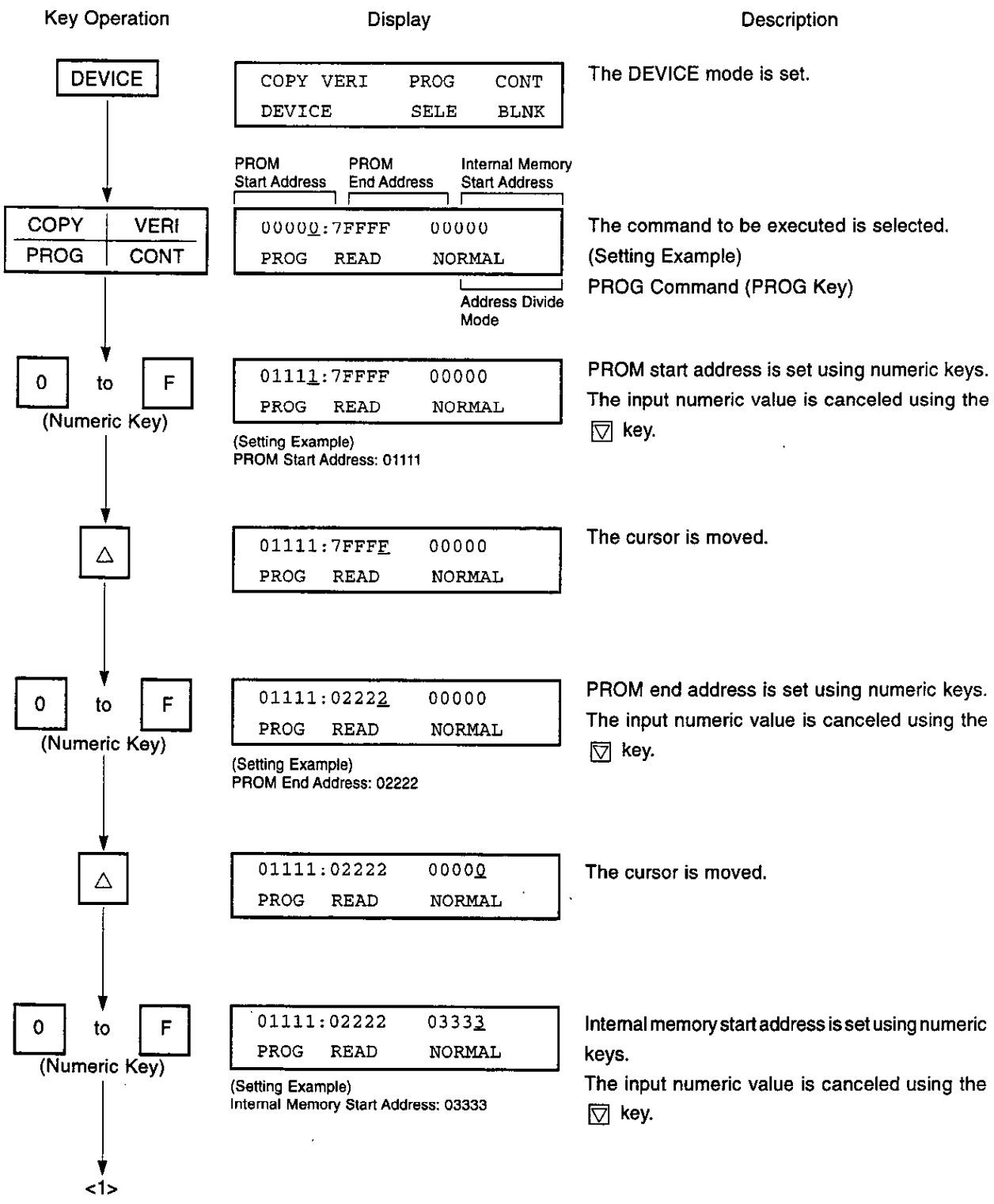
B 32/4O2 (32-Bit, 4-Divide Odd Address-2)

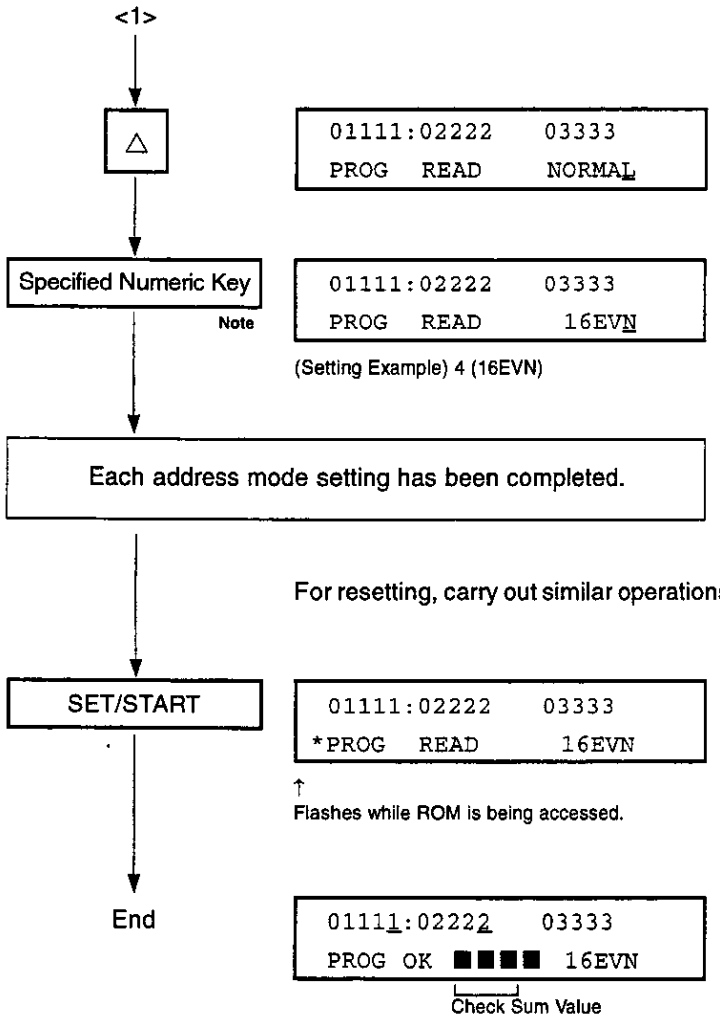


The parameter setting methods are described from the next page.

DEVICE

<Operating procedure>





The cursor is moved.

The address divide mode is specified using the specified numeric keys.

For resetting, carry out similar operations after moving the cursor using the △ or ▽ key.

PROM write operation is started.

Upon normal termination, [OK] and the check sum value are displayed.

Note Refer to Table 2-2 for the specified numeric keys.

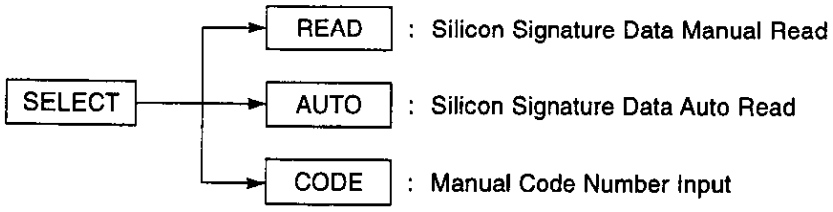
DEVICE

SELECT

2.4.2 Device selection (SELECT)

The SELECT command is intended to select the device to be used and set the device write conditions (including the write voltage). This command should be carried out at the start of the DEVICE mode.

There are three modes for device selection: READ mode, AUTO mode, and CODE mode. There may be restrictions on the methods that can be used depending on the device; therefore, one method should be selected in accordance with the following description.



The mode set by the SELECT command is displayed while a DEVICE mode command (BLANK, COPY, PROG, VERIFY and CONT) is executed.

Example Display for PROG command execution

```
00000:7FFFF     00000
PROG   READ     NORMAL
```

Displayed here

(1) Silicon signature compatible and non-compatible products

Each device has its own specific write conditions.

The write conditions are recorded in the device as a silicon signature. With the PG-1500, the write conditions for a particular device are set by reading the silicon signature data from the device or inputting a code number corresponding to the write conditions to the PG-1500.

Depending on the device, the silicon signature may or may not be compatible with the PG-1500.

Device selection by silicon signature compatibility is detailed in Tables 2-4 and 2-5.

Table 2-4. Device Selection by Silicon Signature Compatibility

		READ Mode	AUTO Mode	CODE Mode
Silicon signature compatible products	General-purpose PROM	○	○	○
	μPD75P402	○	○	○
	78K Series products shown in Table 2-5	○	○	○
★	V851/V852	○	○	○
	87AD series	○	○	○
	Turbo Access Manager	○	○	○
	75X Series (except μPD75P402)	○	○	×
★	75XL Series	○	○	×
	μPD7500 Series	○	○	×
	Speech Synthesis LSI	○	○	×
Silicon nature non-compatible products	78K Series products not shown in Table 2-6	×	×	○
	V25/V35	×	×	○
	DSP	×	×	○

Remark ○: Usable, ×: Not usable

(As of July '96)

★ **Table 2-5. 78K Series Silicon Signature Compatible Products**

	8-Bit Single-Chip Microcontrollers		16-Bit Single-Chip Microcontrollers	
Silicon signature compatible products	μPD78P014	μPD78P078	μPD78P322	μPD78P372[Note]
	μPD78P044	μPD78P083	μPD78P324	μPD78P4026
	μPD78P018F[Note]	μPD78P0208	μPD78P328	μPD78P4038[Note]
	μPD78P024[Note]	μPD78P138	μPD78P334	μPD78P4916
	μPD78P048A[Note]	μDP78P148	μPD78P352	
	μPD78P054	μPD78P218A	μPD78P356	
	μPD78P058	μPD78P224	μPD78P364	
	μPD78P064[Note]		μPD78P368A	

Note Under development

(As of July '96)

DEVICE SELECT

(2) Use of different selection methods

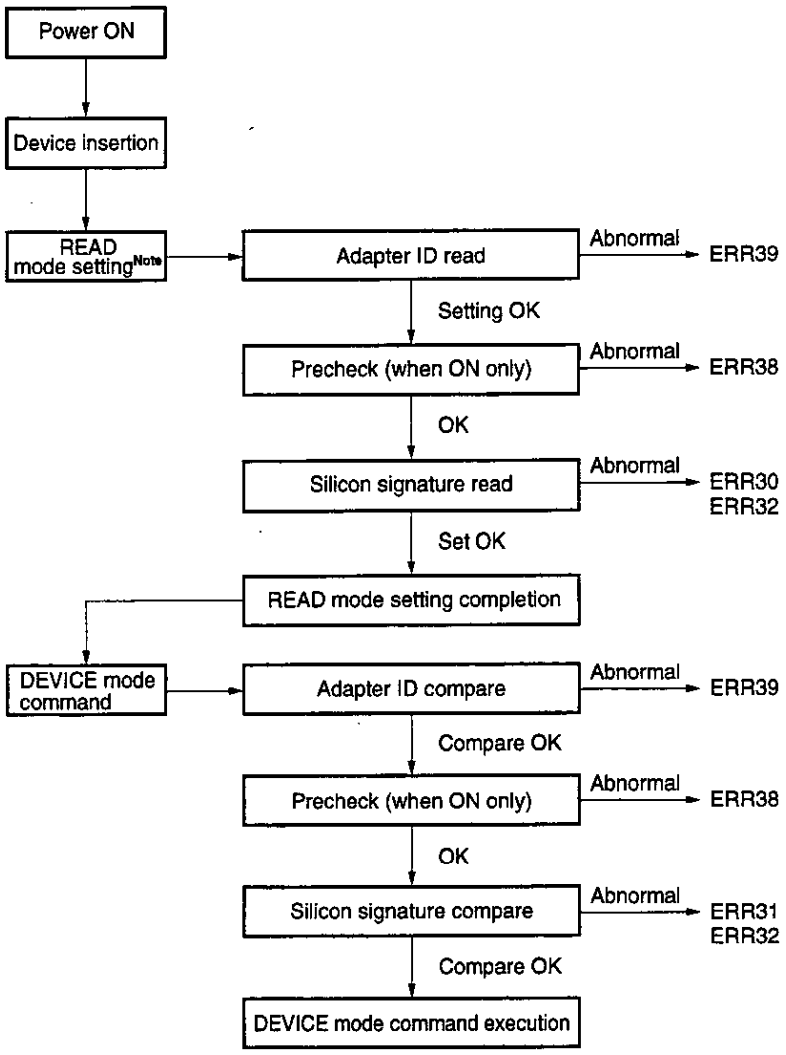
The appropriate selection method – READ mode, AUTO mode, or CODE mode – for the device used should be selected in accordance with the description given below.

Caution On no account set a mode which cannot be used, as this may damage the device.

★ **(a) READ mode: manual reading of silicon signature data**

This method sets the device-specific write conditions by reading silicon signature data from the device inserted into the socket when SELECT command is executed.
After setting, the read silicon signature data is compared with previously set silicon signature data at the execution of BLACK, COPY, PROG, VERIFY, and CONT in the ROM control instruction.
This is useful when a number of devices of the same type are used one after another.
When the device type is changed, select the device type by executing another SELECT command.

Caution READ mode can only be used to set the write conditions for silicon signature compatible products.
Refer to Table 2-4 in 2.4.2 Device Selection (SELECT).



Note See the operating method on the next page.

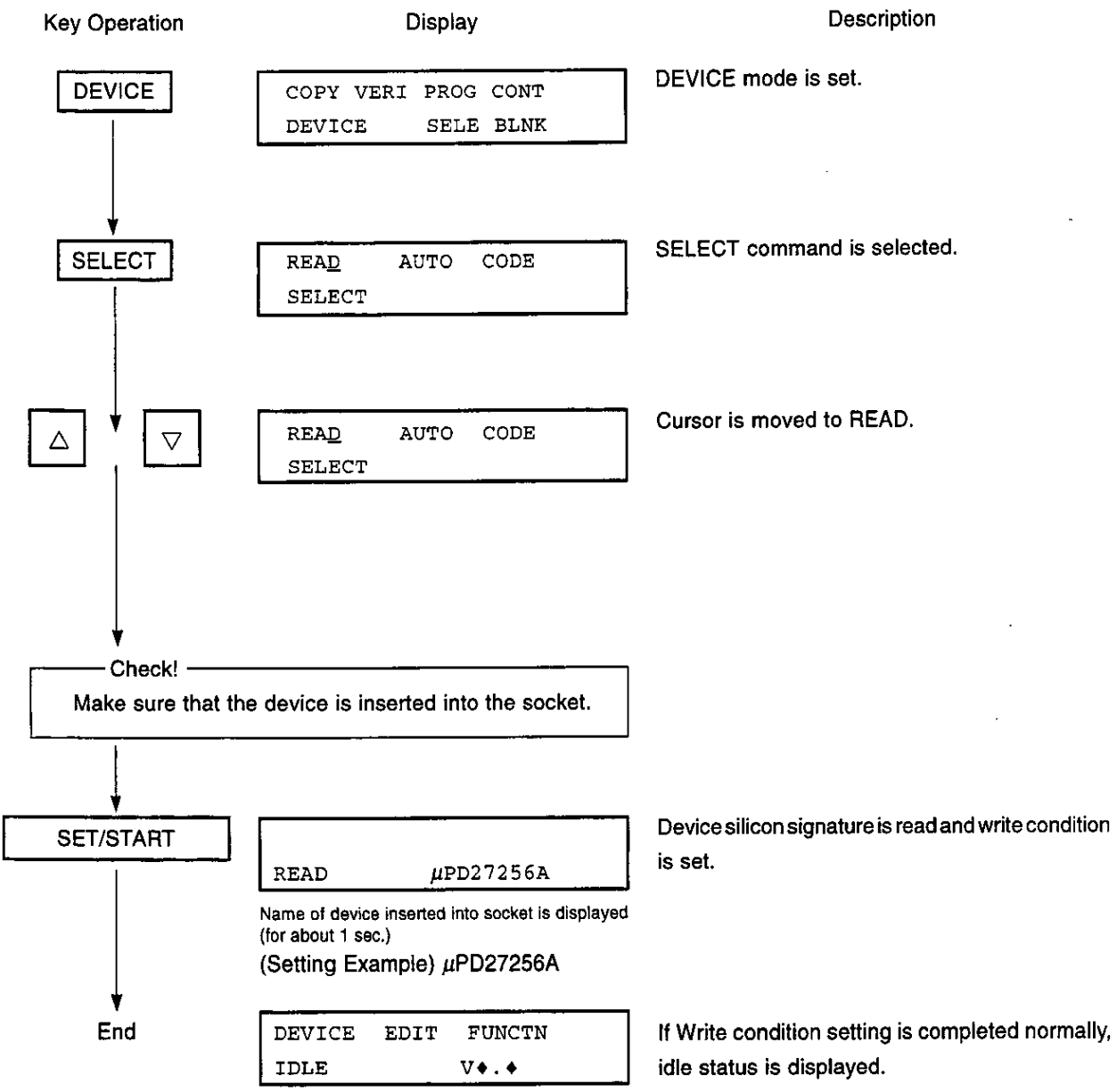
Cautions 1. If READ mode is used with a device without silicon signature compatibility, the device may be damaged.
In this case, CODE mode should be used.

★ **2. When setting the μPD75P402, set the ROM end address to 77FH while executing COPY, PROG, VERIFY, and CONT.**

DEVICE

SELECT

<Operating procedure>



★ **(b) AUTO mode: automatic reading of silicon signature data**

With this method, the silicon signature data which indicates the device-specific write conditions is automatically read from the device each time a DEVICE mode command, BLANK, COPY, PROG, VERIFY, or CONT is executed, and the write conditions are then set. The write address range should be set to the entire address range of the device.

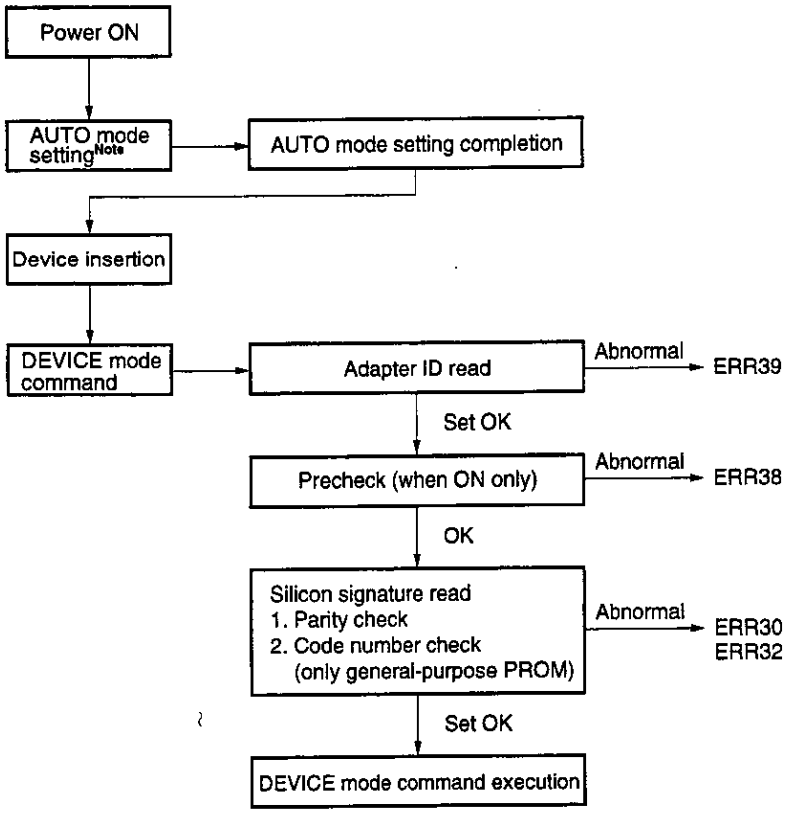
This is useful when a number of devices of different types are used one after another.

Caution AUTO mode can only be used to set the write conditions for silicon signature compatible products.

Refer to Table 2-4 in 2.4.2 Device Selection (SELECT)

DEVICE

SELECT



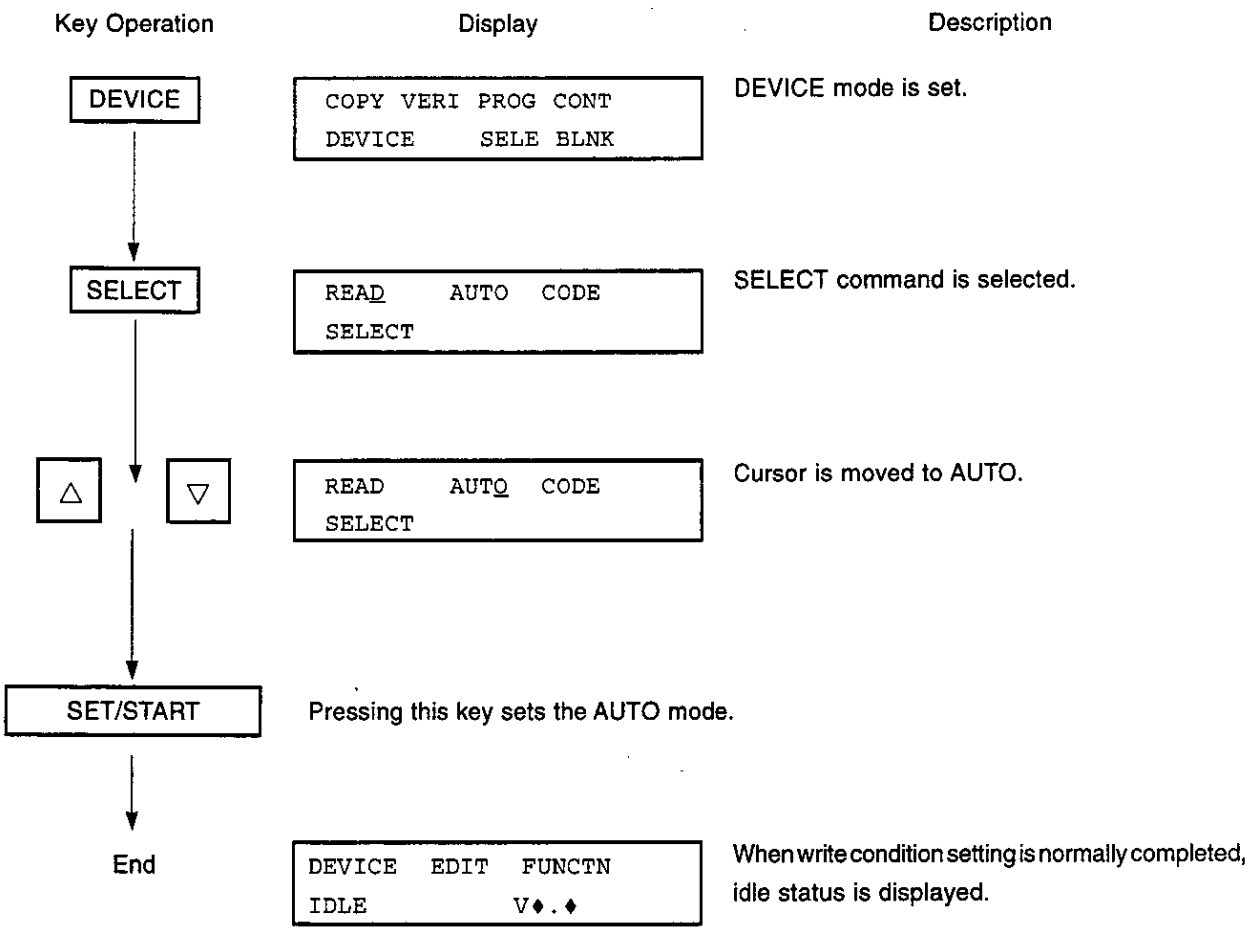
Note See the operating method on the next page.

Caution If AUTO mode is used with a device without silicon signature compatibility, the device may be damaged. In this case, CODE mode should be used.

DEVICE

SELECT

<Operating procedure>



DEVICE SELECT

★ **(c) CODE mode: manual input of code number**

With this method, a code number which indicates the device-specific write conditions is input at the SELECT command execution, and the write conditions are then set. When using a device other than general-purpose PROM (including silicon signature noncompatibles), the end address of the general-purpose PROM corresponding to the device may differ. The write address range should be set at the time of ROM control instruction (DEVICE) input such as COPY, PROG, VERIFY, or CONT.

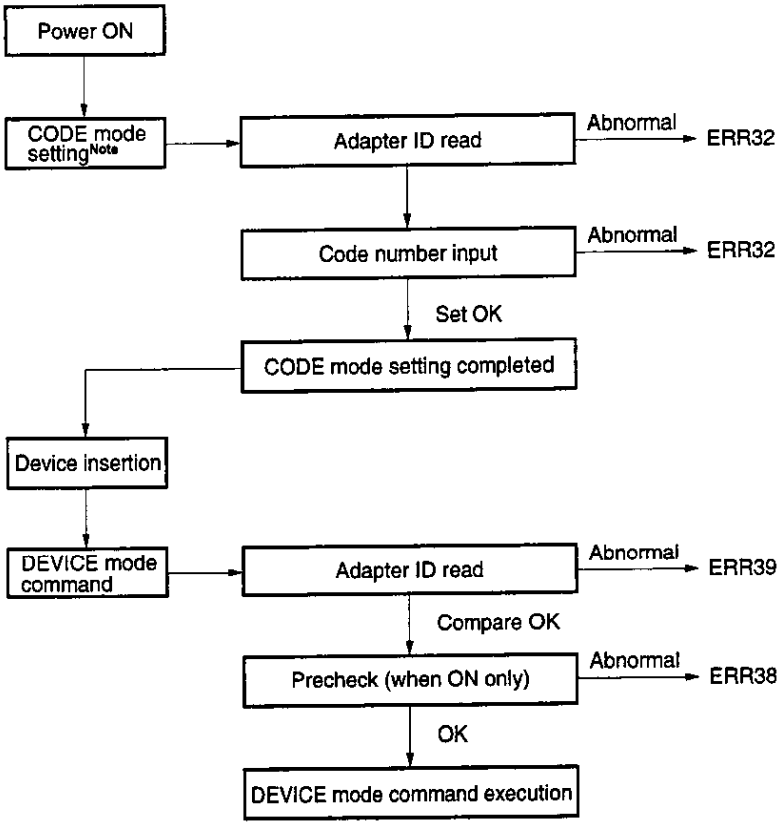
Cautions 1. When the μPD75P402 is used, the write conditions are set by inputting the code number for the μPD27C256A (1064) and changing the ROM end address to 77FH when executing each command.

2. CODE mode cannot be used to set the write conditions for 75X Series devices (except the μPD75P402), μPD7500 Series devices, or speech synthesis LSIs.

Table 2-6. List of Code Numbers

General-Purpose PROM	Code Number
μPD27256	1004
μPD27256A	10C4
μPD27C256	10A4
μPD27C256A	1064
μPD27C512	1025
μPD27C1000	1086
μPD27C1000A	1016
μPD27C1001	1046
μPD27C1001A	10D6
μPD27C1024	1026
μPD27C1024A	10B6
μPD27C2001	10C7
μPD27C4001	10C8
μPD27C4096	10A8

★



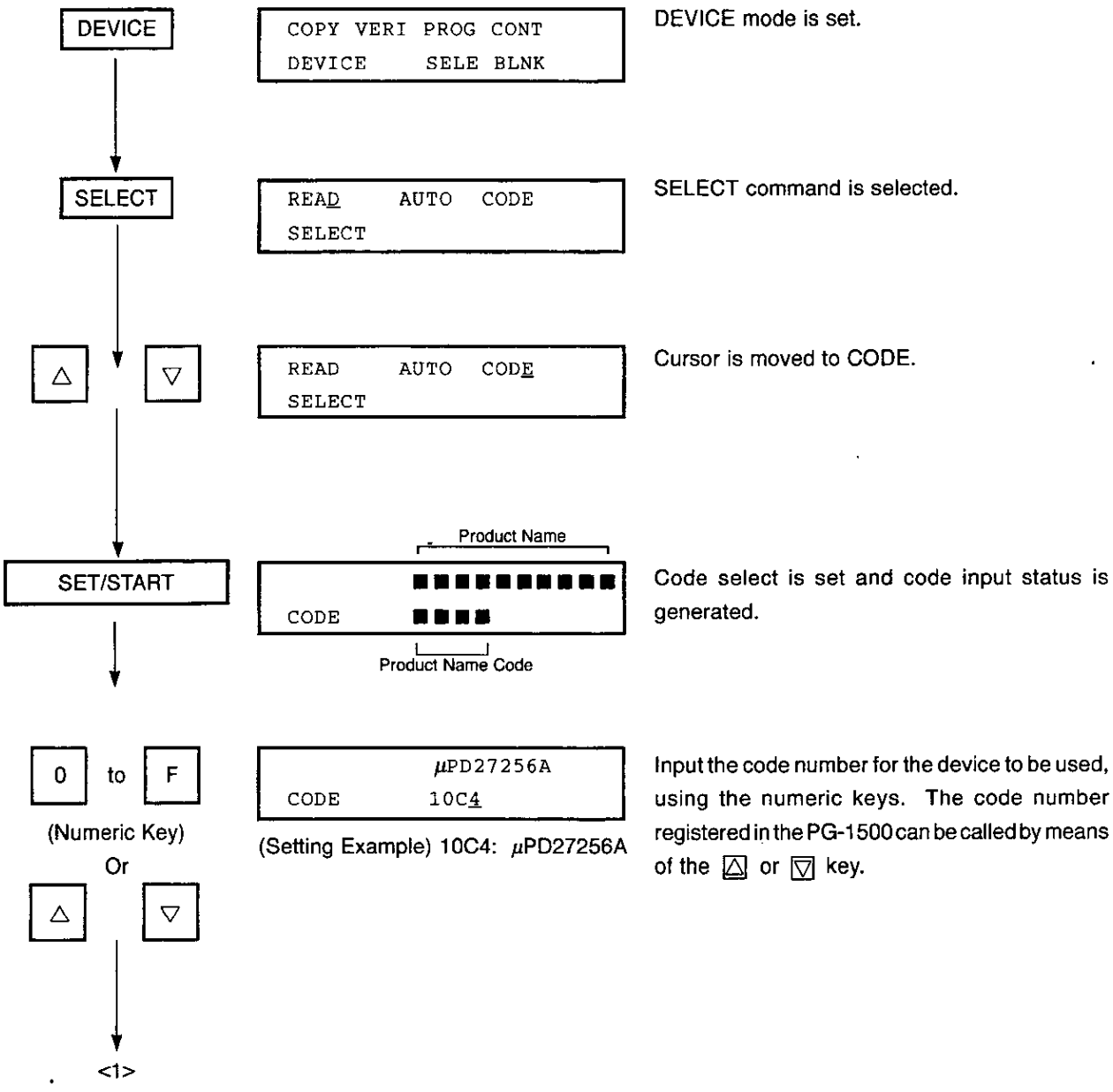
Note See operating procedure on the next page.

Caution If a different code number device is used after CODE mode setting, no errors result.

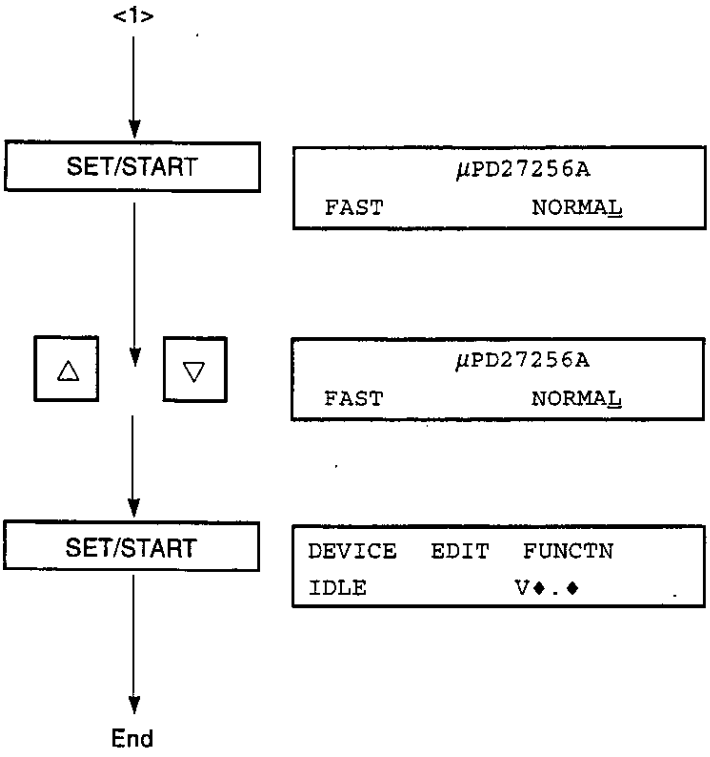
DEVICE

SELECT

<Operating procedure>



DEVICE SELECT



Set to the μPD27256A and placed in the mode select state. However, when only one device is placed in the program mode, an idle state is soon displayed.

Select the program mode with an △ or ▽ key.

If write condition setting is completed normally, idle status is displayed.

DEVICE

SELECT

(3) Program mode

The program mode designates the write method according to differences in the length of the program pulses, the number of bytes written at one time, etc.

If READ mode or AUTO mode is used as the device selection method, the program mode is changed automatically according to the device being written to, so that the fastest write method is selected.

If CODE mode is used as the device selection method, the program mode should be selected after the code number is input. Any of three program modes can be selected: NORMAL, FAST and PAGE.

(a) Normal program mode (NORMAL)

Target devices: All devices[Note]

The program can be performed by applying a 1-ms initial program pulse (active low) to the $\overline{CE}$ pin for the initial address, then executing the program verify with $\overline{OE}$[Note] set to 0. If the program cannot be performed only by the first initial program pulse, programs and program verifies are repeated X times ($X \leq 25$) to verify a 1-byte program, then an additional program pulse (3X ms) is added to complete the 1-byte program. After completing the 1-byte program, the address is incremented by one. The same sequence as above is repeated up to the last address.

After completing whole byte programs, the whole byte verify is carried out.

Figure 2-2 shows the program mode flowchart.

Note The normal program mode for the μPD27C1000A, μPD27C1001A and μPD27C1024A, 27C2001, 27C4001, 27C4096 is the same as the fast program mode.

(b) Fast program mode (FAST)

Target devices: μPD27256A, μPD27C256A and μPD27C512

The program can be performed by applying a 0.1-ms initial program pulse (active low) to the $\overline{CE}$ ($\overline{PGM}$) pin for the initial address, then executing the program verify with $\overline{OE}$ set to 0. If the program cannot be performed only by the first initial program pulse, programs and program verifies are repeated X times ($X \leq 10$) to verify the 1-byte program. This completes the 1-byte program. After completing the 1-byte program, the address is incremented by one. The same sequence as above is repeated up to the last address. After completing whole byte programs, the whole program verify is carried out.

Figure 2-3 shows the program mode flowchart.

(c) Page program mode (PAGE)

Target devices: μPD27C1000A, μPD27C1001A and μPD27C1024A, 27C2001

The program can be performed by latching the initial 4-byte, 1-page address and data in the page data latch mode, and by applying 0.1-ms program pulse (active low) to the $\overline{PGM}$ pin with $\overline{CE}$ and $\overline{OE}$ set to 1, then immediately changing $\overline{CE}$ and $\overline{OE}$ to 0. This completes the program verify. If the program cannot be performed only by the first program pulse, programs and program verifies are repeated X times ($X \leq 10$). After confirming the 1-page program, the address is incremented by one. The same sequence as above is repeated up to the last address.

After completing whole byte programs, the whole byte verify is carried out.

Figure 2-4 shows the program mode flowchart.

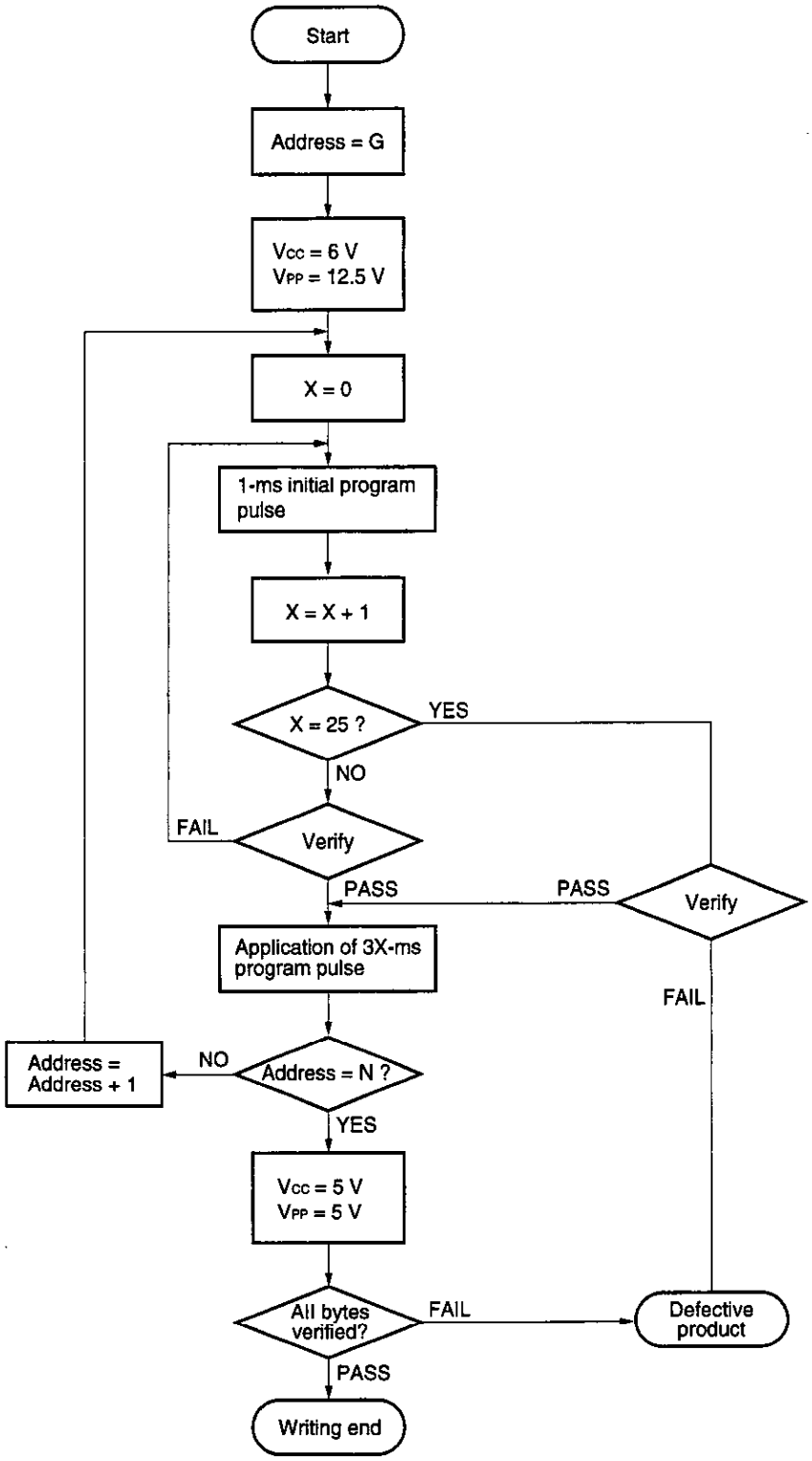
The program mode cannot be selected for a device for which CODE mode cannot be used (75X Series, μPD7500 Series, or speech synthesis LSI). When READ mode or AUTO mode is used, the program mode is set automatically. With a general-purpose PROM, the program modes that can be selected vary from device to device. If there is more than one selectable program mode, one of these should be selected.

With other devices, as a general rule the NORMAL program mode should be selected.

Please refer to the data sheet for the device concerned for details of program modes.

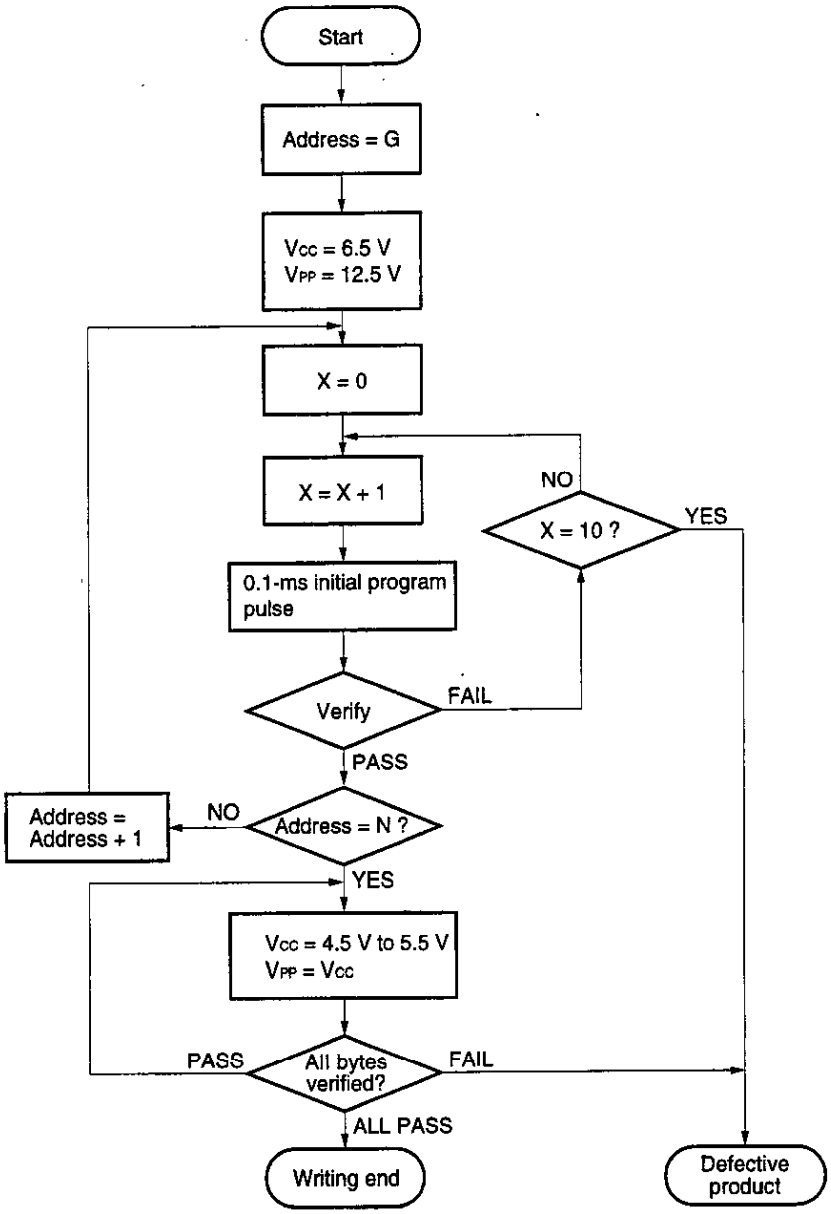
DEVICE SELECT

Figure 2-2. Normal Program Mode Flowchart



G = Start Address
N = Program End Address

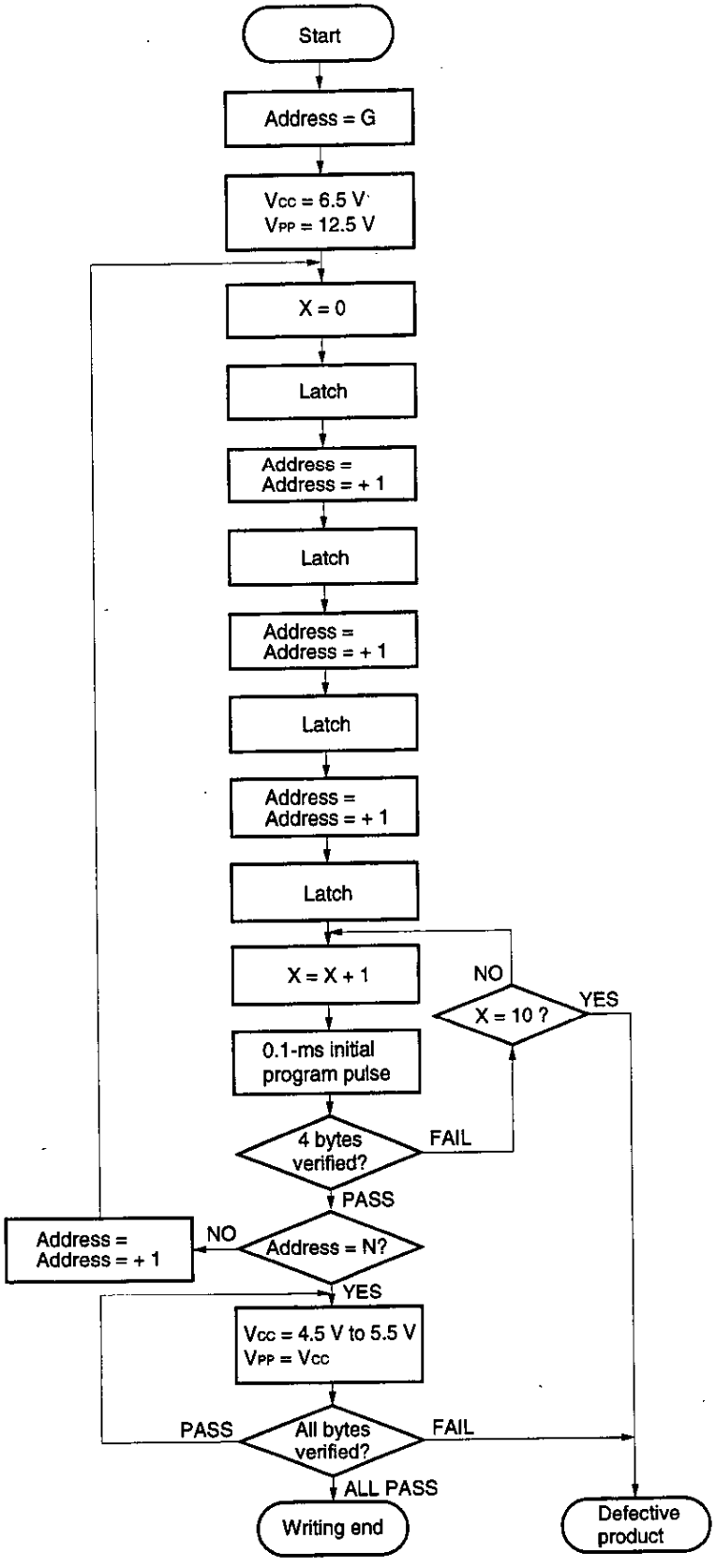
Figure 2-3. Fast Program Mode Flowchart



G = Start Address
N = Program End Address

DEVICE SELECT

Figure 2-4. Page Program Mode Flowchart

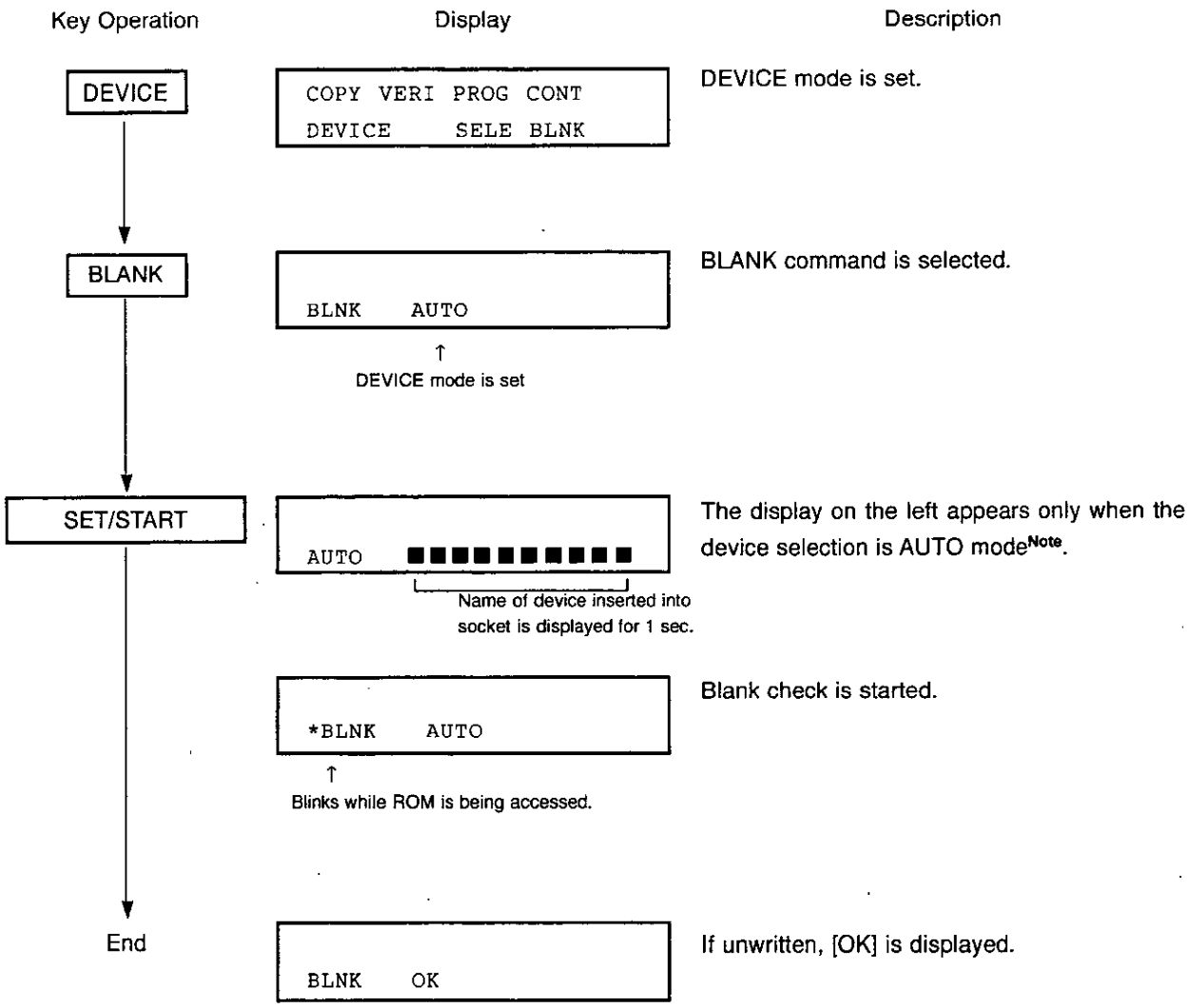


2.4.3 Blank check (BLANK)

The BLANK command performs a check to determine whether the device inserted in the socket is blank (blank check).

The entire address range is checked regardless of the operation address range set by other commands.

<Operating procedure>



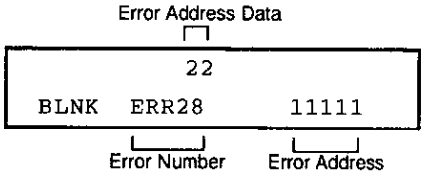
Note There is no code display when the device selection mode is READ mode or CODE mode.

DEVICE

BLANK

In the event of an error, take the following countermeasure.

If [ERR28] is displayed



A blank error has occurred.
This error occurs if the device inserted into the socket is not unwritten.

Countermeasure 1

To stop command execution, press the [RESET] key.
This generates the idle status.

Countermeasure 2

To execute a blank check, press the [SET/START] key.
Blank check starts at an address following the error address.

Caution When operation becomes normal at the address following the error address by taking countermeasure 2, [OK] is displayed.

If any other error occurs, take the necessary measure in accordance with **Appendix A.1 Standalone Mode Error List.**

2.4.4 Read (COPY)

The COPY command is intended to copy the data written into the ROM to the PG-1500 internal memory. After all the addresses have been read, verification is performed on all the addresses automatically.

<Operating procedure>

Key Operation	Display	Description
DEVICE	COPY VERI PROG CONT DEVICE SELE BLNK	DEVICE mode is set.
COPY	00000:7FFFF 00000 COPY READ NORMAL	COPY command is selected.

Set the PROM start address, PROM end address, PG-1500 internal memory start address and address divide mode. For details of the setting procedure, refer to **Part II 2.4.1 "Parameter Setting"**.

(Setting Example)
- PROM Start Address : 01111H
- PROM End Address : 02222H
- Internal Memory Start Address : 03333H
- Address Divide Mode : 16EVN

Key Operation	Display	Description
SET/START	01111:02222 03333 *COPY READ 16EVN ↑ Blinks while ROM is being accessed.	ROM content is copied to PG-1500 internal memory.
End	01111:02222 03333 COPY OK ■■■■ 16EVN Check Sum Value	Upon normal termination, [OK] and check sum value are displayed.

DEVICE

PROG

2.4.5 Write (PROG)

The PROG (PROGRAM) command is intended to write PG-1500 internal memory data into the unwritten device inserted into the socket.

Writing (including verification) is performed in accordance with the program mode specified when the SELECT command is executed.

<Operating procedure>

Key Operation	Display	Description
DEVICE	COPY VERI PROG CONT DEVICE SELE BLNK	DEVICE mode is set.
PROG	00000:7FFFF 00000 PROG READ NORMAL	PROG command is selected.

Set the PROM start address, PROM end address, PG-1500 internal memory start address and address divide mode. For details of the setting procedure, refer to **Part II 2.4.1 "Parameter Setting"**.

(Setting Example)
- PROM Start Address : 01111H
- PROM End Address : 02222H
- Internal Memory Start Address : 03333H
- Address Divide Mode : 16EVN

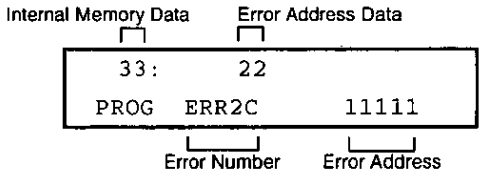
Key Operation	Display	Description
SET/START	01111:02222 03333 *PROG READ 16EVN ↑ Blinks while ROM is being accessed.	Write to PROM is started.
End	01111:02222 03333 PROG OK ■■■■ 16EVN Check Sum Value	Upon normal termination, [OK] and check sum value are displayed.

DEVICE

PROG

In the event of an error, take the following countermeasure.

If [ERR2C] is displayed



A write error has occurred.
This error occurs if data cannot be written to the device.

Countermeasure 1

To stop command execution, press the [RESET] key.
This generates the idle status.

Countermeasure 2

To continue write operation, press the [SET/START] key.
Write to ROM starts at an address following the error address.

★ **Caution Even if operation becomes normal at the address following the error address by taking countermeasure 2, a verify error (ERR20) still occurs in a verify check to be executed after termination of write operation.**

If any other error occurs, take the necessary measure in accordance with **Appendix A.1 Standalone Mode Error List.**

DEVICE

VERIFY

2.4.6 Verify check (VERIFY)

The VERIFY command is intended to check if the data which is written into the device matches the PG-1500 internal memory content.

When data has been written to the device, or when data has been read from the device, a verify check should be performed directly afterward. If power is cut or the device is replaced before a verify check is performed, the data write must be repeated from the start, followed immediately by a verify check.

<Operating procedure>

Key Operation | Display | Description

DEVICE

```
COPY VERI PROG CONT
DEVICE    SELE BLNK
```

DEVICE mode is set.

↓

VERIFY

```
00000:7FFFF   00000
VERI  READ    NORMAL
```

VERIFY command is selected.

↓

Set the PROM start address, PROM end address, PG-1500 internal memory start address and address divide mode. For details of the setting procedure, refer to **Part II 2.4.1 "Parameter Setting"**.

(Setting Example)

PROM Start Address	: 01111H
PROM End Address	: 02222H
Internal Memory Start Address	: 03333H
Address Divide Mode	: 16EVN

↓

SET/START

```
01111:02222   03333
*VERI  READ     16EVN
```

Data check is started.

↑
Blinks while ROM is being accessed.

↓

End

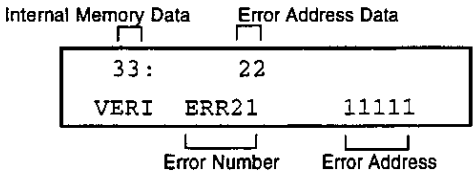
```
01111:02222   03333
VERI OK ■■■■  16EVN
```

Upon normal termination, [OK] and check sum value are displayed.

Check Sum Value

In the event of an error, take the following countermeasure.

★ If [ERR21, 22] is displayed



A verify error has occurred.
This error occurs if device data does not match the PG-1500 internal memory data content.

Countermeasure 1

To stop command execution, press the [RESET] key.
This generates the idle status.

Countermeasure 2

To execute a verify check, press the [SET/START] key.
Compare starts at an address following the error address.

Caution When operation becomes normal at the address following the error address by taking countermeasure 2, [OK] is displayed.

If any other error occurs, take the necessary measure in accordance with **Appendix A.1 Standalone Mode Error List.**

DEVICE

CONT

2.4.7 Continuous operation (CONT)

The CONT (CONTINUOUS) command is intended to carry out a continuous operation concerning a program which executes blank check, ROM write, and verify check in order.

<Operating procedure>

Key Operation | Display | Description

DEVICE

```
COPY VERI PROG CONT
DEVICE     SELE BLNK
```

DEVICE mode is set.

CONT

```
00000:7FFFF    00000
CONT   READ     NORMAL
```

CONT command is selected.

Set the PROM start address, PROM end address, PG-1500 internal memory start address and address divide mode. For details of the setting procedure, refer to **2.4.1 Parameter Setting** in **Part II**.

(Setting Example)

PROM Start Address	: 01111H
PROM End Address	: 02222H
Internal Memory Start Address	: 03333H
Address Divide Mode	: 16EVN

SET/START

```
01111:02222    03333
*CONT   READ     16EVN
```

↑
Blinks while ROM is being accessed.

Blank check is started.
After that, ROM write and verify check are carried out.

End

```
01111:02222    03333
CONT OK ■■■■  16EVN
```

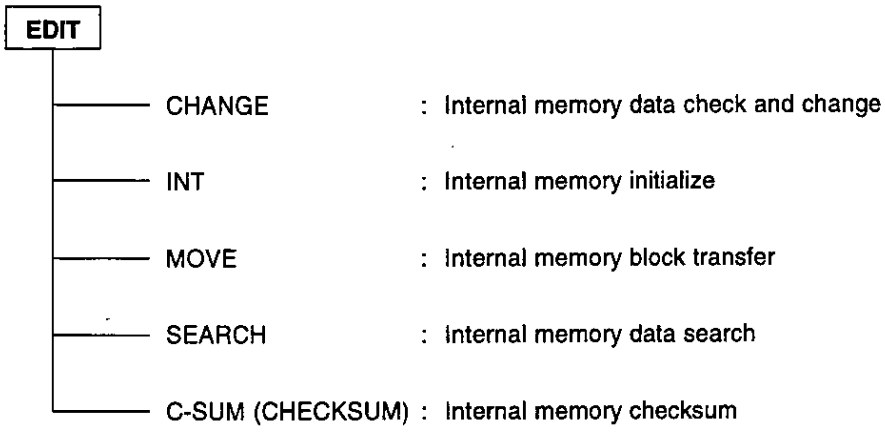
Check Sum Value

Upon normal termination, [OK] and check sum value are displayed.

EDIT

★ 2.5 Memory Edit (EDIT MODE)

The EDIT mode is intended to edit or change data in the PG-1500 internal memory.



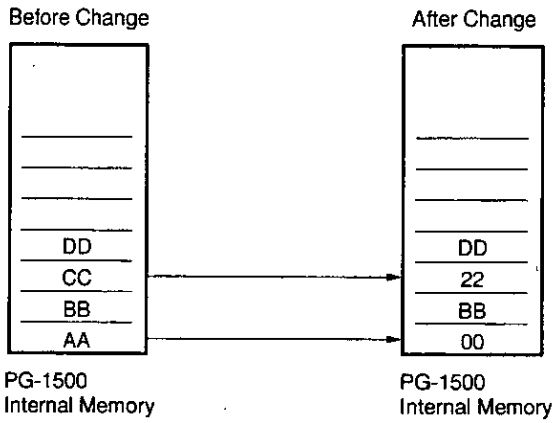
EDIT

CHANGE

2.5.1 Data change (CHANGE)

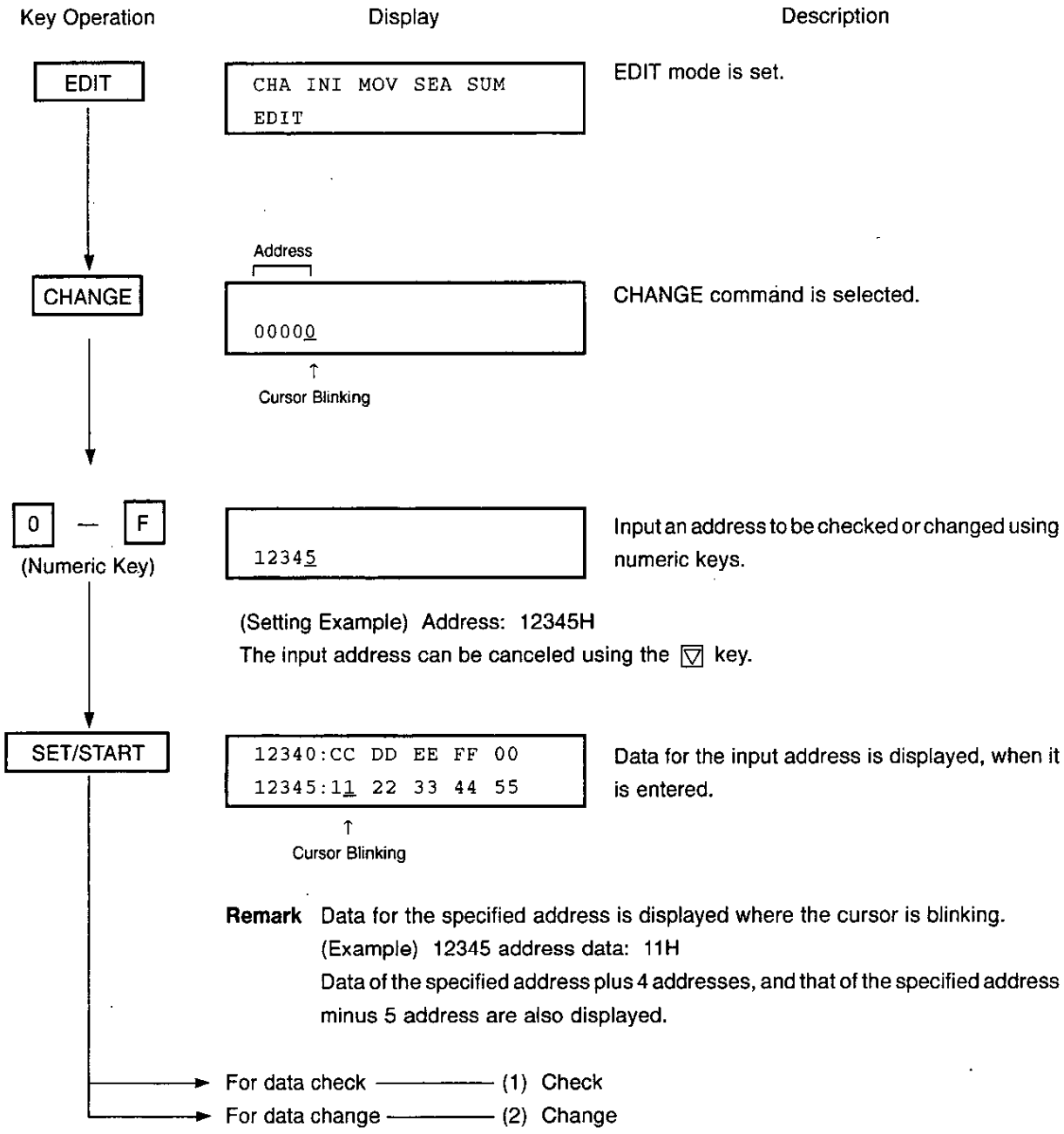
The CHANGE command is intended to check or change PG-1500 internal memory data.

Because this command enables any address in the PG-1500 internal memory to be set, data at any address can be readily checked or changed.



EDIT
CHANGE

<Operating procedure>



Remark Data for the specified address is displayed where the cursor is blinking.
(Example) 12345 address data: 11H
Data of the specified address plus 4 addresses, and that of the specified address minus 5 address are also displayed.

EDIT

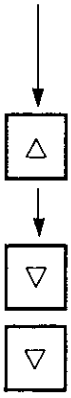
CHANGE

(1) Check

To check data, change the address value using the △ or ▽ key.

△ : Address value increases.

▽ : Address value decreases.



```
12341:DD EE FF 00 11
12346:22 33 44 55 66
```

Address value increases and data shifts.

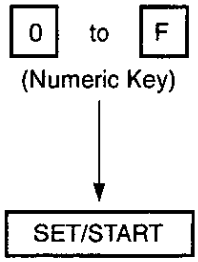
```
1233F:BB CC DD EE FF
12344:00 11 22 33 44
```

Address value decreases and data shifts.

Upon termination of check operation, exit from this mode using the DEVICE, EDIT, FUNCTION or RESET key.

(2) Change

To change the data for the specified address, press the 0 to F numeric keys. The displayed data (at locations where the cursor is blinking) is erased and the input numeric value is displayed from the right.




```
12340:CC DD EE FF 00
12345:7B 22 33 44 55
```

Input data.

Use the ▽ key to cancel the input numeric value.

(Setting Example)

Changing [12345] address data to [7B]

```
12341:DD EE FF 00 7B
12346:22 33 44 55 66
```

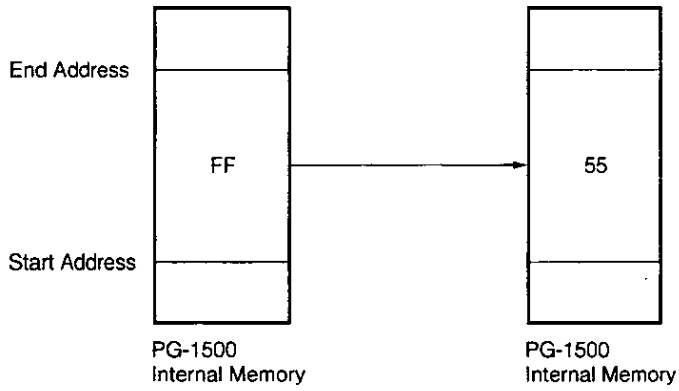
Data is changed and the address proceeds to the next value

Upon termination of change operation, exit from this mode using the DEVICE, EDIT, FUNCTION or RESET key.

Caution **If a numeric value is input, the preset data cannot be changed unless the SET/START key is pressed.**

2.5.2 Initialize (INIT)

The INIT (INITIAL) command is intended to initialize the data in the range specified by the PG-1500 internal memory using the specified data.



Remark It takes about 1 second to initialize 512K bytes (all data of the PG-1500 internal memory).

<Operating procedure>

Key Operation	Display	Description
EDIT	CHA INI MOV SEA SUM EDIT	EDIT mode is set.
INIT	Internal Memory Start Address / Internal Memory End Address / Initial Data 00000:7FFFF 00 INIT	INIT command is selected.
0 to F (Numeric Key)	11111:7FFFF 00 INIT	Input the internal memory start address using numeric keys. Use the ▽ key to cancel the input numeric value.
<1>	(Setting Example) Internal Memory Start Address: 11111H	

EDIT

INIT

<1>

△

```
11111:7FFFF   00
INIT
```

The cursor is moved.

0 to F (Numeric Key)

```
11111:22222   00
INIT
```

The internal memory end address is input using numeric keys.

(Setting Example)
Internal Memory End Address: 22222H

△

```
11111:22222   00
INIT
```

The cursor is moved.

0 to F (Numeric Key)

```
11111:22222   AA
INIT
```

Initial data is input using numeric keys.

(Setting Example)
Initial data AA is set

SET/START

```
 11111:22222   AA
*INIT
```

↑
Blinks while internal memory is being accessed.

Data initialization is executed.

End

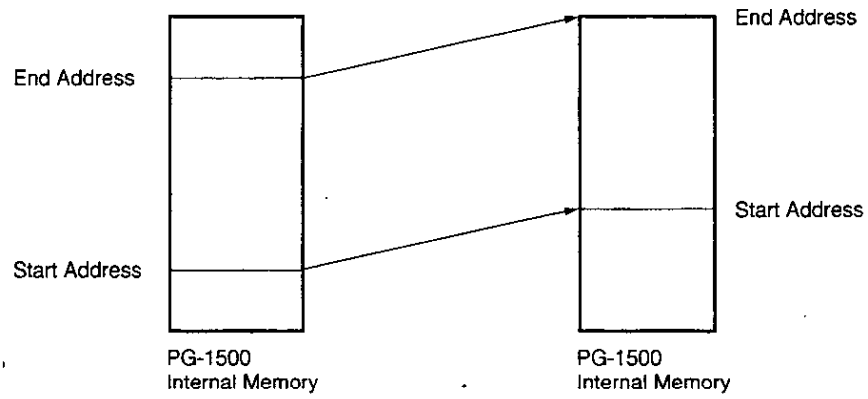
```
11111:22222   AA
INIT OK
```

Upon normal termination, [OK] is displayed.

Upon termination of initialize, exit from this mode using the DEVICE, EDIT, FUNCTION or RESET key.

2.5.3 Block transfer (MOVE)

The MOVE command is intended for block transfer of data between any start address of the PG-1500 internal memory and the end address to any different address.



<Operating procedure>

Key Operation	Display	Description
EDIT	CHA INI MOV SEA SUM EDIT	EDIT mode is set.
MOVE	Internal Memory Start Address / Internal Memory End Address / Transfer Destination Start Address 00000:7FFFF 00000 MOVE	MOVE command is selected.
0 to F (Numeric Key)	11111:7FFFF 00000 MOVE	Input the specified internal memory start address using numeric keys.
	(Setting Example) Internal Memory Start Address: 11111H	
△	11111:7FFFF 00000 MOVE	The cursor is moved.
<1>		

EDIT

MOVE

<1>

0 to F (Numeric Key)

```
11111:22222  00000
MOVE
```

The specified internal memory end address is input using numeric keys.

(Setting Example)
Internal Memory End Address: 22222H

△

```
11111:22222  00000
MOVE
```

The cursor is moved.

0 to F (Numeric Key)

```
11111:22222  33333
MOVE
```

The transfer destination start address is input using numeric keys.

(Setting Example)
Transfer Destination Start Address: 33333H

SET/START

```
11111:22222  33333
*MOVE
```

Block transfer is executed.

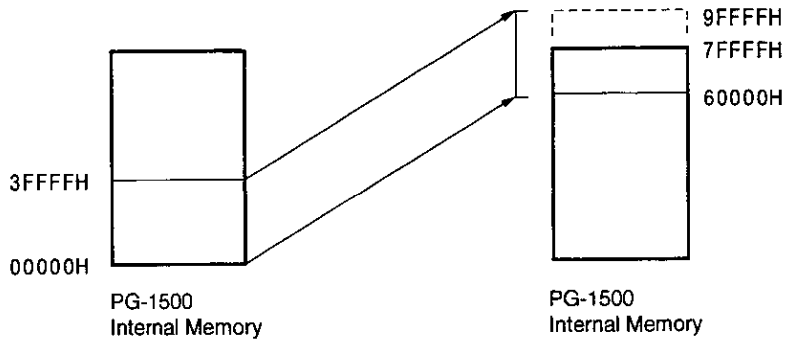
↑
Blinks while internal memory is being accessed.

End

```
11111:22222  33333
MOVE OK
```

Upon normal termination, [OK] is displayed.

Caution If the transfer address range overflow the destination address range, [ERR12] occurs.
(Example)

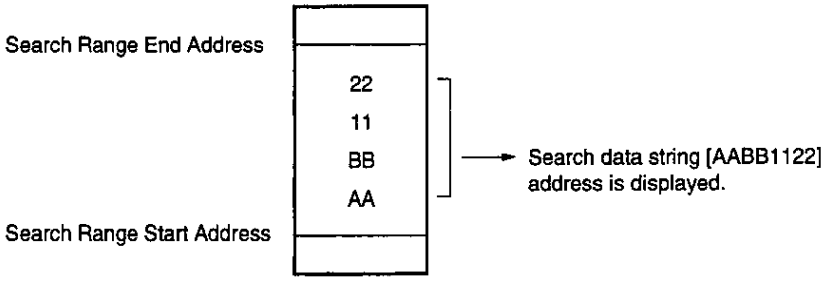


In this case, change the transfer destination start address or decrease the transfer address range.

2.5.4 Data search (SEARCH)

The SEARCH command is intended to search for the PG-1500 internal memory address at which the key input data string is located.

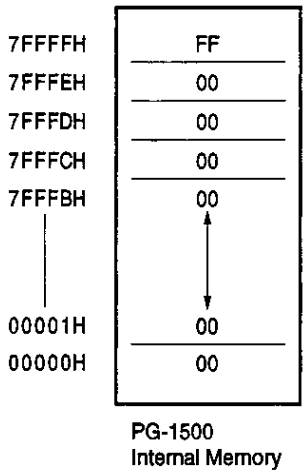
A data string with a maximum of 4 bytes can be searched for and the search range can also be specified.



Caution 1-, 2- or 4-byte data string can be searched. 3-byte data string cannot be searched.

Remark It takes a maximum of about 20 seconds to search for a data string.

Example Search data string : 000000FF
Search range : 00000H to 7FFFFH



EDIT

SEARCH

<Operating procedure>

Key Operation	Display	Description
EDIT	CHA INI MOV SEA SUM EDIT	EDIT mode is set.
SEARCH	Search Range Start Address / Search Range End Address 00000:7FFFF SRCH 00	SEARCH command is selected.
0 to F (Numeric Key)	11111:7FFFF SRCH 00 (Setting Example) Search Range Start Address: 11111H	Search range start address is input using numeric keys.
△	11111:7FFFF SRCH 00	The cursor is moved.
0 to F (Numeric Key)	11111:22222 SRCH 00 (Setting Example) Search Range End Address: 22222H	Search range end address is input using numeric keys.
△	11111:22222 SRCH 00 ↑ Cursor Blinking	The cursor is moved.
<1>		

EDIT
SEARCH

<1>

0 to F
(Numeric Key)

```
11111:22222
SRCH       11223344
```

Search data string is input using numeric keys.

(Setting Example)
Search Data String: 11223344

SET/START

```
11111:22222
*SRCH      11223344
```

Search is executed in the specified address range.

↑
Blinks while internal memory is being accessed.

Search Data
Start Address

```
11111:22222  11123
SRCH       11223344
```

Address 11123H 11124H 11125H 11126H

When data is located, the search data string start data address is displayed.

Remark When the SET/START key is pressed at this point.

1. If there is a data string at another address, the address is displayed.
2. If there is no data string at another address, [END] is displayed and search operation is terminated.

End

```
11111:22222    END
SRCH       11223344
```

If there is no search data, [END] is displayed.

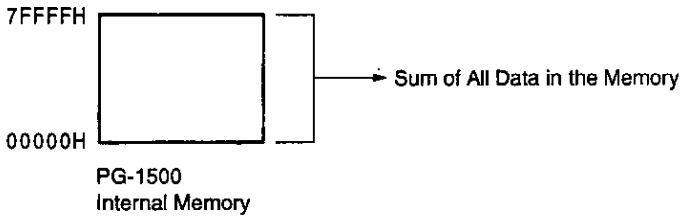
EDIT

C-SUM

2.5.5 Checksum (C-SUM)

The C-SUM (CHECKSUM) command is intended to display the PG-1500 internal memory data sum value.

The checksum value is also displayed upon termination of each DEVICE mode command (COPY, PROG, VERIFY and CONT).



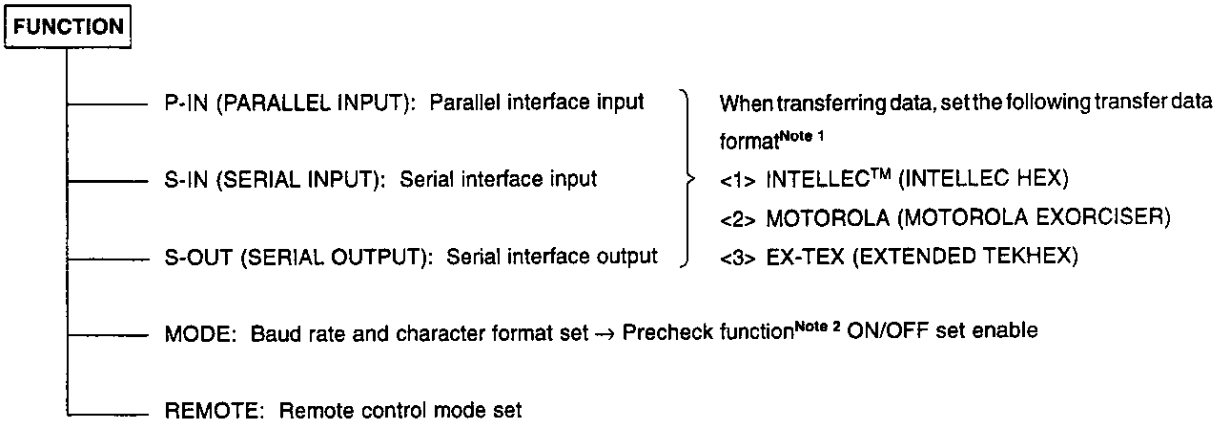
<Operating procedure>

Key Operation	Display	Description
EDIT	CHA INI MOV SEA SUM EDIT	EDIT mode is set.
C-SUM	00000:7FFFF CSUM	C-SUM command is selected.
SET/START	00000:7FFFF *CSUM ↑ Blinks while internal memory is being accessed.	Checksum is calculated.
End	Checksum Value 00000:7FFFF 0000 CSUM	Upon normal termination, the checksum value is displayed.

Caution The address range cannot be specified by this command.

★ 2.6 Interface Setting (FUNCTION MODE)

The FUNCTION mode is intended to input/output data to/from the external device or to set the interface.



Cautions 1. For details of these transfer formats, refer to Appendix B Object Formats.

2. In baud rate and character format setting, ON/OFF can be set for the precheck function to check whether the device is inserted correctly only for general-purpose PROMs.

FUNCTION

P-IN

2.6.1 Parallel input (P-IN)

The P-IN (PARALLEL INPUT) command is intended to input data from an external device connected to the PG-1500 parallel interface.

When executing the P-IN command, the PG-1500 should be connected to the external machine by a serial interface cable.

The P-IN command enables the following transfer data formats to be set.

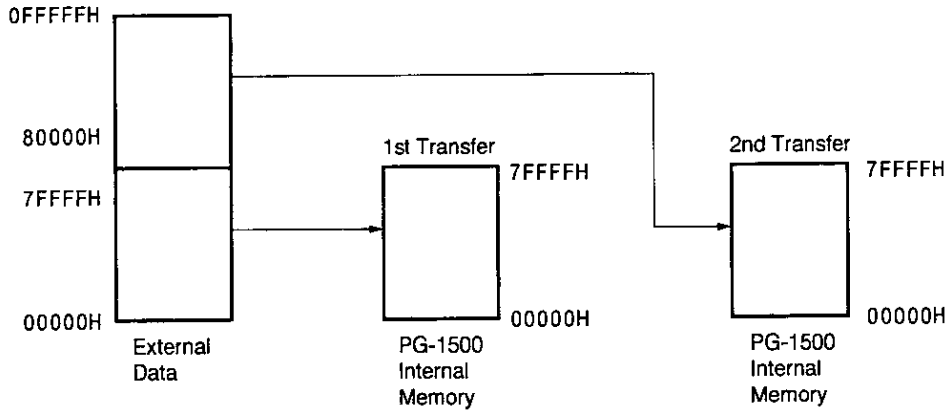
- INTELLEC HEX (INTELLEC)
- MOTOROLA EXORCISER (MOTOROLA)
- EXTENDED TEKHEX (EX-TEK)

<Transfer method>

(1) Transferred data is masked in a 512K-byte unit.

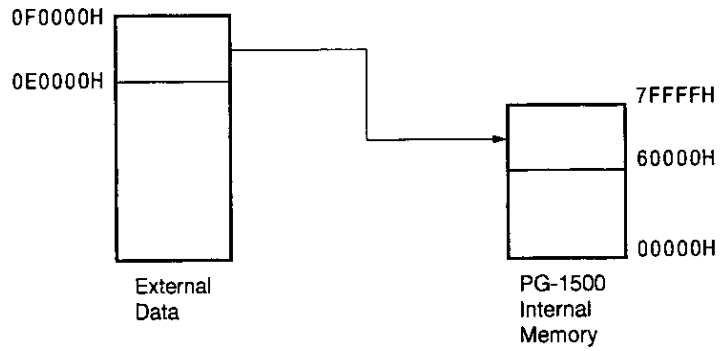
(Transfer example)

(a) When data transferred from an external device is 00000H to 0FFFFFH



Unless data is transferred in two transfers, only [80000H to 0FFFFFH] data is transferred to the PG-1500 internal memory.

(b) When external transfer data is 0E0000H to 0F0000H in INTELLEC format

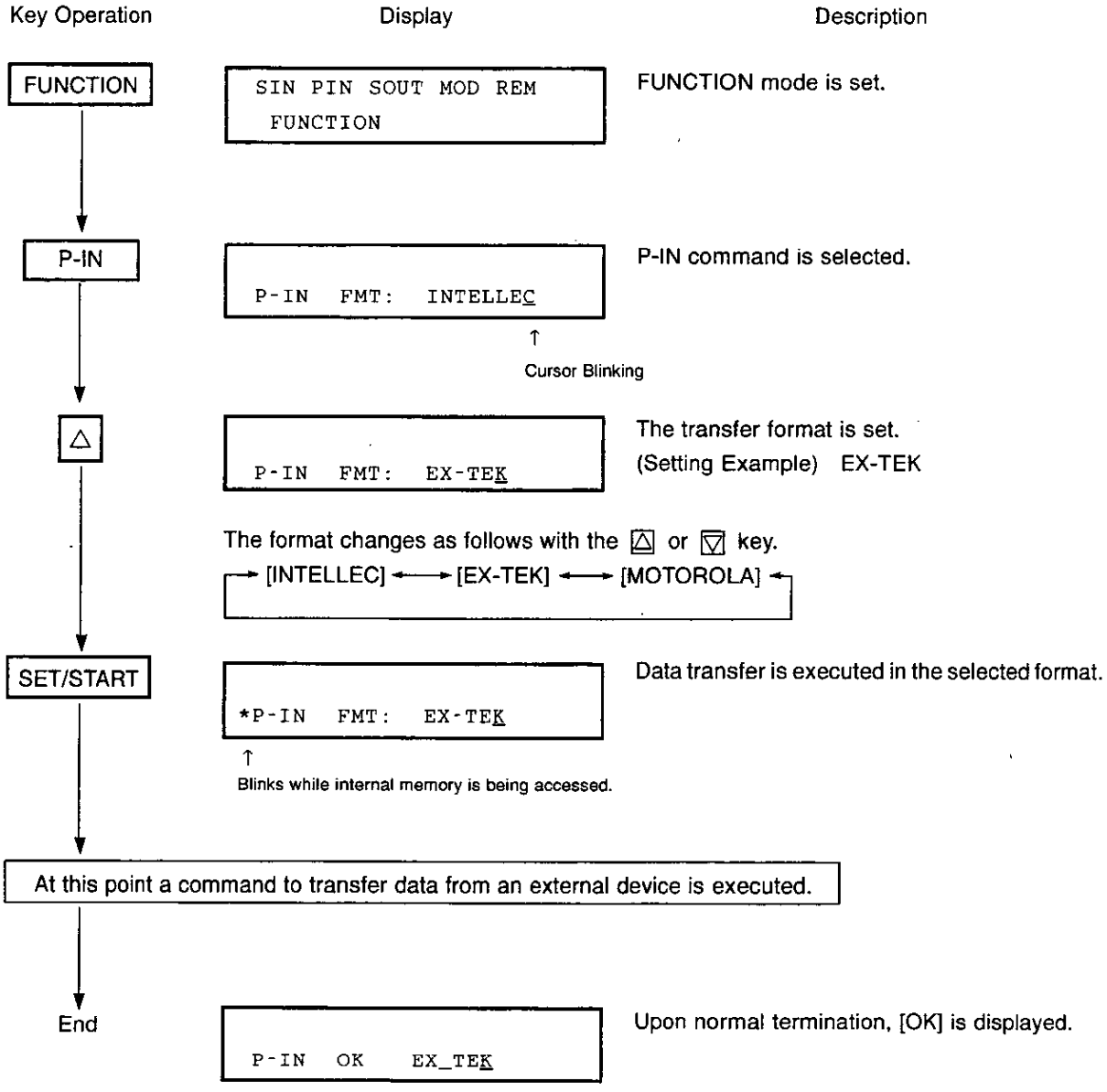


As shown above, data is transferred to the 60000H to 7FFFFH range.

(2) The end of data input is an end record in each transfer format (INTELLEC, MOTOROLA and EX-TEX).

Caution When using this mode, be sure to start external device data output after setting the PG-1500 to the RECEIVE mode. If the procedure is carried out in reverse order, the first data is not loaded correctly.

<Operating procedure>



Remark When the PC-9801VX (V30: 10 MHz) MS-DOS V3.1 is connected, it takes approx. 2 minutes to transfer (receive) 512K bits.

FUNCTION

S-IN

2.6.2 Serial input (S-IN)

The S-IN (SERIAL INPUT) command is intended to input data from an external device connected to the PG-1500 serial interface.

When executing the S-IN command, the PG-1500 should be connected to the external machine by a serial interface cable.

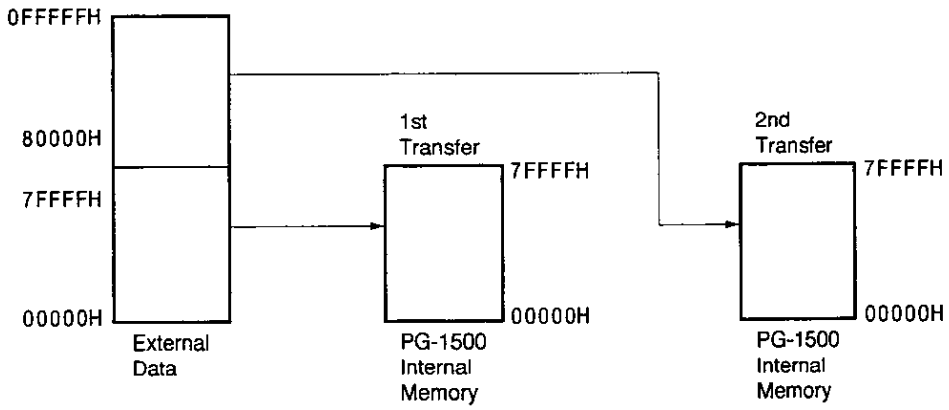
The following data formats can be set by the S-IN command.

- INTELLEC HEX (INTELLEC)
- MOTOROLA EXORCISER (MOTOROLA)
- EXTENDED TEKHEX (EX-TEK)

<Transfer method>

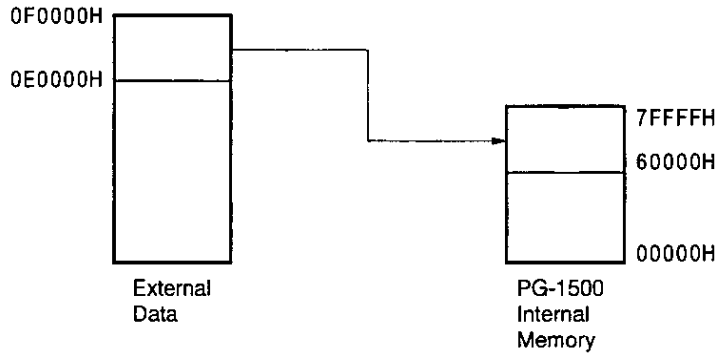
(1) The location of the transferred data is masked in a 512K-byte unit.
(Transfer example)

(a) When data transferred from an external device is 00000H to 0FFFFFH.



Unless data is transferred in two transfers, only [80000H to 0FFFFFH] data is transferred to the PG-1500 internal memory.

(b) When external transfer data is 0E0000H to 0F0000H in INTELLEC format.



As shown above, data is transferred to the 60000H to 7FFFFH range.

(2) Data input terminates with an end record in each transfer format (INTELLEC, MOTOROLA and EX-TEX).

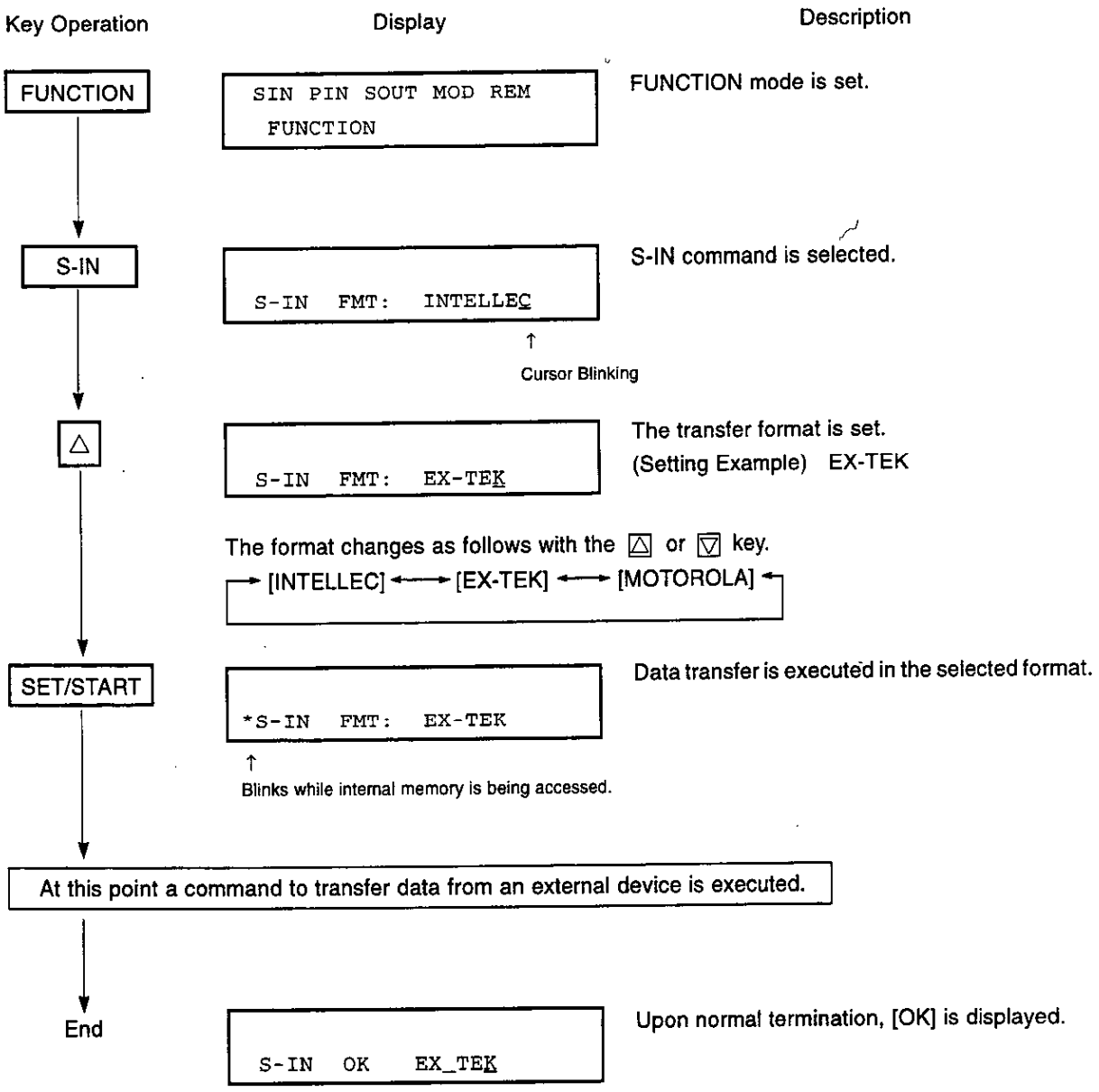
Caution When using this mode, be sure to start external device data output after setting the PG-1500 to the RECEIVE mode. If the procedure is carried out in reverse order, the first data is not loaded correctly.

Phase-out/Discontinued

FUNCTION

S-IN

<Operating procedure>



Caution If no external devices are connected, pressing the SET/START key causes [ERR40] as follows.

```
ERR40      Not ready
```

Remark When the PC-9801VX (V30™: 10 MHz) MS-DOS™ V3.1 is connected, it takes approx. 3 minutes to transfer (receive) 512K bits at the baud rate of 9600 bps.

2.6.3 Serial output (S-OUT)

The S-OUT (SERIAL OUTPUT) command is intended to output data from the PG-1500 with an external device connected to the PG-1500 serial interface.

When executing the S-OUT command, the PG-1500 should be connected to the external machine by a serial interface cable.

The S-OUT command enables the following transfer data formats to be set.

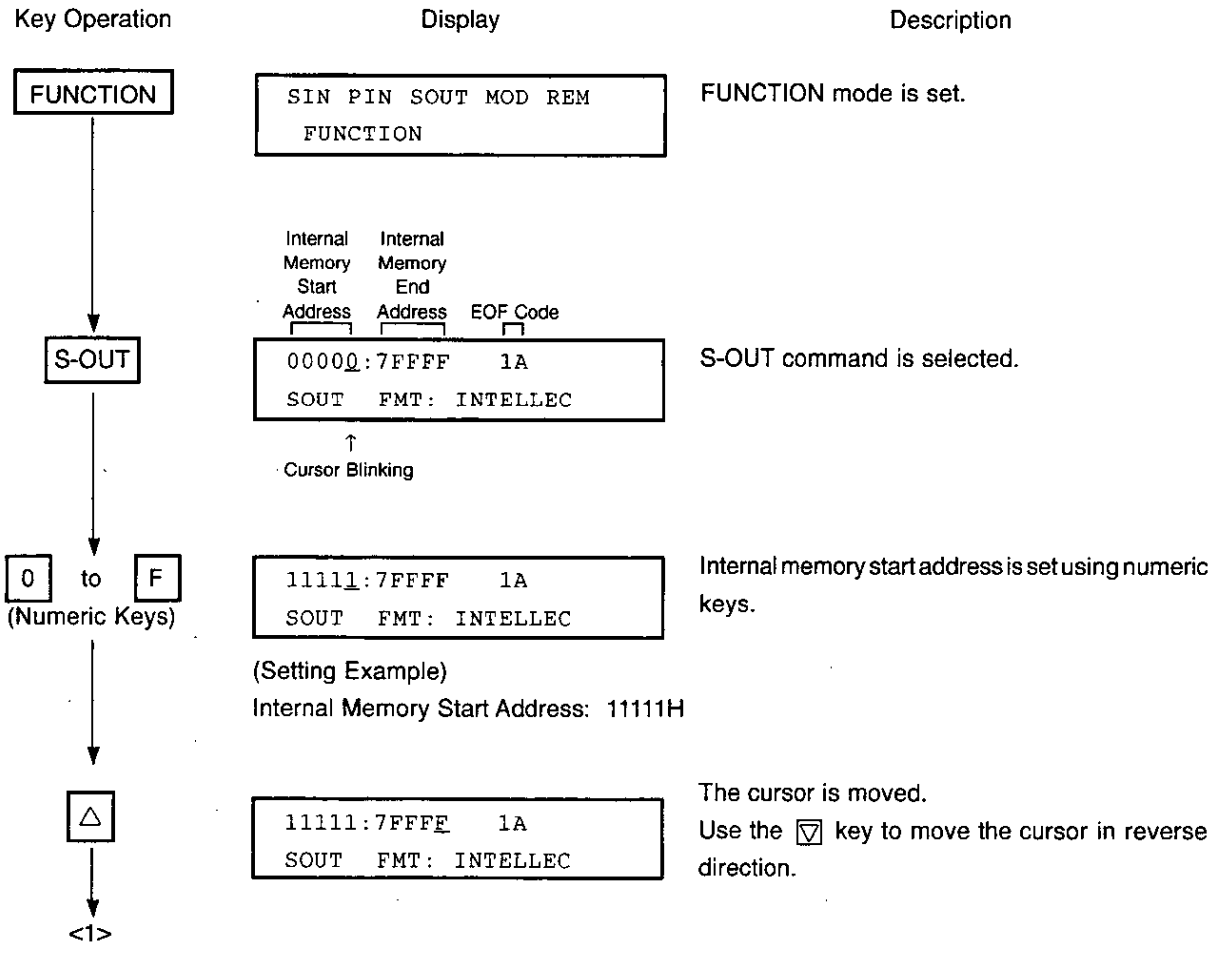
- INTELLEC HEX (INTELLEC)
- MOTOROLA EXORCISER (MOTOROLA)
- EXTENDED TEKHEX (EX-TEK)

It also enables the PG-1500 internal memory start address, end address and EOF code specifying the transfer range to be set.

EOF code

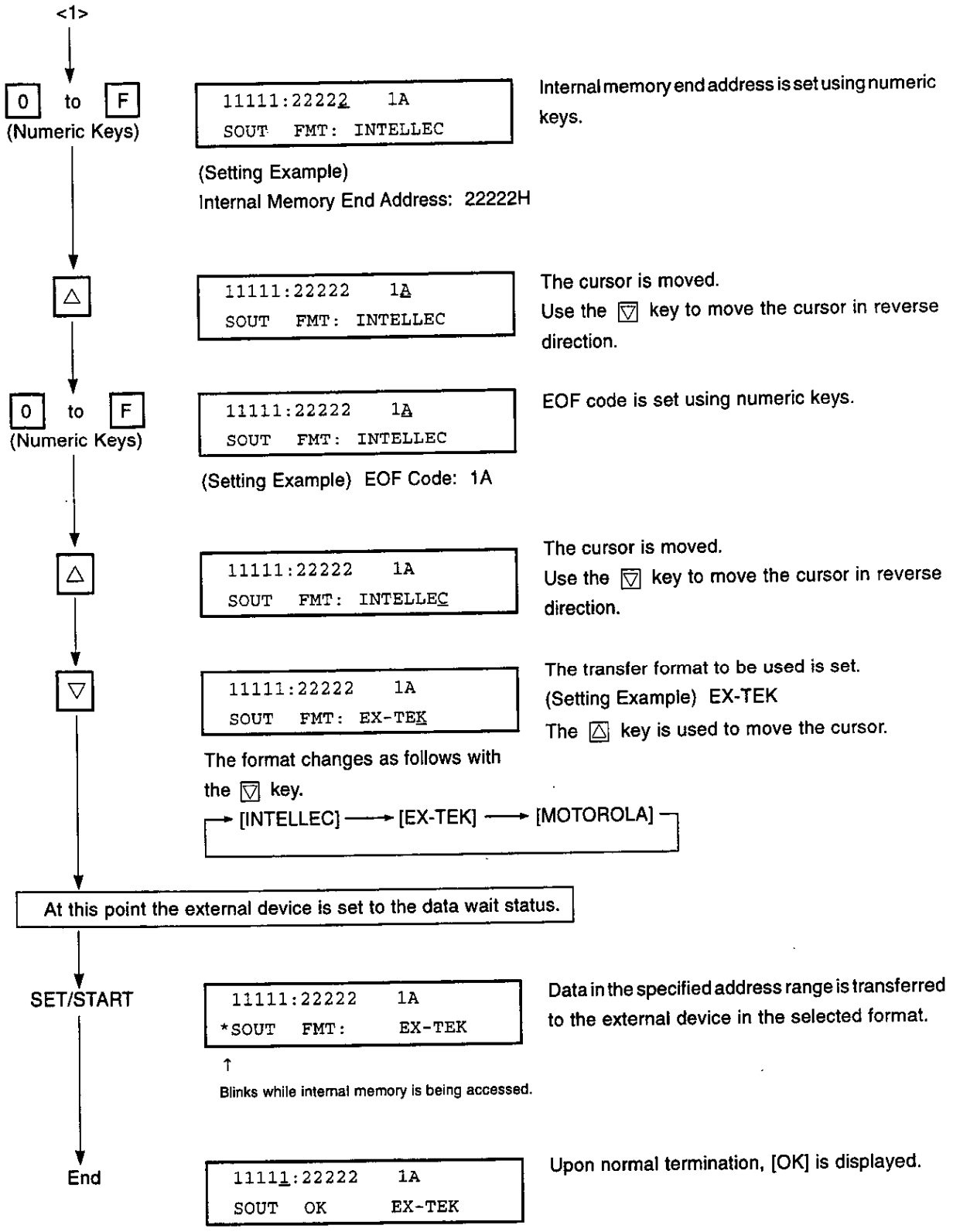
The EOF code is used for an external device connected to the PG-1500 to close a file.
Data output terminates with each format end record and the EOF code following the record.
(EOF code example) When OS is MS-DOS
↑ Z (control Z) → 1AH

<Operating procedure>



FUNCTION

S-OUT



Remark When the PC-9801VX (V30: 10 MHz) MS-DOS V3.1 is connected, it takes approx. 3 minutes to transfer 512K bits at the baud rate of 9600 bps.

2.6.4 Serial interface setting (MODE)

The MODE command is intended to execute serial interface setting and set the precheck function.

This setting is saved in the NV-RAM (nonvolatile RAM) of the PG-1500 and remains unchanged after power-OFF.

The following items are set. Change by setting in accordance with the external machine to be connected.

Table 2-7. Items to be Set by MODE Command

Item	Setting	Display Symbol
Baud rate	1200 2400 4800 9600 19200 [bps]	BR
Parity	NON (none) EVN (even number) ODD (odd number)	P
XON/OFF control[Note 1]	ON (yes) OFF (none)	XN
Character length	7 8	B
Stop bit	1 2	SB
Precheck[Note 2]	ON (yes) OF (none)	PC

Notes 1. When connecting the unit to an in-circuit emulator, XON/XOFF control should be set to "none" (LCD display: OF).

2. This function checks whether the device has been inserted correctly. It can only be used with an NEC general-purpose PROM.

Remark The default settings at shipment are underlined in the Setting column.

FUNCTION

MODE

<Operating procedure>

Key Operation | Display | Description

FUNCTION

```
SIN PIN SOUT MOD REM
 FUNCTION
```

FUNCTION mode is set.

MODE

Baud Rate / Parity / XON/XOFF

```
BR:  9600 P:NON XN:OF
 MODE B:8 SB:2 PC:OF
```

Character Length / Stop Bit / Precheck

Various setting modes are selected.

Caution The parameter cannot be changed using numeric keys.

△: Parameter Select

▽: Parameter Setting Change

▽

```
BR:  1200 P:NON XN:OF
 MODE B:8 SB:2 PC:OF
```

The parameter is changed to a desired value.
(Setting Example) 1200 bps

The parameter changes as follows with the ▽ key.

→[19200]→[1200]→[2400]→[8400]→[9600]→

△

```
BR:  1200 P:NON XN:OF
 MODE B:8 SB:2 PC:OF
```

The cursor is moved.

▽

```
BR:  1200 P:EVN XN:OF
 MODE B:8 SB:2 PC:OF
```

The parameter is changed to a desired value.
(Setting Example) EVN [Even Parity]

The parameter changes as follows with the ▽ key.

→[NON]→[EVN]→[ODD]→

△

```
BR:  1200 P:EVN XN:OF
 MODE B:8 SB:2 PC:OF
```

The cursor is moved.

▽

```
BR:  1200 P:EVN XN:ON
 MODE B:8 SB:2 PC:OF
```

The parameter is changed to a desired value
(Set to external equipment to be connected).
(Setting Example) ON

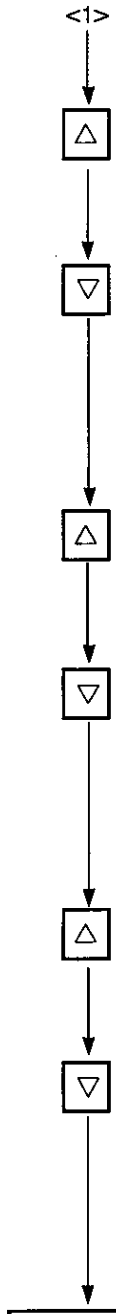
The parameter changes as follows with the ▽ key.

[OF]←→[ON]

<1>

Phase-out/Discontinued

FUNCTION MODE




```
BR:  1200 P:EVN XN:ON
 MODE B:8 SB:2 PC:OF
```

The cursor is moved.

```
BR:  1200 P:EVN XN:ON
 MODE B:7 SB:2 PC:OF
```

The parameter is changed to a desired value.
(Setting Example) 7

The parameter changes as follows with the ▽ key.

[8] ⟷ [7]

```
BR:  1200 P:EVN XN:ON
 MODE B:7 SB:2 PC:OF
```

The cursor is moved.

```
BR:  1200 P:EVN XN:ON
 MODE B:7 SB:1 PC:OF
```

The parameter is changed to a desired value.
(Setting Example) 1

The parameter changes as follows with the ▽ key.

[2] ⟷ [1]

```
BR:  1200 P:EVN XN:ON
 MODE B:7 SB:1 PC:OF
```

The cursor is moved.

```
BR:  1200 P:EVN XN:ON
 MODE B:7 SB:1 PC:ON
```

The parameter is changed to a desired value.
(Setting Example) ON

The parameter changes as follows with the ▽ key.

[OF] ⟷ [ON]

```
DEVICE EDIT FUNCTN
IDLE          V♦.♦
```

All items are set and the idle status is generated.

Cautions 1. This setting is not changed unless the SET/START key is pressed.

2. Pressing the SET/START key executes data write to the NV-RAM in the PG-1500.

FUNCTION

REMOTE

2.6.5 Remote control mode setting (REMOTE)

The REMOTE command is intended for control the PG-1500 with an external device.
When executing the REMOTE command, connect the PG-1500 to the external device with a serial interface cable.

<Operating procedure>

Key Operation	Display	Description
FUNCTION	SIN PIN SOUT MOD REM FUNCTION	FUNCTION mode is set.
REMOTE	REMOTE MODE	REMOTE command is selected.
SET/START	REMOTE MODE OK	If the PG-1500 is connected to the external device normally, [OK] is displayed.

To terminate control by the external machine, press the [RESET] key.
For details of the REMOTE command, refer to **Chapter 3 Remote Control Mode** in **Part II**.

CHAPTER 3. REMOTE CONTROL MODE

★ 3.1 Outline of Operation

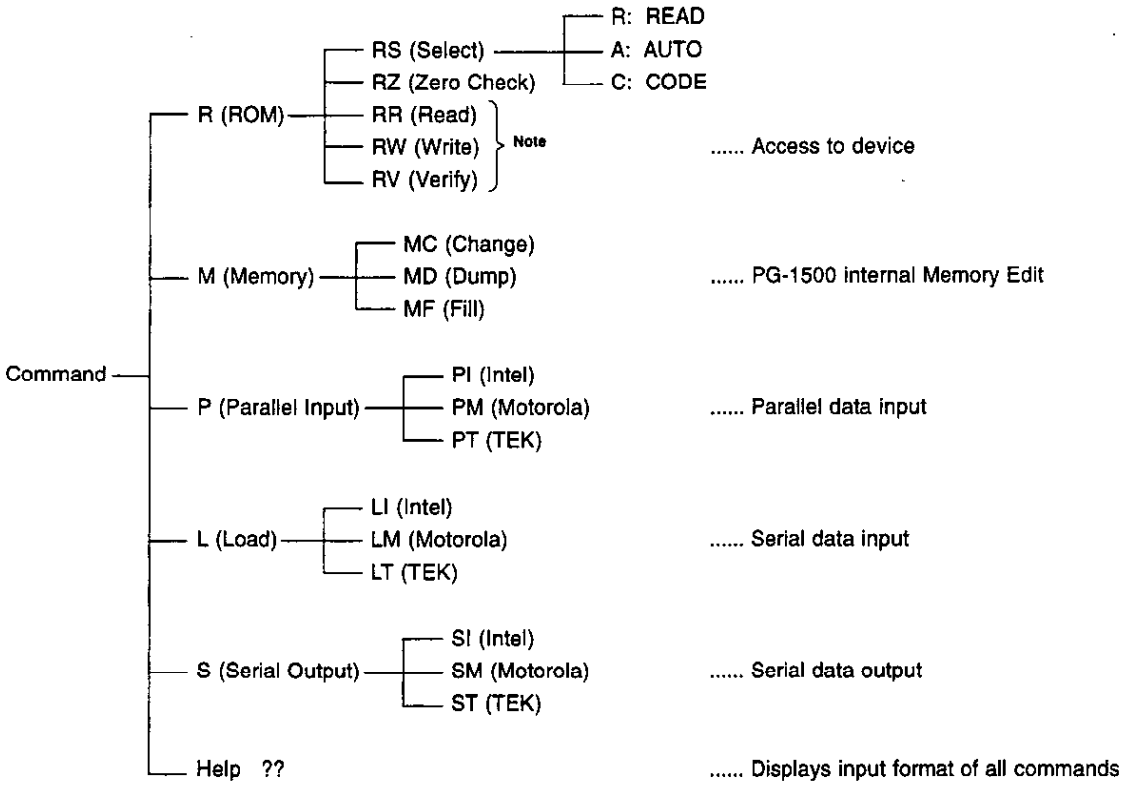
When the PG-1500 is connected to a host machine (PC-9800 series, etc.), the remote control mode is used to control the PG-1500 from the host machine.

When the remote control mode is used, the PG-1500 controller (control software, separately available), or an in-circuit emulator (IE-75001-R, etc.) is required.

To connect the PG-1500 to an external machine, the serial interface alone, or the serial interface and the parallel interface, are used. Please refer to the relevant User's Manual for the connection and start-up procedure. An example of connection to an in-circuit emulator is given in **4.2.1 Outline of Operations Using NEC In-Circuit Emulator**.

For the operation method for the PG-1500 controller, refer to the **PG-1500 Controller User's Manual** (EEU-1291C MS-DOS based, U10540EJ PC DOS based).

Remote control mode commands are shown below.



Note These command set the below parameters at execution.

<1> PROM start address
<2> PROM end address
<3> PG-1500 internal memory start address
<4> Address division mode

3.2 Setting

An adapter board for the device used is connected to the PG-1500. When a device other than a general-purpose PROM is used, a PROM programmer adapter is connected to the adapter board.

Check the interface of the external machine used before connecting. To connect the PG-1500 to an external machine, the serial interface alone, or the serial interface and the parallel interface, are used.

After the external machine and the PG-1500 have been powered on and the initial test has been performed, perform the PG-1500 and external machine settings and start the control software, etc., then insert the device into the socket.

See the sections of **2.5 Adapter Board Connection** and **2.6 Device Insertion** in **Part I** and **Appendix C External Interfaces** in **Appendix**, and the User's Manual for the external machine, etc., for details.

3.3 START, INITIAL TEST AND MODE SETTING

When connection of the PG-1500 to the host machine is completed, power on the host machine.

When the PG-1500 power supply is turned on, the following message is displayed on the LCD and an initial test is performed (as in the standalone mode).

```
 PG-1500
*Initial Test Busy
```

↑
Blinking During Initial Test Execution

```
DEVICE EDIT FUNCTN
IDLE          V♦.♦
```

PG-1500 Monitor ROM Version is displayed.

Caution Do not turn the power on/off with the device inserted in the socket, as this may damage it.

Use the PG-1500 keys to set to the remote control mode.

<Operating procedure>

Key Operation	Display	Description
FUNCTION	SIN PIN SOUT MOD REM FUNCTION	FUNCTION mode is set.
REMOTE	REMOTE MODE	REMOTE command is selected.
SET/START	REMOTE MODE OK	If the PG-1500 is connected to the external device correctly, [OK] is displayed.

Caution If no external devices are connected, an error results.
If the DSR and DTR external devices are set to [OFF], an error results.

To release the remote control mode, press the [RESET] key on the PG-1500.

3.4 COMMANDS

The commands for the remote control mode are described below.

RS
(ROM Select)

3.4.1 RS (ROM Select) command

The RS command is used to select the device.

The device selection method is set by the subcommands C, R, and A.

There are three device selection methods: CODE mode (subcommand: C), READ mode (subcommand: R), and AUTO mode (subcommand: A).

In CODE mode, the code number and program mode are input when the RS command is executed, and the device write conditions are set accordingly.

In READ mode, the silicon signature data is read from the device inserted in the socket when the RS command is executed, and the device write conditions are set in accordance with this data.

In AUTO mode, the silicon signature data is read automatically each time RR, RW, RV or RZ is executed, and the device write conditions are set in accordance with this data.

See **Section 2.4.2 Device Selection (SELECT)** in **Part II** for details of the device selection methods.

<Input format>

```
PG > RS C ↵
```

```
PG > RS R ↵
```

```
PG > RS A ↵
```

↑

Subcommand

Subcommand	Function
C	Manual input of code number (CODE mode)
R	Manual read of silicon signature data (READ mode)
A	Automatic read of silicon signature data (AUTO mode)

An error message will be displayed if a character other than C, R, or A is input, or if subcommand input is omitted.

RS
(ROM Select)

<Execution example>

(1) Code Mode

When 27A board is used

(a) Normal execution

```
PG>RS C↵

ROM SELECT
 1004 = μPD27256     (VPP = 21V)  (N)   10A4 = μPD27C256  (VPP = 21V)  (N)
 10C4 = μPD27256A    (VPP = 12.5V)(F/N) 1064 = μPD27C256A (VPP = 12.5V)(F/N)
 1025 = μPD27C512    (VPP = 12.5V)(F/N) 1086 = μPD27C1000 (VPP = 12.5V)(N)
★1016 = μPD27C1000A (VPP = 12.5V)(P/N) 1046 = μPD27C1001 (VPP = 12.5V)(N)
 10D6 = μPD27C1001A (VPP = 12.5V)(P/N) 1026 = μPD27C1024 (VPP = 12.5V)(N)
 10B6 = μPD27C1024A (VPP = 12.5V)(P/N) 10C7 = μPD27C2001 (VPP = 12.5V)(P/N)
 10C8 = μPD27C4001  (VPP = 12.5V)(N)   10A8 = μPD27C4096 (VPP = 12.5V)(N)
Please input code No. = 10C4↵
Please input program mode (Page/Fast/Normal) = F↵

PG>
```

RS
(ROM Select)

(b) Error (when an item other than code numbers is input)

```
PG>RS C↵

ROM SELECT
 1004 = μPD27256     (VPP = 21V)   (N)    10A4 = μPD27C256   (VPP = 21V)   (N)
 10C4 = μPD27256A    (VPP = 12.5V)(F/N) 1064 = μPD27C256A (VPP = 12.5V)(F/N)
 1025 = μPD27C512    (VPP = 12.5V)(F/N) 1086 = μDP27C1000 (VPP = 12.5V)(N)
 1016 = μPD27C1000A (VPP = 12.5V)(P/N) 1046 = μPD27C1001 (VPP = 12.5V)(N)
 10D6 = μPD27C1001A (VPP = 12.5V)(P/N) 1026 = μPD27C1024 (VPP = 12.5V)(N)
 10B6 = μPD27C1024A (VPP = 12.5V)(P/N) 10C7 = μPD27C2001 (VPP = 12.5V)(P/N)
 10C8 = μPD27C4001  (VPP = 12.5V)(N)    10A8 = μPD27C4096 (VPP = 12.5V)(N)
Please input code No. = 5555↵
★
ROM SELECT
 1004 = μPD27256     (VPP = 21V)   (N)    10A4 = μPD27C256   (VPP = 21V)   (N)
 10C4 = μPD27256A    (VPP = 12.5V)(F/N) 1064 = μPD27C256A (VPP = 12.5V)(F/N)
 1025 = μPD27C512    (VPP = 12.5V)(F/N) 1086 = μPD27C1000 (VPP = 12.5V)(N)
 1016 = μPD27C1000A (VPP = 12.5V)(P/N) 1046 = μPD27C1001 (VPP = 12.5V)(N)
 10D6 = μPD27C1001A (VPP = 12.5V)(P/N) 1026 = μPD27C1024 (VPP = 12.5V)(N)
 10B6 = μPD27C1024A (VPP = 12.5V)(P/N) 10C7 = μPD27C2001 (VPP = 12.5V)(P/N)
 10C8 = μPD27C4001  (VPP = 12.5V)(N)    10A8 = μPD27C4096 (VPP = 12.5V)(N)
Please input code No. = ↵

PG>
```

If a number not displayed is input, the message is displayed again.
Press the RETURN key to exit from the CODE mode.

When 04A board is used
CODE mode cannot be used. The following error message is displayed.

```
PG>RS C↵

ERR39(Board not connected)

PG>■
```

(2) READ mode

(a) Normal execution (μPD75P108)

```
PG>RS R ↵

Your setting ROM is μPD75P108

PG>
```

(b) Error

★

```
PG>RS R ↵

ERR30 (Signature read error)

PG>
```

(3) AUTO mode (only for SELECT mode setting)

```
PG>RS A ↵

PG>
```

<Error control>

<1> When a command other than the specified subcommand is input

```
PG>RS F ↵

ERR16 (Command syntax error)

PG>
```

<2> When the preset device silicon signature data cannot be read.

```
PG>RS R ↵

ERR30 (Signature read error)

PG>
```

RS
(ROM Zero check)

3.4.2 RZ (ROM Zero check) command

The RZ command is intended to check if the device inserted into the socket is unwritten.

<Input format>

```
PG > RZ ↵
```

<Execution example>

(1) Upon normal termination

★

```
PG>RZ↵

ROM erase OK!

PG>■
```

(2) When device has not been written

```
PG>RZ↵

ERR28 ROM not erased !!

 Adr          ROM data
00000            FE

Continue(Y:Yes/N:No)?
```

↑

"Continue (Y:Yes/N:No)?" message is displayed.

If "Continue (Y:Yes/N:No)?" message is displayed during execution, input Y or N.
If Y is input, blank check is done again at the address following the displayed address.
If N is input, blank check is stopped.
If a character other than Y or N is input, message is displayed again.

<1> Y input

(a) When device is unwritten in check after re-execution

```
Continue(Y:Yes/N:No)?Y
ROM erase OK!

PG>
```

Caution "OK" is displayed, but this is not a normal termination.

(b) When device is not unwritten in erase status check after re-execution

```
Continue(Y:Yes/N:No)?Y
ERR28 ROM not erased !!

 Adr         ROM data
00001           FD

Continue(Y:Yes/N:No)?
```

The message is displayed again.

<2> N Input

```
Continue(Y:Yes/N:No)?N

PG>
```

The instruction is stopped.

<3> Input other than Y and N

```
Continue(Y:Yes/N:No)?G
Continue(Y:Yes/N:No)?
```

The message is displayed again.

RS
(ROM Zero check)

<Error control>

<1> When symbol is input after RZ

```
PG>RZ 0,1FFF↵

ERR16(Command syntax error)

PG>
```

<2> When silicon signature data cannot be read

```
PG>RZ↵

ERR30(Signature read error)

PG>
```

<3> When the read silicon signature data differs from the preset data

```
PG>RZ↵

ERR31(Unexpected Signature)

PG>
```

<4> When undefined data is read in silicon signature data read

```
PG>RZ↵

ERR32(Undefined Signature)

PG>
```

<5> When the device insert direction is inverted (this occurs only when general-purpose PROM precheck is ON)

```
PG>RZ↵

ERR38(Device insert error)

PG>
```

Phase-out/Discontinued

RS RW RV

(ROM Read) (ROM Write) (ROM Verify)

★ **3.4.3 RR/RW/RV Command input format**

<Input format>

PG>Rx ROM_S_ADR, ROM_E_ADR, PG_S_ADR, CONV

Command	PROM start address	PROM end address	PG-1500 internal memory start address	Address divide mode

Remark x: R/W/V

<Input example>

In the case of any PR command of the following addresses:

PROM start address : 0000H

PROM end address : FFFFH

PG start address : 0000H

↓

PG>RR 0, FFFF, 0, BE

The symbols used for command description have the following meanings.

Symbol	Meaning	Remark
ROM_S_ADR	PROM start address	Input 5-digit hexadecimal number. If 4 digits or less are input, 0 is set to the highest digit. If 6 digits or more, an error results.
ROM_E_ADR	PROM end address	
PG_S_ADR	PG-1500 internal start address	
PG_E_ADR	PG-1500 internal end address	
CONV	Address division mode[Note]. The following modes are available: N Normal (No address divide) BE 16-bit data 2-divide even address specification BO 16-bit data 2-divide odd address specification WE 32-bit data 2-divide even address specification WO 32-bit data 2-divide odd address specification 0 32-bit data 4-divide 0-block specification 1 32-bit data 4-divide 1-block specification 2 32-bit data 4-divide 2-block specification 3 32-bit data 4-divide 3-block specification	Inputs other than those listed on the left result in an error.
↵	RETURN Key input	
RR 0, FFFF, 0, BE (Underlined portion)	Indicates input from keyboard	

Note For device types and specifiable address division modes, see **Table 2-3 Specifiable Address Divide Mode** in **Part II**.

RS RW RV

(ROM Read) (ROM Write) (ROM Verify)

<Abbreviation format>

After inputting commands, the format can be abbreviated for the following parameter conditions. The abbreviated format is described below.

Abbreviated format	Setting condition				
	PROM start address	PROM end address	PG start address	Divide mode	
Rx ROM_S_ADR, ROM_E_ADR, PG_S_ADR, CONV	Address input	Address input	Address input	Input	
Rx ROM_S_ADR, ROM_E_ADR, PG_S_ADR,	Address input	Address input	Address input	N	
Rx ROM_S_ADR, ROM_E_ADR, PG_S_ADR	Address input	Address input	Address input	N	
Rx ROM_S_ADR, ROM_E_ADR,, CONV	Address input	Address input	0	Input	
Rx ROM_S_ADR, ROM_E_ADR,,	Address input	Address input	0	N	
Rx ROM_S_ADR, ROM_E_ADR	Address input	Address input	0	N	
Rx ROM_S_ADR,, PG_S_ADR, CONV	Address input	0	Address input	Input	Note 1
Rx ROM_S_ADR,, PG_S_ADR,	Address input	0	Address input	N	Note 1
Rx ROM_S_ADR,, PG_S_ADR	Address input	0	Address input	N	Note 1
Rx ROM_S_ADR,,, CONV	Address input	0	0	Input	Note 1
Rx ROM_S_ADR,,,	Address input	0	0	N	Note 1
Rx ROM_S_ADR,,	Address input	0	0	N	Note 1
Rx ROM_S_ADR,	Address input	0	0	N	Note 1
Rx ROM-S_ADR	Address input	0	0	N	Note 1
Rx ROM_E_ADR, PG_S_ADR, CONV	0	Address input	Address input	Input	Note 1
Rx , ROM_E_ADR, PG_S_ADR,	0	Address input	Address input	N	
Rx , ROM_E_ADR, PG_S_ADR	0	Address input	Address input	N	
Rx , ROM_E_ADR,, CONV	0	Address input	0	Input	
Rx , ROM_E_ADR,,	0	Address input	0	N	
Rx , ROM_E_ADR	0	Address input	0	N	
Rx ,, PG_S_ADR, CONV	0	0	Address input	Input	
Rx ,, PG_S_ADR,	0	0	Address input	N	
Rx ,, PG_S_ADR	0	0	Address input	N	
Rx ,,, CONV	0	0	0	Input	
Rx ,,,	0	0	0	N	
Rx ,,	0	0	0	N	
Rx ,	0	0	0	N	
Rx	0	Preset ROM_E_ADR[Note2]	0	N	

Notes 1. Because of ROM_S_ADR > ROM_E_ADR, error results.

2. Preselected ROM end address in the CODE mode.

3. ROM end address set by the silicon signature data that was read previously in the READ mode.

4. ROM end address set by the silicon signature data that is read in the AUTO mode.

Remark x: R/W/V

3.4.4 RR (ROM Read) command

The RR command is used to read the specified range of data from the device inserted in the socket into PG-1500 internal memory, allocating the data at the specified start address. After the addresses have been read, verification is performed on all the addresses automatically.

<Execution example>

When
- ROM_S_ADR = 00H
- ROM_E_ADR = FFFFH
- PG_S_ADR = 00H

(1) Upon normal termination (CONV: BE)

```
PG>RR 0,FFFF,0,BE↵

Now , data reading !
Data complete
Check sum : 2BC8

PG>
```

RR
(ROM Read)

(2) If an error occurs in verify operation, the display is made as follows.

(a) When using 8-bits data length ROM

```
PG>RR 0,FFFF,0,W0↵

Now , data reading !
ERR20 Data not completed !!

 Adr          ROM data      RAM data
00000           FFFF          FF00

Continue(Y:Yes/N:No)?
```

(b) When using 16-bits data length ROM

```
PG>RR 0,FFFF,0,N↵

Now , data reading !
ERR20 Data not completed !!

 Adr          ROM data      RAM data
00000           FF            00

Continue(Y:Yes/N:No)?
```

↑

"Continue(Y:Yes/N:No)?" message is displayed.

(3) If [Continue (Y:Yes/N:No)?] message is displayed during execution, input Y or N.
If Y is input, verify is done again at the address following the displayed address.
If N is input, verify is stopped.
If a character other than Y or N is input, message is displayed again.

Phase-out/Discontinued

RR
(ROM Read)

<1> Y input

(a) When compare data is the same after re-execution

```
Continue(Y:Yes/N:No)?Y
Data complete
Check sum : 7D6F

PG>
```

(b) When compare data differs after re-execution

```
Continue(Y:Yes/N:No)?Y
ERR20 Data not completed !!

 Adr          ROM data      RAM data
00010            FF            00

Continue(Y:Yes/N:No)?
```

The message is displayed again.

<2> N input

```
Continue(Y:Yes/N:No)?N

PG>
```

The instruction is stopped.

<3> Input other than Y and N

```
Continue(Y:Yes/N:No)?G
Continue(Y:Yes/N:No)?
```

The message is displayed again.

RR
(ROM Read)

<Error control>

<1> When PROM start address is larger than PROM end address
(ROM_S_ADR>ROM_E_ADR)

```
PG>RR 100,00,0,BE↵

ERR10(START_ADR>END_ADR)

PG>■
```

<2> When PROM end address is larger than PROM size
(ROM_E_ADR>ROM SIZE)

Example: When 75P108 is used (ROM end address = 1FFFH)

```
PG>RR 2000,3FFF,0,N↵

Now, data reading!

ERR11(ROM_S_ADR OR ROM_E_ADR > ROM SIZE)

PG>■
```

<3> When the device inserted into the socket cannot be operated by the selected address divide mode

Example When 8-bit specification is made with a data length 16-bits PROM selected

```
PG>RR 0,1FFF,0,BE↵

Now, data reading!

ERR13(Conversion error)

PG>■
```

<4> When a symbol not in hexadecimal notation is used

```
PG>RR 0,G,0,WE↵

ERR14(Illegal character)

PG>
```

<5> When an inappropriate symbol is used for address divide mode specification

```
PG>RR 0,1FFF,0,R↵

ERR15(Illegal conversion)

PG>
```

<6> When silicon signature data cannot be read

```
PG>RR 0,FF,0,BE↵

ERR30(Signature read error)

PG>
```

<7> When the read silicon signature differs from the preset data

```
PG>RR 0,FF,0,N↵

Now , data reading !

ERR31(Unexpected Signature)

PG>
```

RR

(ROM Read)

<8> When undefined data is read in silicon signature data read

```
PG>RR 0,FF,0,WE↵

Now , data reading !

ERR32(Undefined Signature)

PG>■
```

<9> When the device insert direction is inverted (this occurs only when general-purpose μPD27xxx system precheck is ON)

```
PG>RR 0,3FFF,0,N↵

Now , data reading !

ERR38(Device insert error)

PG>■
```

3.4.5 RW (ROM Write) command

The RW command is intended to write the PG-1500 internal memory data allocated at the specified start address to the unwritten device inserted in the socket, allocating the data to the specified range. Writing (including verification) is performed in accordance with the program mode specified when the RS command is executed.

<Execution example>

When [ROM_S_ADDR=00H
ROM_E_ADDR=FFFFH
PG_S_ADR=00H]

(1) Upon normal termination

```
PG>RW 0,FFFF,0,BE↵

Now , data writing !
Data complete
Check sum : 2BC8

PG>
```

(2) If an error occurs in write operation

```
PG>RW 0,FFFF,0,W0↵

Now , data writing !
ERR2C Write error !!

 Adr          ROM data
00010            FE

Continue(Y:Yes/N:No)?
```

RW
(ROM Write)

(3) If an error occurs in verify operation

(a) When using data length 8-bits ROM

```
PG>RW 0,FFFF,0,N↵

Now , data writing !
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00000            FF            00

Continue(Y:Yes/N:No)?
```

(b) When using data length 16-bits ROM

```
PG>RW 0,FFFF,0,WE↵

Now , data writing !
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00000           FFFF          FF00

Continue(Y:Yes/N:No)?
```

↑

"Continue(Y:Yes/N:No)?" message is displayed.

RW

(ROM Write)

If [Continue (Y:Yes/N:No)?] message is displayed during execution, input Y or N.
If Y is input, write is done again at the address following the displayed address.
If N is input, write is stopped.
If a character other than Y or N is input, message is displayed again.

<1> Y input

(a) When compare data is the same after re-execution

```
Continue(Y:Yes/N:No)?Y
Data complete
Check sum : FFFF

PG>
```

(b) When compare data differs after re-execution

When using data length 8-bits ROM

```
Continue(Y:Yes/N:No)?Y
ERR20 Data not completed !!

 Adr          ROM data      RAM data
00010            FF            00

Continue(Y:Yes/N:No)?
```

When using data length 16-bits ROM

```
Continue(Y:Yes/N:No)?Y
ERR20 Data not completed !!

 Adr          ROM data      RAM data
00010           FFFF          FF00

Continue(Y:Yes/N:No)?
```

The message is displayed again.

RW
(ROM Write)

<2> N input

```
Continue(Y:Yes/N:No)?N

PG>
```

The instruction is stopped.

<3> Input other than Y and N

```
Continue(Y:Yes/N:No)?G
Continue(Y:Yes/N:No)?
```

The message is displayed again.

<Error control>

<1> When PROM start address is larger than PROM end address (ROM_S_ADR>ROM_E_ADR)

```
PG>RW 100,0,0,BE↵

ERR10(START_ADR>END_ADR)

PG>
```

<2> When a symbol not in hexadecimal notation is used

```
PG>RW 0,G,0,WE↵

ERR14(Illegal character)

PG>
```

<3> When PROM end address is larger than PROM size (ROM_E_ADR>ROM SIZE)

Example: When μPD75P108 is used (ROM end address = 1FFFH)

```
PG>RW 0,2000,0,N↵

Now , data writing !

ERR11(ROM_S_ADR OR ROM_E_ADR > ROM SIZE)

PG>
```

<4> When an inappropriate symbol is used for address divide mode specification

```
PG>RW 0,1FFF,0,R↵

ERR15(Illegal conversion)

PG>
```

RW
(ROM Write)

<5> When silicon signature data cannot be read

```
PG>RW 0,FF,0,BE↵

ERR30(Signature read error)

PG>
```

<6> When the read silicon signature data differs from the preset data

```
PG>RW 0,FF,0,N↵

Now , data writing !

ERR31(Unexpected Signature)

PG>
```

<7> When undefined data is read in silicon signature data read

```
PG>RW 0,FF,0,WE↵

Now , data writing !

ERR32(Undefined Signature)

PG>
```

<8> When the device insert direction is inverted (this occurs only when general-purpose PROM precheck is ON)

```
PG>RW 0,3FFF,0,N↵

Now , data writing !

ERR38(Device insert error)

PG>
```

3.4.6 RV (ROM Verify) command

The RV command compares the data in the device inserted in the socket with the PG-1500 internal memory data. It should be executed after execution of the RR or RW command.

<Execution example>

When
```
ROM_S_ADR=00H
ROM_E_ADR=1FFFH
PG_S_ADR=00H
```

(1) Upon normal termination

```
PG>RV 0,1FFF,0,N ↵

Now , data reading !
Data complete
Check sum : 2BC8

PG>
```

RV
(ROM Verify)

(2) If an error occurs in verify operation

(a) When using data length 8-bits ROM

```
PG>RV 0,FFFF,0,N↵

Now , data reading !
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00000            FF            00

Continue(Y:Yes/N:No)?
```

(b) When using data length 16-bits ROM

```
PG>RV 0,FFFF,0,N↵

Now , data reading !
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00000            FFFF          FF00

Continue(Y:Yes/N:No)?
```

↑

"Continue(Y:Yes/N:No)?" message is displayed.

If [Continue (Y:Yes/N:No)?] message is displayed during execution, input Y or N.
If Y is input, verify is done again at the address following the displayed address.
If Y is input, verify is stopped.
If a character other than Y or N is input, message is displayed again.

Phase-out/Discontinued

RV

(ROM Verify)

<1> Y input

(a) When compare data is the same after re-execution

★

```
Continue(Y:Yes/N:No)?Y
Data complete
Check sum : FFFF

PG>
```

(b) When compare data differs after re-execution

When using data length 8-bits ROM

```
Continue(Y:Yes/N:No)?Y
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00010            FF            00

Continue(Y:Yes/N:No)?
```

When using data length 8-bits ROM

```
Continue(Y:Yes/N:No)?Y
ERR22 Data not completed !!

 Adr          ROM data      RAM data
00010           FFFF          FF00

Continue(Y:Yes/N:No)?
```

The message is displayed again.

RV
(ROM Verify)

<2> N input

```
Continue(Y:Yes/N:No)?N

PG>■
```

The instruction is stopped.

<3> Input other than Y and N

```
Continue(Y:Yes/N:No)?G
Continue(Y:Yes/N:No)?
```

The message is displayed again.

<Error control>

<1> When PROM start address is larger than PROM end address (ROM_S_ADR>ROM_E_ADR)

```
PG>RV 100,0,0,BE↵

ERR10(START_ADR>END_ADR)

PG>
```

<2> When a symbol not in hexadecimal notation is used

```
PG>RV 0,G,0,WE↵

ERR14(Illegal character)

PG>
```

<3> When PROM end address is larger than PROM size (ROM_E_ADR>ROM SIZE)

Example When 75P108 is used (ROM end address = 1FFFH)

```
PG>RV 0,2000,0,N↵

Now , data reading !

ERR11(ROM_S_ADR OR ROM_E_ADR > ROM SIZE)

PG>
```

<4> When an inappropriate symbol is used for address divide mode specification

```
PG>RV 0,1FFF,0,R↵

ERR15(Illegal conversion)

PG>
```

RV
(ROM Verify)

<5> When silicon signature data cannot be read

```
PG>RV 0,FF,0,BE↵

ERR30(Signature read error)

PG>
```

<6> When the read silicon signature data differs from the preset data

```
PG>RV 0,FF,0,N↵

Now , data reading !

ERR31(Unexpected Signature)

PG>
```

<7> When undefined data is read in silicon signature data read

```
PG>RV 0,FF,0,WE↵

Now , data reading !

ERR32(Undefined Signature)

PG>
```

<8> When the device insert direction is inverted (this occurs only when general-purpose PROM precheck is ON)

```
PG>RV 0,3FFF,0,N↵

Now , data reading !

ERR38(Device insert error)

PG>
```

3.4.7 MC (Memory change) command

The MC command is used to change the PG-1500 internal memory data.

<Input format>

```
PG>MC PG_S_ADR ↵
```

PA_S_ADR: PG-1500 internal memory start address

<Execution example>

[PG_S_ADR=100H]

```
PG>MC 100↵

00100 FF-
```

The following can be input in this status.

Input	Function
Hexadecimal 2-digit data	Data change
Space key	Display shifts to the next address data without data change
RETURN key	End of data change

★

<1> When data is changed

(Data at address 100H is changed to 00 and data at address 101H is changed to 01)

```
PG>MC 100↵

00100 FF-00 FF-01↵

PG>■
```

<2> When data is not changed

```
PG>MC 100↵

00100 FF-FF FF-FF FF-↵

PG>■
```

MC
(Memory Change)

<Abbreviated format>

When a command is used, an abbreviated input format can be used for the following setting.

Input	PG_S_ADR
MC PG_S_ADR	Address input
MC	0

<Error control>

<1> When a symbol not in hexadecimal notation is input

```
PG>MC 000H↵

ERR14(Illegal character)

PG>
```

<2> When the PG-1500 internal memory start address is larger than the PG-1500 internal memory size (PG_S_ADR>PG_BUFF_SIZE)

```
PG>MC FFFFF↵

ERR12(PG_BUFF_SIZE over)

PG>
```

3.4.8 MD (Memory dump) command

The MD command is used to display data in the range specified within the PG-1500 internal memory.

<Input format>

```
PG>MD PG_S_ADR, PG_E_ADR ↵
```

PG_S_ADR: PG-1500 internal memory start address

PG_E_ADR: PG-1500 internal memory end address

The following key inputs are valid during data display after instruction execution.

Input key	Function
CTRL-S	Display suspend
CTRL-Q	Display resume
Space key	Display stop
CTRL-C	Display stop

MD
(Memory Dump)

<Execution example>

When [PG_S_ADR=00H, PG_E_ADR=FFH]

```
PG>MD 0,FF↵

 PG A +0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +A +B +C +D +E +F
00000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

PG>■
```

<Abbreviated format>

When a command is input, an abbreviated input format can be used for the following setting.

Input Format	PG_S_ADR	PG_E_ADR	
MD PG_S_ADR, PG_E_ADR	Address input	Address input	
MD, PG_E_ADR	0	Address input	
MD PG_S_ADR,	Address input	0	Note
MD PG_S_ADR	Address input	Address input + 0FFH	
MD,	0	0	
MD	0	0FFH	

Note Because PG_S_ADR>PG_E>ADR, an error results.

MD
(Memory Dump)

<Error control>

<1> When the PG-1500 internal memory start address is larger than the end address (PG_S_ADR>PG_E_ADR)

```
PG>MD 100,0↵

ERR10(START_ADR>END_ADR)

PG>
```

<2> When the PG-1500 internal memory end address is larger than the PG-1500 internal memory size (PG_E_ADR>PG_BUFF_SIZE)

```
PG>MD 0,FFFFF↵

ERR12(PG_BUFF_SIZE over)

PG>
```

<3> When a symbol not in hexadecimal notation is input

```
PG>MD 0,G↵

ERR14(Illegal character)

PG>
```

MF
(Memory Fill)

3.4.9 MF (Memory fill) command

The MF command is used to initialize the PG-1500 internal memory contents with the specified data.
The specified range can be initialized.

<Input format>

```
PG>MF PG_S_ADR, PG_E_ADR, INT_DATA ↵
```

PG_S_ADR : PG-1500 internal memory start address
PG_E_ADR : PG-1500 internal memory end address
INT_DATA : Initialize data

<Execution example>

When
```
PG_S_ADR=00H
PG_E_ADR=FFFFH
INT_DATA=FFH
```

```
PG>MF 0,FFFF,FF ↵

PG>■
```

<Abbreviated format>

When a command is input, an abbreviated input format can be used for the following setting.

Input	PG_S_ADR	PG_E_ADR	INT_DATA	
MF PG_S_ADR, PG_E_ADR, INT_DATA	Address input	Address input	Data input	
MF PG_S_ADR, PG_E_ADR,	Input format error ERROR (Command syntax)			
MF PG_S_ADR,, INT_DATA	Address input	0	Data input	Note
MF PG_S_ADR,,	Input format error ERROR (Command syntax)			
MF PG_S_ADR,	Input format error ERROR (Command syntax)			
MF PG_S_ADR	Input format error ERROR (Command syntax)			
MF , PG_E_ADR, INT_DATA	0	Address input	Data input	
MF , PG_E_ADR,	Input format error ERROR (Command syntax)			
MF , PG_E_ADR	Input format error ERROR (Command syntax)			
MF ,, INT_DATA	0	0	Data input	
MF ,,	Input format error ERROR (Command syntax)			
MF ,	Input format error ERROR (Command syntax)			
MF	Input format error ERROR (Command syntax)			

Note Because PG_S_ADR>PG_E_ADR, an error results.

MF
(Memory Fill)

<Error control>

<1> When the PG-1500 internal memory start address is larger than the end address (PG_S_ADR>PG_E_ADR)

```
PG>MF 1FFF,1FFE,0↵

ERR10(START_ADR>END ADR)

PG>
```

<2> When the PG-1500 internal memory end address is larger than the PG-1500 internal memory size (PG_E_ADR>PG_BUFF_SIZE)

```
PG>MF 0,FFFFF,FF↵

ERR12(PG BUFF SIZE over)

PG>
```

<3> When a symbol not in hexadecimal notation is input

```
PG>MF 0,GG,RR↵

ERR14(Illegal character)

PG>
```

PI
(Parallel Intel)

3.4.10 PI (Parallel Intel) command

The PI command is used to input parallel data in the INTELLEC HEX format.

When executing the PI command, the PG-1500 should be connected to the external machine by a parallel interface cable.

<Input format>

```
PG>PI↵
```

<Execution example>

Data file name: TEST.HEX

```
PG>PI↵

A>COPY TEST.HEX prn
        one file was copied.

A>
```

PG>PI is displayed and the PG-1500 is set to the parallel input status.

Exit from the terminal mode is marked by the dotted frame.

The procedure to exit from the terminal mode differs depending on the type of external device.

3.4.11 PM (Parallel Motorola) command

The PM command is used to input parallel data in the MOTOROLA EXORCISER format.

When executing the PM command, the PG-1500 should be connected to the external machine by a parallel interface cable.

<Input format>

```
PG>PM ↵
```

<Execution example>

Data file name: TEST.HEX

```
PG>PM ↵
┌----------------------------------------┐
¦                                        ¦
¦                                        ¦
¦                                        ¦
└----------------------------------------┘
A>COPY TEST.HEX prn
        one file was copied.

A>■
```

PG>PM is displayed and the PG-1500 is set to the parallel input status.

Exit from the terminal mode is marked by the dotted frame.

The procedure to exit from the terminal mode differs depending on the type of external device.

PT

(Parallel TEK)

3.4.12 PT (Parallel TEK) command

The PT command is used to input parallel data in the EXTENDED TEKHEX format.

When executing the PT command, the PG-1500 should be connected to the external machine by a parallel interface cable.

<Input format>

```
PG>PT ↵
```

<Execution example>

Data file name: TEST.HEX

```
PG>PT ↵

A>COPY TEST.HEX prn
        one file was copied.

A>█
```

PG>PT is displayed and the PG-1500 is set to the parallel input status.

Exit from the terminal mode is marked by the dotted frame.

The procedure to exit from the terminal mode differs depending on the type of external device.

3.4.13 LI (Load Intel) command

The LI command is used to input serial data in the INTELLEC HEX format.

★ This command transfers to the PG-1500 internal memory the data inside the memory of the NEC in-circuit emulator.

<Input format>

```
PG>LI ↵
```

<Execution example>

When transferring the IE-75000-R contents at addresses 00H to FFH to the PG-1500

```
brk:0>PGM ↵

PG>LI ↵

 partition=0,FF ↵

PG>
```

<Error control>

<1> When a parameter is attached after LI

```
PG>LI 0,1FFF ↵

ERR16(Command syntax error)

PG>
```

<2> When serial is disconnected

```
PG>LI ↵

ERR40(Serial not ready)

PG>
```

Caution The LI command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the LI command.

LM
(Load Motorola)

3.4.14 LM (Load Motorola) command

The LM command is used to input serial data in the MOTOROLA EXORCISER format.

★ This command transfers to the PG-1500 internal memory the data inside the memory of the NEC in-circuit emulator.

<Input format>

```
PG>LM↵
```

<Error control>

<1> When a parameter is attached after LM

```
PG>LM 0,1FFF↵

ERR16(Command syntax error)

PG>
```

<2> When serial is disconnected

```
PG>LM↵

ERR40(Serial not ready)

PG>
```

Cautions 1. The LM command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the LM command.

★ **2. The MOTOROLA EXORCISER format is not supported in some in-circuit emulators.**

3.4.15 LT (Load TEK) command

The LT command is used to input serial data in EXTENDED TEKHEX format.

★ This command transfers to the PG-1500 internal memory the data inside the memory of the NEC in-circuit emulator.

<Input format>

```
PG>LT ↵
```

<Error control>

<1> When a parameter is attached after LT

```
PG>LT 0,1FFF ↵

ERR16(Command syntax error)

PG>
```

<2> When serial is disconnected

```
PG>LT ↵

ERR40(Serial not ready)

PG>
```

Cautions 1. The LT command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the LT command.

★ **2. The EXTENDED TEKHEX format is not supported in some in-circuit emulators.**

SI
(Serial Intel)

3.4.16 SI (Serial Intel) command

★ The SI command is used to serially transfer the data within the specified range of the PG-1500 internal memory to the memory of the NEC in-circuit emulator in the INTELLEC HEX format.

<Input format>

```
PG>SI PG_S_ADR, PG_E_ADR ↵
```

PG_S_ADR : PG-1500 internal memory start address
PG_E_ADR : PG-1500 internal memory end address

<Execution example>

When [PG_S_ADR=00H, PG_E_ADR=FFH]

★

```
PG>SI 0,FF ↵

PG>
```

<Abbreviated format>

When a command is used, an abbreviated input format can be used for the following setting.

Input Format	PG_S_ADR	PG_E_ADR
SI PG_S_ADR, PG_E_ADR	Address input	Address input
SI, PG_E_ADR	0	Address input
SI PG_S_ADR,	Address input	0 Note
SI PG_S_ADR	Address input	Address input + 0FFH
SI,	0	0
SI	0	FFH

Note Because PG_S_ADR>PG_E_ADR, an error results.

Phase-out/Discontinued

<Error control>

<1> When the PG-1500 internal memory start address is larger than the end address (PG_S_ADR>PG_E_ADR)

```
PG>SI 100,0↵

ERR10(START_ADR>END_ADR)

PG>
```

<2> When the PG-1500 internal memory end address is larger than the PG-1500 internal memory size (PG_E_ADR>PG_BUFF_SIZE)

```
PG>SI 0,FFFFF↵

ERR12(PG_BUFF_SIZE over)

PG>
```

<3> When a symbol not in hexadecimal notation is input

```
PG>SI 0,G↵

ERR14(Illegal character)

PG>
```

Caution The SI command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the SI command.

SM
(Serial Motorola)

3.4.17 SM (Serial Motorola) command

★ The SM command is intended to serially transfer the data within the specified range of the PG-1500 internal memory to the memory of the NEC in-circuit emulator in the MOTOROLA EXORCISER format.

<Input format>

```
PG>SM PG_S_ADR, PG_E_ADR↵
```

PG_S_ADR: PG-1500 internal memory start address
PG_E_ADR: PG-1500 internal memory end address

<Execution example>

When [PG_S_ADR=00H, PG_E_ADR=FFH]

```
PG>SM 0,FF↵

PG>
```

<Error control>

<1> When the PG-1500 internal memory start address is larger than the end address (PG_S_ADR>PG_E_ADR)

```
PG>SM 100,0↵

ERR10(START_ADR>END_ADR)

PG>
```

<2> When the PG-1500 internal memory end address is larger than the PG-1500 internal memory size (PG_E_ADR>PG_BUFF_SIZE)

```
PG>SM 0,FFFFF↵

ERR12(PG_BUFF_SIZE over)

PG>
```

<3> When a symbol not in hexadecimal notation is input

```
PG>SM 0,G↵

ERR14(Illegal character)

PG>■
```

Cautions 1. The SM command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the SM command.

★ **2. The MOTOROLA EXORCISER format is not supported in some in-circuit emulators.**

<Abbreviated format>

When a command is used, an abbreviated input format can be used for the following setting.

Input Format	PG_S_ADR	PG_E_ADR
SM PG_S_ADR, PG_E_ADR	Data input	Data input
SM, PG_E_ADR	0	Data input
SM PG_S_ADR,	Data input	0 Note
SM PG_S_ADR	Data input	Data input + 0FFH
SM,	0	0
SM	0	FFH

Note Because PG_S_ADR>PG_E_ADR, an error results.

ST
(Serial TEK)

3.4.18 ST (Serial TEK) command

★ The ST command is used to serially transfer the data within the specified range of the PG-1500 internal memory to the memory of the NEC in-circuit emulator in the EXTENDED TEKHEX format.

<Input format>

```
PG>ST PG_S_ADR, PG_E_ADR ↵
```

PG_S_ADR: PG-1500 internal memory start address
PG_E_ADR: PG-1500 internal memory end address

<Execution example>

When [PG_S_ADR=00H, PG_E_ADR=FFH]

```
PG>ST 0,FF↵

PG>■
```

<Abbreviated format>

When a command is used, an abbreviated input format can be used for the following setting.

Input Format	PG_S_ADR	PG_E_ADR	
ST PG_S_ADR, PG_E_ADR	Address input	Address input	
ST, PG_E_ADR	0	Address input	
ST PG_S_ADR,	Address input	0	Note
ST PG_S_ADR	Address input	Address input + 0FFH	
ST,	0	0	
ST	0	FFH	

Note Because PG_S_ADR>PG_E_ADR, an error results.

<Error control>

<1> When the PG-1500 internal memory start address is larger than the end address (PG_S_ADR>PG_E_ADR)

```
PG>ST 100,0↵

ERR10(START_ADR>END_ADR)

PG>■
```

<2> When the PG-1500 internal memory end address is larger than the PG-1500 internal memory size (PG_E_ADR>PG_BUFF_SIZE)

```
PG>ST 0,FFFFF↵

ERR12(PG_BUFF_SIZE over)

PG>
```

<3> When a symbol not in hexadecimal notation is input

```
PG>ST 0,G↵

ERR14(Illegal character)

PG>
```

Cautions 1. The ST command uses a simplified protocol as the communication procedure. Thus, communication with a personal computer cannot be carried out using the ST command.

★ **2. The EXTENDED TEKHEX format is not supported in some in-circuit emulators.**

??
(Help)

3.4.19 ?? (Help) command

The ?? command is intended to display the types of instructions and their input methods in the remote control mode.

<Input format>

```
PG>??↵
```

<Execution example>

```
PG>??↵

 1. RR rom_st,rom_end,pg_st,conv
 2. RS[C R A]
 3. RV rom_st, rom_end, pg_st, conv
 4. RW rom_st, rom_end, pg_st, conv
 5. RZ
 6. MC pg_st
 7. MD pg_st, pg_end
 8. MF pg_st, pg_end, init_data
 9. PI                {PM,PT}
10. LI                {LM,LT}
11. SI pg_st, pg_end  {SM,ST}

    conv      :N,BE,B0,WE,W0,0,1,2,3
    rom_st    :0-7FFFF
    rom_end   :0-7FFFF
    pg_st     :0-7FFFF
    init_data:0-FF
```

CHAPTER 4. SIMPLE OPERATION EXAMPLES

The following operation procedures in standalone mode and remote control mode are shown in this chapter.

4.1 Standalone Mode

4.1.1 Data Read from Master ROM to PG-1500 Internal Memory

(1) Procedure for data read from general-purpose PROM to PG-1500 internal memory

(2) Procedure for data read from 75X series on-chip PROM product to PG-1500 internal memory

(3) Procedure for data read from 78K/II series on-chip PROM product to PG-1500 internal memory

4.1.2 Data Write from PG-1500 Internal Memory to Blank ROM

(1) Procedure for data write from PG-1500 internal memory to general-purpose PROM

(2) Procedure for data write from PG-1500 internal memory to 75X series on-chip PROM product

(3) Procedure for data write from PG-1500 internal memory to 78K/II series on-chip PROM product

4.1.3 Changing PG-1500 Internal Memory Data

4.1.4 Verify Check

4.1.5 Split Write to Two PROMs of PG-1500 Internal Memory Data

4.1.6 Data Transfer from External Machine to PG-1500

4.1.7 Data Transfer from PG-1500 to External Machine

4.2 Remote Control Mode

4.2.1 Outline of Operations Using NEC In-Circuit Emulator

4.2.2 Data Write from In-Circuit Emulator to Blank ROM

4.2.3 Data Read from Master ROM to In-Circuit Emulator

4.2.4 Data Transfer from External Machine to PG-1500 via Parallel Interface

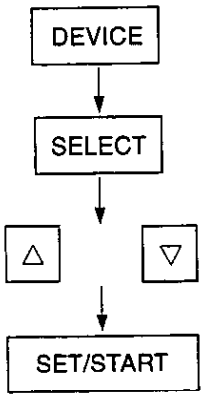
4.1 Standalone Mode

4.1.1 Data read from master ROM to PG-1500 internal memory

(1) Procedure for data read from general-purpose PROM to PG-1500 internal memory

Example	Master ROM	μPD27C1001A
	Device selection method	READ mode
	PROM start address	00000H
	PROM end address	1FFFFH
	Internal memory start address	00000H
	Address division mode	NORMAL

<1> Select the device.
Connect the 27A board to the PG-1500. After power has been turned on and the initial test has been performed, insert the μPD27C1001A in the 32-pin PROM socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

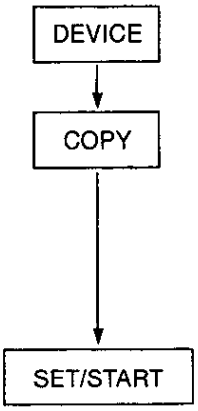
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ      μPD27C1001A
```

Remark If AUTO mode or CODE mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Read the master ROM data into the PG-1500 internal memory.



Set DEVICE mode.

Select the COPY command.

Check the following is displayed on the LCD:

```
00000:1FFFF  00000
COPY  READ   NORMAL
```

Read the ROM contents.

When the COPY command terminates normally, the following is displayed:

```
00000:1FFFF   00000
COPY OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The general-purpose PROM data has been read into the PG-1500 internal memory.

(2) Procedure for data read from 75X Series on-chip PROM product to PG-1500 internal memory

Example

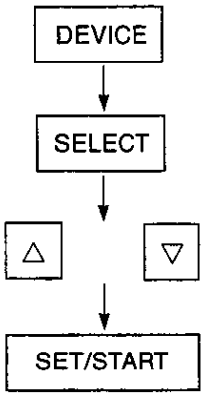
Master ROM	μPD27P308GF
Device selection method	READ mode
PROM start address	00000H
PROM end address	01F7FH
Internal memory start address	00000H
Address division mode	NORMAL[Note]

Note When a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified.

<1> Select the device.

Connect the 04A board to the PG-1500, and connect the PROM programmer adapter (PA-75P308GF) to this board.

After power has been turned on and the initial test has been performed, insert the μPD75P308GF in the PROM programmer adapter socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

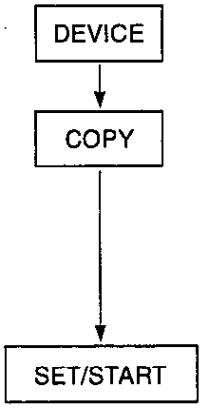
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ     D75P308
```

Remark If AUTO mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Read the master ROM data into the PG-1500 internal memory.



Set DEVICE mode.

Select the COPY command.

Check the following is displayed on the LCD:

```
00000:01F7F  00000
COPY  READ   NORMAL
```

Read the ROM contents.

When the COPY command terminates normally, the following is displayed:

```
00000:01F7F   00000
COPY OK ■■■■ NORMAL
        Checksum Value
```

The 75X Series on-chip PROM version data has been read into the PG-1500 internal memory.

(3) Procedure for data read from 78K/II Series on-chip PROM product to PG-1500 internal memory

Example

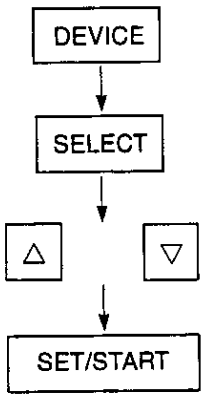
Master ROM	μPD78P214CW
Device selection method	READ mode
PROM start address	00000H
PROM end address	03FFFH
Internal memory start address	00000H
Address division mode	NORMAL[Note]

Note When a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified.

<1> Select the device

Connect the 27A board to the PG-1500, and connect the PROM programmer adapter (PA-78P214CW) to this board.

After power has been turned on and the initial test has been performed, insert the μPD78P214CW in the PROM programmer adapter socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

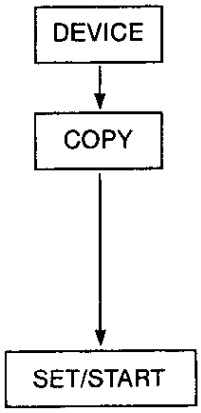
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ      D78P214
```

Remark If AUTO mode or CODE mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Read the master ROM data into the PG-1500 internal memory.



Set DEVICE mode.

Select the COPY command.

Check the following is displayed on the LCD:

```
0000Q:03FFF  00000
COPY  READ   NORMAL
```

Read the ROM contents.

When the COPY command terminates normally, the following is displayed:

```
0000Q:03FFF   00000
COPY OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The 78K/II Series on-chip PROM version data has been read into the PG-1500 internal memory.

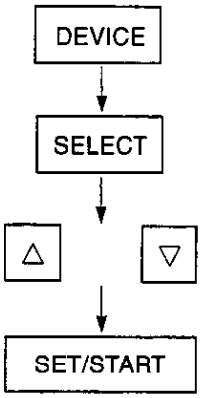
4.1.2 Data write from PG-1500 internal memory to blank ROM

(1) Procedure for data write from PG-1500 internal memory to general-purpose PROM

Example	Blank ROM	μPD27C1001A
	Device selection method	READ mode
	PROM start address	00000H
	PROM end address	1FFFFH
	Internal memory start address	00000H
	Address division mode	NORMAL

It is assumed that data has already been read into the PG-1500 internal memory (see **Section 4.1.1 Data Read from Master ROM to PG-1500 Internal Memory**).

<1> Select the device.
Connect the 27A board to the PG-1500.
Insert the μPD27C1001A in the 32-pin PROM socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

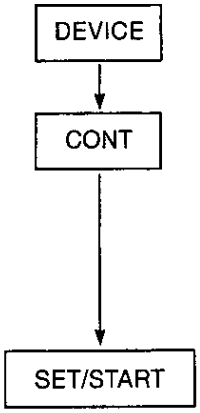
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ     μPD27C1001A
```

Remark If AUTO mode or CODE mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Write the PG-1500 internal memory data to the blank ROM.
The CONT command is used here to perform the following series of operations: blank check → ROM write → verify check.



Set DEVICE mode.

Select the CONT command.

Check that the following is displayed on the LCD:

```
00000:1FFFF  00000
CONT  READ   NORMAL
```

Start the blank check.
The ROM write and verify check are then executed.

When this series of operations terminates normally, the following is displayed:

```
00000:1FFFF   00000
CONT OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The PG-1500 internal memory data has been written to the general-purpose PROM.

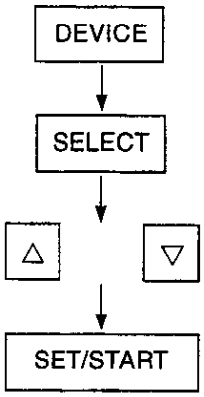
(2) Procedure for data write from PG-1500 internal memory to 75X Series on-chip PROM product

Example	Blank ROM	μPD75P308GF
	Device selection method	READ mode
	PROM start address	00000H
	PROM end address	01F7FH
	Internal memory start address	00000H
	Address division mode	NORMAL[Note]

Note When a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified.

It is assumed that data has already been read into the PG-1500 internal memory (see Section **4.1.1 Data Read from Master ROM to PG-1500 Internal Memory**).

<1> Select the device.
Connect the 04A board to the PG-1500, and connect the PROM programmer adapter (PA-75P308GF) to this board. Insert the μPD75P308GF in the PROM programmer adapter socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

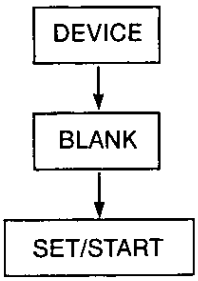
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ      D75P308
```

Remark If AUTO mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Check whether the device is blank.



Set DEVICE mode.

Select the BLANK command.

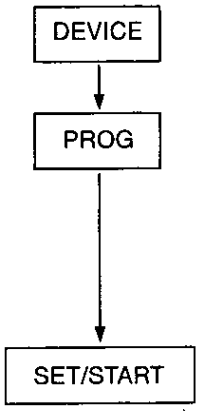
Start the blank check.

When the blank check terminates normally, the following is displayed:

```
BLNK  OK
```

If the result is not OK, replace the device with another one, and repeat the blank check.

<3> Write the PG-1500 internal memory data to the blank PROM.



Set DEVICE mode.

Select the PROG command.

Check that the following is displayed on the LCD:

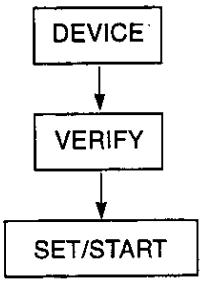
```
00000:01F7F  00000
PROG  READ   NORMAL
```

Write the data to the ROM.

When the write terminates normally, the following is displayed:

```
00000:01F7F   00000
PROG OK ■■■■ NORMAL
        └──┘
      Checksum Value
```

<4> Compare the written ROM contents with the contents of the PG-1500 internal memory.



Set DEVICE mode.

Select the VERIFY command.

Start the verify check.

When the verify check terminates normally, the following is displayed:

```
00000:01F7F   00000
VERI OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The PG-1500 internal memory data has been written to the 75X Series on-chip PROM version.

Remark The CONT command can also be used, which performs the following series of operations: blank check, ROM write, verify check.

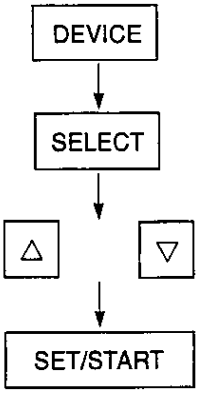
(3) Procedure for data write from PG-1500 internal memory to 78K/II Series on-chip PROM product

Example	Blank ROM	μPD78P214CW
	Device selection method	READ mode
	PROM start address	00000H
	PROM end address	03FFFH
	Internal memory start address	00000H
	Address division mode	NORMAL[Note]

Note When a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified.

It is assumed that data has already been read into the PG-1500 internal memory (see **4.1.1 Data Read from Master ROM to PG-1500 Internal Memory**).

<1> Select the device.
Connect the 27A board to the PG-1500, and connect the PROM programmer adapter (PA-78P214CW) to this board. Insert the μPD78P214CW in the PROM programmer adapter socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

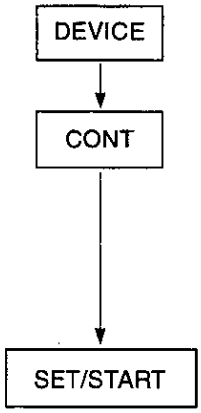
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ      D78P214
```

Remark If AUTO mode or CODE mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Write the PG-1500 internal memory data to the blank ROM.
The CONT command is used here to perform the following series of operations: blank check → ROM write → verify check.



Set DEVICE mode.

Select the CONT command.

Check that the following is displayed on the LCD:

```
0000Q:03FFF  00000
CONT  READ   NORMAL
```

Start the blank check.
The ROM write and verify check are then executed.

When this series of operations terminates normally, the following is displayed:

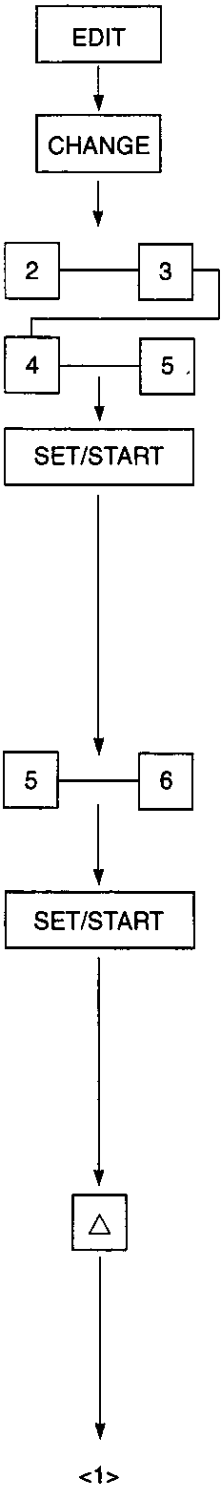
```
0000Q:03FFF   00000
CONT OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The PG-1500 internal memory data has been written to the 78K/II Series on-chip PROM version.

4.1.3 Changing PG-1500 internal memory data

It is assumed that data has already been read into the PG-1500 internal memory (see **4.1.1 Data Read from Master ROM to PG-1500 Internal Memory**).

	Address	Data before Change		Data after Change
Examples 1.	02345	C7	→	56
2.	02347	66	→	57



Set EDIT mode.

Select the CHANGE command.

Input the address of the location to be changed using the numeric keys.
(Example 1: 2345)

The data corresponding to the input address value is displayed above the cursor.
The display is as follows:

```
02340:EE  B5  A4  AA  13
02345:C7  84  66  D2  FA
      ⌊
Data in Address 2345
```

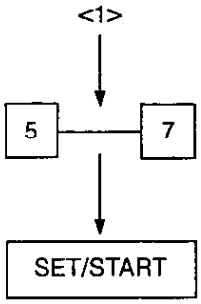
Input the data to be changed to, using the numeric keys.
(Example 1: 56)

The data is changed, and the following is displayed:

```
          Data in Address 2345
                ⌐
02341:B5  A4  AA  13  56
02346:84  66  D2  FA  9C
      ⌊
Data in Address 2346
```

Move the cursor to the address of the data to be changed.
(Example 2: 2347)

```
02342:A4  AA  13  56  84
02347:66  D2  FA  9C  BB
      ⌊
Data in Address 2347
```



Input the data to be changed to, using the numeric keys.
(Example 1: 57)

The data is changed, and the following is displayed:

```
                Data in Address 2347
                                ┌┐
 02343:AA  13  56  84  57
 02348:D2  FA  9C  BB  DD
          └┘
Data in Address 2348
```

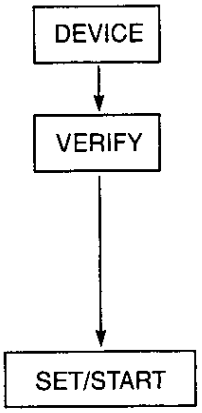
When the change is completed, exit the CHANGE command using the DEVICE, EDIT, FUNCTION, or RESET key. The PG-1500 internal memory data has been changed.

4.1.4 Verify check

The procedure for checking whether the data written in the device matches the contents of the PG-1500 internal memory is shown below.

Example

Programmed ROM	μPD27C1001A
ROM code	10D6
Device selection method	READ mode
PROM start address	00000H
PROM end address	1FFFFH
Internal memory start address	00000H
Address division mode	NORMAL



Set DEVICE mode.

Select the VERIFY command.

Check that the following is displayed on the LCD:

```
00000:1FFFF  00000
VERI  READ   NORMAL
```

Start the verify check.

When the verify check terminates normally, the following is displayed:

```
00000:1FFFF   00000
VERI OK ■■■■ NORMAL
        └──┘
     Checksum Value
```

The verify check is now terminated.

4.1.5 Split write to two PROMs of PG-1500 internal memory data

The procedure for writing data read into the PG-1500 internal memory to two PROMs, divided between odd addresses and even addresses, is described below.

An example of a split write of 16-bit data is shown below.

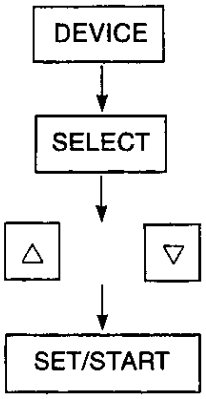
Example	Blank ROM	μPD27C1001A × 2
	Device selection method	READ mode
	PROM start address	00000H
	PROM end address	1FFFFH
	Internal memory start address	00000H
	Address division mode	16EVN, 16ODD

It is assumed that data has already been read into the PG-1500 internal memory (see Section **4.1.1 Data Read from Master ROM to PG-1500 Internal Memory**).

<1> Select the device.

Connect the 27A board to the PG-1500.

Insert a μPD27C1001A in the 32-pin PROM socket.



Set DEVICE mode.

Select the SELECT command.

Move the cursor to [READ].

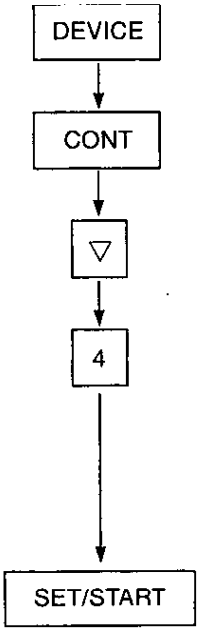
The silicon signature data is read from the device, and the write conditions are set in accordance with this data.

When the above read and settings terminate normally, the following is displayed for 1 second:

```
READ      μPD27C1001A
```

Remark If AUTO mode or CODE mode is used as the device selection method, see Section **2.4.2 Device Selection (SELECT)**.

<2> Write only the data corresponding to the even addresses of the PG-1500 internal memory to the blank ROM. The CONT command is used here to perform the following series of operations: blank check → ROM write → verify check.



Set DEVICE mode.

Select the CONT command.

Move the cursor to the address division mode.

Set the address division mode to [16EVN].

Check that the following is displayed on the LCD:

```
00000:1FFFF  00000
CONT  READ    16EVN
```

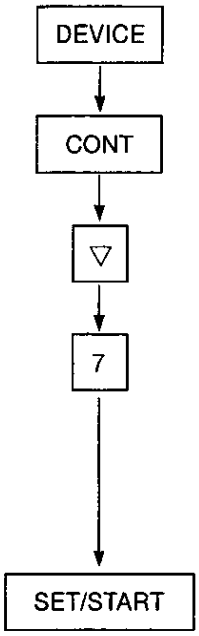
Start the blank check.
The ROM write and verify check are then executed.

When this series of operations terminates normally, the following is displayed:

```
00000:1FFFF   00000
CONT OK ■■■■  16EVN
        └──┘
      Checksum Value
```

<3> Remove the written ROM, and insert the blank ROM in the 32-pin PROM socket.

<4> Write only the data corresponding to the odd addresses of the PG-1500 internal memory to the blank ROM.
The CONT command is used here to perform the following series of operations: blank check → ROM write → verify check.



Set DEVICE mode.

Select the CONT command.

Move the cursor to the address division mode.

Set the address division mode to [16ODD].

Check that the following is displayed on the LCD:

```
00000:1FFFF  00000
CONT  READ    16ODD
```

Start the blank check.
The ROM write and verify check are then executed.

When this series of operations terminates normally, the following is displayed:

```
00000:1FFFF   00000
CONT OK ■■■■  16ODD
        └──┘
      Checksum Value
```

The split-write of the PG-1500 internal memory data to the two PROMs is completed.

4.1.6 Data transfer from external machine to PG-1500

The procedure for transferring a data file on an external machine to the PG-1500 internal memory using an RS-232-C cable is shown below.

Example	External Machine	PC-9800 Series
	OS	MS-DOS
	Transfer file name	TEST.HEX
	Transfer data format	INTELLEC
	Baud rate	9600
	Parity	None
	XON/XOFF	ON
	Character length	8
	Stop bits	2

<1> Connect the PC-9800 to the PG-1500 using an RS-232-C cable.

<2> Perform PC-9800 internal settings.

PC-9800 Display

```
A>SPEED R0 9600 B8 PN S2 XON↵
A>■
```

<3> Perform PG-1500 internal settings.

FUNCTION — Set FUNCTION mode.

↓

MODE — Select the MODE command.

Change the baud rate, parity, XON/XOFF, character length, and stop bit settings as shown in the following display.

```
BR: 9600  P:NON  XN:ON
MODE  B:8  SB:2  PC:OF
```

Use △ to move the cursor, and ▽ to change the setting.

↓

SET/START — Set when the display is as shown above.

<4> Set the PG-1500 to the data input wait state.

FUNCTION — Set FUNCTION mode.

↓

S-IN — Select the S-IN command.

Check that the following is displayed on the LCD:

```
S-IN  FMT: INTELLEC
```

If the data format to be used is not INTELLEC, use the △ or ▽ key to change the setting.

↓

SET/START — The PG-1500 enters the data input wait state and [*] flashes.

<5> Send the data file from the PC-9800.

PC-9800 Display

```
A>COPY TEST.HEX AUX↵
     1 file has been copied.

A>■
```

<6> When the transfer ends, the PG-1500 displays the following:

```
S-IN  OK   INTELLEC
```

The external machine data has been transferred to the PG-1500.

4.1.7 Data transfer from PG-1500 to external machine

The procedure for transferring PG-1500 internal memory data to an external machine using an RS-232-C cable is shown below.

Example	External Machine	PC-9800 Series
	OS	MS-DOS
	Transfer file name	TEST.HEX
	Transfer range	3000H to 4FFFH
	Transfer data format	INTELLEC
	Baud rate	9600
	Parity	None
	XON/XOFF	ON
	Character length	8
	Stop bits	2

<1> Connect the PC-9800 to the PG-1500 using an RS-232-C cable.

<2> Perform PC-9800 internal settings, then set the input wait state.

PC-9800 Display

```
A>SPEED R0 9600 B8 PN S2 XON↵
A>■
```

★

<3> Perform PG-1500 internal settings.

FUNCTION — Set FUNCTION mode.

↓

MODE — Select the MODE command.

Change the baud rate, parity, XON/XOFF, character length, and stop bit settings as shown in the following display.

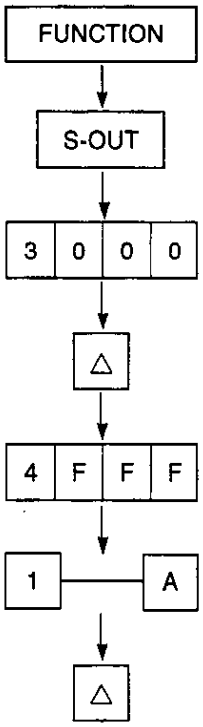
```
BR:  9600  P:NON  XN:ON
 MOVE  B:8  SB:2  PC:OF
```

Use △ to move the cursor, and ▽ to change the setting.

↓

SET/START — Set when the display is as shown above.

★ <4> Set data transfer conditions from PG-1500.



Set FUNCTION mode.

Select the S-OUT command.

Set the internal memory start address to 3000H.

Move the cursor.

Set the internal memory end address to 4FFFH.

Set the EOF code.

Set the transfer data format to <INTELLEC>.

★ <5> Set the PC-9800 to input wait.

PC-9800 Display

```
A>COPY AUX TEST.HEX↵
```

★ <6> Data transfer start from the PG-1500.

SET/START

Data transfer is started, and [*] flashes.

```
  03000:04FFF  1A
 *SOUT  FMT: INTELLEC
```

When the transfer ends, the PG-1500 displays the following:

```
  03000:04FFF  1A
  SOUT  OK  INTELLEC
```

The PC-9800 displays the following:

PC-9800 Display

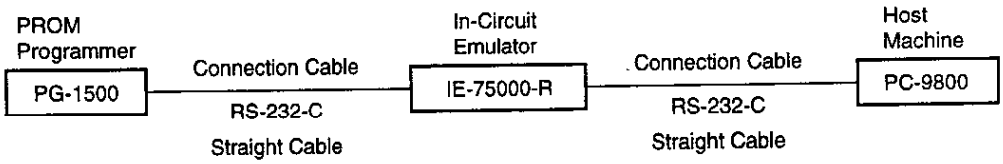
```
        1 file has been copied.
A>■
```

The PG-1500 data has been transferred to the external machine.

4.2 Remote Control Mode

4.2.1 Outline of operations using NEC in-circuit emulator

This section outlines operations when a PC-9800 series model is used as the host machine, and an NEC IE-75000-R in-circuit emulator is connected. The description given here assumes that the IE-75000-R and PC-9800 are already connected. Please refer to the in-circuit emulator User's Manual for how to connect the host machine and in-circuit emulator.



The procedure for performing operations using the IE-75000-R is as follows:

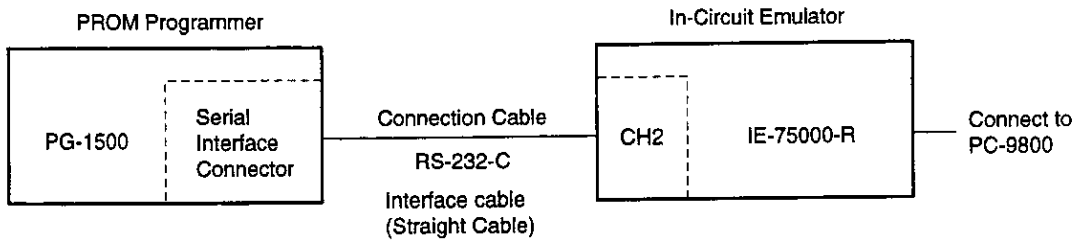
(1) Power off each unit.
(2) Connect the PG-1500 to the IE-75000-R with a cable.
(3) Set the IE-75000-R's interface with the PG-1500 (channel 2).
(4) Power on each unit.
(5) Set the PG-1500's interface with the IE-75000-R.
(6) Start the IE-75000-R control program.
(7) Set the PG-1500 to remote control mode.
(8) Start PG-1500 remote operation (PGM mode).
(9) Execute a PG-1500 command.
(10) Terminate PG-1500 remote operation (PGM mode).
(11) Terminate PG-1500 remote control mode.
(12) Terminate the IE-75000-R control program.
(13) Power off each unit.

(1) Power off each unit

The power of each unit should be off before starting the connection procedure. If the PG-1500, IE-75000-R and PC-9800 are powered on, first power them off.

(2) Connect the PG-1500 to the IE-75000-R with a cable

Connect the serial interface connector of the PG-1500 (on the right of the rear panel) to the CH2 serial interface port of the IE-75000-R, using a commercially available RS-232-C interface cable (straight cable).



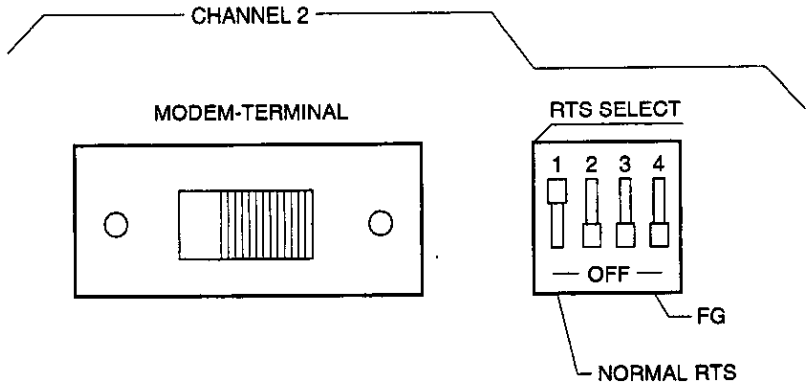
(3) Set the IE-75000-R's interface with the PG-1500 (channel 2)

Channel 2 of the IE-75000-R can be set by setting switches on the main unit with the power off, or by starting the main unit and executing the MOD command. Setting using the switches on the main unit is shown here.

Table 4-1. IE-75000-R Channel 2 Setting

Item	Setting
Mode switchover	Terminal mode
Frame ground	No. 4: OFF
RTS selection	No. 1: ON, Nos. 2 & 3: OFF

Figure 4-1. IE-75000-R Channel 2 Setting



Modem/Terminal Mode Select Switch

RTS/FG Select Switch

<1> Open the RS-232-C setting section cover on the side of the IE-75000-R.

<2> Slide the CH2 modem/terminal mode selection switch to the right, setting terminal mode.

<3> Turn switch 4 of the CH2 RTS/FG selection switch off (down position), setting FG and SG to the open state.

<4> Set switches 1 to 3 of the CH2 RTS/FG selection switch as shown below, selecting the RTS setting.

No. 1: ON (UP)
No. 2: OFF (DOWN)
No. 3: OFF (DOWN)

Remark Channel 2 setting using MOD command
Settings for the channel 2 handshaking method, baud rate, and character length are made by means of the MOD command. See the "IE-75000-R User's Manual' for details.

Table 4-2. Channel 2 Settings By MOD Command

Item		Setting	Set By
Handshaking method		1 character	MOD command
Baud rate		9600 bps	
Character specification	Character length	8 bits	
	Parity bits	None	
	Stop bit length	2 bits	

(4) Power on each unit

Follow the procedure below when powering on the equipment.

<1> Power on the PC-9800.

<2> Power on the IE-75000-R.

<3> Power on the PG-1500.

(5) Set the PG-1500's interface with the IE-75000-R

Set the serial interface of the PG-1500. Execute the FUNCTION mode MODE command. The settings are shown below.

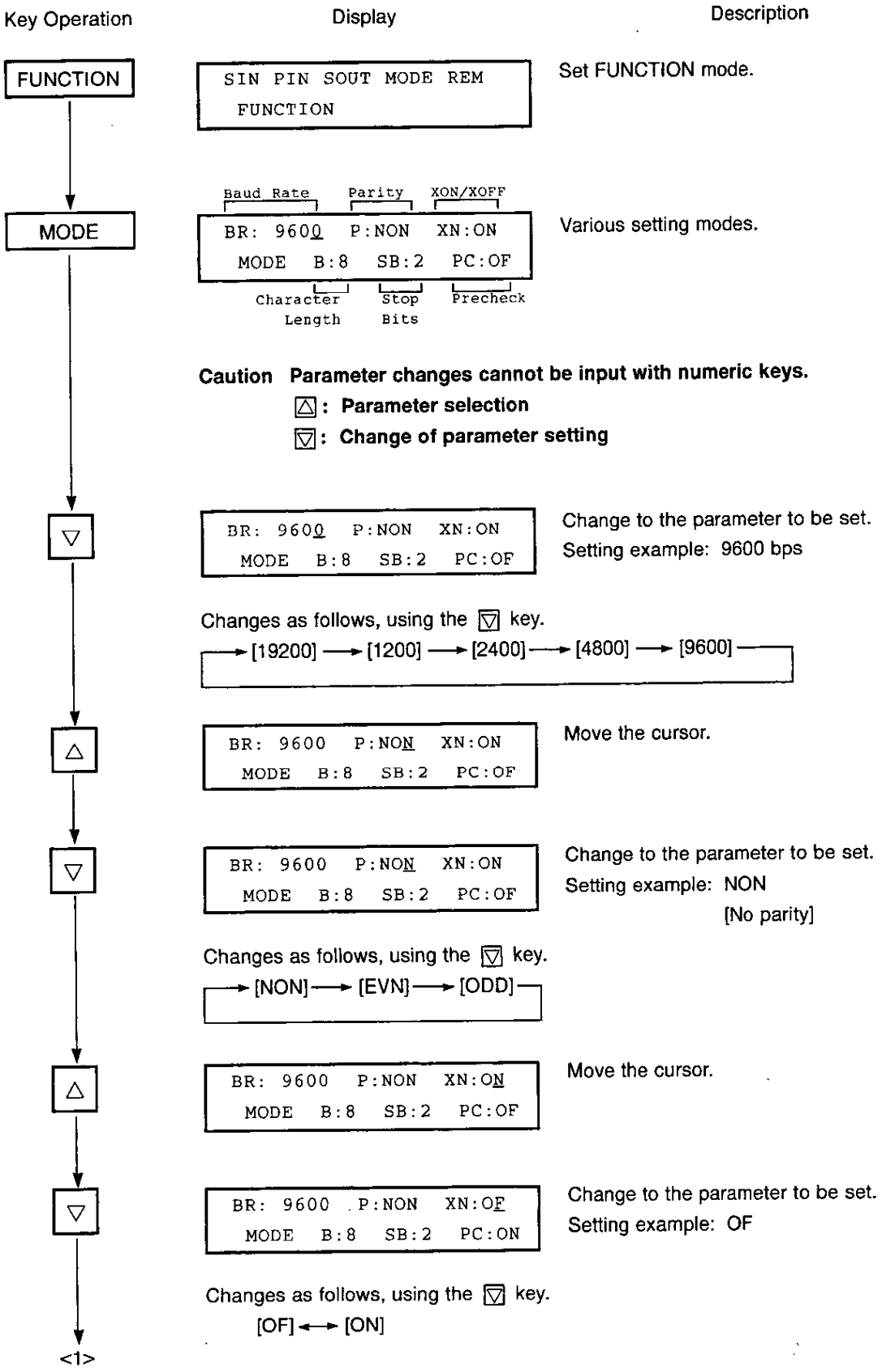
Table 4-3. Sample of PG-1500 Serial Interface Settings

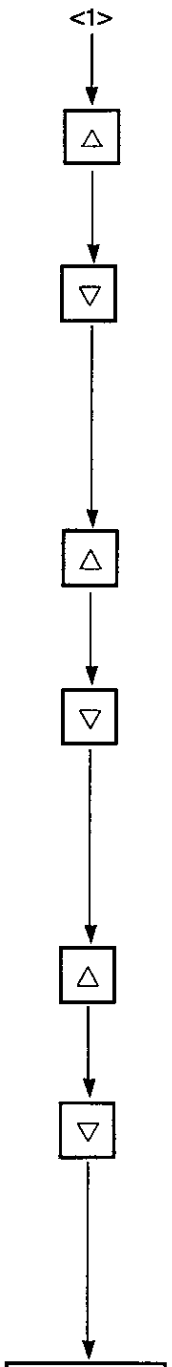
Item	Setting	LCD Display
Baud rate	9600 bps	BR : 9600
Parity bit	None	P : NON
XON/XOFF control[Note 1]	None	XN : OF
Character length	8 bits	B : 8
Stop bits	2 bits	SB : 2
Precheck[Note 2]	None	PC : OF

Notes 1. When connecting the unit to the in-circuit emulator, XON/XOFF control should be set to "none" (LCD display: OF).

2. This function checks whether the device has been inserted correctly. It can only be used with an NEC general-purpose PROM.

<Operation Method>






```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Move the cursor.

```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Change to the parameter to be set.
Setting example: 8

Changes as follows, using the ▽ key.
[8] ⟷ [7]

```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Move the cursor.

```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Change to the parameter to be set.
Setting example: 2

Changes as follows, using the ▽ key.
[2] ⟷ [1]

```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Move the cursor.

```
BR: 9600   P:NON   XN:OF
 MODE   B:8   SB:2   PC:OF
```

Change to the parameter to be set.
Setting example: OF

Changes as follows, using the ▽ key.
[OF] ⟷ [ON]

```
DEVICE EDIT FUNCTN
IDLE  V♦.♦
```

All parameters have been set, and the idle state is entered.

Cautions 1. If the SET/START key is not pressed, the settings are not changed.

2. When the SET/START key is pressed, a write is performed to the NV-RAM in the PG-1500.

(6) Start the IE-75000-R control program

Start the IE-75000-R control program.

```
A>IE75000↵

 IE-75000 CONTROLLER (PC-9801 SERIES) V2.16 [18 Nov93]
      Copyright (C) 1989,1993 by NEC Corporation


 IE-75000/1-R Monitor V1.5 [1 May 93]
   Copyright (C) 1989,1993 by NEC Corporation

Self check ok

Target CPU      μPD75108/108A/108F/P108/P108B/112/112F/116/116F/P116
Program Memory  0-FFFFH
Data Memory     00H-1FFH,F80-FFFH
Memory Bank     0-1,15
Register Bank   0-3
Power on target system (Y/N) Y↵
Do you use high speed down load mode? (Y/N) = N↵

brk:0>■
```

"brk:0>" is displayed as a prompt, and the break mode is set.

(7) Set the PG-1500 to remote control mode

Set the PG-1500 remote control mode, using the following procedure.

<Operation Method>

Key Operation	Display	Description
FUNCTION	SIN PIN SOUT MOD REM FUNCTION	Set FUNCTION mode.
↓		
REMOTE	REMOTE MODE	Select the REMOTE command.
↓		
SET/START	REMOTE MODE OK	If correctly connected with the external machine, [OK] is displayed.

(8) Start PG-1500 remote operation (PGM mode)

Input the IE-75000-R PROM programmer control command (PGM command). PG-1500 remote operation (PGM mode) is then started.

```
brk:0>PGM↵
 Beginning of PGM mode

PG>■
```

(9) Execute a PG-1500 command

PG-1500 commands that can be used in remote operation (PGM mode) by the IE-75000-R are shown below.

Command	Input Format	Function
RR	PG>RR ROM_S_ADR, ROM_E_ADR, PG_S_ADR, CONV↵	Data read from device.
RS	PG>RS sub↵ sub = C/R/A	Device selection
RV	PG>RV ROM-S_ADR, ROM_E_ADR, PG_S_ADR, CONV↵	Comparison of device data with PG-1500 internal memory data
RW	PG>RW ROM-S_ADR, ROM_E_ADR, PG_S_ADR, CONV↵	Write to device
RZ	PG>RZ↵	Check of device erased state
MC	PG>MC PG_S_ADR↵	Change of PG-1500 internal memory data
MD	PG>MD PG_S_ADR, PG_E_ADR↵	Display of PG-1500 internal memory data
MF	PG>MF PG_S_ADR, PG_E_ADR, INT_DATA↵	Initialization of PG-1500 internal memory data
LI	PG>LI↵	Serial input using Intel HEX
SI	PG>SI PG_S_ADR, PG_E_ADR↵	Serial output using Intel HEX
??	PG>??↵	Help command

Remark ROM_S_ADR : PROM start address
ROM_E_ADR : PROM end address
PG_S_ADR : PG-1500 internal memory start address
PG_E_ADR : PG-1500 internal memory end address
CONV : Address division mode
INT_DATA : Initialization data

See Section **3.4 Commands** in **Part II** for details of the commands.

(10) Terminate PG-1500 remote operation (PGM mode)

Input CTRL + Z to the PC-9800. PG-1500 remote operation will terminate.

```
PG>^Z
 Exit PGM mode(Y/N)Y
 Termination of PGM mode
brk:0>■
```

"brk:0>" is displayed as a prompt, and the break mode is set.

(11) Terminate PG-1500 remote control mode

Press the RESET key on the PG-1500 to release the remote control mode.

(12) Terminate the IE-75000-R control program

Input the IE-75000-R control program termination command (EXT). Control is returned to the OS, and the prompt is displayed.

```
brk:0>EXT↵

A>■
```

(13) Power off each unit

Follow the procedure below when powering off the equipment.

<1> Power off the PG-1500.

<2> Power off the IE-75000-R.

<3> Power off the PC-9800.

4.2.2 Data write from in-circuit emulator to blank PROM

This description assumes that the PG-1500 is already connected to the in-circuit emulator and host machine, and is ready for remote operation (in PGM mode) (see Section **4.2.1 Outline of operations using NEC in-circuit emulator**).

Example	Host machine	PC-9800 Series
	In-circuit emulator	IE-75001-R
	Blank ROM	μPD75P308GF
	PROM start address	00000H
	PROM end address	01F7FH
	IE-75000-R memory transfer start address	0000H
	IE-75000-R memory transfer end address	0FFFH

The following procedure is used to write data from the in-circuit emulator to the blank ROM.

(1) Transfer the data from the in-circuit emulator to the PG-1500 using the LI command.
(2) Set the blank ROM in the PG-1500.
(3) Perform device selection using the RS command.
(4) Perform a write using the RW command.
(5) Perform verification using the RV command.

(1) Transfer the data from the in-circuit emulator to the PG-1500 using the LI command

Uses the LI command to transfer the data in the memory space mapped in the IE-75001-R to the PG-1500 internal memory.
Input the transfer start address (0) and transfer end address (0FFF) of the IE-75000-R memory.
If the transfer range specification is omitted, the entire mapped memory space is transferred.
To suspend the transfer, input [ESC].

```
PG>LI↵

 partition=0,0FFF↵

PG>■
```

(2) Set the blank ROM in the PG-1500

Connect the 04A board to the PG-1500, and connect the PROM programmer adapter (PA-75P308GF) to this board.
Insert the blank ROM (μPD75P308GF) in the socket on the PROM programmer adapter.

(3) Perform device selection using the RS command

An example in which the READ mode is used is shown here.

```
PG>RS R↵

Your setting ROM is μPD75P308

PG>■
```

(4) Perform a write using the RW command

Input the PROM start address (0), PROM end address (1F7F), PG-1500 internal memory start address (0), and address division mode (N).

If a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified as the address division mode.

```
PG>RW 0,1F7F,0,N↵

Now , data writing !
Data complete
Check sum : 2BC8

PG>■
```

(5) Perform verification using the RV command

The device on which writing is finished is compared with the PG-1500 internal memory data. Perform this directly after executing the RW command.

```
PG>RV 0,1F7F,0,N↵

Now , data reading !
Data complete
Check sum : 2BC8

PG>■
```

This completes the data write from the in-circuit emulator to the blank ROM.

4.2.3 Data read from master ROM to in-circuit emulator

This description assumes that the PG-1500 is already connected to the in-circuit emulator and host machine, and is ready for remote operation (in PGM mode) (see Section **4.2.1 Outline of operations using NEC in-circuit emulator**).

Example	Host machine	PC-9800 Series
	In-circuit emulator	IE-75001-R
	Master ROM	μPD75P308GF
	PROM start address	00000H
	PROM end address	01F7FH
	PG-1500 internal memory start address	00000H
	PG-1500 internal memory end address	01F7FH
	Address division specification	N
	IE-75000-R- load bias[Note]	0

Caution The value obtained by adding the IE-75000-R load bias to the PG-1500 internal memory start address is the IE-75000-R transfer start address.

The following procedure is used to read data from the master ROM to the in-circuit emulator.

(1) Set the master ROM in the PG-1500.
(2) Perform device selection using the RS command.
(3) Perform a read using the RR command.
(4) Perform verification using the RV command.
(5) Transfer the data from the PG-1500 to the in-circuit emulator using the SI command.

(1) Set the master ROM in the PG-1500

Connect the 04A board to the PG-1500, and connect the PROM programmer adapter (RA-75P308GF) to this board.

Insert the master ROM (μPD75P308GF) in the socket on the PROM programmer adapter.

(2) Perform device selection using the RS command

An example in which the READ mode is used is shown here.

```
PG>RS R↵

Your setting ROM is μPD75P308

PG>
```

(3) Perform a read using the RR command

Input the PROM start address (0), PROM end address (1F7F), PG-1500 internal memory start address (0), and address division mode (N).

If a device other than a general-purpose PROM is used, NORMAL (no address division) must be specified as the address division mode.

```
PG>RR 0,1F7F,0,N↵

Now , data reading !
Data complete
Check sum : 2BC8

PG>■
```

(4) Perform verification using the RV command

The device on which reading is finished is compared with the PG-1500 internal memory data.

Perform this directly after executing the RR command.

```
PG>RV 0,1F7F,0,N↵

Now , data reading !
Data complete
Check sum : 2BC8

PG>■
```

(5) Transfer the data from the PG-1500 to the in-circuit emulator using the SI command

Use the SI command to transfer the contents of the PG-1500 internal memory to the memory space mapped in the IE-75001-R.

Input the PG-1500 internal memory start address (0), PG-1500 internal memory end address (1F7F), and IE-75001-R load bias (0).

The IE-75001-R load bias cannot be omitted.

To suspend the transfer, input ESC.

```
PG>SI 0,1F7F↵

Bias=0↵
 complete

PG>■
```

This completes the data read from the master ROM to the in-circuit emulator.

4.2.4 Data transfer from external machine to PG-1500 via parallel interface

Connect the PG-1500 to the in-circuit emulator and host machine via the serial interface and parallel interface. See **4.2.1 Outline of Operations Using NEC In-Circuit Emulator** for the serial interface connection. The parallel interface connection is described below.

Connect the parallel interface connector on the PG-1500 to the printer output connector on the host machine, using a parallel interface cable (printer cable). Power off both units before making the connection.

Data in the in-circuit emulator cannot be transferred directly to the PG-1500. The data to be transferred must first be saved to a floppy disk, etc.

The PG-1500 is assumed to be ready for remote operation (in PGM mode).

Example	Host machine	PC-9800 Series
	In-Circuit emulator	IE-75001-R
	Transfer file name	TEST.HEX

The following procedure is used to transfer data from the external machine to the PG-1500 via the parallel interface.

(1) Set the PG-1500 to the parallel input state with the PI command.
(2) Terminate PG-1500 remote operation (PGM mode).
(3) Transfer control to the OS (DOS).
(4) Perform the data transfer with an OS command.
(5) Return control to the IE-75001-R control program.
(6) State PG-1500 remote operation (PGM mode).

(1) Set the PG-1500 to the parallel input state with the PI command

Execute the PI command. The PG-1500 is set to the parallel input state.

```
PG>PI↵
```

(2) Terminate PG-1500 remote operation (PGM mode)

Input CTRL + Z . PG-1500 remote operation (PGM mode) terminates and the break mode is set.

```
^Z
 Exit PGM mode (Y/N)Y
 Termination of PGM mode
brk:0>
```

(3) Transfer control to the OS (DOS)

Execute the in-device emulator DOS command. Control is transferred from the in-device emulator control program to the OS (DOS).

```
brk:0>DOS↵
Command version ♦.♦♦

A>
```

(4) Perform the data transfer with an OS command

Execute the OS COPY command. Data is output from the parallel interface of the host machine.

```
A>COPY TEST.HEX PRN↵
        1 file has been copied.

A>■
```

(5) Return control to the IE-75001-R control program

On completion of the data transfer, execute the OS EXIT command to return control to the in-circuit emulator control program.

```
A>EXIT↵

 Return from Child !

brk:0>■
```

(6) Start PG-1500 remote operation (PGM mode)

When the PGM command is executed in break mode, PG-1500 remote operation (PGM mode) is started.

```
brk:0>PGM↵
 Beginning of PGM mode

PG>■
```

This concludes the data transfer from the external machine to the PG-1500 via the parallel interface.

[MEMO]

Phase-out/Discontinued

APPENDIX

[MEMO]

APPENDIX A. ERROR MESSAGE LIST

A.1 Standalone Mode Error List

Error No.	00
Description	Internal circuit power supply +5.00 VDC check error
Occurrence	During initial test
Display	PG-1500 ERR00
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	01
Description	Internal circuit GND check error
Occurrence	During initial test
Display	PG-1500 ERR01
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	02
Description	PG-1500 internal memory check error
Occurrence	During initial test
Display	PG-1500 ERR02
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	03
Description	Internal compare voltage +2.5 V check error
Occurrence	During initial test
Display	PG-1500 ERR03
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	04
Description	Internal compare voltage +2.35 V check error
Occurrence	During initial test
Display	PG-1500 ERR04
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	05
Description	Internal compare voltage +1.5 V check error
Occurrence	During initial test
Display	PG-1500 ERR05
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	06
Description	Internal compare voltage +0.5 V check error
Occurrence	During initial test
Display	PG-1500 ERR06
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	07
Description	VCC (variable) voltage check error
Occurrence	During initial test
Display	PG-1500 ERR07
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	08
Description	VPP (variable) voltage check error
Occurrence	During initial test
Display	PG-1500 ERR08
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	09
Description	Data bus check error
Occurrence	During initial test
Display	PG-1500 ERR09
Countermeasure	Turn off the power supply and turn it on again. If an error still occurs, the PG-1500 may be defective. In such case, consult with an NEC or authorized NEC dealer sales representative.

Error No.	10
Description	Start address > end address
Occurrence	During address check in each command execution
Display	AAAAA:BBBBB CCCCC DDDD ERR10 FFFFFF A : PROM/internal memory start address B : PROM/internal memory end address C : Internal memory start address/data D : Execute command F : Address divide mode (when DEVICE mode command is used)
Countermeasure	Check the input addresses and reinput the addresses.

Error No.	11
Description	PROM start address > ROM size
Occurrence	During address check in each command execution
Display	AAAAA:BBBBB CCCCC DDDD ERR11 FFFFFF A : PROM/internal memory start address B : PROM/internal memory end address C : Internal memory start address/data D : Execute command F : Address divide mode (when DEVICE mode command is used)
Countermeasure	Check the input addresses and reinput the addresses.

Error No.	12
Description	Internal memory start address > Internal memory size
Occurrence	During address check in each command execution
Display	AAAAA:BBBBB CCCCC DDDD ERR12 FFFFFF A : PROM/internal memory start address B : PROM/internal memory end address C : Internal memory start address/data D : Execute command F : Address divide mode (when DEVICE mode command is used)
Countermeasure	Check the input addresses and reinput the addresses.

Error No.	13
Description	Conversion error
Occurrence	During address check in each command execution
Display	AAAAA:BBBBB CCCCC DDDD ERR13 FFFFFF A : PROM/internal memory start address B : PROM/internal memory end address C : Internal memory start address/data D : Execute command F : Address divide mode (when DEVICE mode command is used)
Countermeasure	The currently selected device does not operate in the specified divide mode. Check the selected device and divide mode and determine the divide mode again.

Error No.	20
★ Description	Verify error (when Vcc = 5 V)
Occurrence	During data compare in commands performing a verify operation (COPY, PROGRAM)
Display	BB: CC DDDD ERR20 AAAAA A : Address at which error occurred B : Internal memory data C : Device data D : Execute command
Countermeasure	The read device data and the internal memory data contents do not match. If this occurs during write, the write operation has not been carried out normally. In such cases, write once again.

Error No.	21
★ Description	Verify error (when Vcc = 5 + α) (The value of a depends on the device)
Occurrence	During data compare in commands performing a verify operation (VERIFY, COPY, PROGRAM, CONT)
Display	BB: CC DDDD ERR21 AAAAA A : Address at which error occurred B : Internal memory data C : Device data D : Execute command
Countermeasure	The read device data and the internal memory data content do not match. If this occurs during write, the write operation has not been carried out normally. In such cases, write once again.

Error No.	22
★ Description	Verify error (when Vcc = 5 – α) (The value of a depends on the device)
Occurrence	During data compare in commands performing a verify operation (VERIFY, COPY, PROGRAM, CONT)
Display	BB: CC DDDD ERR22 AAAAA A : Address at which error occurred B : Internal memory data C : Device data D : Execute command
Countermeasure	The read device data and the internal memory data content do not match. If this occurs during write, the write operation has not been carried out normally. In such cases, write once again.

Error No.	28
Description	Blank check error
Occurrence	In data compare during blank check command execution
Display	BB BLANK ERR28 AAAAA A : Address not erased B : Device data
Countermeasure	Data read from the device does not match data which is not written to the device. When writing, use another device.

Error No.	2C
Description	Write error
Occurrence	During data write in write commands (PROG, CONT)
Display	CC: BB DDDD ERR2C AAAAA A : Address at which error occurred B : Devide data C : Internal memory data D : Execute command
★ Countermeasure	If data cannot be written normally in the device write flow, this error occurs. In such case, check if the used device matches the selected device. If they match, the device may be defective.

Error No.	30
Description	Silicon signature data read error
Occurrence	This error occurs if a read data parity calculation executed in silicon signature data read shows that the read data is not correct
Display	AAAA ERR30 A : Execute command
★ Countermeasure	There may be no silicon signature data in the selected device.

Error No.	31
Description	Silicon signature data read error
★ Occurrence	When READ mode is used for the device selection method, the target device at ROM control instruction execution differs from the set device.
Display	AAAA ERR31 A : Execute command
Countermeasure	When READ mode is used as the device selection method, the read silicon signature data differs from the preset silicon signature data. Check the device inserted in the socket. When carrying operation for the inserted device, start it by reading the silicon signature again.

Error No.	32
Description	Silicon signature undefined error
Occurrence	This error occurs when the device write condition is set using the data read in silicon signature data read.
Display	AAAA ERR32 A : Execute command
Countermeasure	Since the data read in system silicon signature data read is not supported by the PG-1500, replace the device with one that supports the data.

Error No.	38
Description	Device incorrect insert error
Occurrence	During NEC general-purpose PROM precheck
Display	AAAA ERR38 A : Execute command
★ Countermeasure	The device is wrongly inserted. Re-insert in the correct direction

Error No.	39
Description	Adapter board and PROM programmer adapter disconnect error
Occurrence	During DEVICE instruction execution
Display	AAAA ERR39 A : Execute command
Countermeasure	The adapter board or PROM programmer adapter is not connected. Check adapter board/PROM programmer adapter connection.

Error No.	40
Description	Serial disconnect error
Occurrence	During communication destination check in serial input/output instruction execution
Display	REMOTE MODE ERR40 Not ready
Countermeasure	The RS-232-C cable is not connected correctly. Check the cable, the currently set baud rate and character length.

Error No.	41
Description	File transfer error
Occurrence	During serial/parallel transfer
Display	AAAA ERR41 BBBBBBBB A : Execute command B : Data format
★ Countermeasure	Check the device connection and HEX fail format and carry out transfer again.

A.2 Remote Control Mode Error List

Error No.	10
Description	Start address > end address
Occurrence	During address check in command execution
Display	ERR10 (START_ADR > END_ADR)
Countermeasure	Input the correct addresses.

Error No.	11
Description	PROM start address > ROM size
Occurrence	During address check in each command execution
Display	ERR11 (ROM_S_ADR or ROM_E_ADR > ROM_SIZE)
Countermeasure	Input the correct addresses.

Error No.	12
Description	Internal memory start address > PG-1500 internal memory size
Occurrence	During address check in each command execution
Display	ERR12 (PG_BUFF SIZE over)
Countermeasure	Input the correct addresses.

Error No.	13
Description	Conversion error
Occurrence	During input parameter check in RR, RV and RW command execution
Display	ERR13 (Conversion error)
Countermeasure	The currently selected device does not operate in the specified divide mode. Check the selected device and divide mode.

Error No.	14
Description	Input symbol error
Occurrence	During address check in each command execution
Display	ERR14 (Illegal character)
Countermeasure	A symbol not in hexadecimal notation was used for address input. Check the input characters and reinput the addresses.

Error No.	15
Description	Address divide specify error
Occurrence	During input parameter check in RR, RV and RW command execution
Display	ERR15 (Illegal character)
Countermeasure	An unspecified symbol was input for address divide specification. Reinput using the specified symbol.

Error No.	16
Description	Command syntax error
Occurrence	During input parameter check in each command execution.
Display	ERR16 (Command syntax error)
Countermeasure	The command input format is wrong. Reinput after checking a correct input format.

Error No.	17
Description	Illegal command
Occurrence	During input parameter check in each command execution.
Display	ERR17 (Illegal command)
Countermeasure	An unspecified command has been input. Reinput using the specified command.

Error No.	20
Description	Verify error (generated when V_{CC} = 5 V)
★ Occurrence	Generated when a data comparison is made in a command (RR, RV, or RW) which performs verification.
Display	ERR20 Data not complete!! Adr ROM data RAM data xxxxx xxxx xxxx Continue (Y:Yes/N:No)?
Countermeasure	The read device data does not match the internal memory data. If generated in a write, the write has not been performed normally. Perform the write again.

Error No.	21
★ Description	Verify error (generated when V_{CC} = 5 + α) (The value of α depends on the device)
Occurrence	Generated when a data comparison is made in a command (RR, RV, or RW) which performs verification.
Display	ERR21 Data not complete!! Adr ROM data RAM data xxxxx xxxx xxxx Continue (Y:Yes/N:No)?
Countermeasure	The read device data does not match the internal memory data. If generated in a write, the write has not been performed normally. Perform the write again.

Error No.	22
Description	Verify error (generated when Vcc = 5 – α) (The value of α depends on the device)
Occurrence	Generated when a data comparison is made in a command (RR, RV, or RW) which performs verification.
Display	ERR22 Data not complete!! Adr ROM data RAM data xxxxx xxxx xxxx Continue (Y:Yes/N:No)?
Countermeasure	The read device data does not match the internal memory data. If generated in a write, the write has not been performed normally. Perform the write again.

Error No.	28
Description	Blank check error
Occurrence	During blank check command execution
Display	ERR28 ROM not erased!! Adr ROM data xxxxx FE Continue (Y:Yes/N:No)?
Countermeasure	The data read from device does not match the data which is not written to device. When writing, use another device.

Error No.	2C
Description	Write error
Occurrence	During data write in device write commands (PROG, CONT)
Display	ERR2C Write error! Adr ROM data xxxxx FE Continue (Y:Yes/N:No)?
Countermeasure	Data is not written normally, perform rewriting. If the error occurs again, check if the used device matches the selected device. If they match, the data is already written or the device may be defective.

Error No.	30
Description	Silicon signature data read error
Occurrence	This error occurs if read data parity calculation executed in silicon signature data read shows that the read data is not correct.
Display	ERR30 (Signature read error)
Countermeasure	No silicon signature operation can be performed for the selected device.

Error No.	31
Description	Silicon signature data compare error
★ Occurrence	This error occurs when the R subcommand of the RS command is specified or the target device differs from the set device during RR, RV, RW and RZ command silicon signature data compare.
Display	ERR31 (Unexpected Signature)
Countermeasure	When READ mode is used as the device selection method, the read silicon signature data differs from the preset silicon signature data. Check the device inserted in the socket. When carrying operation for the inserted device, start it by reading the silicon signature data again.

Error No.	32
Description	Silicon signature data undefined error
Occurrence	This error occurs when device write condition is set using the data read in silicon signature data read.
Display	ERR32 (Undefined Signature)
Countermeasure	Since the data read in silicon signature read is not supported by the PG-1500, replace the device with one that supports the data.

Error No.	38
Description	Device incorrect insert error
Occurrence	During NEC general-purpose PROM precheck.
Display	ERR38 (Device insert error)
Countermeasure	A device is not inserted in the socket, or the device is wrongly inserted. Re-insert in the correct direction.

Error No.	39
Description	Adapter board and PROM programmer adapter disconnect error
Occurrence	During DEVICE instruction execution
★ Display	ERR39 (Board not connected)
Countermeasure	The adapter board or PROM programmer adapter is not connected. Check the adapter board/PROM programmer adapter connection.

Error No.	40
Description	Serial disconnect error
Occurrence	During communication destination check
Display	ERR40 (Serial not ready)
Countermeasure	The RS-232-C cable is not connected correctly. Check the cable, the currently set baud rate and character length.

Error No.	41
Description	File transfer error
Occurrence	During serial/parallel transfer
Display	ERR41 (Illegal format data error)
★ Countermeasure	Check the device connection and HEX format and carry out transfer again.

APPENDIX B. OBJECT FORMATS

B.1 INTELLEC HEX

INTELLEC HEX formats are described in (1) and (2) below.
Descriptions <1> to <7> in (1) and (2) are made below.

<1> Start mark
Format recognition is made by start mark [:].

<2> No. of byte counts
a. Extended address record:
No. of bytes of the high segment base address <7>
b. Data record : No. of bytes of data <5>
c. End record : [00]

<3> Address value
a. Extended address record: [0000]
b. Data record : Start address to be input
c. End record : [0000]

<4> Record type
a. Extended address record: [02]
b. Data record : [00]
c. End record : [01]
d. Start address record : [03]

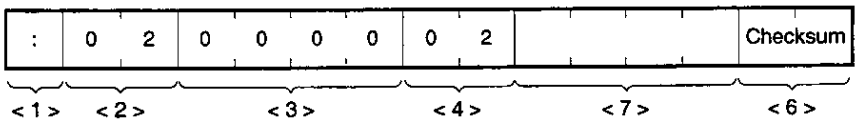
<5> PG-1500 internal memory input or output data (data record only)
The start data address is the value indicated in <3>.

<6> Check sum
The least significant 8-bit data of two's complement obtained by adding data from byte count data to data in the frame just before the check sum.

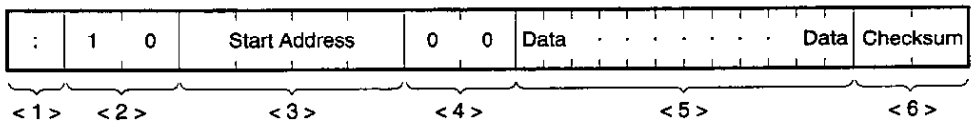
<7> High-end segment base address (extended address record only)
When the record type [02] is recognized during input/output in extended address record, data is identified as one from bits 4 to 19 at the segment base address. The start data storage address for the subsequent data records is determined by start address and segment base address operations.

(1) Serial input and parallel input PG-1500 ← external device

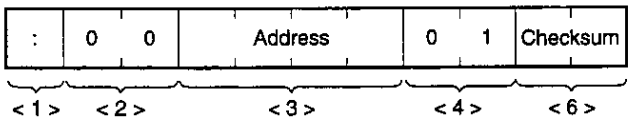
(a) Extended address record



(b) Data record

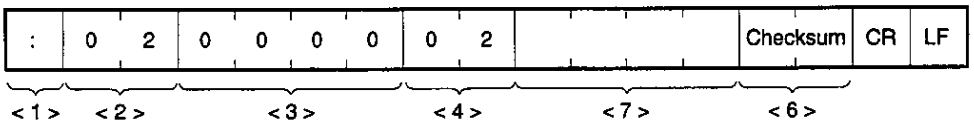


(c) End record

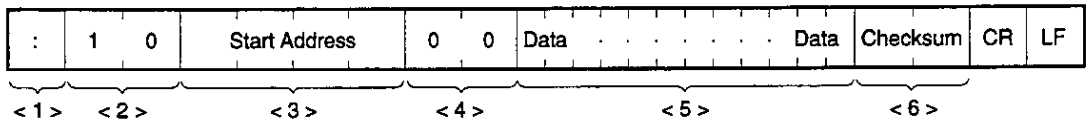


(2) Serial output PG-1500 → external device

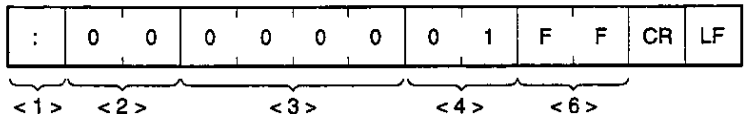
(a) Extended address record



(b) Data record



(c) End record



B.2 MOTOROLA EXORCISER

The MOTOROLA EXORCISER formats are described in (1) and (2) below.
Items <1> to <6> in (1) and (2) are explained below.

<1> Start mark
Format recognition is made by start mark [S].

<2> Record types
a. Header record (optional) : [0]
b. S1 data record : [1]
c. S2 data record : [2]
d. S3 data record : [3]
e. End record (short address) : [9]
f. End record (standard address) : [8]
g. End record (long address) : [7]

<3> No. of byte counts
a. Data record:
No. of bytes from the start address to the checksum value
b. End record:
No. of bytes of the address value and the checksum value

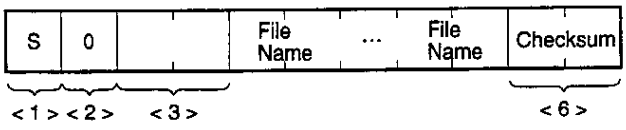
<4> Address value
a. Data record : Start address to be input
b. End record : [0000]

<5> PG-1500 internal memory input or output data (data record only)
The start data address is the value indicated in <4>.

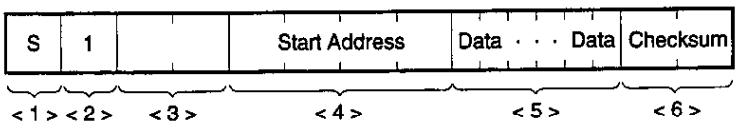
<6> Check sum
The least significant 8-bit data of one's complement obtained by adding data from byte count data to data in the frame just before the checksum.

(1) Serial input and parallel input PG-1500 ← external device

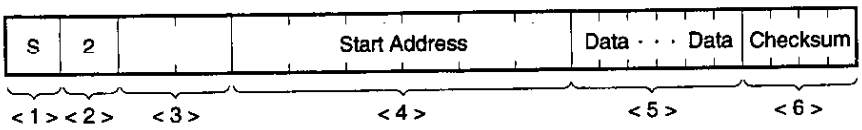
(a) Header record



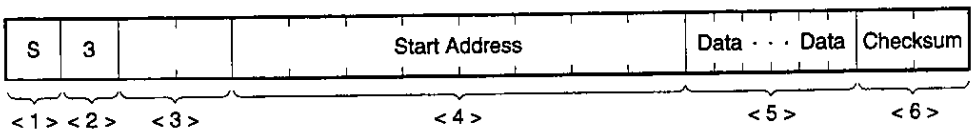
(b) S1 data record



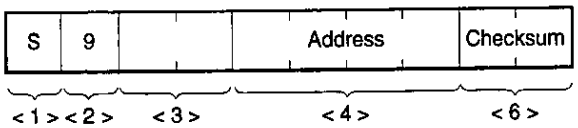
(c) S2 data record



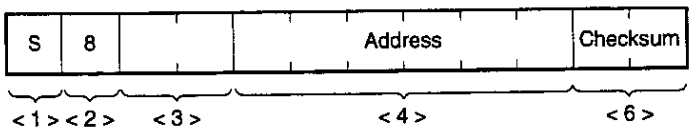
(d) S3 data record



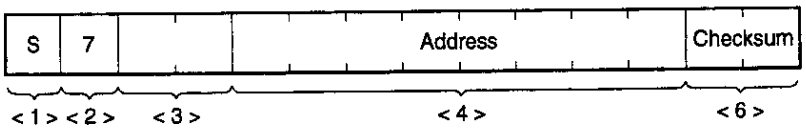
(e) End record (short address)



(f) End record (standard address)

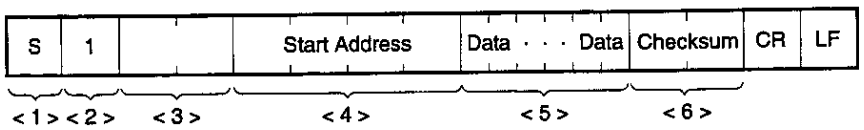


(g) End record (long address)

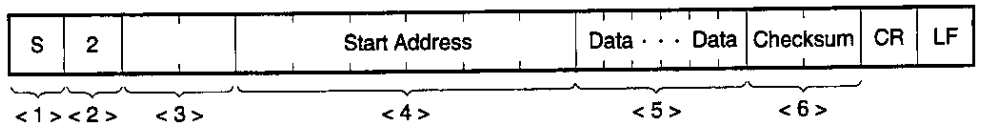


(2) Serial output PG-1500 → external device

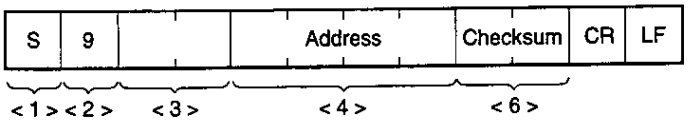
(a) S1 data record



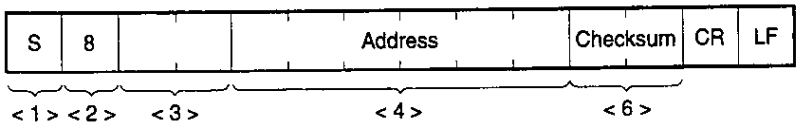
(b) S2 data record



(c) End record (short address)



(d) End record (standard address)



Remark In the case of output, the start address has less than 6 bytes. Thus, the [S3 data record] and [end record] following it do not exist.

B.3 EXTENDED TEKHEX

The EXTENDED TEKHEX formats are described in (1) and (2) below.
Items <1> to <7> in (1) and (2) are explained below.

<1> Start mark
Format recognition is made by start mark [%].

<2> Block length
Total of blocks excluding the start mark (including the block length)

<3> Block types
a. Data block : [6]
b. Terminate block: [8]
c. Symbol block : [3]
All other numeric values result in an error.
When terminate block [8] is recognized, data load is stopped.

<4> Check sum
Sum of hexadecimal numbers excluding the start mark and checksum value.

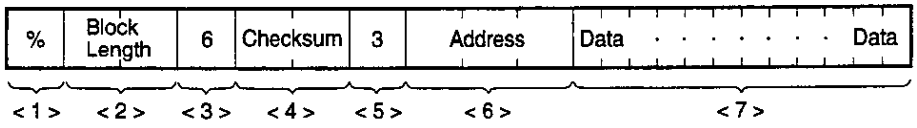
<5> No. of address digits
No. of digits of the start data storage address following from the next block.

<6> Address value
Address with the number of digits set in <5>.
Indicates the data address.

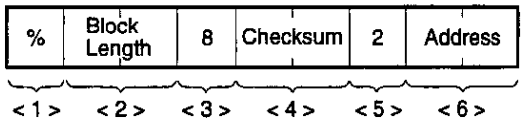
<7> PG-1500 internal memory input or output data (data block only)
The start data address is the value indicated in <6>.

(1) Serial input and parallel input PG-1500 ← external device

(a) Data block

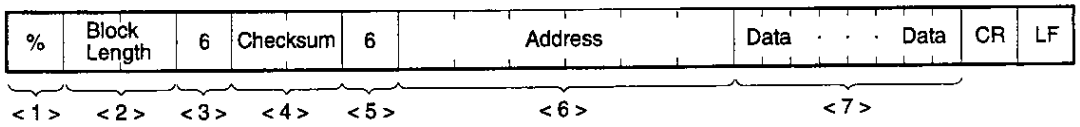


(b) Terminate block

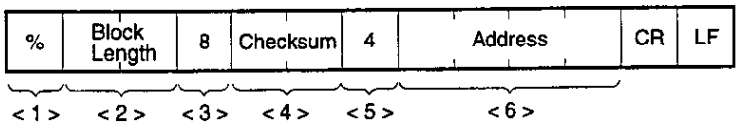


(2) Serial output PG-1500 → external device

(a) Data block



(b) Terminate block



Remark For output, the address display unit of the data block becomes 3 bytes (6 digits).

[MEMO]

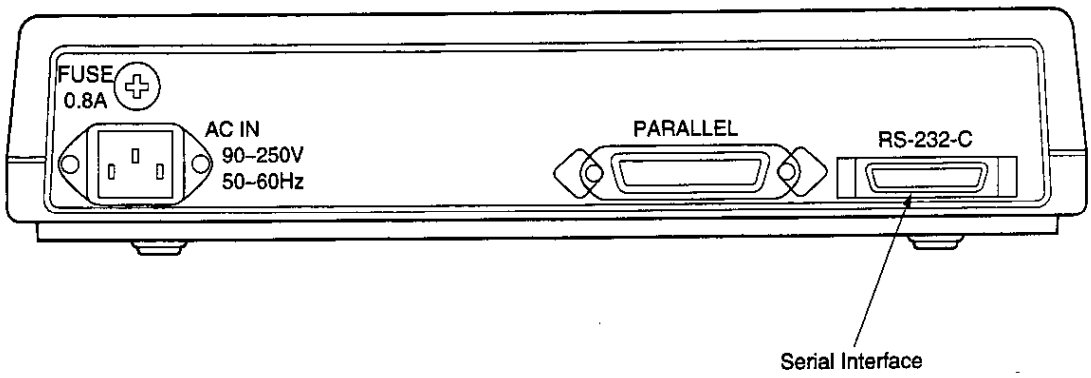
APPENDIX C. EXTERNAL INTERFACE

This chapter describes the interface on the rear panel.

C.1 Serial Interface

The PG-1500 has an asynchronous serial interface and can be connected to a PC-9800 Series personal computer. The RS-232-C is used as an interface circuit.

Figure C-1. Serial Interface Connector



C.1.1 Pin configuration

The serial interface connector pins are positioned as follows.

Figure C-2. Serial Interface Pin Configuration

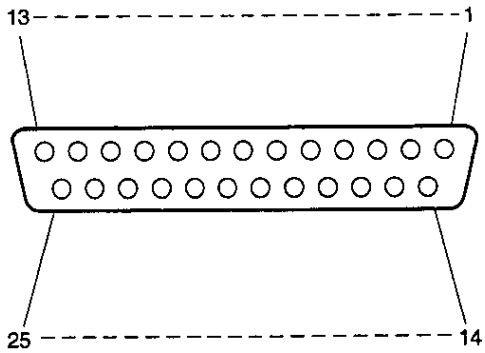


Table C-1. Serial Interface Connector Signal Table

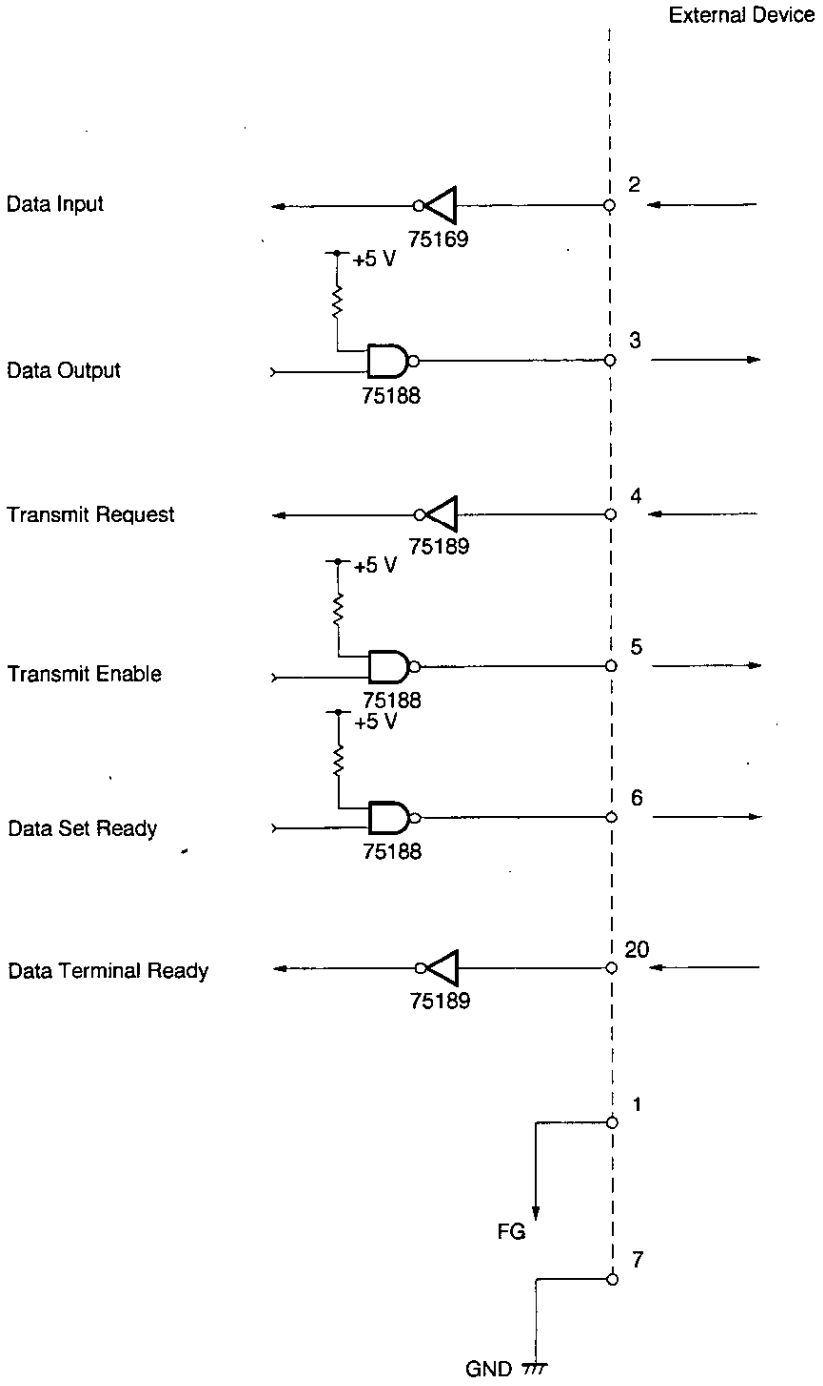
Pin No.	Signal Name	Direction (PG-1500) – (External Device)	Function
1	FG	—	Frame ground
2	TXD	←	Data receive
3	RXD	→	Data transmit
4	RTS	←	Transmit enable at high level
5	CTS	→	Receive enable at high level
6	DSR	→	Receive enable at high level
7	SG	—	Signal ground
20	DTR	←	Transmit enable at high level

Caution **Be sure to ground the power cable and FG pin of the PG-1500 and external devices. If an external device with FG and SG short-circuited is to be used, remove the FG interface cable.**

C.1.2 Interface circuit

Figure C-3 shows the PG-1500 serial interface circuit (RS-232-C).

Figure C-3. RS-232-C Interface Circuit



C.1.3 Resetting

When a serial interface is used, set the following:

- Baud rate
- Parity bit
- XON/XOFF control
- Character length
- Stop bit

Execute resetting by key input.

For details of resetting, refer to Section **2.6.4 Serial Interface Setting (MODE)** in **Part II**.

C.1.4 Handshake method

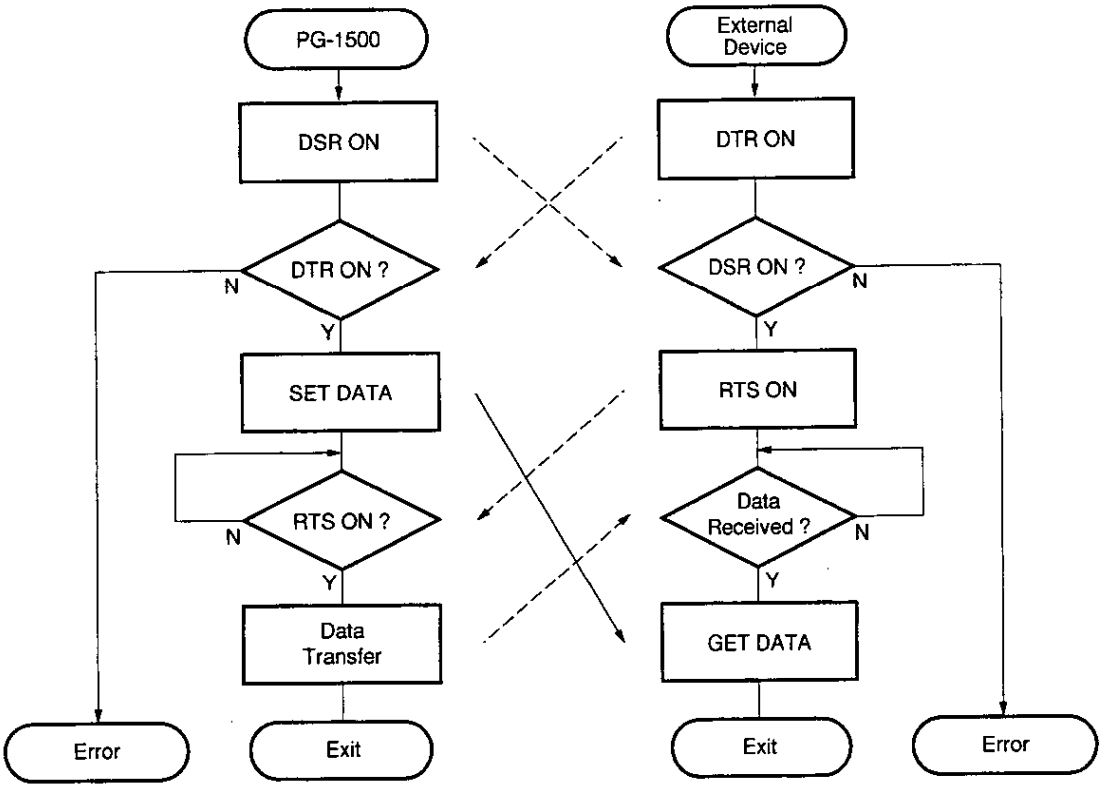
This section describes the handshake method in the serial interface.

(1) PG-1500 data output

(a) Hardware handshake

In PG-1500 data transmission, hardware operations are only carried out when XON/XOFF control is set to OFF.

Figure C-4. Hardware Handshake



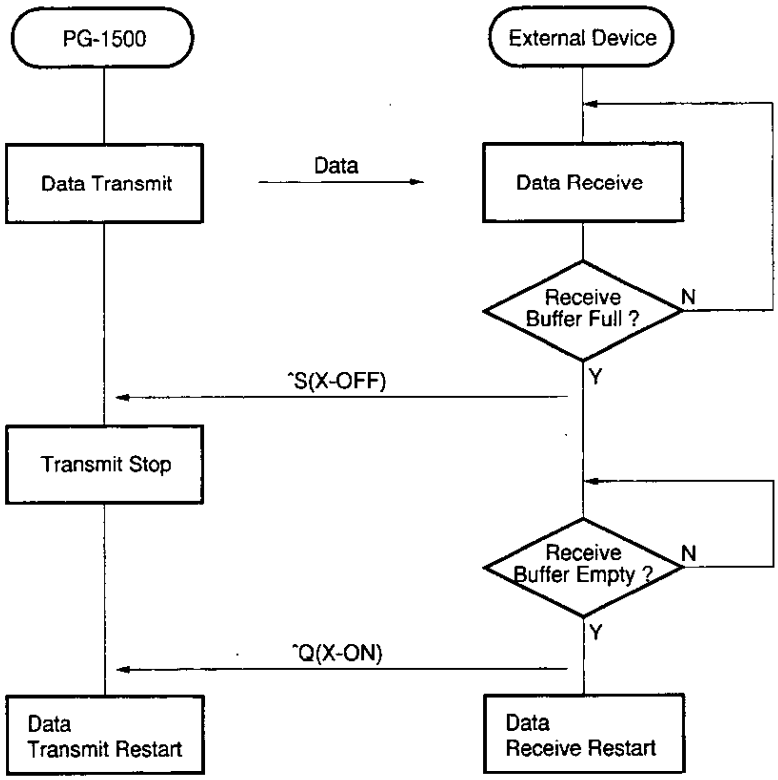
<1> DSR ON in serial mode
<2> DTR check
<3> Data set
<4> Wait for RTS ON
<5> Data transfer start

<1> DTR ON upon power-ON
<2> DSR check
<3> RTS ON
<4> Wait for data receive completion
<5> Data fetch

(b) Software handshake

In PG-1500 data transmission, software processing is carried out whether XON/XOFF control is ON or OFF.

Figure C-5. Software Handshake



<1> PG-1500 transmits data.

<2> External device receives data.

<3> When the receive buffer becomes full, the external device generates ^S(X-OFF) transmit stop character.

<4> Upon receipt of the transmit stop character, the PG-1500 stops data transmission.

<5> When the receive buffer becomes empty, the PG-1500 generates ^Q(X-ON) transmit restart character.

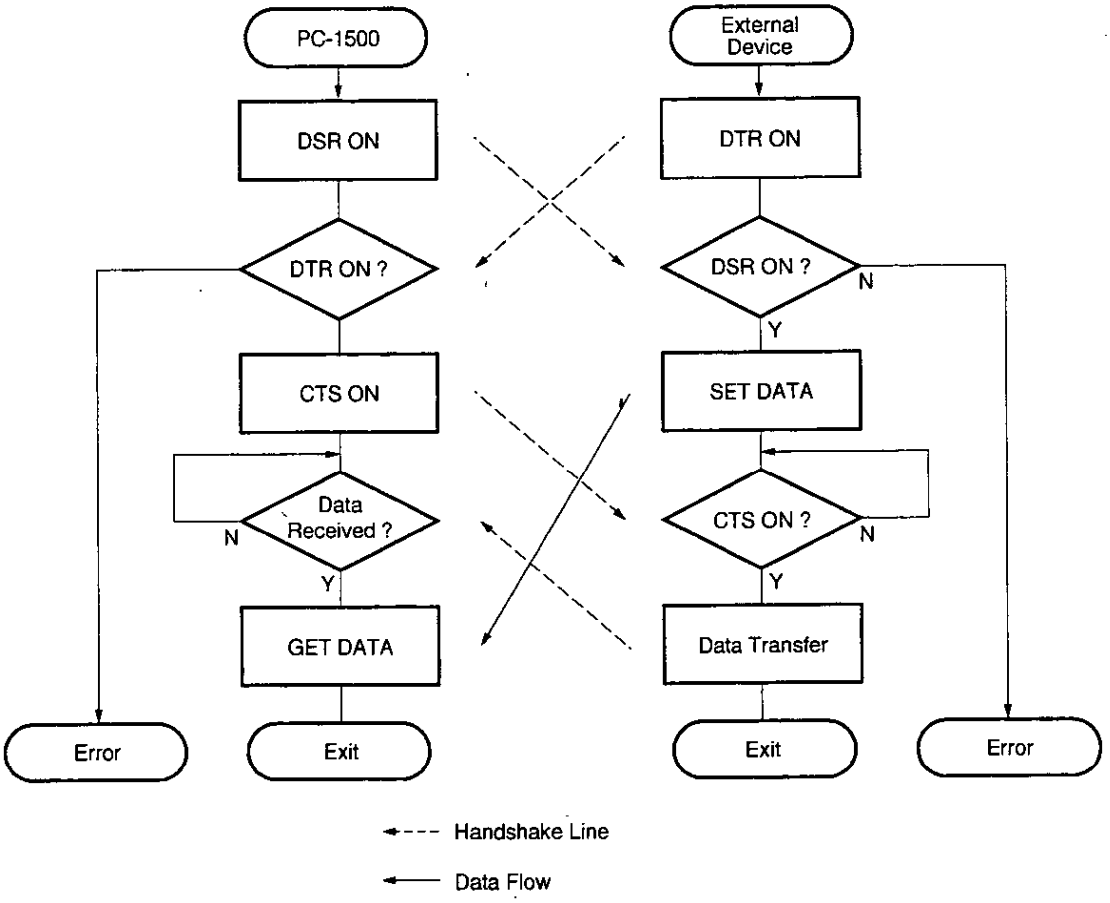
<6> Upon receipt of the transmit restart character, the PG-1500 restarts data transmission.

(2) PG-1500 data input

(a) Hardware handshake

In PG-1500 data reception, hardware processing is only carried out when XON/XOFF control is set to OFF.

Figure C-6. Hardware Handshake

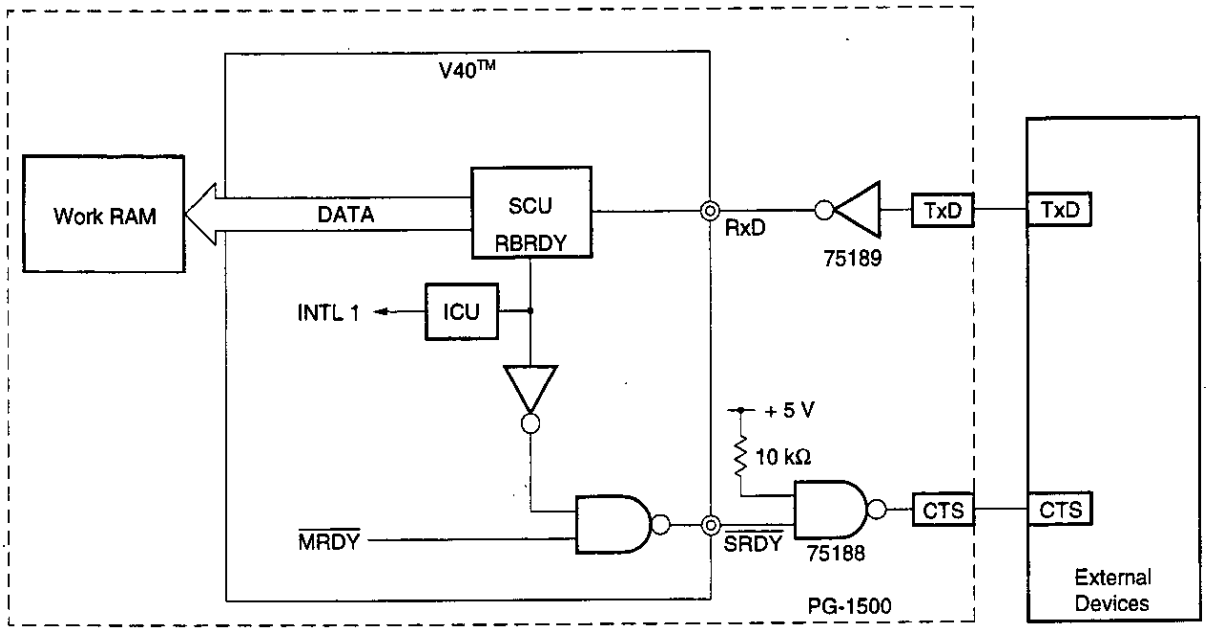


<1> DSR ON in serial mode
<2> DTR check
<3> CTS ON
<4> Wait for data receive completion
<5> Data fetch

<1> DTR ON upon power-ON
<2> DSR check
<3> Data set
<4> Wait for CTS ON
<5> Data transfer start upon CTS ON

PG-1500 internal control method in hardware handshake is described below.

Figure C-7. Schematic Circuit Diagram of Serial Input Unit



<1> PG-1500 has a 256-byte receive buffer in the work RAM.

<2> Data from an external device is converted into parallel data in the SCU and sent to the receive buffer.

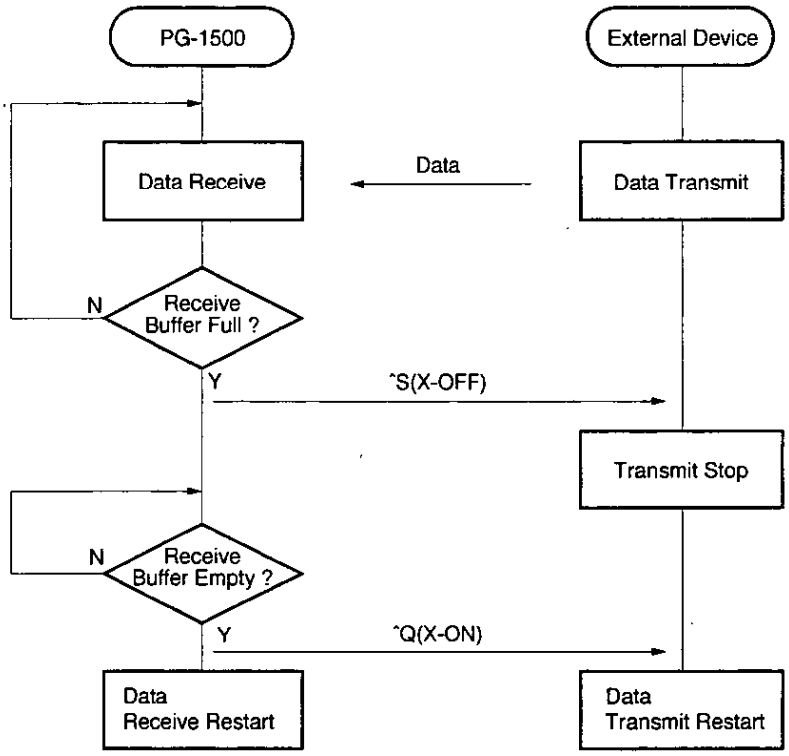
<3> If the receive buffer receives 100 bytes or more data, $\overline{\text{MRDY}}$ signal in the V40 (CPU) turns OFF and the external device is notified of data receive disable.

<4> When the receive buffer becomes 10 bytes or less, $\overline{\text{MRDY}}$ signal turns ON and the RBRDY signal of the SCU is connected to the external device, and thus, normal data reception is restarted.

(b) Software handshake

In PG-1500 data transmission, software processing is only carried out when XON/XOFF control is set to ON.

Figure C-8. Software Handshake



<1> The external device transmits data.

<2> PG-1500 receives data.

<3> PG-1500 has a 256-byte receive buffer. If the receive buffer becomes 100 bytes or more, the PG-1500 generates ^S(X-OFF) transmit stop character.

<4> Upon receipt of the transmit stop character, the external device stops data transmission.

<5> When the receive buffer becomes 10 bytes or less, the PG-1500 generates ^Q(X-ON) transmit restart character.

<6> Upon receipt of the transmit restart character, the external device restarts data transmission.

C.1.5 Connection example

This section describes the procedure of connecting a serial interface using NEC personal computer PC-9800 Series as an example.

Use an RS-232-C cable (straight type) for the connection with PC-9800.

The correspondence between the connecting cable signals and pins is shown in Table C-2.

Table C-2. Connection Cable and Signal Relations

PG-1500		PC-9800 Series		
Symbol Name	Pin No.	Pin No.	Symbol Name	
FG	1	1	SG	Note
TXD	2	2	TXD	
RXD	3	3	RXD	
RTS	4	4	RTS	
CTS	5	5	CTS	
DSR	6	6	DSR	
SG	7	7	SG	
DTR	20	20	DTR	

Note Connect pin No. 1 of PG-1500 to that of PC-9800 series only when the PG-1500 and external device (PC-9800 Series) FG are grounded.

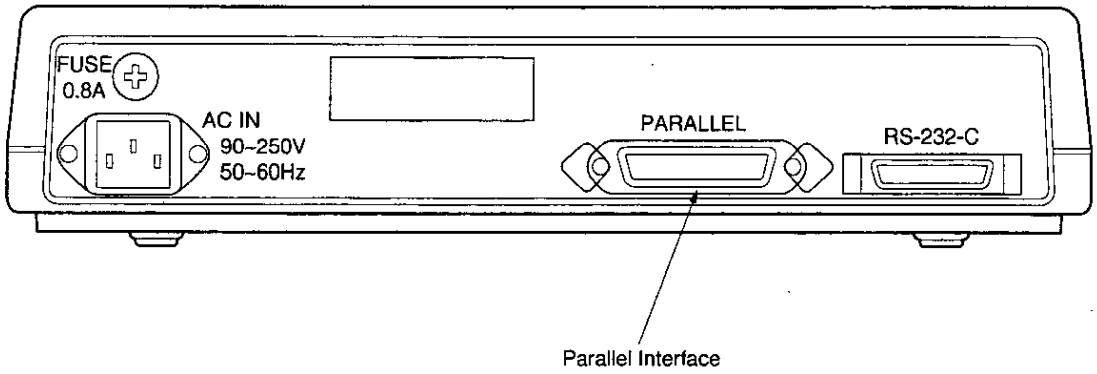
C.2 Parallel Interface

The PG-1500 is equipped with an 8-bit parallel input interface.

The input data and interface control signals are all set to the TTL level.

The interface circuit is compliant with the Centronics.

Figure C-9. Parallel Interface Connector



C.2.1 Pin configuration

The parallel interface connector pins are positioned as follows.

Figure C-10. Parallel Interface Pin Configuration

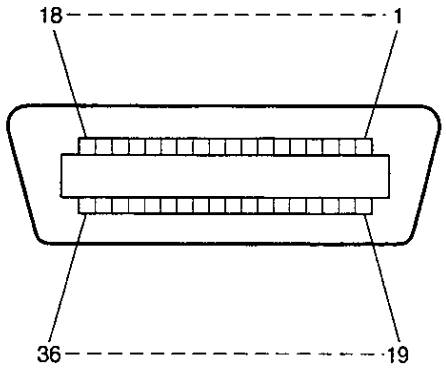


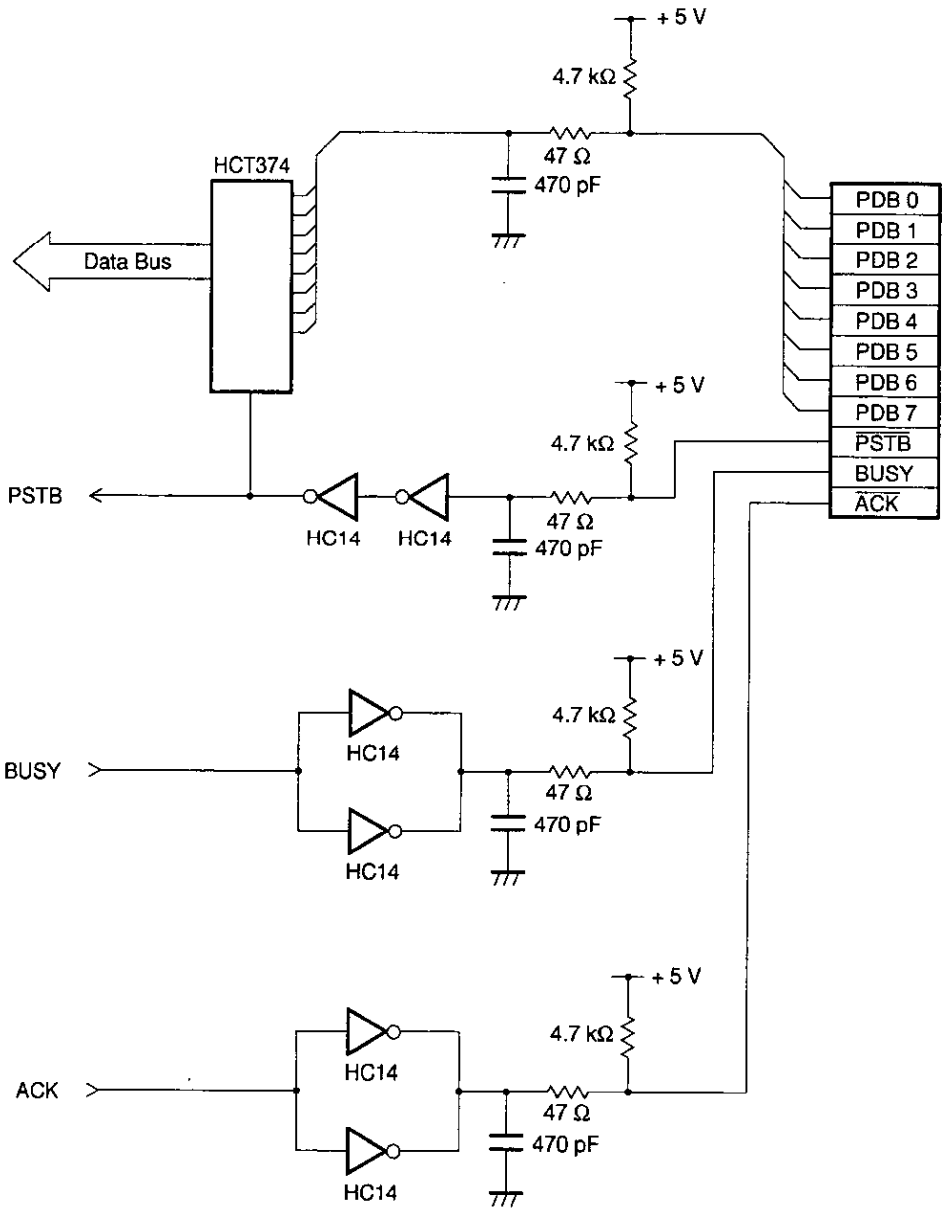
Table C-3. Parallel Interface Connector Signal Table

Pin No.	Signal Name	Direction (PG-1500) – (External Device)	Function
1	$\overline{\text{PSTB}}$	←	Data read timing signal
2	PDB0	←	Parallel data 0
3	PDB1	←	Parallel data 1
4	PDB2	←	Parallel data 2
5	PDB3	←	Parallel data 3
6	PDB4	←	Parallel data 4
7	PDB5	←	Parallel data 5
8	PDB6	←	Parallel data 6
9	PDB7	←	Parallel data 7
10	ACK	→	Signal to be output after data read
11	BUSY	→	Status signal indicating whether PG-1500 can acknowledge data or not
19 to 30, 33	GND	—	Signal ground

C.2.2 Interface circuit

Figure C-11 shows the PG-1500 parallel interface circuit.

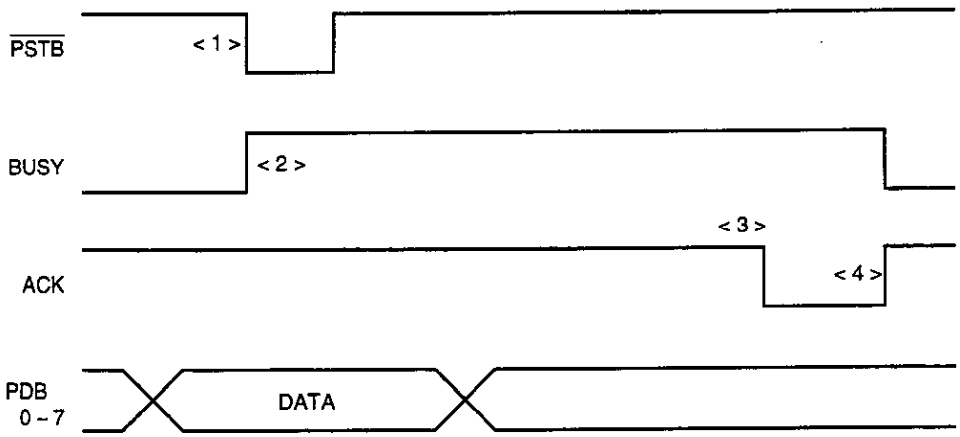
Figure C-11. Parallel Interface Circuit



C.2.3 Handshake method

This section describes the handshake method in the parallel interface.

Figure C-12. Parallel Interface Timings



<1> $\overline{\text{PSTB}}$ signal transmitted from the external device becomes active (low level).

<2> BUSY signal is activated (high level) by the $\overline{\text{PSTB}}$ signal. Until the BUSY signal is canceled, the PG-1500 does not acknowledge the $\overline{\text{PSTB}}$ signal.

<3> PG-1500 transmits the $\overline{\text{ACK}}$ signal by data read.

<4> Next, the PG-1500 cancels the BUSY signal at the rising edge of the $\overline{\text{ACK}}$ signal and waits for the next data.

C.2.4 Connection example

This section describes the procedure of connecting a parallel interface using an NEC personal computer of the PC-9800 Series as an example.

Use a parallel interface cable (printer cable) for the connection with the PC-9800 Series personal computer. The correspondence between the connecting cable signals and pins is shown in Table C-4.

Table C-4. Connection Cable and Signal Relations

PG-1500		PC-9800 Series	
Symbol Name	Pin No.	Pin No.	Symbol Name
$\overline{\text{PSTB}}$	1	1	$\overline{\text{PSTB}}$
PDB0	2	2	PDB0
PDB1	3	3	PDB1
PDB2	4	4	PDB2
PDB3	5	5	PDB3
PDB4	6	6	PDB4
PDB5	7	7	PDB5
PDB6	8	8	PDB6
PDB7	9	9	PDB7
$\overline{\text{ACK}}$	10	10	NC
BUSY	11	11	BUSY
GND	19	14	GND

Caution Be sure to ground the power cable and FG pin of the PG-1500 and external devices. If an external device with FG and SG short-circuited is to be used, remove the FG interface cable.

[MEMO]

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