GP-IB
OPERATION MANUAL
PULSE PATTERN GENERATOR
MP1701B/MP1755A/MP1608A/MP1650A

MAY 1992
VER. I
W0520AE

ANRITSU CORPORATION

APR.
1997

CERTIFICATION

ANRITSU CORPORATION certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.
Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

WARRANTY

All parts of this product are warranted by Anritsu Corporation of Japan against defects in material or workmanship for a period of one year from the date of delivery.
In the event of a defect occurring during the warranty period, Anritsu Corporation will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided that: it is returned to Anritsu; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

Any unauthorized modification, repair, or attempt to repair, will render this warranty void.

This warranty is effective only for the original purchaser of this product and is not transferable if it is resold.

ALL OTHER EXPRESSED WARRANTIES ARE DISCLAIMED AND ALL IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. IN NO EVENT SHALL ANRITSU CORPORATION BE LIABLE TO THE CUSTOMER FOR ANY DAMAGES, INCLUDING LOST PROFITS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to Anritsu Corporation or its representative in your area.

WARNING

NO OPERATOR SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED PERSONNEL.

CAUTION

FOR CONTINUED FIRE PROTECTION REPLACE
ONLY WITH SPECIFIED TYPE AND RATED FUSE.

TABLE OF CONTENTS

SECTION 1
GENERAL

The MP1701B/MP1755A/MP1608A/MP1650A has an IEEE Std. 488.2 GP-IB (General Purpose Interface Bus).

Control commands that are equivalent to the common commands (Common Command: header with *) defined by IEEE Std. 488.2 are provided.

For the relationship between the IEEE common commands and the MP1701B/MP1755A/MP1608A/MP1650A commands, see paragraph 7.3.

Also, the standard event status byte uses only the necessary functions.

In addition to the programmable pattern setting and the set state outputting via GP-IB, and the output interface parameter setting and the set status outputting; the set pattern and set parameter data can also be stored to and read from a 3.5-inch floppy disk.

The MP1701B/MP1755A/MP1608A/MP1650A also has a DMA function for high-speed transfer of large volumes of pattern data.

SECTION 2
GP-IB ADDRESS SETTING

With systems that use GP-IB, a unique address must be set for each device connected to the bus.

The MP1701B/MP1755A/MP1608A/MP1650A GP-IB address is set by the GP-IB ADDRESS switches on the rear panel.

Addresses from 0 to 30 can be set by the five switches.

The five address switches (named 1 to 5) have different weights of 1, 2, 4, 8, and 16, respectively,

For example to set address 11 (= 1 + 2 + 8), set the switches as follows:

Switch	1	2	3	4	5
Weight	1	2	4	8	16
Setting	1	1	0	1	0

When all the switches are set to 1 (1 + 2 + 4 + 8 + 16 = 31), the address is assumed to be 0.

Note: The MP1701B/MP1755A/MP1608A/MP1650A always checks the address switch status, so address switch change is always recognized.

SECTION 3
GP-IB CABLE CONNECTION

GP-IB cable is connected to the GP-IB connector on the rear panel by fastening the screws on the cable connector.

One GP-IB system can contain up to 15 devices.

However, the following restriction applies to the cable length.

(Total cable length) $\leqq$ 2m* (number of devices)

The maximum total length of all cables is 20m.

The MP1701B/MP1755A/MP1608A/MP1650A GP-IB connector is shown on the next page.

- Pin connections

Pin No.	Signal name	Pin No.	Signal name
1	DIO1	13	DIO5
2	DIO2	14	DIO6
3	DIO3	15	DIO7
4	DIO4	16	DIO8
5	EOI	17	REN
6	DAV	18	Signal ground
7	NRFD	19	Signal ground
8	NDAC	20	Signal ground
9	IFC	21	Signal ground
10	SRQ	22	Signal ground
11	ATN	23	Signal ground
12	Shield	24	Signal ground

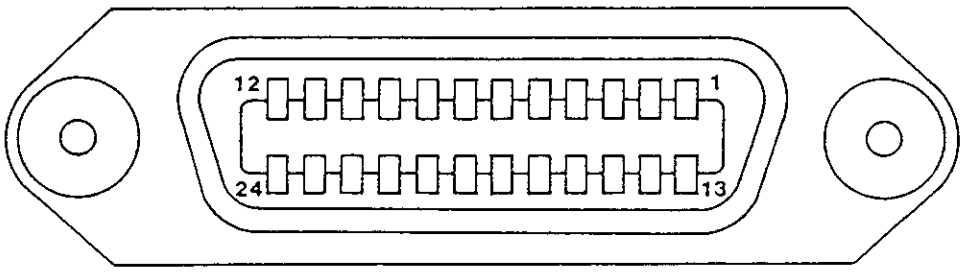


Fig. 3-1 GP-IB Connector

SECTION 4
INTERFACE FUNCTION

The GP-IB interface functions of the MP1701B/MP1755A/MP1608A/MP1650A are listed in Table 4-1.

Table 4-1 GP-IB Interface Functions

Function	Symbol	Explanation
Source handshake	SH1	All source handshake functions provided
Acceptor handshake	AH1	All acceptor handshake functions provided
Talker	T6	Basic talker functions provided Serial polling function provided Talk only function not provided Talker designation clear function by listener designation provided
Extended talker	TE0	Extended talker function not provided
Listener	L3	Basic listener functions provided Listen only mode function provided Listener designation clear function by talker designation provided
Extender listener	LE0	Extended listener function not provided
Service request	SR1	All service request functions provided
Remote/local	RL1	All remote local functions provided
Parallel polling	PP0	Parallel polling function not provided
Device clear	DC1	All device clear functions provided
Device trigger	DT0	Device trigger functions not provided
Controller	C0	System controller function not provided

SECTION 5
GP-IB COMMAND FORMAT

5.1 COMMAND FORMAT

The MP1701B/MP1755A/MP1608A/MP1650A GP-IB command format consists of a header field that indicates the command type, and a numeric data field that indicates spaces and values.

Use at least one space after the header field to separate it from the numeric data field.

In the data request message format, the header field, which shows the command type, is followed by [?].

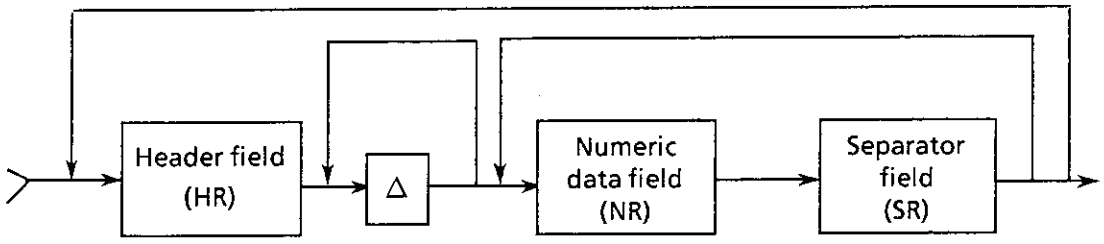
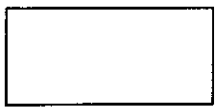


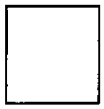
Fig. 5-1 Basic Command Format

5.2 Explanation of Symbols and Description

The method using the figure shown in Fig. 5-1 and the format figures shown in paragraph 5.3 are described below.

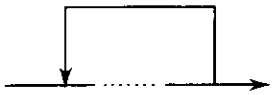


: Indicates data element.



: Indicates the data element of one character.

: Indicates connection of data elements.



: Indicates that data elements in this area can be repeated.

: Indicates that this area can be omitted.

5.3 Header Field (HR)

The header field has an HR2 format consisting of three alphabetic characters (A to Z, a to z).

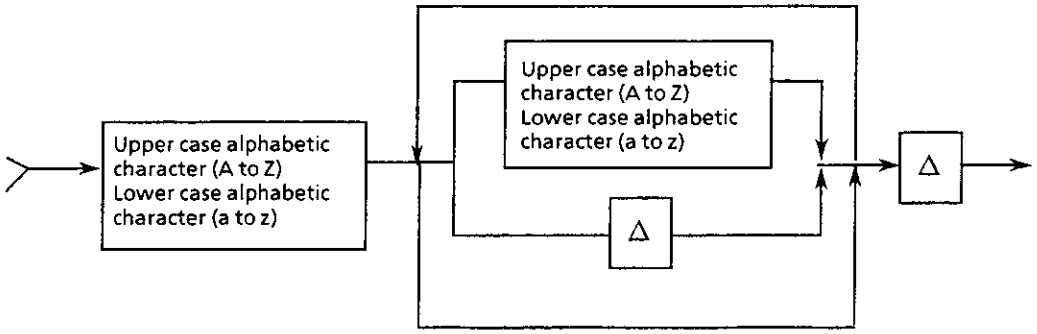


Fig. 5-2 HR2 Format

5.4 Numeric Data Field (NR)

The numeric data field has four formats depending on the comamnd: NR1 format (integer type), NR2 format (real number type), Hexadecimal format (HEX type), Binary format (BIN type).

5.4.1 NR1 format (integer type)

NR1 format is an integer type numeric representation format. It consists of a one character sign (+, −) followed by numerics (0 to 9). The + sign can be omitted, or replaced by a space. Leading spaces can also be inserted to align the number of digits of data, etc.

Examples:

- General representation +1234 , − 567, +0
- + sign omitted +1234 → 1234
- + sign replaced +1234 → Δ1234
- Spaces inserted +1234 → ΔΔ+1234
  −567 → ΔΔΔ−567

(Δ : Space)

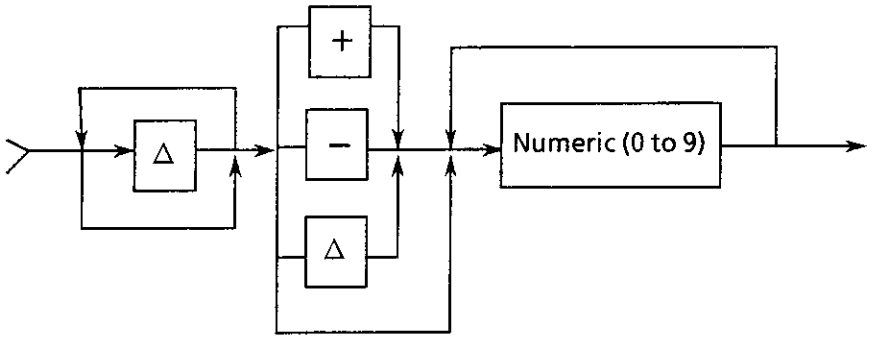


Fig. 5-3 NR1 Format

5.4.2 NR2 format (real number type)

NR2 format is real number type numeric representation.

It consists of a character sign (+, −) followed by numerics (0 to 9), decimal point (.), and numerics (0 to 9).

The + sign can be omitted or replaced and leading spaces can be inserted to align the number of digits of data, the same as NR1 format. When the decimal point is preceded, or followed by 0, the 0 can be omitted.

Examples:

- General representation +1.23, −45.6, −0.12, +34.0, +0.0
- + sign omitted +1.23 → 1.23
- + sign replaced +1.23 → Δ1.23
- Space insertion +1.23 → ΔΔ+1.23
  −45.6 → Δ−45.6
- High-order 0 omitted −0.12 → −.12
- Low-order 0 omitted +34.0 → +34
- +0.0 omitted +0.0 → +0. or +.0

(Δ : Space)

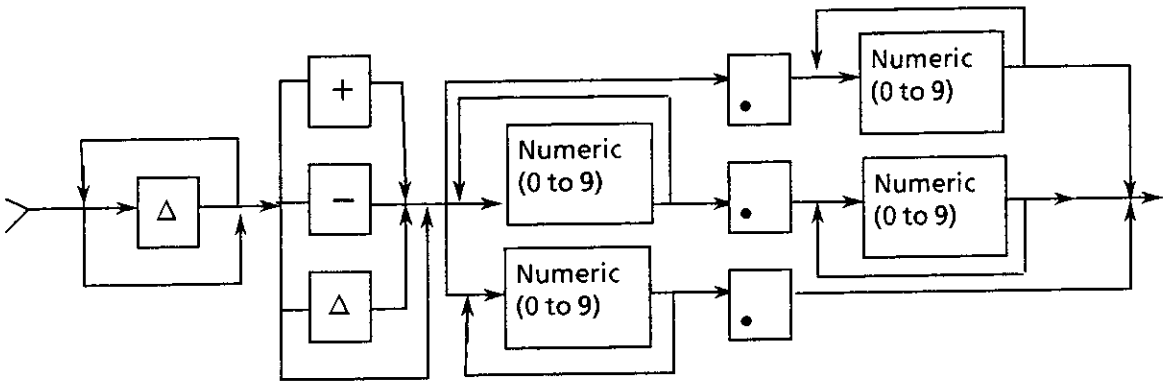


Fig. 5-4 NR2 Format

5.4.3 Hexadecimal format (HEX type)

Hexadecimal format consists of the identifier #H followed by numerics (0 to 9) or alphabetic characters (A to F). In hexadecimal format, a space can be inserted between the identifier and data. High-order 0 can be omitted.

Examples:

- General representation #H1234,#H00FF,#H0000
- Space insertion #H1234 → #HΔ1234
  #H00AF → #HΔΔΔ00AF
- 0 omission #H00FF → #HFF
  #H0000 → #H0

(Δ : Space)

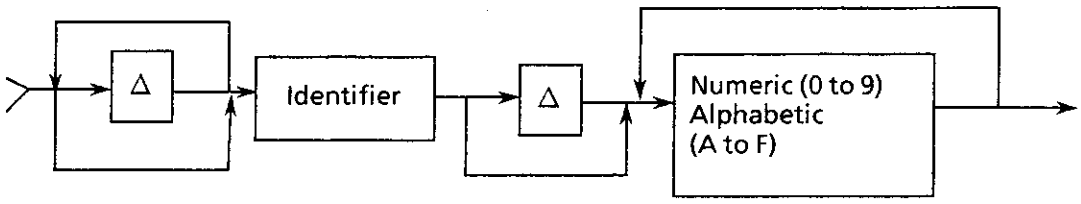


Fig. 5-5 Hexadecimal Format

5.4.4 Binary format (BIN type)

Binary format consists of the identifier #B followed by the numerics (0 and 1). In binary format, a space can be inserted between the identifier and data.

When the most significant bit is 0, the zeroes following it can be omitted.

Examples:

- General representation — #B11011011,#B00100100, #B00000000
- Space insertion — #B11011011 → #BΔ11011011; #B00100100 → #BΔΔΔ00100100
- 0 omission — #B00100100 → #B100100; #B00000000 → #B0

(Δ : Space)

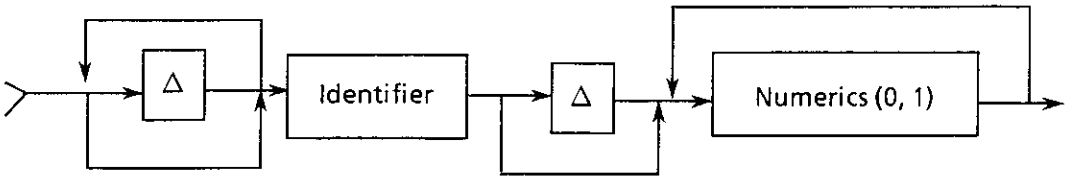


Fig. 5-6 Binary Format

5.5 Command Separator

The command separator has the following four formats:

SR1 format (semicolon ;) SR1 format (comma ,) SR2 format (line feed LF), SR3 format (END message).

5.5.1 SR1 format (semicolon ;)

SR1 format (semicolon ;) is used to separate the commands from each other when commands are sent consecutively.

Example:

ABC123;DEF45.6 is decoded as two commands "ABC123" and "DEF45.6".

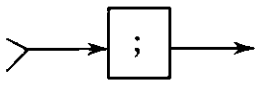


Fig. 5-7 SR1 (Semicolon ;) Format

5.5.2 SR1 format (comma ,)

The SR1 format (comma ,) is used to separate data when data are sent after a header filed.

Example:

ABC123,45.6 is decoded as the two data "123" and "45.6" following the header "ABC".

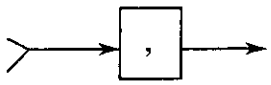


Fig. 5-8 SR1 (Comma ,) Format

5.5.3 SR2 format (line feed LF)

The SR2 format is used as the symbol that indicates the end of the command. The line feed (LF) code can be used as the SR2 format code. The carriage return (CR) code can also be inserted before the line feed code.

When the MP1701B/MP1608A is designed as a listener, the receiving operation is performed until this SR2 format code or the SR3 format code described next is received. When the SR2 format or SR3 format code is received, the receiving operation ends and the make up of the received command is decoded.

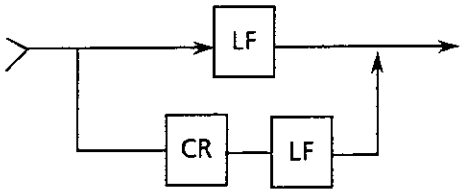


Fig. 5-9 SR2 Format

5.5.4 SR3 format (END message)

The SR3 format is used as the symbol that indicates the end of a command, the same as SR2 format.

An END message (EOI line used) can be used as the SR3 format code. (SR3 format and SR2 format can be used together.)

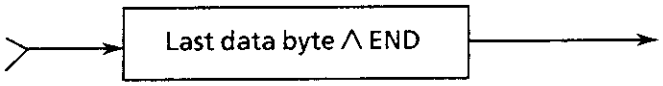


Fig. 5-10 SR3 Format

5.6 Definition of Space

The MP1701B/MP1755A/MP1608A/MP1650A treats the ASCII codes 00H to 09H and 0BH to 20H as blank space.

SECTION 6
EXECUTING PROGRAMS USED BY OTHER DEVICES

When executing programs for other devices (MP1601A/MP1604A) with the MP1701B/MP1755A/MP1608A/MP1650A, the program must be re-editted with respect to the four items described below.

1. Leave at least one space after the header (HR) field.

   The header field and numeric data field (or identifier) are identified by this space.

   Example:

   OUTPUT 700;"CLK0"

   ↓

   OUTPUT 700;"CLKΔ0"

   ↑ Space inserted here.

2. Descriminate between use of a separator (SR) field comma (,) and a semicolon (;).

   The semicolon (;) is used to separate commands and the comma (,) is used to separate data.

   Examples:

   - Command separation

     OUTPUT 700;"CLKΔ0,PTNΔ0"

     ↓

     OUTPUT 700;"CLKΔ0;PTNΔ0"

     ↑ Changed to semicolon(;) here.

   - Data separation

     OUTPUT 700;"BITΔ10;20"

     OUTPUT 700;"BITΔ10,20"

     ↑ Changed to comma(,) here.

3. When data request messages are received consecutively, only the information for the data request message received last is output.

   When data request messages are sent consecutively to the MP1701B/MP1755A/MP1608A/MP1650A as shown in the example below, the MP1701B/MP1755A/MP1608A/MP1650A outputs only the data in response to the data request message received last.

   Examples:

   - When one line of the program contains multiple data request messages

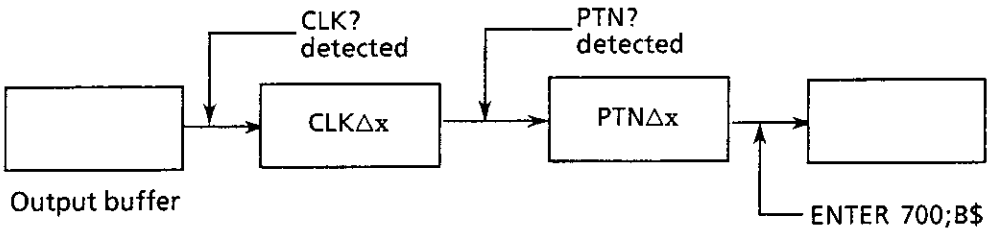
     OUTPUT 700;"CLK?;PTN?"

     ENTER 700;B$

     PRINT B$ ← Outputs PTNΔx.

     (x: Status at that time)

     When the program above is executed, the output buffer operates as shown below.



     Change to the following format:

     OUTPUT 700; "CLK?"

     ENTER 700;B$

     PRINT B$ ← Outputs CLKΔx.

     !

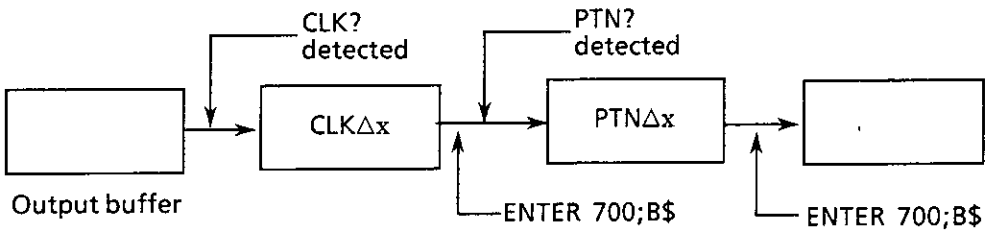
     OUTPUT 700; "PTN?"

     ENTER 700: B$

     PRINT B$ ← Outputs PTNΔx.

     (x: Status at that time)

When the program above is executed, the output buffer operates as shown below.



- When multiple data request messages were sent

  OUTPUT 700;"CLK"

  OUTPUT 700;"PTN?"

  ENTER 700;B$

  PRINT B$ ← Outputs PTNΔx.

  (x: Status at that time)

  ↓

  Change to the following format:

  OUTPUT 700;"CLK?"

  ENTER 700;B$

  PRINT B$ ← Outputs CLKΔx.

  !

  OUTPUT 700; "PTN?"

  ENTER 700; B$

  PRINT B$ ← Outputs PTNΔx.

  (x: Status at that time)

4. The GP-IB status byte basic format is the same as the conventional one but the functions have been increased.

   The MP1701B/MP1755A/MP1608A/MP1650A GP-IB status byte is described in SECTION 12. A sample program is shown in SECTION 14.

SECTION 7
GP-IB CONTROL COMMANDS

7.1 GP-IB Control Command List

The control command and data request commands are listed in Table 7-1. The commands that can be used differ with the current set operation mode.

There may be restrictions by the conditions already set in the command.

Table 7-1 GP-IB Commands (1/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Operation clock *	CLK		NR1 format	CLK?	①
Internal clock frequency setting resolution *	RES		NR1 format	RES?	②
Internal clock frequency *	FRQ		NR1 format	FRQ?	③
Output pattern logic	LGC		NR1 format	LGC	④
Output pattern	PTN		NR1 format	PTN?	⑤
Output pattern mark ratio	MRK		NR1 format	MRK?	⑥
Code error addition	EAD		NR1 format	EAD?	⑦
Numbr of words	WNB		NR1 format	WNB?	⑧
Word length	WLN		NR1 format	WLN?	⑨
Data length	DLN		NR1 format	DLN?	⑩
Number of page	ADR		NR1 format	ADR?	⑪
	PAG			PAG?	
Pattern bit	BIT		NR1 format	BIT?	⑫
			Hexadecimal format		

* : Not effective for the MP1755A.

Table 7-1 GP-IB Commands (2/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Number of pattern data input bytes	WRT		NR1 format	———	⑬
Number of pattern data output bytes	RED		NR1 format	———	⑭
Preset (all bits on all pages)	ALL		NR1 format	———	⑮
Preset (all bits on 1 page)	PST		NR1 format	———	⑯
DATA, $\overline{\text{DATA}}$, CLOCK output offset reference value	OFS		NR1 format	OFS?	⑰
Front panel/rear panel output switching	SPD		NR1 format	SPD?	⑱
DATA output amplitude	DAP		NR2 format	DAP?	⑲
DATA output offset	DOS		NR2 format	DOS?	⑳
DATA/$\overline{\text{DATA}}$ tracking	TRK		NR1 format	TRK?	㉑
$\overline{\text{DATA}}$ output amplitude	NAP		NR2 format	NAP?	㉒
$\overline{\text{DATA}}$ output offset	NOS		NR2 format	NOS?	㉓
Delay time between CLOCK outputs	CDL		NR2 format	CDL?	㉔
CLOCK output amplitude	CAP		NR2 format	CAP?	㉕

Table 7-1 GP-IB Commands (3/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
CLOCK otput offset	COS		NR2 format	COS?	㉖
Memory function switching	MEM		NR1 format	MEM?	㉗
File No./directory mode switching	FIL		NR1 format	FIL?	㉘
Data recall	RCL		NR1 format	———	㉙
Data save	SAV		NR1 format	———	㉚
Data resave	RSV		NR1 format	———	㉛
Number of external pattern input channel	SCH		Binary format	SCH?	㉜
Error addition channel	ECH		NR1 format	ECH?	㉝
Number of mark ratio AND bit shifts	SFT		NR1 format	SFT?	㉞
Service request enable register	SRQ		NR1 format	SRQ?	㉟
Status byte register	———		———	STB?	㊱
Standard event status enable register	ESE		NR1 format	ESE?	㊲
Standard event status register	———		———	ESR?	㊳

Table 7-1 GP-IB Commands (4/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Extended event status enable register	EES		NR1 format	EES?	㊴
Extended event status register	———		———	EER?	㊵
Initialize	INI		———	———	㊶
Internal timer setting	RTM		NR1 format	RTM?	㊷
Power failure, power recovery status	———		———	PWI?	㊸
PLL lock status	———		———	PLL?	㊹
Delay status	———		———	DLY?	㊺
Floppy access status	———		———	MAC?	㊻

7.2 GP-IB Control Command List in Alphabetic Order

The MP1701B/MP1755A/MP1608A/MP1650A GP-IB control commands given in paragraph 7.1 are listed in alphabetic order in Table 7-2.

Table 7-2 GP-IB Commands in Alphabetic Order(1/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Number of page	ADR		NR1 format	ADR?	⑪
Preset (all bits on all pages)	ALL		NR1 format	———	⑮
Pattern bit	BIT		NR1 format Hexadecimal format	BIT?	⑫
CLOCK output amplitude	CAP		NR2 format	CAP?	㉕
CLOCK output delay time	CDL		NR2 format	CDL?	㉔
Operation clock *	CLK		NR1 format	CLK?	①
CLOCK output offset	COS		NR2 format	COS?	㉖
DATA output amplitude	DAP		NR2 format	DAP?	⑲
Data length	DLN		NR1 format	DLN?	⑩
Delay status	———		———	DLY?	㊺
DATA output format	DOS		NR2 format	DOS?	⑳
Code error addition	EAD		NR1 format	EAD?	⑦
Error addition channel	ECH		NR1 format	ECH?	㉝

* : Not effective for the MP1755A.

Table 7-2 GP-IB Commands in Alphabetic Order (2/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Extended event status register	———		———	EER?	㊵
Extended event status enable register	EES		NR1 format	EES?	㊴
Standard event status enable register	ESE		NR1 format	ESE?	㊲
Standard event status register	———		———	ESR?	㊳
File No./directory mode switching	FIL		NR1 format	FIL?	㉘
Internal clock frequency *	FRQ		NR1 format	FRQ?	③
Initialize	INI		———	———	㊶
Output pattern logic	LGC		NR1 format	LGC?	④
Floppy disk access status	———		———	MAC?	㊻
Memory function switching	MEM		NR1 format	MEM?	㉗
Output pattern mark ratio	MRK		NR1 format	MRK?	⑥
$\overline{\text{DATA}}$ output amplitude	NAP		NR2 format	NAP?	㉒
$\overline{\text{DATA}}$ output offset	NOS		NR2 format	NOS?	㉓

* : Not effective for the MP1755A.

Table 7-2 GP-IB Commands in Alphabetic Order (3/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
DATA, $\overline{\text{DATA}}$, CLOCK output offset reference value	OFS		NR1 format	OFS?	⑰
Number of page	PAG		NR1 format	PAG?	⑪
PLL lock status	———		———	PLL?	㊹
Preset (all bits on 1 page)	PST		NR1 format	———	⑯
Output pattern	PTN		NR1 format	PTN?	⑤
Power failure, power recovery status	———		———	PWI?	㊸
Data recall	RCL		NR1 format	———	㉙
Number of pattern data output bytes	RED		NR1 format	———	⑭
Internal clock frequency setting resolution *	RES		NR1 format	RES?	②
Data resave	RSV		NR1 format	———	㉛
Internal time setting	RTM		NR1 format	RTM?	㊷
Data save	SAV		NR1 format	———	㉚
Number of external pattern input channel	SCH		Binary format	SCH	㉜
Number of mark ratio AND bit shifts	SFT		NR1 format	SFT?	㉞

* : Not effective for the MP1755A.

Table 7-2 GP-IB Commands in Alphabetic Order (4/4)

Function	Control message			Data request message	No.
	Header field	Space	Numeric data field	Header field	
Front panel/rear panel output switching	SPD		NR1 format	SPD?	⑱
Service request enable register	SRQ		NR1 format	SRQ?	㉟
Status byte register	———		———	STB?	㊱
DATA/$\overline{\text{DATA}}$ tracking	TRK		NR1 format	TRK?	㉑
Word length	WLN		NR1 format	WLN?	⑨
Number of words	WNB		NR1 format	WNB?	⑧
Number of pattern data input bytes	WRT		NR1 format	———	⑬

7.3 Correspondence with Common Commands

The relationship between the common commands defined by IEEE 488.2 and the MP1701B/MP1755A/MP1608A/MP1650A commands is shown in Table 7-3.

The common commands of the table below are essential commands defined by IEEE 488.2. For a detailed description of the common commands, refer to IEEE 488.2.

Table 7-3 Correspondence with Common Commands

Common Command	Corresponding Command	No.	Item on IEEE 488.2 standard
*IDN?	———	———	10.14
*RST	———	———	10.32
*TST?	———	———	10.38
*OPC	———	———	10.18
*OPC?	———	———	10.19
*WAI	———	———	10.39
*CLS	———	———	10.3
*ESE	ESE	(37)	10.10
*ESE?	ESE?	(37)	10.11
*ESR?	ESR?	(38)	10.12
*PSC	———	———	10.25
*PSC?	———	———	10.26
*SRE	SRQ	(35)	10.34
*SRE?	SRQ?	(35)	10.35
*STB?	STB?	(36)	10.36

SECTION 8
DEVICE CLEAR FUNCTION

When the MP1701B/MP1755A/MP1608A/MP1650A receives the device clear command, it returns to its state immediately after the power is turned on. Lamp check is not performed.

The rear panel functions return to the state set by the dip switches.

(When the MP1701B/MP1755A/MP1608A/MP1650A is returned from the remote state to the local state, the rear panel functions return to the state set by the dip switches.)

Moreover, if the floppy disk is being accessed, access is interrupted.

SECTION 9
DEVICE TRIGGER FUNCTION

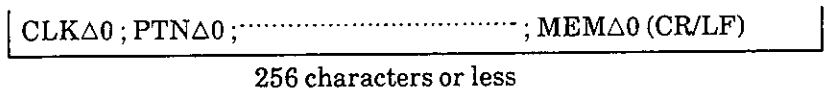
The MP1701B/MP1755A/MP1608A/MP1650A does not have a device trigger function.

SECTION 10
MESSAGE LENGTH

The effective message length of the data acceptable to the MP1701B/MP1755A/MP1608A/MP1650A is up to 256 bytes (256 characters).

It can be assumed that data exceeding this number is not input.

That is, limit the number of characters of a GP-IB command sent by one line to 256 characters or less, including the last CR/LF.



SECTION 11
CONTROL MESSAGE AND DATA REQUEST MESSAGE

11.1 INTERNAL CLOCK Section

The INTERNAL CLOCK section GP-IB commands are described in the following pages.

The △ in the test means a space.

Note: The MP1755A does not have an internal clock.
So, the INTERNAL CLOCK section GP-IB commands are not effective for the MP1755A.

① Operation clock (Clock mode)

Set value	Control message	Data request message	Output message
External clock (EXT)	CLKΔ0	CLK?	CLKΔ0
Internal clock (INT)	CLKΔ1		CLKΔ1

Restrictions

Control message — Invalid in the following case:
When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "CLKΔ0"
```

Selects external clock (EXT) as the operation clock.

Data request mesage — When operation clock is external (EXT)

```
OUTPUT 700; "CLK?"
ENTER 700; B$
PRINT B$
```

↓

Outputs CLKΔ0 (CR/LF).

Note: Those commands are not effective for the MP1755A.

② Internal clock frequency setting resolution (Resolution mode)

Set value	Control message	Data request message	Output message
kHz units	RESΔ0	RES?	RESΔ0
MHz units	RESΔ1		RESΔ1

Restrictions

Control message — Invalid in the following cases:
When operation clock is external clock (EXT)
When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:
When operation clock is external clock (EXT)

Examples

Control message — When operation clock is internal clock (INT)

```
OUTPUT 700; "RESΔ0"
```

Sets the internal clock frequency setting resolution to kHz.

Data request message — When the internal clock frequency setting resolution is kHz

```
OUTPUT 700; "RES?"
ENTER 700;B$
PRINT B$
```

↓

Outputs RESΔ0 (CR/LF).

When operation clock is external clock (EXT)

```
OUTPUT 700; "RES?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

Notes: 1. The number of settable digits and display digits of the internal clock frequency differs depending on whether the setting is in kHz or MHz units.

2. Those commands are not effective for the MP1755A.

③ Internal clock frequency (Frequency)

MP1701B: When the internal clock frequency setting resolution is in kHz units.

Set value	Control message	Data request message	Output message
50000kHz ⋮ 100000000kHz	FRQ△50000 ⋮ FRQ△100000000	FRQ?	FRQ△△△△50000 ⋮ FRQ△100000000

MP1608A: When the internal clock frequency setting resolution is in kHz units.

Set value	Control message	Data request message	Output message
50000kHz ⋮ 50000000kHz	FRQ△50000 ⋮ FRQ△50000000	FRQ?	FRQ△△△△50000 ⋮ FRQ△△50000000

MP1650A: When the internal clock frequency setting resolution is in kHz units.

Set value	Control message	Data request message	Output message
30000kHz ⋮ 30000000kHz	FRQ△30000 ⋮ FRQ△30000000	FRQ?	FRQ△△△△30000 ⋮ FRQ△△30000000

MP1701B: When the internal clock frequency setting resolution is in MHz units.

Set value	Control message	Data request message	Output message
50MHz ⋮ 10000 MHz	FRQ△50 ⋮ FRQ△1000	FRQ?	FRQ△△△△50 ⋮ FRQ△10000

MP1608A: When the internal clock frequency setting resolution is in MHz units.

Set value	Control message	Data request message	Output message
50 MHz ⋮ 5000 MHz	FRQ△50 ⋮ FRQ△5000	FRQ?	FRQ△△△△50 ⋮ FRQ△△5000

MP1650A: When the internal clock frequency setting resolution is in MHz units.

Set value	Control message	Data request message	Output message
30 MHz ⋮ 3000 MHz	FRQ△30 ⋮ FRQ△3000	FRQ?	FRQ△△△△30 ⋮ FRQ△△3000

Restrictions

Control message	Invalid in the following cases:
	When operation clock is external clock (EXT)
	When floppy disk is being accessed
Data request message	Invalid in the following case and ERR is output:
	When operation clock is external clock (EXT)

Examples

Control message

When operation clock is internal clock (INT) and internal clock frequency setting resolution is set in kHz units.

```
OUTPUT 700; "FRQ△50000"
```

Sets the internal clock frequency to 50000 kHz.

Data request message

When internal clock frequency is 50000 kHz

```
OUTPUT 700; "FRQ?"
ENTER 700;B$
PRINT B$
        ↓
```

Outputs FRQ△△△△50000 (CR/LF).

When operation clock is external clock (EXT)

```
OUTPUT 700; "FRQ?"
ENTER 700;B$
PRINT B$
        ↓
```

Outputs ERR (CR/LF).

Notes: 1. The number of settable digits and display digits of the internal clock frequency differs depending on whether the setting is kHz or MHz units.

2. Those commands are not effective for the MP1755A.

11.2 PATTERN Section

The PATTERN section GP-IB commmands are described on the following pages.

The △ in the text means a space.

④ Output pattern logic (Logic mode)

Set value	Control message	Data request message	Output message
Positive logic (POSITIVE)	LGC△0	LGC?	LGC△0
Negative logic (NEGATIVE)	LGC△1		LGC△1

Restrictions

Control message — Invalid in the following cases:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "LGC△0"
```

Sets the Output pattern logic to positive logic (POSITIVE).

Data request message — When output pattern logic is positive logic (POSITIVE)

```
OUTPUT 700; "LGC?"
ENTER 700;B$
PRINT B$
```

↓

Outputs LGC△0 (CR/LF).

Note: When output pattern is in PRBS mode, if the output pattern logic is set, the output pattern mark ratio is switched automatically.

⑤ Output pattern (Pattern mode)

Set value	Control message	Data request message	Output message
PRGM. WORD	PTNΔ0	PTN?	PTNΔ0
PRGM. DATA	PTNΔ1		PTNΔ1
PRBS 2^{7}-1	PTNΔ2		PTNΔ2
PRBS 2^{9}-1	PTNΔ3		PTNΔ3
PRBS 2^{11}-1	PTNΔ5		PTNΔ5
PRBS 2^{15}-1	PTNΔ6		PTNΔ6
PRBS 2^{20}-1	PTNΔ7		PTNΔ7
PRBS 2^{23}-1	PTNΔ8		PTNΔ8
PRBS 2^{31}-1	PTNΔ9		PTNΔ9

Restrictions

Control message — Invalid in the following cases:

When PTNΔ4 is set

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — OUTPUT 700; "PTNΔ0"

Sets the word pattern to PRGM.WORD pattern.

Data request message — When output pattern is PRGM.WORD

```
OUTPUT 700; "PTN?"
ENTER 700;B$
PRINT B$
```

↓

Outputs PTNΔ0 (CR/LF).

Note: PRGM: Programmable pattern, PRBS: Pseudorandom pattern

When output pattern is set in the PRBS mode, the previously set output pattern mark ratio display and its settings are reset.

⑥ Output pattern mark ratio (Mark ratio mode)

Set value	Control message	Data request message	Output message
Positive logic : 0/8 Negative logic : 8/8	MRKΔ0	MRK?	MRKΔ0
Positive logic : 1/8 Negative logic : 7/8	MRKΔ1		MRKΔ1
Positive logic : 1/4 Negative logic : 3/4	MRKΔ2		MRKΔ2
Positive logic : 1/2 Negative logic : 1/2	MRKΔ3		MRKΔ3

Restrictions

Control message — Invalid in the following cases:

When output pattern is in PRGM. (WORD or DATA) mode

When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:

When the output pattern is in PRGM. (WORD or DATA) mode

Examples

Control message — When output pattern logic is positive logic (POSITIVE) and output pattern is PRGM mode

```
OUTPUT 700; "MRKΔ0"
```

Sets the output pattern mark ratio to 0/8.

Data request message — When output pattern mark ratio is 0/8

```
OUTPUT 700; "MRK?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERRΔ0 (CR/LF).

When output pattern is in PRGM (WORD or DATA) mode

```
OUTPUT 700; "MRK?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERRΔ0 (CR/LF).

Note: When output pattern is set in the PRBS mode, the previously set output pattern mark ratio display and its settings are reset.

⑦ Code error addition (Error addition mode)

Set value	Control message	Data request message	Output message
OFF	EAD△0	EAD?	EAD△0
1×10^−4	EAD△1		EAD△1
1×10^−5	EAD△2		EAD△2
1×10^−6	EAD△3		EAD△3
1×10^−7	EAD△4		EAD△4
1×10^−8	EAD△5		EAD△5
1×10^−9	EAD△6		EAD△6
SINGLE	EAD△7		EAD△7

Restrictions

Control message — Invalid in the following case:
When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "EAD△0"
```

Turns OFF code error addition.

Data request message

When code error addition is OFF

```
OUTPUT 700; "EAD?"
ENTER 700;B$
PRINT B$
```

↓

Outputs EAD△0 (CR/LF).

Note: SINGLE addition adds 1 pulse error.

⑧ Number of of words (Number of words)

Set value	Control message	Data request message	Output message
1 ⋮ 32768	WNB△1 ⋮ WNB△32768	WNB?	WNB△△△△△1 ⋮ WNB△32768
However, there are some restrictions on the step value.			

Restrictions

Control message — Invalid in the following cases:
When output pattern is other than WORD pattern
When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:
When output pattern is other than WORD pattern

Examples

Control message — When output pattern is WORD pattern

```
OUTPUT 700; "WNB△1"
```

Sets the number of words to 1.

Data request message — When number of words is 1

```
OUTPUT 700; "WNB?"
ENTER 700;B$
PRINT B$
```

↓

Outputs WNB△△△△△1 (CR/LF).

When output pattern is other than WORD pattern

```
OUTPUT 700; "WNB?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

Note: The number of words step value that can be set differs depending on the word length set value.

(See Table 11-1.)

When the input number of words can not be set, the input value is compared to the currently displayed value and the input value is changed to an optimum value.

Note (Cont.):

Example: For word length 2

When number of words 2100 is input, it is changed to 2048 and displayed.

Next, when number of words 2100 is input again, it is changed to 2112 and displayed.

Table 11-1 Numeric Relationship between Word Length and Number of Words

Word length	Number of words			
	Step width	Range	Step width	Range
2	1 step	1 to 2048	64 step	2112 to 32768
3	1 step	1 to 1365	128 step	1408 to 32768
4	1 step	1 to 1024	32 step	1056 to 32768
5	1 step	1 to 819	128 step	896 to 32768
6	1 step	1 to 682	64 step	704 to 32768
7	1 step	1 to 585	128 step	640 to 32768
8	1 step	1 to 512	16 step	528 to 32768
9	1 step	1 to 455	128 step	512 to 32768
10	1 step	1 to 409	64 step	448 to 32768
11	1 step	1 to 372	128 step	384 to 32768
12	1 step	1 to 341	32 step	352 to 32768
13	1 step	1 to 315	128 step	384 to 32768
14	1 step	1 to 292	64 step	320 to 32768
15	1 step	1 to 273	128 step	384 to 32768
16	1 step	1 to 256	8 step	264 to 32768

⑨ Word length (Word length)

Set value	Control message	Data request message	Output message
2 ⋮ 16	WLNΔ2 ⋮ WLNΔ16	WLN?	WLN ΔΔ2 ⋮ WLN Δ16
The set state is every step in the table above.			

Restrictions

Control message — Invalid in the following cases:

When output pattern is other than WORD pattern

When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:

When output pattern is other than WORD pattern

Examples

Control message — When output pattern is WORD pattern

```
OUTPUT 700; "WLNΔ2"
```

Sets the word length to 2.

Data request message — When word length is 2

```
OUTPUT 700; "WLN?"
ENTER 700;B$
PRINT B$
        ↓
```

Outputs WLNΔΔ2 (CR/LF).

When output pattern is other than WORD pattern

```
OUTPUT 700; "WLN?"
ENTER 700;B$
PRINT B$
        ↓
```

Outputs ERR (CR/LF).

Note: Depending on the word length setting, if the number of words at that time is not suitable, it is changed automatically to the corresponding optimum value. (See Note in ⑧ command.)

⑩ Data length (Data length)

Set value	Control message	Data request message	Output message
2 ⋮ 524288	DLN△2 ⋮ DLN△524288	DLN?	DLN△△△△△△2 ⋮ DLN△524288
However, there are some restrictions on the step value in the table above.			

Restrictions

Control message — Invalid in the following cases:
When output pattern is other than DATA pattern
When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:
When output pattern is other than DATA pattern

Examples

Control message — When output pattern is DATA pattern

```
OUTPUT 700; "DLN△2"
```

Sets the data length to 2.

Data request message — When data length is 2

```
OUTPUT 700; "DLN?"
ENTER 700;B$
PRINT B$
```

↓

Outputs DLN△△△△△△2 (CR/LF).

When output pattern is other than DATA pattern

```
OUTPUT 700; "DLN?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

Note: There are two data-length step values: 1 step and 128 steps. (See Table 11-2.)

When the input data length can not be set, the input value is compared to the currently displayed value and the input value is changed to a optimum value.

Example

When data length 4100 is input, it is changed to 4096 and displayed

When data length 4100 is input again, it is changed to 4224 and displayed.

Table 11-2 Numerical Relationship of Data Length

Data length	Step width	
2 to 4096	1 step	524288/128 = 4096
4224 to 524288	128 steps	128N (N = 33 to 4096)

⑪ Number of page (Page)

Set value	Control message	Data request message	Output message
1 ⋮ 32768	PAG△1 ⋮ PAG△32768	PAG?	PAG△△△△△1 ⋮ PAG△32768
1 ⋮ 32768	ADR△1 ⋮ ADR△32768	ADR?	ADR△△△△△1 ⋮ ADR△32768

Restrictions

Control message
Invalid in the following cases:
When output pattern is PRBS mode
When floppy disk is being accessed

Data request message
Invalid in the following case and ERR is output:
When output pattern is PRBS mode

Examples

Control message
When output pattern is PRGM mode

```
OUTPUT 700; "PAG△1"
```
Sets the number of page to 1.
```
OUTPUT 700; "ADR△1"
```
Sets the number of page to 1.

Data request message
When number of page is 1

```
OUTPUT 700; "PAG?"
ENTER 700;B$
PRINT B$
```
↓
Outputs PAG△△△△△1 (CR/LF).
```
OUTPUT 700; "ADR?"
ENTER 700;B$
PRINT B$
```
↓
Outputs ADR△△△△△1 (CR/LF).

When output pattern is PRBS mode
OUTPUT 700; "PAG?"
ENTER 700;B$
PRINT B$
↓
Outputs ERR (CR/LF).

Note: There are two kinds of page number set comands: PAG and ADR.

They have the same function. The maximum number of page that can be set depends on the number of words, word length, and data length.

When a number of page exceeds a maximum number of page, page number are held to that maximum number set.

Example

When data length = 32 and displayed number of page = 1, the maximum number of page is 2.

If PAG△3 is input, the displayed number of page is changed to page 2.

Table 11-3 Relationship between Numer of Page and WORD/DATA Pattern

Output pattern	Page variation range
WORD	1 to set number of words, 1 step width
DATA	1 to value not exceeding the value of (data length ÷ 16), 1 step width (When remainder is 0, up to value of quotient, and when there is a remainder, up to value of quotient + 1, 1 step width) Data length — Number of page 2 to 16 — 1 17 to 32 — 2 33 to 48 — 3 49 to .....

⑫ Pattern bit (Pattern bit)

Set value	Control message		Data request essage
0 : : 65535	BIT△0 : : BIT△65535	BIT△0#H0000 : : BIT△#HFFFF	BIT?
Output message image			
The current number of page set and the contents of the bits up to 8 pages including the maximum pattern set page from that page are output in the following format: PAG △*****;BIT△#H****,#H****,#H****,#H****,#H****,#H****,#H****,#H****			

Restrictions

Control message — Invalid in the following cases:

When output pattern is PRBS mode

When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:

When output pattern is PRBS mode

Examples

Control message — When output pattern is in PRGM mode and bit pattern of 3 pages from the currently set page is set.

OUTPUT 700; "BIT△10,20,30"

OUTPUT 700; "BIT△#HFFFF,#H1000,#H2000"

Bit pattern of consecutive pages can be set by separating the data from each other with a comma (,).

When setting number of page and setting pattern bit of 4 pages from the current page.

OUTPUT 700; "PAG△10;BIT△10,20,30,40"

OUTPUT 700; "PAG△10;BIT△#HFFFF,#H1000,#H2000,#H3000"

OUTPUT 700; "ADR△10;BIT△10,20,30,40"

OUTPUT 700; "ADR△10;BIT△#HFFFF,#H1000,#H2000,#H3000"

Data request message When number of displayed page is 1 and maximum number of page is 29, data will appear in this format.

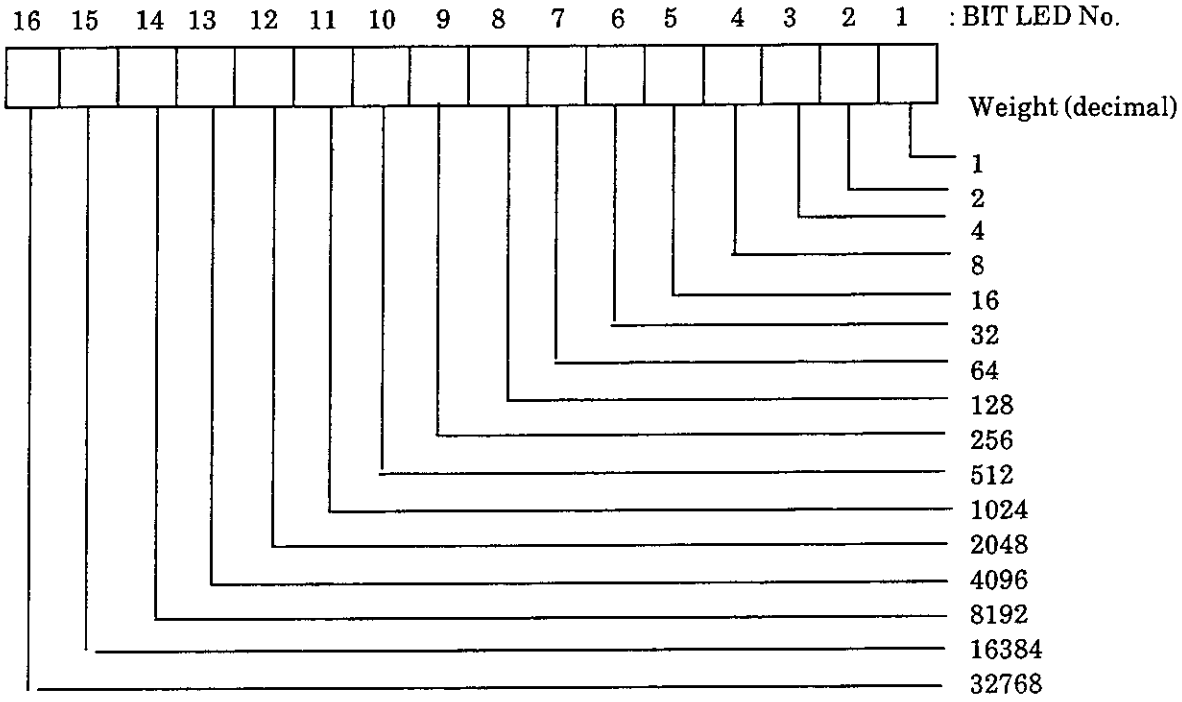
```
OUTPUT 700; "BIT?"
FOR I = 1 to 4
  ENTER 700;B$
  PRINT B$
NEXT I "
        ↓
PAG△△△△△1;BIT△#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000
PAG△△△△△9;BIT△#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000
PAG△△△△17;BIT△#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000,#H0000
PAG△△△△25;BIT△#H0000,#H0000,#H0000,#H0000,#H0000
```

When output pattern is in PRBS mode

```
OUTPUT 700;"BIT?"
ENTER 700;B$
PRINT B$
      ↓
  Outputs ERR (CR/LF).
```

Set value and bit weight

The relationship between actual pattern bit setting and data values set are shown below.



Bit△1	:	Only BIT LED No. 1 is set.
Bit△16	:	Only BIT LED No. 5 is set.
Bit△10	:	Only BIT LED's Nos. 2 and 4 are set.
Bit△#H000F	:	Only BIT LED's Nos. 1 to 4 are set. (Decimal: 15)
Bit△#H00F0	:	Only BIT LED's Nos. 5 to 8 are set. (Decimal: 240)
Bit△#H1000	:	Only BIT LED No. 13 is set. (Decimal: 4096)
Bit△#HA000	:	Only BIT LED's Nos. 14 and 16 are set. (Decimal 40960)

Note: The pattern bit is set at the page which is already set from the value of the NR field.

Pattern bit of consecutive pages can be set by separating the data of the NR field from each other by a comma (,). However, when the output pattern is a WORD pattern, the settable pattern bit are restricted from 1 to a number of set word-length bits; when the output pattern is a DATA pattern, they are restricted to up to number of bits of quotient [data length /16; when remainder is 0, up to all bits.)

⑬ Number of pattern data input bytes (Pattern data write)

Set value		Control message	Data request message
Number of pattern transfer bytes	Pattern input start address		
1 : : 65536	0 : : 32767	WRT△1, 0 : : WRT△65536,32767	None
Perform in "WRT△ number of pattern transfer bytes, pattern input start address" format			

Restrictions

Control message

Invalid in the following cases:

When (the number of pattern transfer bytes + pattern input start address × 2) >65536

When output pattern is in PRBS mode

When floppy disk is being accessed

Examples

Control message

When output pattern is in PRGM mode

```
DIM B (9)
READ B (*)
DATA 1,2,4,8,16,32,64,128,256,512
OUTPUT 700; "WRT△20,0"
OUTPUT 700 USING "W";B(*)
```

↓

Sets the pattern data corresponding to the DATA statement for the number of page 1 to 10.

Note: The MP1701B/MP1755A/MP1608A/MP1650A defines the necessary number of bytes of pattern data to be DMA-transferred and the input start address from each value of the NR field, and defines DMA mode switching and the internal RAM area storage address.

The relationship between pattern input start address and actual number of page is:

(pattern input start address + 1) = actual number of page

The DMA transfer mode is released at the end of pattern data transfer.

However, the following is performed as exception processing:

- When the pattern data is not all sent after the number of pattern input bytes is set, the DMA mode is released and bit 0 (command error bit) of the GP-IB status byte is set to 1 by time-out function.

  The time-out is 60 seconds.

- When a separate control command is transferred after a number of pattern input bytes is set, that command is assumed to be the pattern data set value.

Pattern data DMA transfer is also described in SECTION 13.

⑭ Number of pattern data output bytes (Pattern data read)

Set value		Control message	Data request message
Number of pattern transfer bytes	Pattern input start address		
1 : : 65536	0 : : 32767	RED△1, 0 : : RED△65536,32767	None
Perform in "RED△ number of pattern transfer bytes, pattern input start address" format			

Restrictions

Control message

Invalid in the following cases:

When (number of pattern transfer bytes + pattern output start address × 2) >65536

When output pattern is in PRBS mode

When floppy disk is being accessed

Examples

Control message

When output pattern is in PRGM mode

```
DIM B (9)
OUTPUT 700; "RED△20,0"
ENTER 700 USING "W";B(*)
PRINT B (*)
```

↓

Outputs the pattern data corresponding to number of pages 1 to 10.

Note: The MP1701B/MP1755A/MP1608A/MP1650A defines the necessary number of bytes of pattern data to be DMA-transferred and the output start address from each value of the NR field, and defines DMA mode switching and the internal RAM area storage addresses.

The relationship between pattern input start address and actual number of page is:

(pattern output start address + 1) = actual number of page

The DMA transfer mode is released at the end of pattern data transfer.

However, the following is performed as exception processing:

- When the pattern data is not received at all after number of pattern output bytes is set, the DMA mode is released and bit 0 (command error bit) of the GP-IB status byte is set to 1 by time-out function.

  The time-out is 60 seconds.

Pattern data DMA transfer is also described in SECTION 13.

⑮ Preset (all bits on all pages) (Preset all 0 or 1)

Set value	Control message	Data request message	Output message
All bits on all pages, clear	ALL△0	None	———
All bits on all pages, set	ALL△1		

Restrictions

Control message — Invalid in the following cases:
When output pattern is in PRBS mode
When floppy disk is being accessed

Examples

Control message — When output pattern is in PRGM mode

```
OUTPUT 700; "ALL△0"
```

Sets all bits on all pages to 0.

Note: All bits on all pages have 512k bits of pattern data.

⑯ Preset (all bits on 1 page) (Preset page 0 or 1)

Set value	Control message	Data request message	Output message
All bits on 1 page, clear	PST△0	None	———
All bits on 1 page, set	PAR△1		

Restrictions

Control message — Invalid in the following cases:
When output pattern is in PRBS mode
When floppy disk is being accessed

Examples

Control message — When output pattern is PRGM mode

```
OUTPUT 700; "PST△0"
```

Sets all bits of the displayed page to 0.

Note: All bits on 1 page indicate all the bits of the displayed page (1 page).

11.3 OUTPUT Section

The OUTPUT section GP-IB commands are described on the following pages.

The Δ in the text means a space.

⑰ DATA, $\overline{\text{DATA}}$, CLOCK output offset reference value (Offset mode)

Set value	Control message	Data request message	Output message
Offset reference value VOH	OFSΔ0	OFS?	OFSΔ0
Offset reference value VTH	OFSΔ1		OFSΔ1
Offset reference value VOL	OFSΔ2		OFSΔ2

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — OUTPUT 700; "OFSΔ0"

Sets the DATA, $\overline{\text{DATA}}$, CLOCK output offset reference value to VOH.

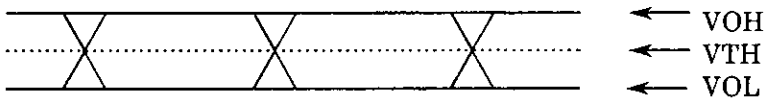
Data request mesage — When DATA, $\overline{\text{DATA}}$, CLOCK output offset reference value is VOH

```
OUTPUT 700, "OFS?"
ENTER 700; B$
PRINT B$
```

↓

Output OFSΔ0 (CR/LF).

Note: The output offset reference values are shown below.



When the offset reference value is set, the DATA, $\overline{\text{DATA}}$, and CLOCK output offset voltage display changes to the optimum value at that time.

⑱ Front panel/rear panel output switching (Speed)

Set value	Control message	Data request message	Output message
1/1 SPEED	SPD△0	SPD?	SPD△0
1/4 SPEED	SPD△1		SPD△1

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — OUTPUT 700; "SPD△0"

Sets front panel/rear panel output switching to 1/1 SPEED (front panel connector output).

Data request message — When front panel/rear panel output switching is 1/1 SPEED (front panel connector output)

```
OUTPUT 700; "SPD?"
ENTER 700;B$
PRINT B$
```

↓

Outputs SPD△0 (CR/LF).

Note: When front panel/rear panel output switching is set to 1/4 SPEED (rear panel connector output), the setting display of the $\overline{\text{DATA}}$ group including the DATA/$\overline{\text{DATA}}$ TRACKING function and CLOCK1 group is turned OFF.

⑲ DATA output amplitude (Data amplitude)

Front panel/rear panel output switching: 1/1 SPEED			
Set value	Control message	Data request message	Output message
0.50 V_{P-P} : : 2.00 V_{P-P}	DAP△0.5 : : DAP△2.00	DAP?	DAP△0.500 : : DAP△2.000
Step value is in 0.01 V_{P-P} units.			

Front panel/rear panel output switching: 1/4 SPEED			
Set value	Control message	Data request message	Output message
0.50 V_{P-P} : : 1.00 V_{P-P}	DAP△0.5 : : DAP△1.00	DAP?	DAP△0.500 : : DAP△1.000
Step value is in 0.01 V_{P-P} units.			

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "DAP△0.5"
```

Sets the DATA output amplitude to 0.50 V_{P-P}.

Data request message — When DATA output amplitude is 0.50 V_{P-P}.

```
OUTPUT 700; "DAP?"
ENTER 700;B$
PRINT B$
```

↓

Outputs DAP△0.500 (CR/LF).

Note: The maximum DATA output amplitude differs with the front panel/rear panel output setting.

The third digit after the decimal point of the defined DATA output amplitude is rounded off.

⑳ DATA output offset (Data offset)

Front panel/rear panel output switching: 1/1 SPEED,
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOH

Set value	Control message	Data request message	Output message
−2.000 V	DOSΔ0−2.0	DOS?	DOSΔ −2.000
:	:		:
:	:		:
+2.000 V	DOSΔ2.0		DOSΔΔ2.000

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED,
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VTH

Set value	Control message	Data request message	Output message
−3.000 V	DOSΔ−3.0	DOS?	DOSΔ−3.000
:	:		:
:	:		:
+1.750 V	DOSΔ1.75		DAPΔΔ1.750

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED,
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOL

Set value	Control message	Data request message	Output message
− 4.000 V	DOSΔ − 4.0	DOS?	DOSΔ −4.000
:	:		:
:	:		:
+1.500 V	DOSΔ1.5		DOSΔΔ1.500

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/4 SPEED,
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOH

Set value	Control message	Data request message	Output message
−1.500 V	DOSΔ − 1.5	DOS?	DOSΔ −1.500
:	:		:
:	:		:
+1.500 V	DOSΔ1.5		DOSΔΔ1.500

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/4 SPEED, DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VTH			
Set value	Control message	Data request message	Output message
−2.000 V : : +1.250 V	DOSΔ−2.0 : : DOSΔ1.25	DOS?	DOSΔ−2.000 : : DOSΔΔ1.250
Step value is in 0.005 V units.			

Front panel/rear panel output switching: 1/4 SPEED, DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOL			
Set value	Control message	Data request message	Output message
−2.500 V : : +1.000 V	DOSΔ−2.5 : : DOSΔ1.0	DOS?	DOSΔ−2.500 : : DOSΔΔ1.000
Step value is in 0.005 V units.			

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — When front panel/rear panel output switching is 1/1 SPEED and DATA/DATA/CLOCK output offset reference value is VOH

```
OUTPUT 700; "DOSΔ-2.0"
```

Sets the DATA output offset to −2.0 V.

Data request message — When DATA output offset is −2.0 V

```
OUTPUT 700; "DOS?"
ENTER 700;B$
PRINT B$
```

↓

Outputs DOSΔ−2.000 (CR/LF).

Note: When the third digit after the decimal point of the defined DATA output offset is not an effective value (other than in 0.005 V units), it is changed to the effective value shown below.

1mV, 2mV→0mV; 3mV, 4mV, 6mV, 7mV→5mV ; 8mV, 9mV→10mV

The DATA output offset setting range differs with the DATA output amplitude set value as shown in Figs. 11-1 to 11-6 on the following pages.

- 1/1 SPEED

  Offset reference value: VOH

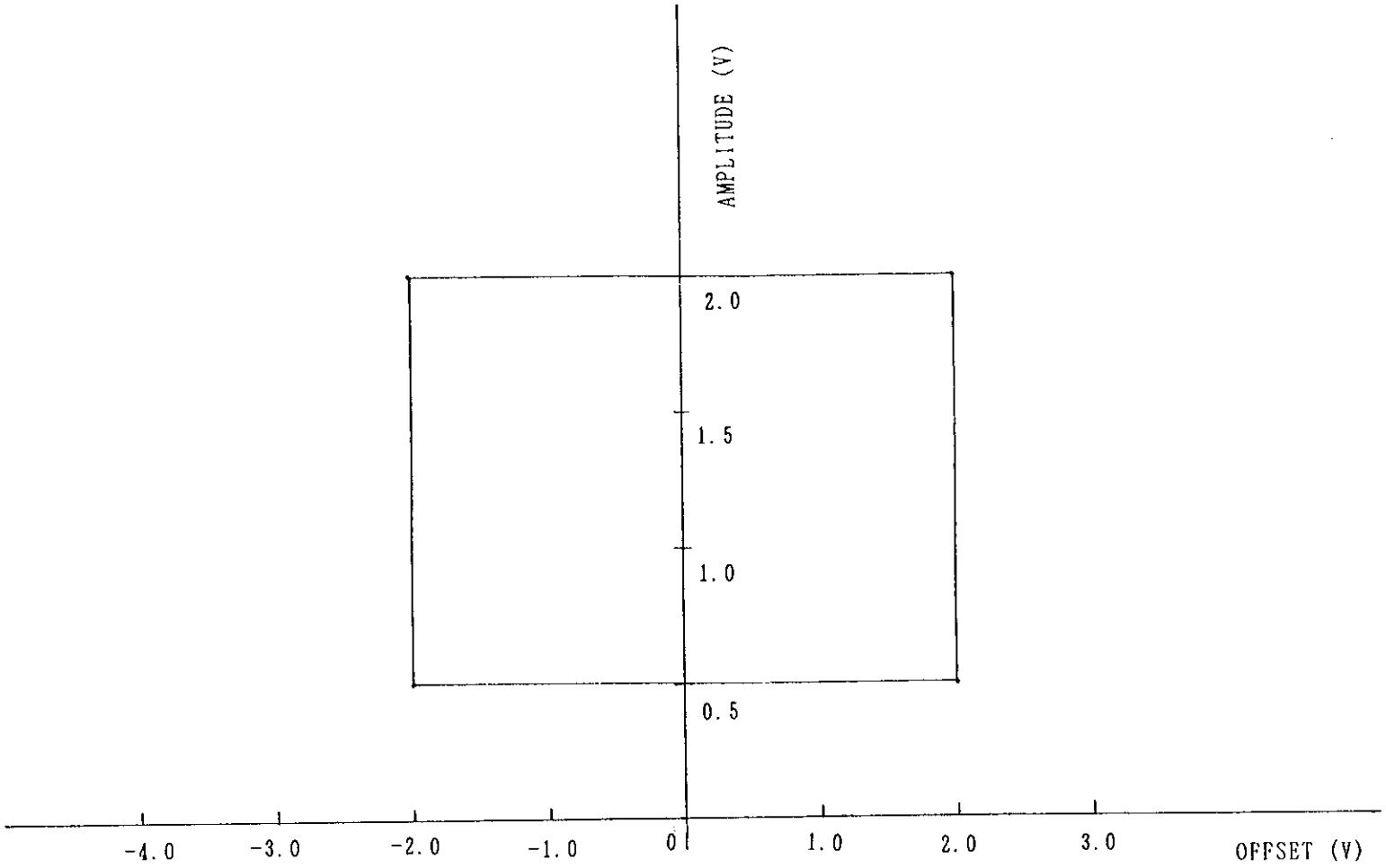


Fig. 11-1 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

- 1/1 SPEED

  Offset reference value: VTH

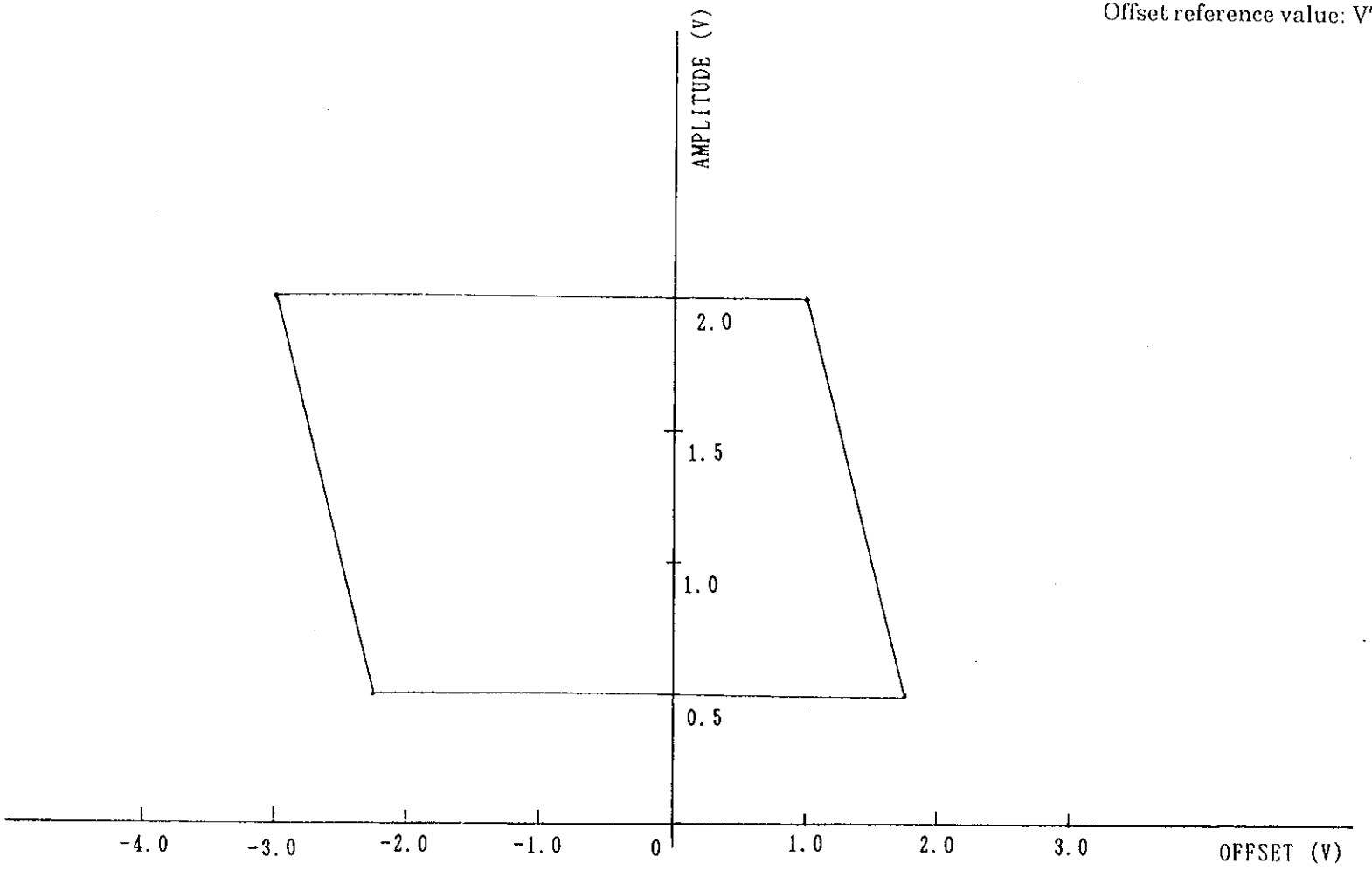


Fig. 11-2 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

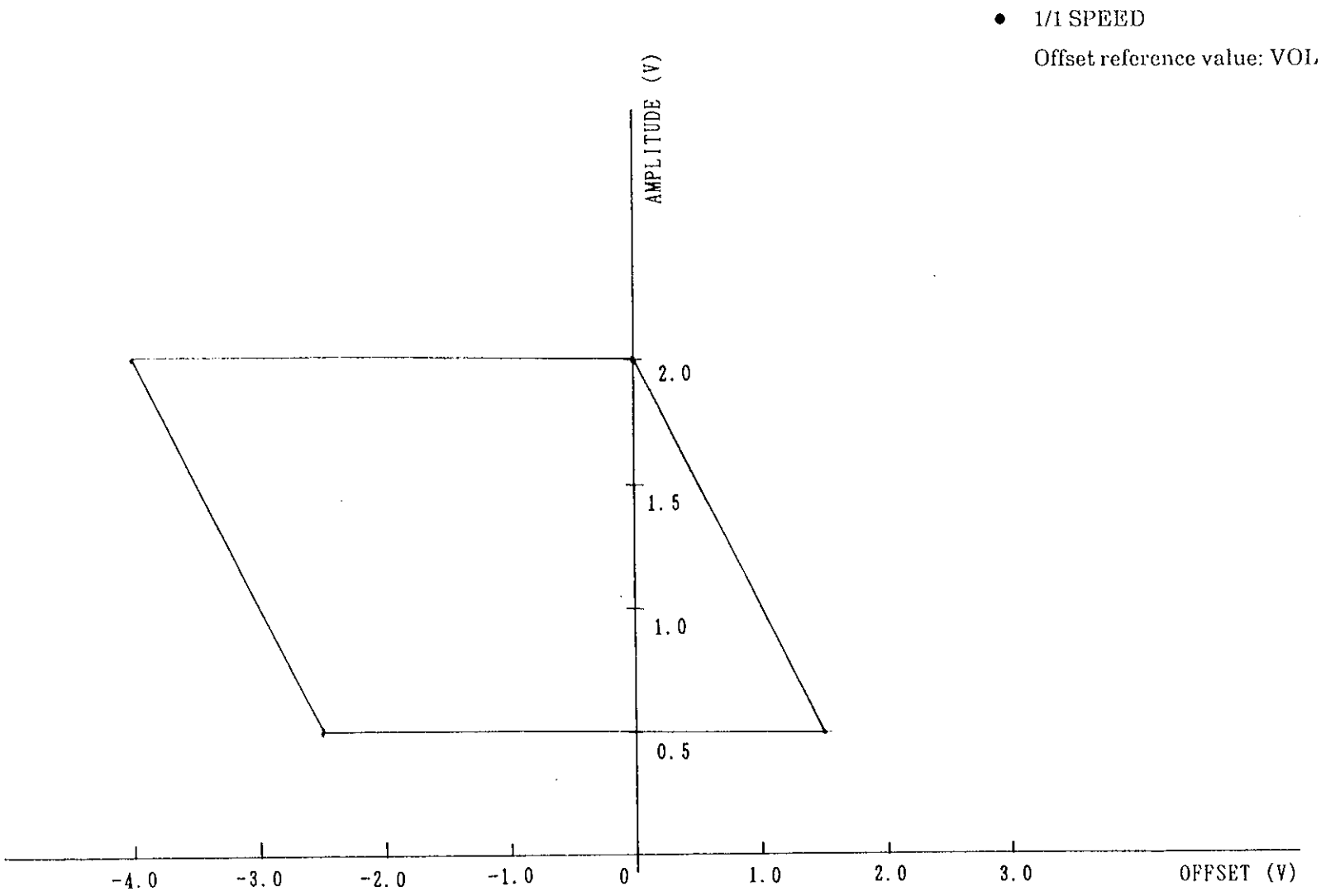


Fig. 11-3 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

- 1/4 SPEED

  Offset reference value: VOH

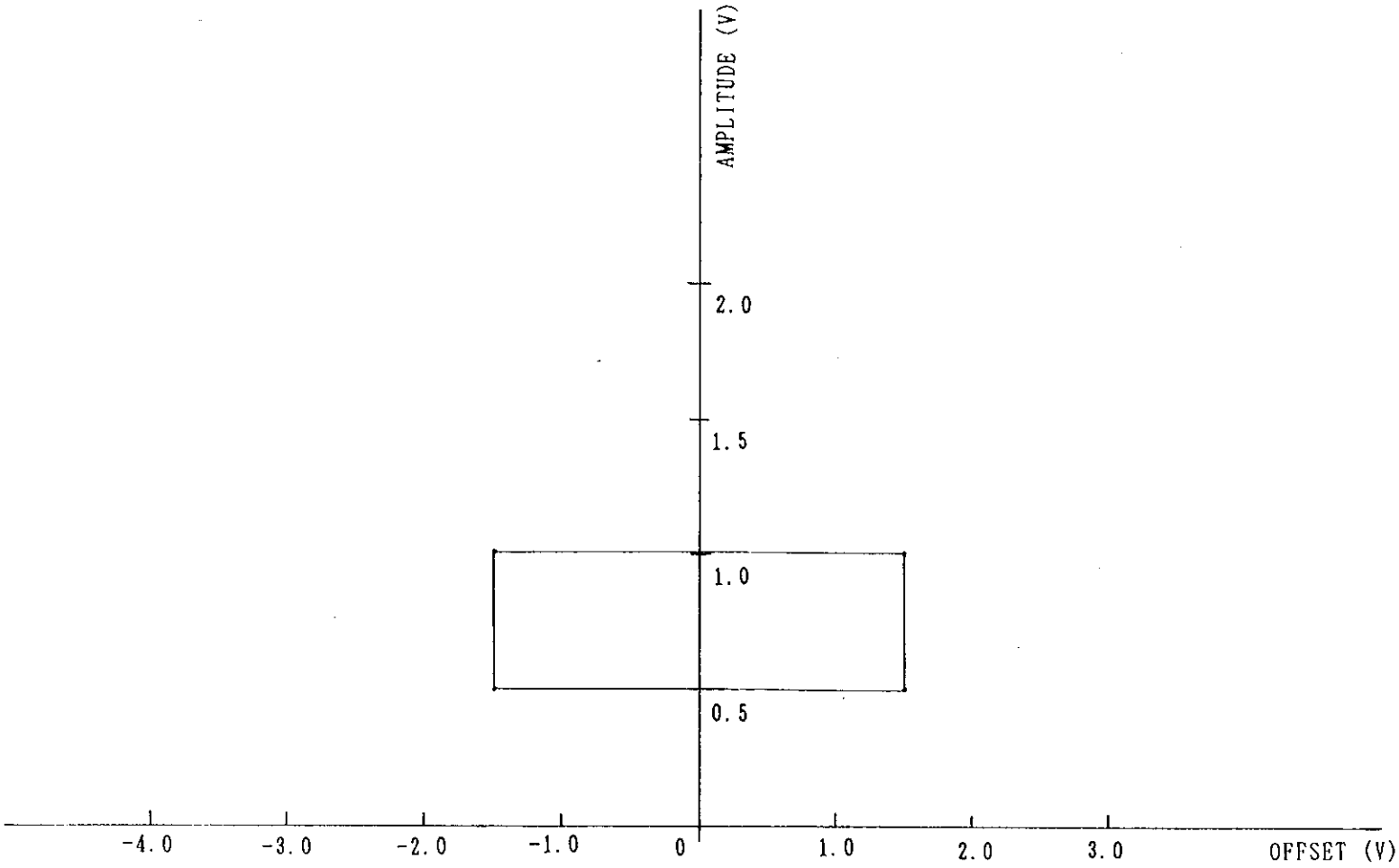


Fig. 11-4 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

- 1/4 SPEED

  Offset reference value: VTH

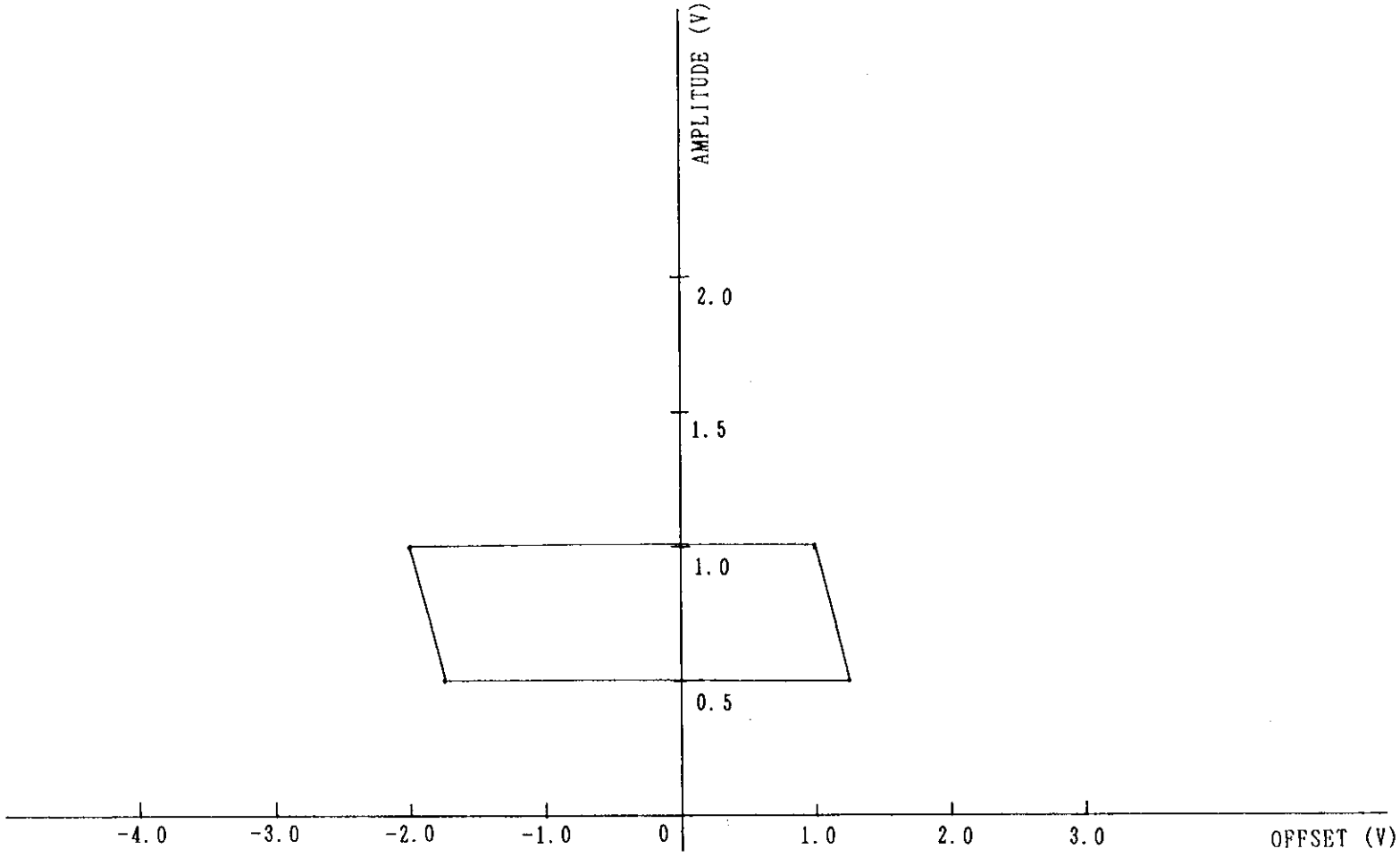


Fig. 11-5 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

- 1/4 SPEED

  Offset reference value: VOL

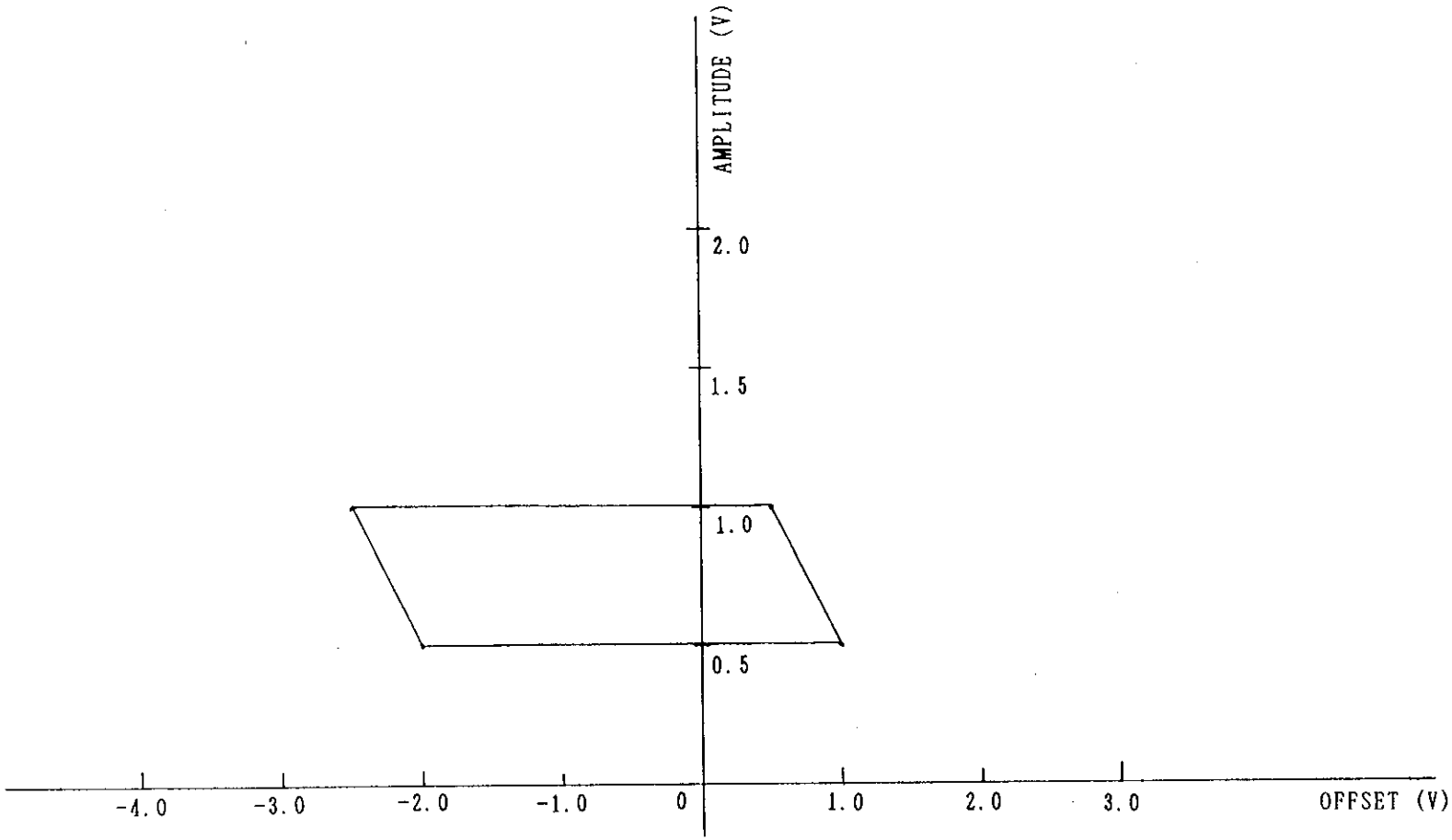


Fig. 11-6 Setting Range of Each Output Amplitude and Offset Voltage for Offset Reference Value

㉑ DATA/$\overline{\text{DATA}}$ tracking (Data/$\overline{\text{Data}}$ tracking)

Set value	Control message	Data request message	Output message
OFF (no tracking)	TRK△0	TRK?	TRK△0
ON (tracking)	TRK△1		TRK△1

Restrictions

Control message

Invalid in the following cases:

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

When floppy disk is being accessed

Data request message

Invalid in the following case and ERR is output:

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

Examples

Control message

When front panel/rear panel output switching is 1/1 SPEED (front panel connector output)

OUTPUT 700; "TRK△0"

Switches DATA/$\overline{\text{DATA}}$ output setting to tracking OFF (no tracking).

Data request message

When DATA/$\overline{\text{DATA}}$ output setting is tracking OFF (no tracking)

OUTPUT 700; "TRK?"

ENTER 700;B$

PRINT B$

↓

Outputs TRK△0 (CR/LF).

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

OUTPUT 700; "TRK?"

ENTER 700;B$

PRINT B$

↓

Outputs ERR (CR/LF).

Note: The tracking OFF function sets the DATA and $\overline{\text{DATA}}$ outputs independently.

The tracking ON function sets the $\overline{\text{DATA}}$ set values automatically to the DATA set values.

㉒ $\overline{\text{DATA}}$ output amplitude (Inverted data amplitude)

Front panel/rear panel output switching: 1/1 SPEED			
Set value	**Control.message**	**Data request message**	**Output message**
0.50 V_{P-P} : : 2.00 V_{P-P}	NAP△0.5 : : NAP△2.00	NAP?	NAP△0.500 : : NAP△2.000
Step value is in 0.01 V_{P-P} units.			

Restrictions

Control message

Invalid in the following cases:

When tracking function is ON

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

When floppy disk is being accessed

Data request message

Inalid in the following cases and ERR is output:

When tracking function is ON

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

Examples

Control message

When tracking function is OFF and front panel/rear panel output switching is 1/1 SPEED (front panel connector output)

OUTPUT 700; "NAP△0.5"

Sets the $\overline{\text{DATA}}$ output amplitude to 0.50 V_{P-P}.

Data request message

When $\overline{\text{DATA}}$ output amplitude is 0.50 $V_{p\text{-}p}$.

```
OUTPUT 700; "NAP?"
ENTER 700;B$
PRINT B$
        ↓
   Outputs NAP△0.500 (CR/LF).
```

When tracking function is ON or front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

```
OUTPUT 700; "NAP?"
ENTER 700;B$
PRINT B$
        ↓
   Outputs ERR (CR/LF).
```

Note: The third digit after the decimal point of the defined $\overline{\text{DATA}}$ output amplitude is rounded off.

㉓ DATA output offset (Inverted data offset)

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOH

Set value	Control message	Data request message	Output message
−2.000 V : : +2.000 V	NOSΔ− 2.0 : : NOSΔ2.0	NOS?	NOSΔ−2.000 : : NOSΔΔ2.000

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VTH

Set value	Control message	Data request message	Output message
−3.000 V : : +1.750 V	NOSΔ−3.0 : : NOSΔ1.75	NOS?	NOSΔ−3.000 : : NOSΔΔ1.750

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOL

Set value	Control message	Data request message	Output message
−4.000 V : : +1.500 V	NOSΔ−4.0 : : NOSΔ1.5	NOS?	NOSΔ−4.000 : : NOSΔΔ1.500

Step value is in 0.005 V units.

Restrictions

Control message

Invalid in the following cases:

When ttracking function is ON

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

When floppy disk is being accessed

Data request message

Invalid in the following cases and ERR is output:

When tracking function is ON

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

Examples

Control message

When tracking function is OFF, front panel/rear panel output switching is 1/1 SPEED, and DATA/DATA/CLOCK output offset reference value is VOH

OUTPUT 700; "NAP△−2.0"

Sets the DATA output offset to −2.0 V.

Data request message

When DATA output offset is −2.0 V

OUTPUT 700; "NOS?"

ENTER 700;B$

PRINT B$

↓

Outputs NOS△−2.000 (CR/LF).

When tracking function is ON, or front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

OUTPUT 700; "NOS?"

ENTER 700;B$

PRINT B$

↓

Outputs ERR (CR/LF).

Note: When the third digit after the decimal point of the defined DATA output offset is not an effective value (other than in 0.005V units), it is changed to the effective value shown below.

1mV,2mV→0mV; 3mV,4mV, 6mV,7mV→5mV; 8mV,9mV→10mV

The DATA output offset setting range differs with the DATA output amplitude set value as shown in Figs. 11-1 to 11-6.

㉔ Delay time between CLOCK outputs (Clock delay)

MP1701B, MP1608A, MP1755A			
Set value	**Control message**	**Data request message**	**Output message**
+500 ps : : −500 ps	CDL△500 : : CDL△−500	CDL?	CDL△△△500 : : CDL△△−500
Step value is in 1 ps unit.			

MP1605A			
Set value	**Control message**	**Data request message**	**Output message**
+1000 ps : : −1 000 ps	CDL△1000 : : CDL△−1000	CDL?	CDL△△1000 : : CDL△−1000
Step value is in 2 ps units.			

Restrictions

Control message — Invalid in the following cases:

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

When floppy disk is being accessed

Data request message — Invalid in the following case and ERR is output:

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

Examples

Control message

When front panel/rear panel output switching is 1/1 SPEED (front panel connector output)

```
OUTPUT 700; "CDL△500"
```

Sets the CLOCK output delay time to +500 ps.

Data request message

When CLOCK output delay time is

+500 ps

```
OUTPUT 700; "CDL?"
ENTER 700;B$
PRINT B$
```

↓

Outputs CDL△△△500 (CR/LF).

When front panel/rear panel output switching is 1/4 SPEED (rear panel connector output)

```
OUTPUT 700; "CDL?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

㉕ CLOCK output amplitude (Clock amplitude)

Front panel/rear panel output switching: 1/1 SPEED			
Set value	**Control message**	**Data request message**	**Output message**
0.50 V_{p-p} : : 2.00 V_{p-p}	CAP△ 0.5 : : CAP△2.00	CAP?	CAP△0.500 : : CAP△2.000
Step value is in 0.01 Vp-p units			

Front panel/rear panel output switching: 1/4 SPEED			
Set value	**Control message**	**Data request message**	**Output message**
0.50 V_{p-p} : : 1.00 V_{p-p}	CAP△ 0.5 : : CAP△1.00	CAP?	CAP△0.500 : : CAP△1.000
Step value is in 0.01 V_{p-p} units			

Restrictions

Control message — Invalid in the following case:
When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "CAP△0.5"
```

Sets the CLOCK output amplitude to 0.50 V_{p-p}.

Data request message — When CLOCK output amplitude is 0.50 V_{p-p}

```
OUTPUT 700; "CAP?"
ENTER 700;B$
PRINT B$
        ↓
```

Outputs CAP△0.500 (CR/LF).

Note: The maximum CLOCK output amplitude differs with the front panel/rear panel output setting.

The third digit after the decimal point of the defined CLOCK output amplitude is rounded off.

㉖ CLOCK output offset (Clock offset)

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOH

Set value	Control message	Data request message	Output message
−2.000 V : : +2.000 V	COSΔ−2.0 : : COSΔ2.0	COS?	COSΔ−2.000 : : COSΔΔ2.000

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VTH

Set value	Control message	Data request message	Output message
−3.000 V : : +1.750 V	COSΔ−3.0 : : COSΔ1.75	COS?	COSΔ−3.000 : : COSΔΔ1.750

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/1 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOL

Set value	Control message	Data request message	Output message
−4.000 V : : +1.500 V	COSΔ−4.0 : : COSΔ1.5	COS?	COSΔ−4.000 : : COSΔΔ1.500

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/4 SPEED
DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOH

Set value	Control message	Data request message	Output message
−1.500 V : : +1.500 V	COSΔ−1.5 : : COSΔ1.5	COS?	COSΔ−1.500 : : COSΔΔ1.500

Step value is in 0.005 V units.

Front panel/rear panel output switching: 1/4 SPEED DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VTH			
Set value	**Control message**	**Data request message**	**Output message**
−2.000 V : : +1.250 V	COSΔ −2.0 : : COSΔ1.25	COS?	COSΔ −2.000 : : COSΔΔ1.250
Step value is in 0.005 V units.			

Front panel/rear panel output switching: 1/4 SPEED DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value: VOL			
Set value	**Control message**	**Data request message**	**Output message**
−2.500 V : : +1.000 V	COSΔ −2.5 : : COSΔ1.0	COS?	COSΔ −2.500 : : COSΔΔ1.000
Step value is in 0.005 V units.			

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — When front panel/rear panel output switching is 1/1 SPEED and DATA/$\overline{\text{DATA}}$/CLOCK output offset reference value is VOH

```
OUTPUT 700; "COSΔ −2.0"
```

Sets the CLOCK output offset to −2.0 V.

Data request message — When CLOCK output offset is −2.0 V

```
OUTPUT 700; "COS?"
ENTER 700;B$
PRINT B$
```

↓

Outputs COSΔ −2.000 (CR/LF).

Note: When the third digit after the decimal point of the defined CLOCK output offset is not an effective value (other than in 0.005 V units), it is changed to the effective value shown below.

1mV, 2mV→0mV; 3mV, 4mV, 6mV, 7mV→5mV; 8mV, 9mV→10mV

The CLOCK output offset setting range differs with the CLOCK output amplitude set value as shown in Figs. 11-1 to 11-6.

11.4 MEMORY Section

The MEMORY section GP-IB commands are described in the following pages. The Δ in the text means a space.

㉗ Memory function switching (Memory mode ptn/other)

Set value	Control message	Data request message	Output message
PTN mode	MEM△0	MEM?	MEM△0
OTH mode	MEM△1		MEM△1

Restrictions

Control message — Invalid in the following cases:

When MEMORY display is in error display mode

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message

```
OUTPUT 700; "MEM△0"
```

Switches the memory function to the PTN mode.

Data request message — When memory function is in PTN mode

```
OUTPUT 700; "MEM?"
ENTER 700;B$
PRINT B$
```

↓

Outputs MEM△ (CR/LF).

Note: "PTN mode" means the PATTERN mode. That is, only pattern data is the objective of the memory function.

"OTH mode" means the OTHERS mode. That is, other than pattern data is the objective of the memory function.

㉘ File No./directory mode switching (File no./directory mode)

Set value	Control message	Data request message	Output message
FILE No.	FIL△0	FIL?	FIL△0
DIR	FIL△1		FIL△1

Restrictions

Control message

Invalid in the following cases:

When MEMORY display is in error display mode

When floppy disk is being accessed

Data request message

No restrictions

Examples

Control message

```
OUTPUT 700; "FIL△0"
```

Switches the memory function to the FILE No. mode.

```
OUTPUT 700; "FIL△1"
```

Switches the memory function to the DIR mode.

At that time, the inserted floppy disk is accessed and the directory information is stored.

Data request message

When memory function is in FILE No. mode

```
OUTPUT 700; "FIL?"
ENTER 700;B$
PRINT B$
      ↓
```

Outputs FIL△0(CR/LF).

When memory system is in DIR mode

```
OUTPUT 700; "FIL?"
LOOP
  ENTER 700;B$
  PRINT B$
EXIT IF B$="FIL△1"
END LOOP
```

Outputs the directory information and FIL△1 (CR/LF) in the format shown on the next page.

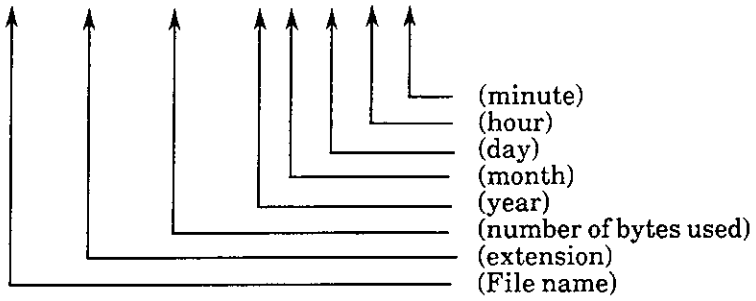
Note: The MP1701B/MP1755A/MP1608A/MP1650A does not have floppy disk insertion detection function.

Therefore, after inserting a floppy disk, set the directory mode to store the inserted floppy disk directory information to the RAM area of the MP1701B/MP1608A.

Directory information and FIL△1 (CR/LF) output format

1. Existing directory information (output by the amount of number of files)

   ********, ***, ********, **-**-**, **:** (CR/LF)



   * marks above indicate the file name, extension (file type), number of bytes used, date, and time.

   Each item has fixed length as follows:

File name:	8 digits
Extension (file type):	3 digits
Number of bytes used:	8 digits
Date:	2 digits each
Time:	2 digits each

2. Setting state

   FIL△1 (CR/LF + EOI)

Example: An actual output example is shown below.

T01△△△△△,PTN, △△△65640, 89-03-27,13:45

T99△△△△△,OTH,△△△△△108, 89-03-27,09:01

FIL△1

㉙ Data recall (Data recall)

File name	Control message	Data request message	Output message
0 ⋮ 99	RCL△0 ⋮ RCL△99	None	———

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Examples

Control message — OUTPUT 700; "RCL△0"

Reads, displays, and sets the data of the file name on floppy disk by the set memory function.

Note: When the specified file does not exist, an error is generated.

This error display is cleared when a data recall, data save, or data resave command is set.

㉚ Data save (Data save)

File name	Control message	Data request message	Output message
0 : : 99	SAV△0 : : SAV△99	None	———————

Restrictions

Control message — Invalid in the following cases:

In directory (DIR) mode

When floppy disk is being accessed

Examples

Control message — When memory system is FILE No. mode

OUTPUT 700; "SAV△0"

Stores the data using the specified file name under the conditions of the set memory function.

Note: When the specified file name exists already, an error is generated.

This error display is cleared when a data recall, data save, or data resave command is set.

㉛ Data resave (Data resave)

File name	Control message	Data request message	Output message
0 ⋮ 99	RSV△0 ⋮ RSV△99	None	———

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Examples

Control message — OUTPUT 700; "RSV△0"

Overwrites the data using the specified file name under the conditions of the set memory function.

Note: When the specified file does not exist, an error is generated.

This error display is cleared when a data recall, data save, or data resave command is set.

11.5 Rear Panel Section

The rear panel section GP-IB commands are described on the following pages. The △ in the text means a space.

㉜ Number of external pattern input channel (1/8 Speed ch select)

Set value	Control message	Data request message	Output message
1 to 8 ch (INT) 1 ch only (EXT) : : 2 to 8 ch (EXT) 1 to 8 ch (EXT)	SCHΔ#B00000000 SCHΔ#B00000001 : : SCHΔ#B11111110 SCHΔ#B11111111	SCH?	SCHΔ#B00000000 SCHΔ#B00000001 : : SCHΔ#B11111110 SCHΔ#B11111111
Sets INT or EXT of each number of external pattern input channel from the value of each bit of the NR field. 0: INT (internal pattern input) 1: EXT (external pattern input)			

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — OUTPUT 700; "SCHΔ#B00000001"

Sets number of external pattern input channel: 1 ch only to EXT.

Data request message — When number of external pattern input channel: 1 ch and 5 ch only are EXT

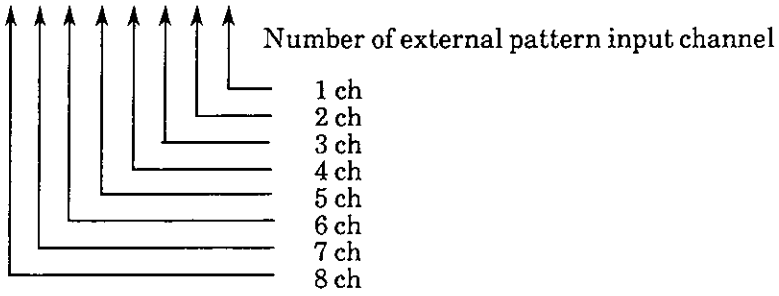
```
OUTPUT 700; "SCH?"
ENTER 700;B$
PRINT B$
```

↓

Outputs SCHΔ#B00010001 (CR/LF).

Note:

SCHΔ#B * * * * * * * *



When multiple conditions are set, the channels are combined.

㉝ Error additional channel (Error addition channel)

MP1701B, MP1755A			
Set value	Control message	Data request message	Output message
1 ch : : 32 ch	ECHΔ 1 : : ECHΔ32	ECH?	ECHΔΔ1 : : ECHΔ32

MP1608A, MP1650A			
Set value	Control message	Data request message	Output message
1 ch : : 16 ch	ECHΔ 1 : : ECHΔ16	ECH?	ECHΔΔ1 : : ECHΔ16

Restrictions

Control message — Invalid in the following cases:
When code error addition function is OFF
When floppy disk is being accessed

Data request message — Invalid in the following cases and ERR is output:
When code error addition function is OFF

Examples

Control message — When code error addition function is other than OFF

```
OUTPUT 700; "ECHΔ1"
```

Sets the number of error addition channel to 1 ch.

Data request message — When number of error addition channel is 1 ch

```
OUTPUT 700; "ECH?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ECHΔΔ1 (CR/LF).

When code error addition function is OFF

```
OUTPUT 700; "ECH?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

㉞ Number of mark ratio AND bit shifts (Mark ratio bit shift)

Set value	Control message	Data request message	Output message
1 bit shift	SFTΔ0	SFT?	SFTΔ0
3 bit shift	SFTΔ1		SFTΔ1

Restrictions

Control message

Invalid in the following cases:

When output pattern is in PRGM. (WORD or DATA) mode

When floppy disk is being accessed.

Data request message

Invalid in the following case and ERR is output:

When output pattern is in PRGM. (WORD or DATA) mode

Examples

Control message

When output pattern is in PRBS mode

OUTPUT 700; "SFTΔ0"

Sets the number of mark ratio AND bit shifts to a 1 bit shift.

Data request message

When number of mark ratio AND bit shifts is 1 bit shift

```
OUTPUT 700; "SFT?"
ENTER 700;B$
PRINT B$
```

↓

Outputs SFTΔ0 (CR/LF).

When output pattern is in PRGM. (WORD or DATA) mode

```
OUTPUT 700; "SFT?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

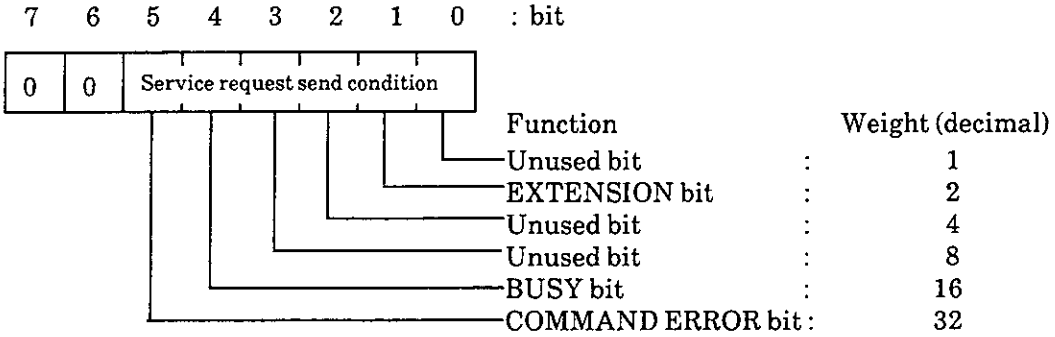
11.6 Other Sections

The GP-IB commands of other sections are described on the following pages. The Δ in the text means a space.

㉟ Service request enable register (Service request enable register)

Setting State

Service request enable register configuration



Function

Weight 0: Makes the service request send condition OFF.

1: Unused bit

2: Sends a service request when the extended event status register is set.

4: Unused bit

8: Unused bit

16: Sends a service request when there is data to be output to GP-IB.

32: Sends a service request when the standard event status register is set.

Notes:

- When an SRQ command is received, all the send conditions previously set are cleared.
- When setting multiple service-request conditions, total the weight values above.
- Immeiately after the power is turned ON, immediately after a device clear, or initialize command is received, all the SRQ send conditions are cleared.

Control message	Data request message	Output message
SRQ△ 0 : SRQ△63	SRQ?	SRQ△△0 : SRQ△63

Restrictions

Control message	Invalid in the following case: When floppy disk is being accessed.
Data request message	No restrictions

Examples

Control message

OUTPUT 700; "SRQ△2"

Sends a service request when the extended event status register is set.

Data request message

When extended event status register is set, a service request send condition is sent.

```
OUTPUT 700; "SRQ?"
ENTER 700;B$
PRINT B$
```

↓

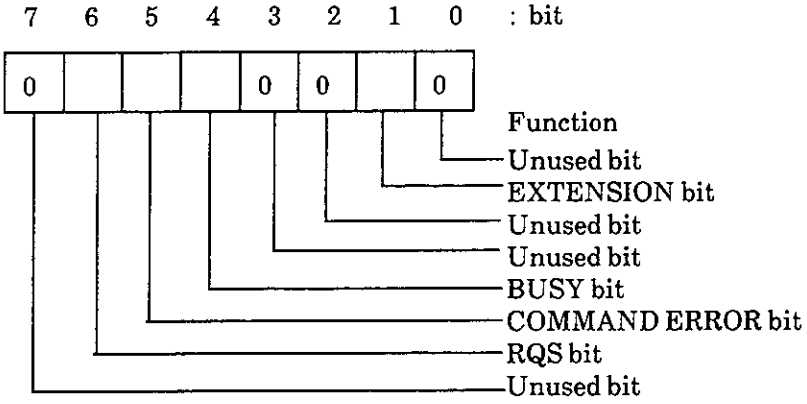
Outputs SRQ△△2 (CR/LF).

Note: The service request enable register and GP-IB status byte are described in SECTION 12.

㊱ Status byte register (Status byte register?)

Setting State

Status byte register configuration



Control message	Data request message	Output message
————	STB?	STB△#B********

Restrictions

Data request message — No restrictions

Examples

Data request message — When GP-IB status byte is 01010000

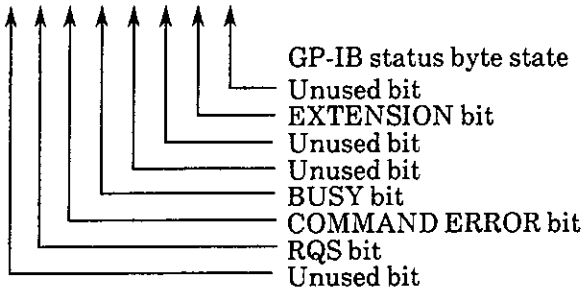
```
OUTPUT 700; "STB?"
ENTER 700;B$
PRINT B$
```

↓

Outputs STB△#B01010000 (CR/LF)

Note: This GP-IB status byte is the same as the data that is read by serial polling.

STB△#B * * * * * * * *

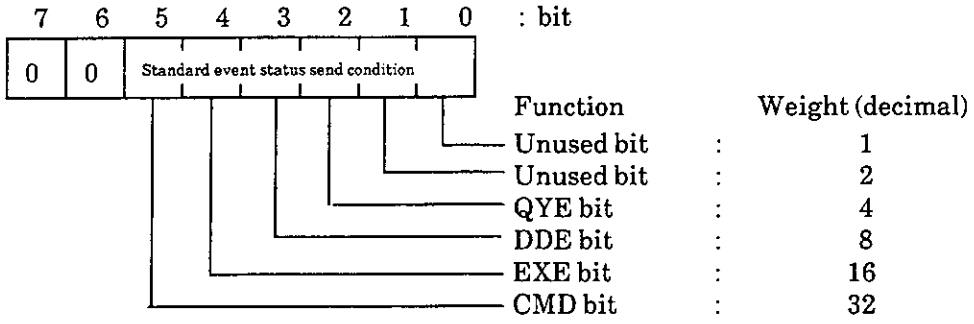


The status byte register and GP-IB status byte are described in SECTION 12.

㊲ Standard event status enable register (Event status enable register [Standard])

Setting State

Standard event status enable register configuration



Function

Weight 0: Turns the standard event status send condition to OFF.

1: Unused bit

2: Unused bit

4: Sends the standard event status send condition when a talker is designated even though the send buffer is empty or when the send buffer has overflowed.

8: Sends the standard even status send condition when the received command is outside the usage condition.

16: Sends the standard event status send condition in a numeric value error or when a HEX value is used in a command in which it cannot be used.

32: Sends the standard event status send cndition when header error is present.

Note:

- When the ESE command is received, all the send conditions set previously are cleared.
- When setting multiple event-status-enable (ESE) conditions, total the weight values above.
- All the ESE send conditions are cleared immeiately after the power is turned ON, and immediately after a device clear, or initialize command is received.

Control message	Data request message	Output message
ESE△ 0 : : ESE△63	ESE?	ESE△△0 : : ESE△63

Restrictions

Control message	Invalid in the following case:
	When floppy disk is being accessed
Data request message	No restrictions

Examples

Control message

```
OUTPUT 700; "ESE△32"
```

Sends the standard event status when a header error is generated.

Data request message

When standard event status send condition is sent at header error

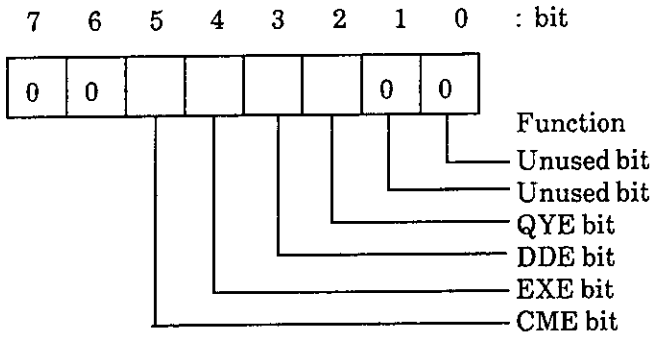
```
OUTPUT 700; "ESE?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ESE△32 (CR/LF).

Note: The standard event status enable register and GP-IB status byte are described in SECTION 12.

㊳ Standard event status register (Event status byte register? [Standard])

Setting state
Status byte register configuration    ***Note:*** • Each bit of the standard event status byte is reset when data is read by this command. • The standard event status byte is not cleared even when a device clear, interface clear, or initialize command is received.

Control message	Data request message	Output message
————	ESR?	ESR△#B********

Restrictions

Data request message — No restrictions

Examples

Data request message — When status of standard event status byte is 00100000

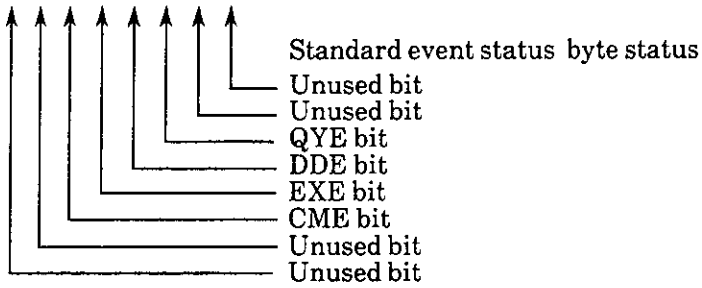
```
OUTPUT 700; "ESR?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ESR△#B00100000 (CR/LF).

Note: This standard event status byte is irrelevant when serial polling. This status is considered an extension byte of the COMMAND ERROR bit in the GP-IB status byte.

ESR△#B * * * * * * * *

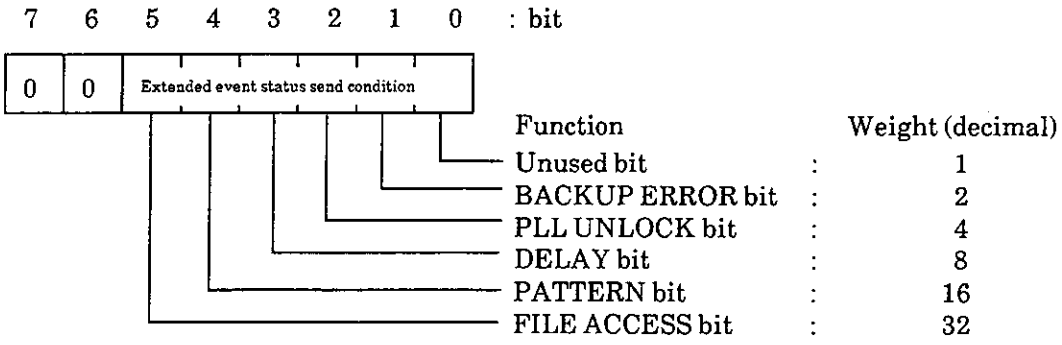


The standard event status byte register and GP-IB status byte are described in SECTION 12.

㊴ Extended event status enable register (Event status enable register [Extension])

Setting state

Extended event status enable register configuration



Function

Weight 0: Turns the extended event status (EES) send condition to OFF.

1: Unused bit

2: Sends the EES send condition at backup error.

4: Sends the EES send condition when the internal clock circuit PLL is unlocked.

8: Sends the EES send condition when the servo circuit of the clock delay circuit is changed from the BUSY to the READY state.

16: Sends the EES send condition at the end of a programmable pattern setting.

32: Sends the EES send condition at the end of floppy disk access function.

Note:

- When an EES command is received, all the send conditions set previously are cleared.
- When setting multiple EES conditions, total the weight values above.
- Immeiately after the power is turned ON, immediately after a device clear or initialize command is received, all EES send conditions are cleared.

Control message	Data request message	Output message
EES△ 0 : EES△63	EES?	EES△△0 : EES△63

Restrictions

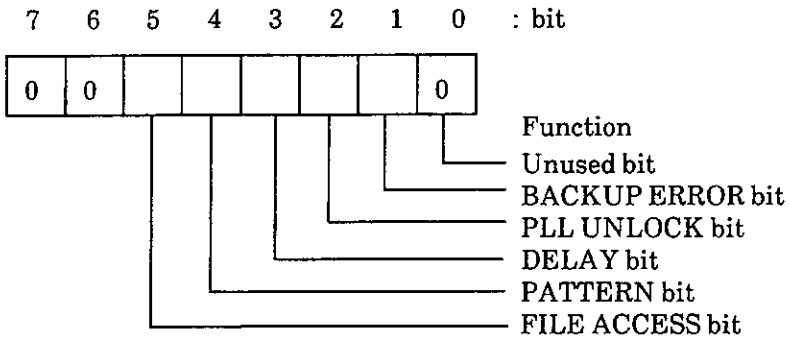
Control message	Invalid in the following case:
	When floppy disk is being accessed.
Data request message	No restrictions

Examples

Control message	OUTPUT 700; "EES△32"
	Sends the extended event status at the end of floppy disk access.
Data request message	When EES send condition is in the state to send at the end of floppy disk access function.
	OUTPUT 700; "EES?"
	ENTER 700;B$
	PRINT B$
	↓
	Outputs EES△32 (CR/LF).

Note: The extended event status enable register and GP-IB status byte are described in SECTION 12.

㊵ Extended event status register (Event status byte register? [Extension])

Setting state
Status byte register configuration    ***Note:*** • Each bit of the extended event status byte is reset when data is read by this command. • This register is not cleared even when a device clear, interface clear, or initialize command is received.

Control message	Data request message	Output message
————	EER?	EER△#B********

Restrictions

Data request message — No restrictions

Examples

Data request message — When status of extended event status byte is 01000000

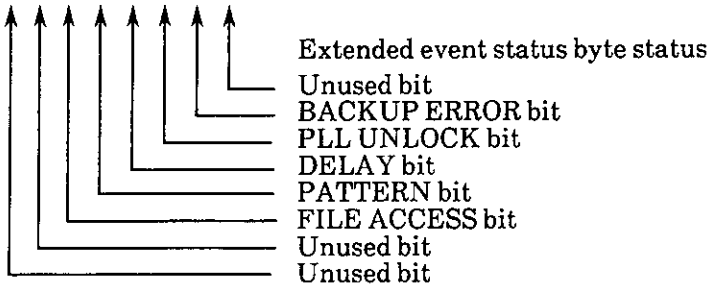
```
OUTPUT 700; "EER?"
ENTER 700;B$
PRINT B$
```

↓

Outputs EER△#B00100000 (CR/LF).

Note: This extended event status byte is irrelevant when serial polling. This status is considered an extension byte of the EXTENSION bit in the GP-IB status byte.

EER△#B * * * * * * * *



The extended event status byte register and GP-IB status byte are described in SECTION 12.

㊶ INITIALIZE (Initialize)

Setting state	Control message	Data request message	Output Message
Initialize	INI	————	————

Restrictions

Control message — No restrictions

Examples

Control message — OUTPUT 700; "INI"

Sets the MP1701B/MP1755A/MP1608A/MP1650A to the factory setting state (forced initialization).

Note: "Forced initialization" is the same as the initialization operation when turning the power ON while pressing the [LOCAL] key.

If the floppy disk is being accessed, the access is aborted.

㊷ Internal timer setting (Real time setting)

Setting state

RTM△NR1, NR1, NR1, NR1, NR1, NR1

Function: Range	
Second:	0 to 59
Minute:	0 to 59
Hour:	0 to 23
Day:	1 to 31 (leap year: 1 to 29)
Month:	1 to 12
Year:	0 to 99 (Gregorian calendar)

Control message	Data request message	Output message
RTM△00,01,01,00,00,00 : : RTM△99,12,31,23,59,59	RTM?	RTM△00,01,01,00,00,00 : : RTM△99,12,31,23,59,59

Restrictions

Control message — Invalid in the following case:

When floppy disk is being accessed

Data request message — No restrictions

Examples

Control message — OUTPUT 700;"RTM△90, 03, 10, 00, 10, 29"

Sets the internal timer to March 10, 1990 ,0 hours 10 minutes 29 seconds, and starts the clock.

Data request message — When internal timer is March 10, 1990, 0 hours 10 minutes 29 seconds

```
OUTPUT 700; "RTM?"
ENTER 700;B$
PRINT B$
```

↓

Outputs RTM△90, 03, 10, 00, 10, 29 (CR/LF).

㊸ Power failure, power recovery (Power failure interval?)

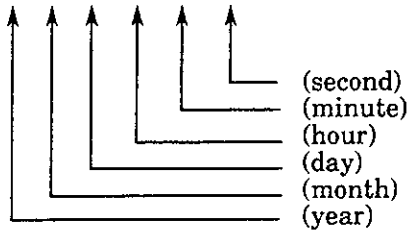
Setting state	Control message	Data request message
———	———	PWI?

Output message format

The power failure time, power recovery time, and interval time are output in the following format:

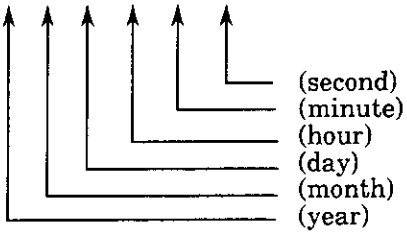
1. Power failure time

   PWF△**, **, **, **, **, ** (CR/LF)



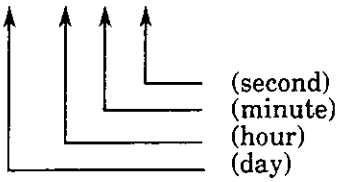
2. Power recovery time

   PWR△**, **, **, **, **, ** (CR/LF)



3. Power failure interval time

   PWI△△△△*****, **, **, ** (CR/LF + EOI)



Example: An example of actual output is shown below.

PWF△89, 03, 01, 00, 00, 00 : Power failure time
PWR△89, 03, 23, 13, 00, 00 : Power recovery time
PWI△△△△△△△△22, 13, 00, 00 : Power failure interval time

Restrictions

Data request message

Invalid in the following cases and ERR is output:

After device clear received

After initialization

Examples

Data request message

```
OUTPUT 700; "PWI?"
LOOP
    ENTER 700;B$
    PRINT B$
EXIT IF B$[1,3]="PWI"
END LOOP
```

↓

Outputs the power failure time, power recovery time, and power failure interval time.

After device clear received or after initialization

```
OUTPUT 700; "PWI?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

㊹ PLL lock status (PLL unlock?)

Setting state	Control message	Data request message	Output message
LOCK	————	PLL?	PLL△0
UNLOCK			PLL△1

Restrictions

Data request message — Invalid in the following case and ERR is output:

When operation clock is externa clock (EXT)

Examples

Data request message — When internal-clock-generator phase lock loop (PLL) is in LOCK state

```
OUTPUT 700; "PLL?"
ENTER 700;B$
PRINT B$
```

↓

Outputs PLL△0 (CR/LF).

When operation clock is an external clock (EXT)

```
OUTPUT 700; "PLL?"
ENTER 700;B$
PRINT B$
```

↓

Outputs ERR (CR/LF).

Note: "LOCK" indicates that the internal clock generator PLL is in the LOCK state.
"UNLOCK" indicates that the internal clock generator PLL is in the UNLOCK state.

㊺ Delay status (Delay unlock?)

Setting state	Control message	Data request message	Output message
READY	———	DLY?	DLY△0
BUSY			DLY△1

Restrictions

Data request message

Invalid in the following case and ERR is output:

When front panel/rear panel output switching (5 DISPLAY mode) is 1/4 SPEED

Examples

Data request message

When servo subcircuit of clock delay circuit is in the READY state

```
OUTPUT 700; "DLY?"
ENTER 700;B$
PRINT B$
      ↓
  Outputs DLY△0 (CR/LF).
```

When DISPLAY mode is 1/4 SPEED

```
OUTPUT 700; "DLY?"
ENTER 700;B$
PRINT B$
      ↓
  Outputs ERR (CR/LF).
```

Note: "READY" indicates that the servo subcircuit of the clock delay circuit is in the READY state. "BUSY" indicates that the servo subcircuit is in the BUSY state.

㊻ Floppy disk access status (Memory access condition?)

Setting value	Control message	Data request message	Output message
Non-access	————	MAC?	MAC△0
Accessing			MAC△1

Restrictions

Data request message — No restrictions

Examples

Data request message — When floppy disk is not being accessed

```
OUTPUT 700; "MAC?"
ENTER 700;B$
PRINT B$
```

↓

Outputs MAC△0 (CR/LF).

SECTION 12
GP-IB STATUS BYTE

The MP1701B/MP1755A/MP1608A/MP1650A has a status byte that outputs information on the bus when serial polling from the controller is received, and has a standard event status byte and extended event status byte (extension byte) that output information in response to data request command with no relation to serial polling.

Note: When multiple serial pollings are performed continuously as shown in the example below, always provide a WAIT time of about 0.1 s before performing the next serial polling.

This is because if serial polling is performed continuously without a WAIT time, this processing task is processed first and information is not sent to slave tasks because of the MP1701B/MP1755A/MP1608A/MP1650A software configuration.

Example:

```
    :
LOOP
    A=SPOLL (700)
EXIT IF BIT (A, 6)=1
    WAIT . 1 <---------- Indicates WAIT time.
END LOOP
    :
```

Status information can also be read by data request message STB? without performing serial polling.

12.1 Status Byte Configuration

The configuration of each status byte is shown in Fig. 12-1.

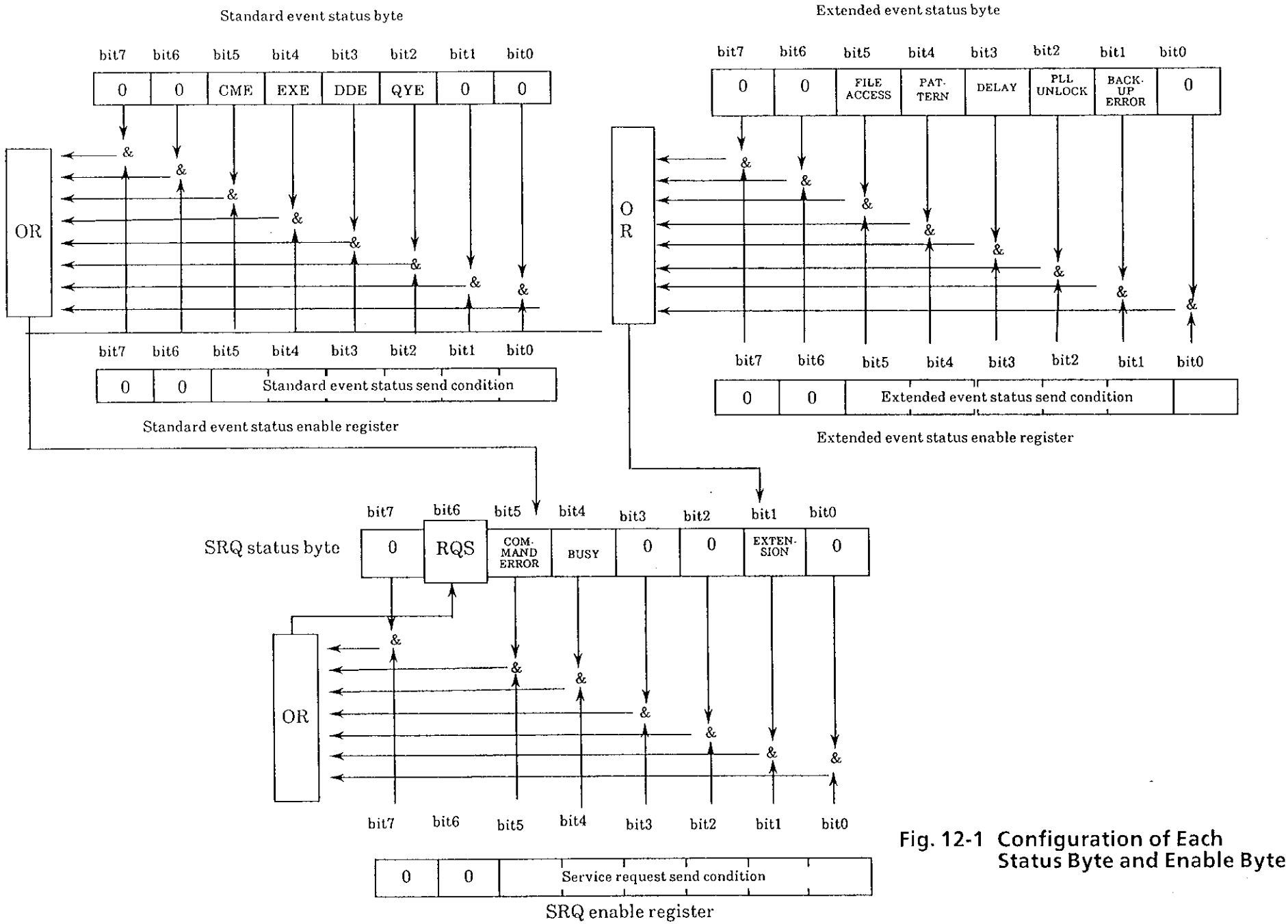


Fig. 12-1 Configuration of Each Status Byte and Enable Byte

12.2 Description of Each Register and Status Byte

12.2.1 SRQ enable register

Operation

This register indicates the GP-IB command service request send condition.

It turns the RQS bit ON and OFF in status byte bit units.

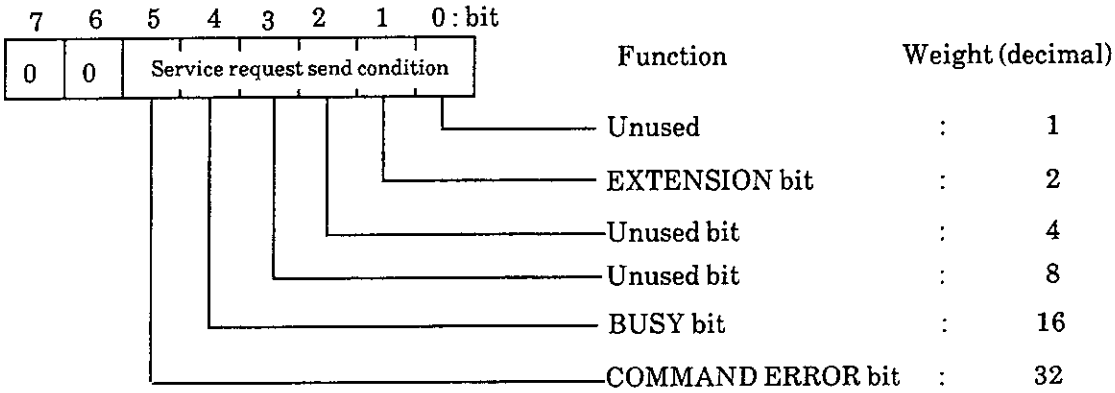
When the event of "1" bit at the SRQ enable register is generated, the RQS bit becomes "1" and an interrupt is sent to the controller.

- When an SRQ command is received, all the send conditions previously set are cleared.
- Multiple conditions can also be set.
- Immediately after the power is turned ON and immediately after a device clear or initialize command is received, all the SRQ send conditions are cleared.

Command

Control message	:	SRQ△0 to SRQ△63
Data request message	:	SRQ?
Output message	:	SRQ△△0 (CR/LF) to SRQ△63 (CR/LF)

Configuration



Function:

weight 0 : Turns the service request send condition to OFF.

1: Unused bit

2: Sends a service request when the extended event status register is set.

4: Unused bit

8: Unused bit

16: Sends a service request when there is data to be output to GP-IB.

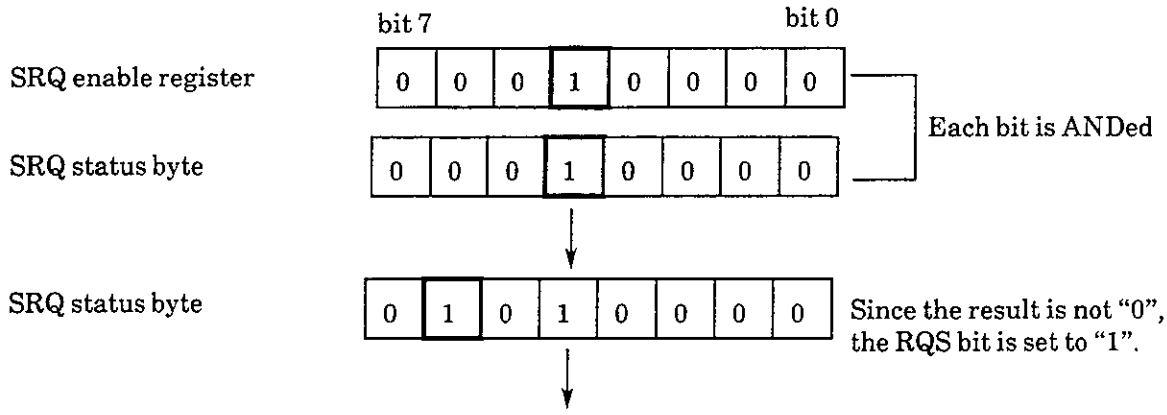
32: Sends a service request when the standard event status register is set.

12.2.2 SRQ status byte

Operation

Status byte is the information for the data that is to be output on the bus when serial polling is received from the controller.

When an event is generated, it is ANDed with the SRQ enable byte. If the result is not "0", the RQS bit (bit 6) is set to "1".



This data is output when serial polling.
This data is also output by a data request message.

Command

Control message :

Data request message : STB?

Output message : STB△#B********(CR/LF)

(*: State at that time)

Configuration

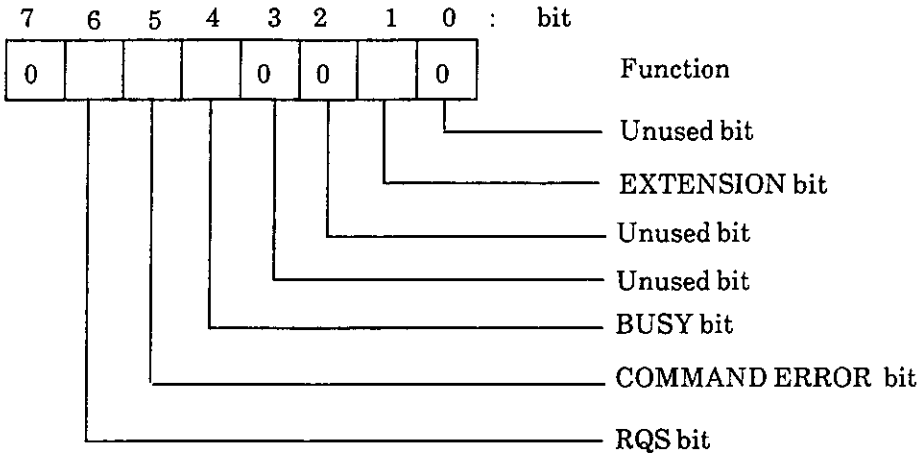


Table 12-1 GP-IB Status Byte

Name	Bit	Function
	7	Not used.
RQS	6	This bit indicates that a service request is issued. It is set when the bit set by SRQ command was set from 0 to 1, and is reset when there is no event requesting service or after the controller has read the status. It is also reset when a device clear or initialize command is received.
COMMAND ERROR	5	This bit indicates the error state. It is set when the condition is satisfied by standard event status byte and standard event status enable register conditions (See paragraph 12.2.3.). It is reset when the standard event status byte is read. It is also reset when a device clear or initialize command is received. When this bit is set after setting the COMMAND ERROR bit (weight 32) by SRQ command, SRQ is sent.
BUSY	4	This bit is set when there is data to be sent on the GP-IB. It is reset when data transfer is completed or when there is no data to be sent. It is also reset when a device clear or initialize command is received. When this bit is set after setting the BUSY bit (weight 16) by SRQ command, SRQ is sent.
	3	Not used.
	2	Not used.
EXTENSION	1	This bit indicates the MP1701B/MP1755A/MP1608A/MP1650A's unique status. It is set when the extended event status byte and extended event status enable register conditions are satisfied (See paragraph 12.2.5.). It is reset when the extended event status byte is read. It is also reset when a device clear or initialize command is received. When this bit is set after setting the EXTENSION bit (weight 2) by SRQ command, SRQ is sent.
	0	Not used.

12.2.3 Standard event status enable register

Operation

This register indicates the GP-IB command standard event status send condition.

The COMMAND ERROR bit ON/OFF of the SRQ status byte is carried out in bit units of the standard event status byte.

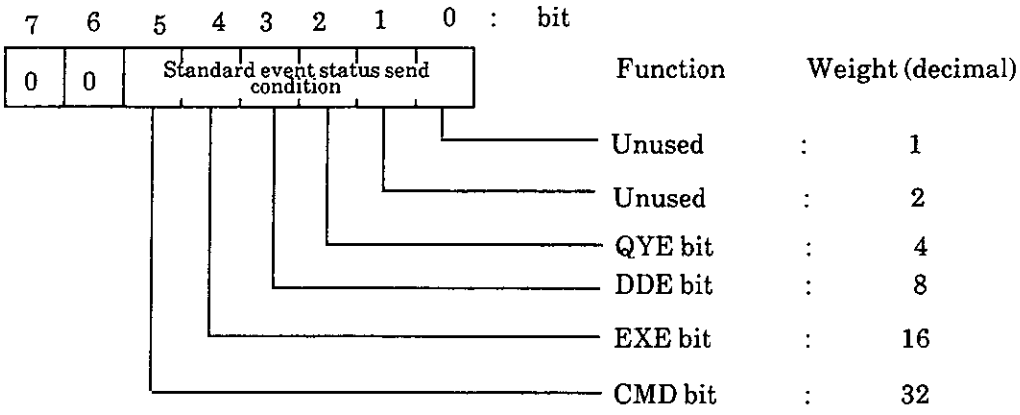
When an event of "1" bit at the standard event status register is generated, the COMMON ERROR bit is set to "1".

- When an ESE command is received, all the send conditions set previously are cleared.
- Multiple conditions can also be set.
- Immediately after the power is turned ON and immediately after a device clear or initialize command is received, all the ESE send conditions are cleared.

Command

Control message	:	ESE△0 to ESE△63
Data request message	:	ESE?
Output message	:	ESE△△0 (CR/LF) to ESE△63 (CR/LF)

Configuration



Function:

Weight 0 : Sets the standard event status send condition to OFF.

1: Unused bit

2: Unused bit

4: Sends the standard event status send condition when a talker is designated event though the send buffer is empty or when the send buffer has overflowed.

8: Sends the standard event status send condition when the command received is outside the usage condition.

16: Sends the standard event status send condition at a numeric value error or when a HEX value is used in a command in which HEX cannot be used.

32: Sends the standard event status send condition at header error.

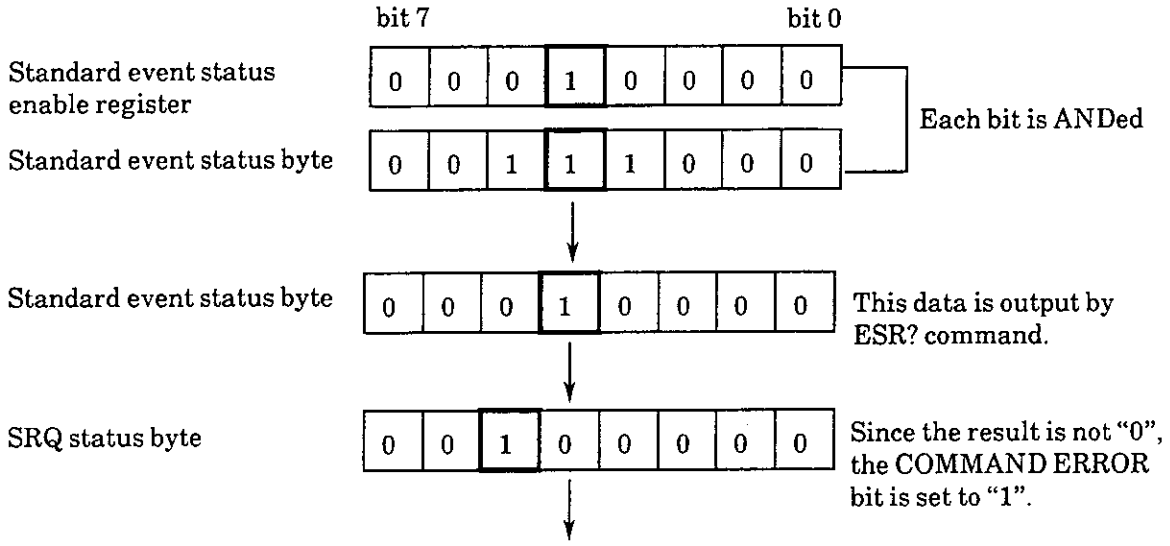
12.2.4 Standard event status byte

Operation

This byte is the information for the data which is to be output on the bus when a data request message is received.

When an event is generated, it is ANDed with the standard event status enable register. If the result is not "0", the COMMAND ERROR bit of the SRQ status byte is set to "1".

- Each bit of the standard event status byte is reset when data is read by data request message.
- This byte is not cleared even if a device clear, interface clear or initialize command is received.



This data is output when serial polling.
This data is also output by data request message.

Command

Control message :

Data request message : ESR?

Output message : ESR△#B********(CR/LF)

(*: State at that time)

Configuration

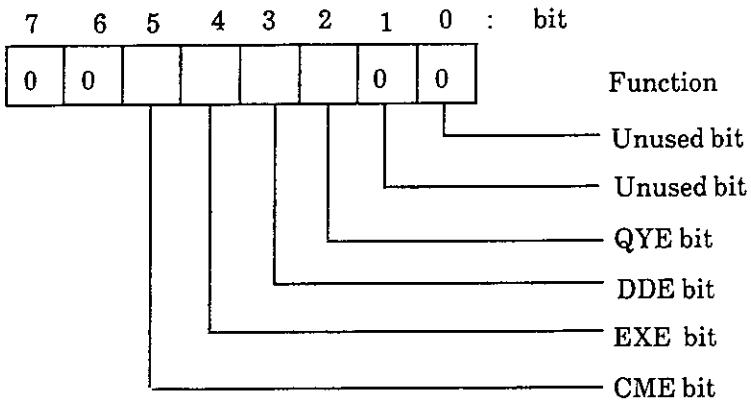


Table 12-2 Standard Event Status Byte

Name	Bit	Function
	7	Not used
	6	Not used
CME	5	CME: Command error This bit is set when an undefined header is received. It is reset when the standard event status byte was read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the CME bit (weight 32) by the ESE command, the COMMAND ERROR bit of the status byte is set.
EXE	4	EXE: Execution error This bit is set when there is an error after the header (value range error or a HEX value used in a command in which HEX cannot be used). It is reset when the standard event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the EXE bit (weight 16) by ESE command, the COMMAND ERROR bit of the status byte is set.
DDE	3	DDE: Device dependent error This bit is set when the received command is outside the usage condition. It is reset when the standard event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the DDE bit (weight 8) by ESE command, the COMMAND ERROR bit of the status byte is set.
QYE	2	QYE: Query error This bit is set when the MP1701B/MP1755A/MP1608A/MP1650A is designated a talker even though the send buffer is empty or when the send buffer has overflowed. It is reset when the standard event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the QYE bit (weight 4) by ESE command, the COMMAND ERROR bit of the status byte is set.
	1	Not used
	0	Not used

12.2.5 Extended event status enable register

Operation

This register indicates the GP-IB command extended event status send condition.

It turns the SRQ status byte EXTENSION bit ON and OFF in bit units of extended event status byte.

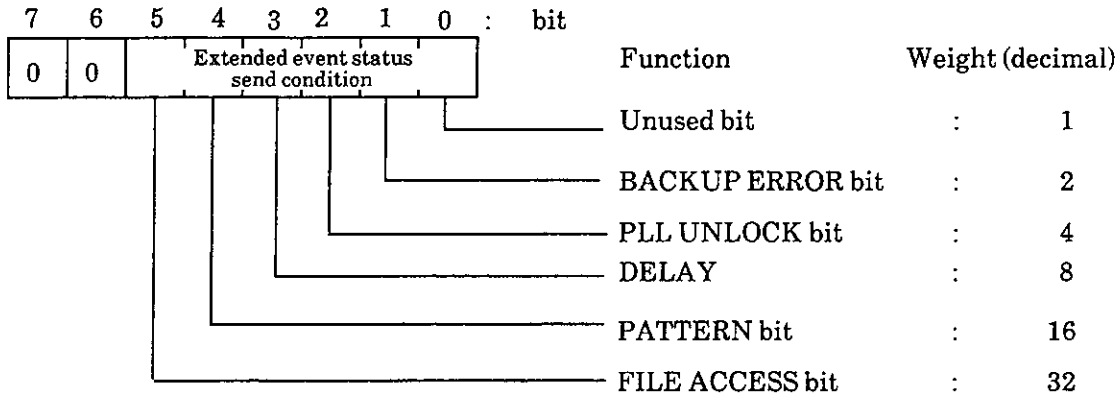
When an event of "1" bit at the extended event status register is generated, the EXTENSION bit is set to "1".

- When an EES command is received, all the send conditions set previously are cleared.
- Multiple conditions can also be set.
- All the EES send conditions are cleared immediately after the power is turned ON and immediately after a device clear or initialize command is received.

Command

Command message	:	EES△0 to EES△63
Data request message	:	EES?
Output message	:	EES△△0 (CR/LF) to EES△63 (CR/LF)

Configuration



Function

Weight 0: Turns the extended event status send condition to OFF

1: Unused bit

2: Sends the extended event status send condition at backup error.

4: Sends the extended event status send condition when internal-clock phase lock loop circuit (PLL) is in unlock state.

8: Send the extended event status send condition when the servo subcircuit of the clock delay circuit is changed from the BUSY to READY state.

16: Sends the extended event status send condition at the end of programmable pattern setting.

32: Sends the extended event status send condition at the end of floppy disk access.

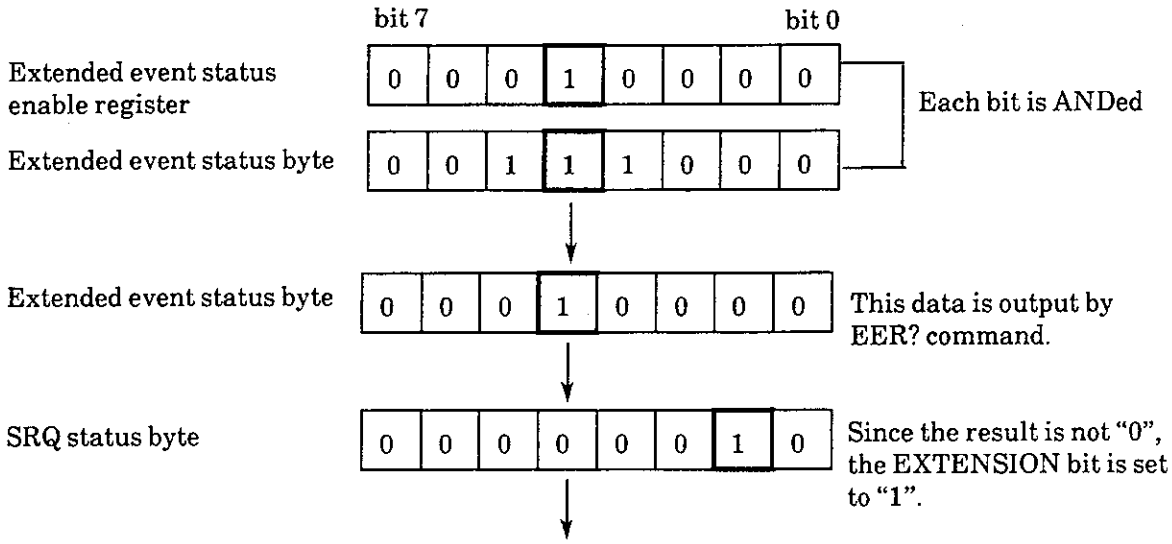
12.2.6 Standard event status byte

Operation

This byte is the information for the data that is sent on the bus when a data request message is received.

When an event is generated, it is ANDed with the extended event status enable register. If the result is not "0", the EXTENSION bit of the SRQ status byte is set to "1".

- Each bit of the extended event status byte is reset when data is read by data request message.
- This byte is not cleared even if a device clear, interface clear, or initialize command is received.



This data is output at serial polling.
This data is also output by a data request message.

Command

Control message :

Data request message : EER?

Output message : EER△#B********(CR/LF)

(*: State at that time)

Configuration

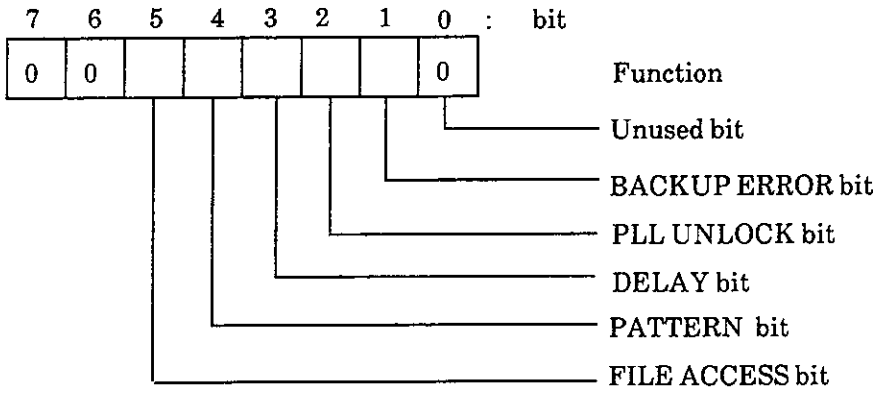


Table 12-3 Extended Event Status Byte

Name	Bit	Function
	7	Not used
	6	Not used
FILE ACCESS	5	This bit is set at the end of a floppy disk access. It is reset when the extended event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the FILE ACCESS bit (weight 32) by EES command, the status byte EXTENSION bit is set.
PATTERN	4	This bit is set at the end of programmable pattern setting. It is reset when the extended event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the PATTERN bit (weight 16) by EES command, the status byte EXTENSION bit is set.
DELAY	3	This bit is set when the servo subcircuit of the clock delay circuit is changed from the BUSY to the READY state. It is reset when the extended event status byte is read. However, it is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the DELAY bit (weight 8) by EES command, the status byte EXTENSION bit is set.
PLL UNLOCK	2	This bit is set when the internal clock circuit PLL is in the UNLOCK state. It is reset when the extended event status byte is read. However, it is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting the PLL UNLOCK bit (weight 4) by EES command, the status byte EXTENSION bit is set.

Table 12-3 Extended Event Status Byte (Cont'd)

Name	Bit	Function
BACKUP ERROR	1	This bit is set when the contents of the backup RAM are checked at power ON and then an error is detected. It is reset when the extended event status byte is read. It is not reset even if a device clear, interface clear, or initialize command is received. When this bit is set after setting BACKUP ERROR bit (weight 2) is set by EES command, the status byte EXTENSION bit is set.
	0	Not used

SECTION 13
PATTERN DATA TRANSFER BY DMA

When up to 512k bits of programmable pattern data are transferred via GP-IB by BIT command, just as with conventional instruments (MP1601A/MP1604A), a large amount of time is required.

The MP1701B/MP1755A/MP1608A/MP1650A is equipped with a DMA transfer function to efficiently transfer this data pattern.

13.1 DMA

DMA is the abbreviation of Direct Memory Access and is a method of transferring a large volume of data at high speed (memory to memory transfer).

13.2 Commands for Number of Pattern Data Input Bytes and Number of Pattern Data Output Bytes

The number of pattern data input bytes (WRT command) and number of pattern data output bytes (RED command) GP-IB commands of the MP1701B/MP1755A/MP1608A/MP1650A are described below.

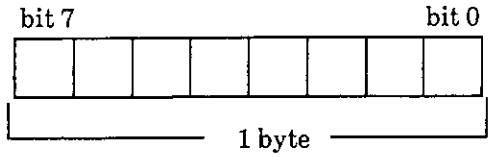
To transfer pattern data, the MP1701B/MP1755A/MP1608A/MP1650A must be given the following information by using the WRT and RED commands:

- Number of bytes of pattern data to be transferred
- The start address of the MP1701B/MP1755A/MP1608A/MP1650A internal RAM to store the transferred pattern data, or the start address of the MP1701B/MP1755A/MP1608A/MP1650A internal RAM to output the pattern data to be transferred.

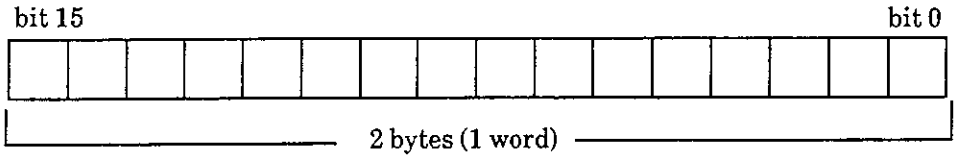
13.2.1 Number of bytes of pattern data to be transferred

A byte is an 8-bit data group.

The MP1701B/MP1755A/MP1608A/MP1650A has a 16-bit pattern data configuration. One word consists of two bytes.

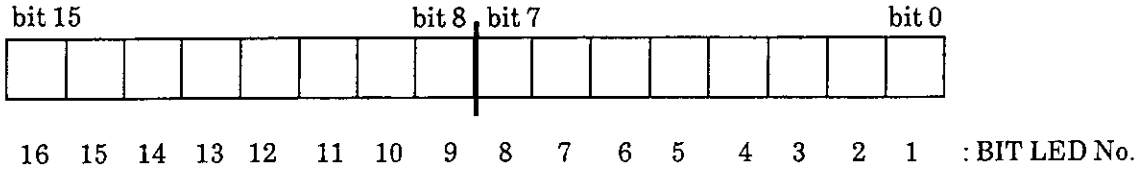


Value range: 0 to 255 (decimal)
0H to FFH (hexadecimal)



Value range: 0 to 65535 (decimal)
0H to FFFFH (hexadecimal)

The pattern data and bit correspondence is shown below.



The number of bytes of pattern data to be transferred equals the number of 8-bit data to be transferred.

Normally, 2 bytes (even number byte transfer) are transferred for one page displayed.

However, for odd number byte transfer, only the higher byte (bits 15 to 8) is set in the figure above.

13.2.2 Start address of the MP1701B/MP1755A/MP1608A/MP1650A internal RAM to store transferred pattern data and that to output pattern data to be transferred

The MP1701B/MP1755A/MP1608A/MP1650A internal RAM address range is from 0 to 32767. This range is common to WORD and DATA patterns.

The relationship between number of the page actually displayed and the corresponding address is shown below.

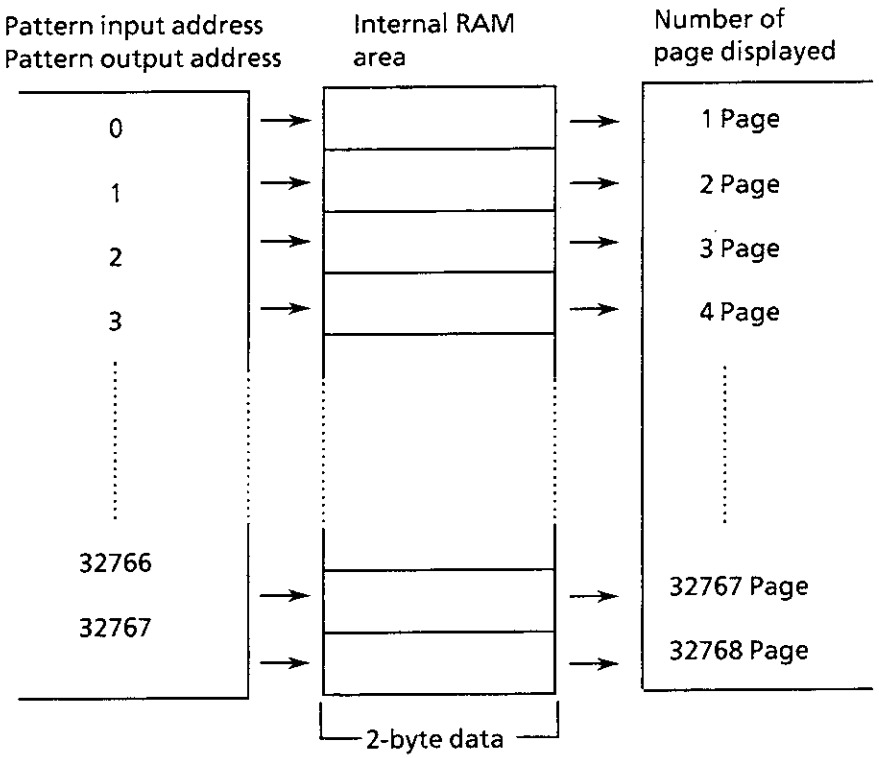


Fig. 13-1 Relationship between Number of Page and Address

13.3 Editing Program using DMA

Sample softwares using DMA function are shown in items (15) and (16) of paragraph 14.4 and 14.5. Learn the function and operation of each by referring to them.

The relationship between the pattern input/output start address and the number of the page actually set is described below.

For a 16-bit CPU, odd numbered addresses cannot be defined and, therefore, the following equation is established.

(Pattern input/output start address + 1) = number of the actual page

SECTION 14
SAMPLE PROGRAMS

Sample programs and their flowcharts for the MP1701B/MP1755A/MP1608A/MP1650A functions by GP-IB are described in this Section.

14.1 Sample Program List

Table 14-1 Sample Program List

Item No. of Paragraphs 14.4 and 14.5	Sample Program Control Function
(1)	Frequency setting
(2)	Frequency setting
(3)	Pattern setting
(4)	Output signal setting
(5)	Floppy disk file information read Floppy disk access status check → serial polling
(6)	Floppy disk file information read Floppy disk access status check → status byte register service request
(7)	Data save, resave, and recall
(8)	Standard event status byte check COMMAND ERROR bit check → serial polling
(9)	Standard event status byte check COMMAND ERROR bit check → status byte register service request
(10)	Internal timer setting
(11)	Power failure and recovery status check
(12)	Number of external pattern input channel setting
(13)	Error addition channel setting
(14)	Number of mark ratio AND bit shifts setting

Table 14-1 Sample Program List (Cont'd)

Item No. of Paragraphs 14.4 and 14.5	Sample Program Control Function
(15)	Pattern data transfer by DMA*
(16)	Pattern data transfer by DMA*

* The sample program of pattern data transfer by DMA uses HP9000 only as the controller.

14.2 Controller Used

Sample programs are made assuming that the controller will be the HP9000 Series Computer or IBM PC (or compatibles, equipped with the GP-IB interface card manufactured by National Instrument, INC. [N.I.]).

The programming languages are HP-BASIC and QUICK-BASIC (by Microsoft).

These programs are checked by the HP9000-200/300 Computer with HP-BASIC (V 5.12) and the Toshiba (Japan) J3100 Computer with QUICK-BASIC (V 3.00) on the GP-IB interface card (N.I.).

14.3 Preparation for Program Execution

Sample program execution preparations are shown below by controller used.

Controller	Program Execution Preparation
HP9000	• Set the MP1701B/MP1755A/MP1608A/MP1650A GP-IB address to "0". • Connect the MP1701B/MP1755A/MP1608A/MP1650A to the HP9000 with a GP-IB cable.
J3100	• Set the MP1701B/MP1755A/MP1608A/MP1650A GP-IB address to "0". • Setting IBCONF ① < Board Characteristics > Board: GPIB0 (Board is made "GPIB0".) Primary GPIB Address 10 Secondary GPIB Address NONE Timeout setting T30S EOS byte 0AH Terminal Read on EOS yes Set EOI with EOS on Write yes Type of compare on EOS 7-bit Set EOI w/last byte of Write yes GPIB-PC Model PC2A Board is System Controller yes Local Lockout on all devices no Desable Auto Serial Polling yes High-speed timing no Interrupt jumper setting 7 Base I/O Address 02E1H DMA channel NONE Internal clock Freq (in MHZ) 6 ② < Device Characteristics > Device: PPG (Device name is made "PPG".) Primary GPIB Address 0 Secondary GPIB Address NONE Timeout setting T30S EOS byte 0AH Terminal Read on EOS yes Set EOI with EOS on Write yes Type of compare on EOS 7-bit Set EOI w/last byte of Write yes ③ Device Map for Board GPIB0 This connects the device made "PPG" to Board: GPIB0 of ①. • Connect the MP1701B/MP1755A/MP1608A/MP1650A to the J3100 with a GP-IB cable.

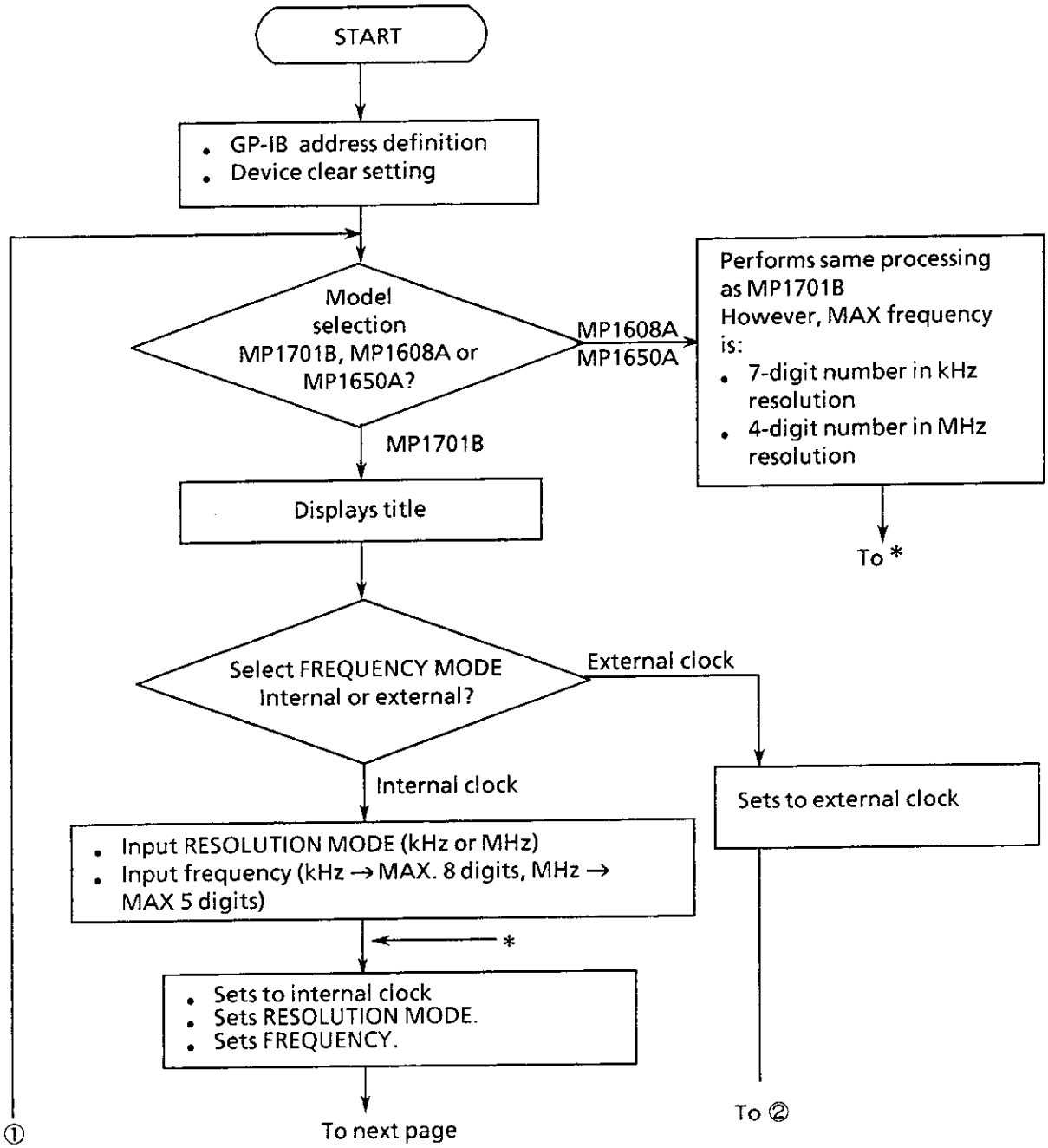
Sample programs using the HP9000 as the controller are shown in paragraph 14.4. Sample programs using the J3100 as the controller are shown in paragraph 14.5.

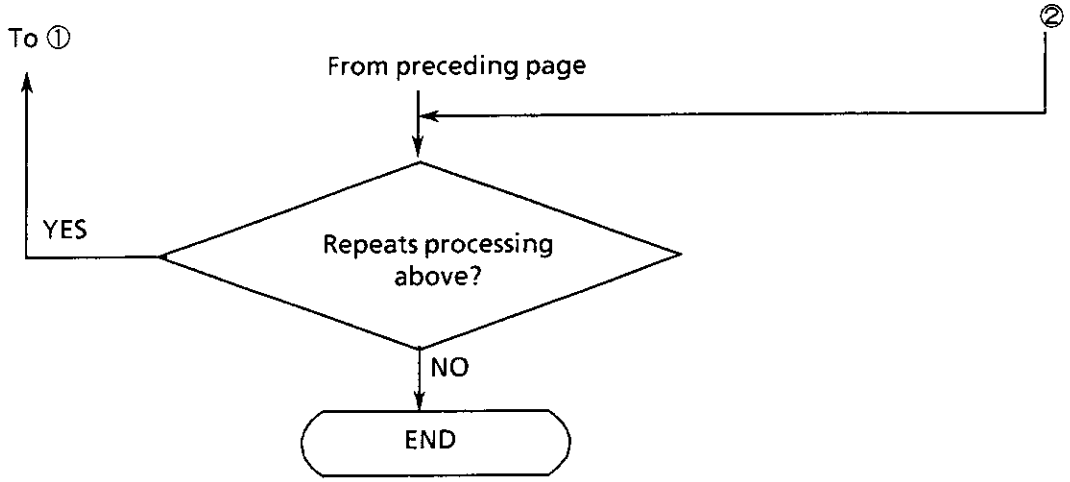
14.4 Sample Programs Using HP9000 as the Controller

(1) Frequency setting

This program performs clock frequency control.

It selects internal clock or external clock, and inputs the frequency resolution and clock frequency.




To ①
From preceding page
②
YES
Repeats processing above?
NO
END

PROGRAM LISTING

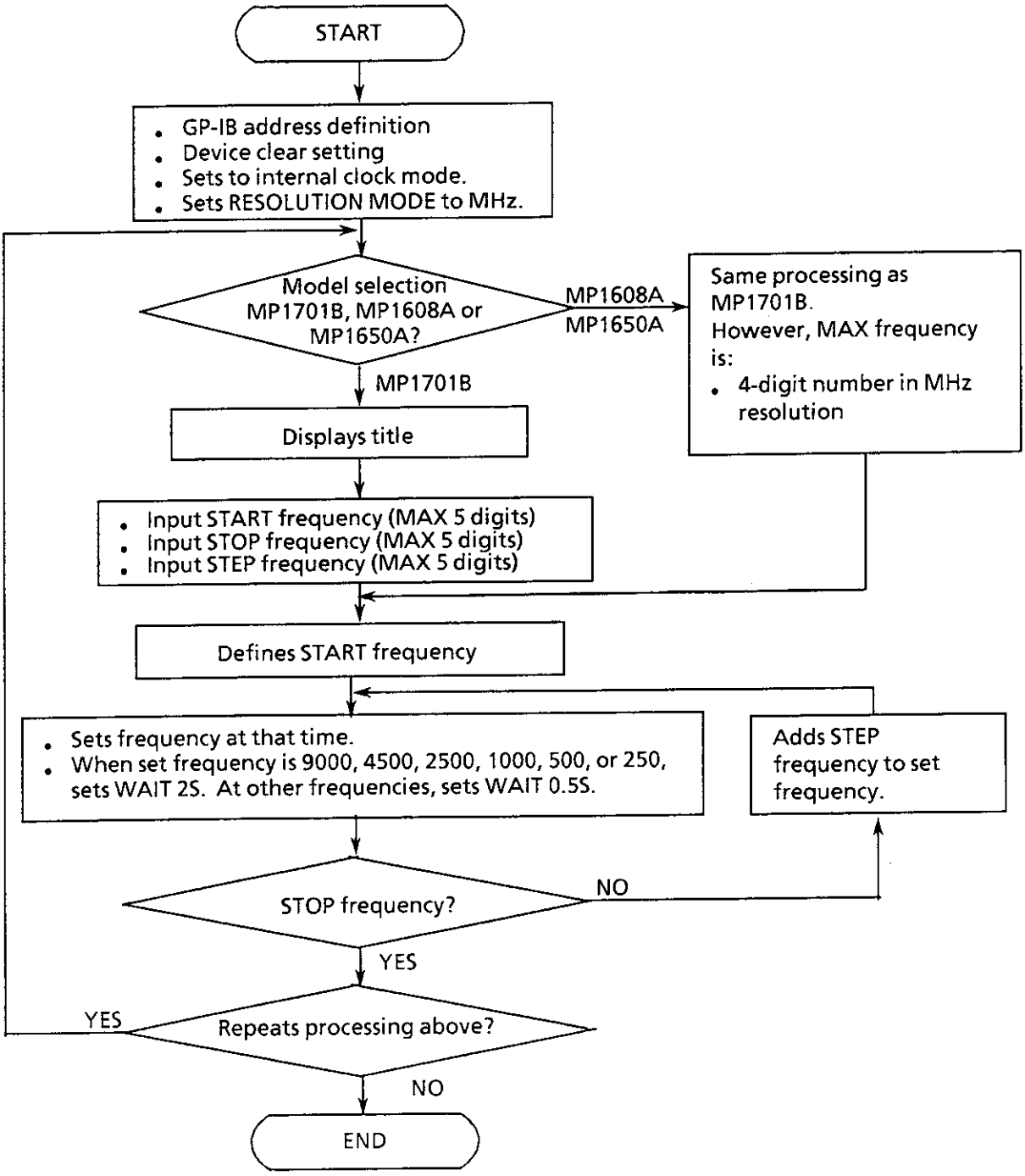
```
10    !*****************************************************************
20    !*                                                               *
30    !*    MP1701B/MP1608A/MP1650A   FREQUENCY SAMPLE SOFT_1          *
40    !*                                                               *
50    !*                                                        FRQ_1  *
60    !*****************************************************************
70    !
80    !---------------------------------------------------------------!
90    !                        MAIN ROUTINE                           !
100   !---------------------------------------------------------------!
110   !
120   LET Add=700                ! Set Device Address
130   CLEAR Add                  ! Device Clear
140   !
150   LOOP
160     !
170     INPUT "MODE SELECT [MP1701B=0, MP1608A=1, MP1650A=2]  ?",Mode$
180     !
190     SELECT Mode$
200     CASE "0"
210       GOSUB P10g
220     CASE "1"
230       Ppg$="MP1608A"
240       GOSUB P5g3g
250     CASE "2"
260       Ppg$="MP1650A"
270       GOSUB P5g3g
280     END SELECT
290     !
300     INPUT "NEXT DATA SET [ YES=0 , NO=1 ]  ?",Loop$
310     !
320   EXIT IF Loop$="1"
330   !
340   END LOOP
350   !
360   STOP
370   !
380   !---------------------------------------------------------------!
390   !                        SUB ROUTINE                            !
400   !---------------------------------------------------------------!
410   !
420 P10g:!---------------------------------- MP1701B DATA INPUT
430   !
440   PRINT "***  MP1701B FREQUENCY SAMPLE SOFT  ***"
450   PRINT ""
460   INPUT "FREQUENCY MODE SELECT[ EXTERNAL=0, INTERNAL=1 ]?",Clk$
470   !
480   IF Clk$="1" THEN
490     INPUT "FREQUENCY RESOLUTION [ kHz=0 , MHz=1 ]  ?",Res$
500     !
510     IF Res$="1" THEN
520       INPUT "FREQUENCY DATA [ MHz=5 figures,MAX ]  ?",Frq$
530     ELSE
540       INPUT "FREQUENCY DATA [ kHz=8 figures,MAX ]  ?",Frq$
550     END IF
560     !
570     GOSUB D_set
580     !
590   ELSE
600     OUTPUT Add;"CLK 0"         ! Clock mode : External
610     !
```

```
620    END IF
630    !
640    RETURN
650    !
660    !
670  P5g3g:!------------------------------ MP1608A/MP1650A DATA INPUT
680    !
690    PRINT "***  "&Ppg$&" FREQUENCY SAMPLE SOFT  ***"
700    PRINT ""
710    INPUT "FREQUENCY MODE SELECT[ EXTERNAL=0, INTERNAL=1 ]?",Clk$
720    !
730    IF Clk$="1" THEN
740      INPUT "FREQUENCY RESOLUTION [ kHz=0 , MHz=1 ]  ?",Res$
750      !
760      IF Res$="1" THEN
770        INPUT "FREQUENCY DATA [ MHz=4 figures,MAX ]  ?",Frq$
780      ELSE
790        INPUT "FREQUENCY DATA [ kHz=7 figures,MAX ]  ?",Frq$
800      END IF
810      !
820      GOSUB D_set
830      !
840    ELSE
850      OUTPUT Add;"CLK 0"          ! Clock mode : External
860      !
870    END IF
880    !
890    RETURN
900    !
910    !
920  D_set:! ---------------------- MP1701B/MP1608A/MP1650A DATA OUTPUT
930    !
940    OUTPUT Add;"CLK 1"            ! Clock mode : Internal
950    OUTPUT Add;"RES "&Res$        ! Send Resolution mode
960    OUTPUT Add;"FRQ "&Frq$        ! Send Frequency data
970    !
980    RETURN
990    !
1000   END
```

(2) Frequency setting

This program increases the internal clock frequency from a start frequency to a stop frequency in a certain step width.

The frequency switching speed is every 0.5 second, but the set state is held for 2 seconds at 250, 500, 1000, 2500, 4500, and 9000 MHz.



PROGRAM LISTING

```
10    !*****************************************************************
20    !*                                                               *
30    !*     MP1701B/MP1608A/MP1650A   FREQUENCY SAMPLE SOFT_2         *
40    !*                                                               *
50    !*                                                      FRQ_2    *
60    !*****************************************************************
70    !
80    !
90    !---------------------------------------------------------------!
100   !                          MAIN ROUTINE                         !
110   !---------------------------------------------------------------!
120   !
130   LET Add=700                    ! Set Device Address
140   CLEAR Add                      ! Device Clear
150   OUTPUT Add;"CLK 1;RES 1"       ! Internal mode , Resolution : MHz
160   !
170   LOOP
180     !
190     INPUT "MODE SELECT [ MP1701B=0, MP1608A=1, MP1650A =2 ]  ?",Mode$
200     !
210     SELECT Mode$
220     CASE "0"
230       GOSUB P10g
240     CASE "1"
250       Ppg$="MP1608A"
260       GOSUB P5g3g
270     CASE "2"
280       Ppg$="MP1650A"
290       GOSUB P5g3g
300     END SELECT
310     !
320     GOSUB D_set
330     !
340     INPUT "NEXT DATA SET ? [ YES=0 , NO=1 ]",Loop$
350     !
360   EXIT IF Loop$="1"
370   !
380   END LOOP
390   !
400   STOP
410   !
420   !
430   !---------------------------------------------------------------!
440   !                          SUB ROUTINE                          !
450   !---------------------------------------------------------------!
460   !
470 P10g:!------------------------------------ MP1701B DATA INPUT
480   !
490   PRINT "  ***** MP1701B FREQUENCY SAMPLE SOFT *****"
500   PRINT ""
510   !
520   INPUT " START FREQUENCY DATA [ MHz=5 figures,MAX ]  ?",Startf$
530   INPUT " STOP  FREQUENCY DATA [ MHz=5 figures,MAX ]  ?",Stopf$
540   INPUT " STEP  FREQUENCY DATA [ MHz=5 figures,MAX ]  ?",Stepf$
550   !
560   RETURN
570   !
580   !
```

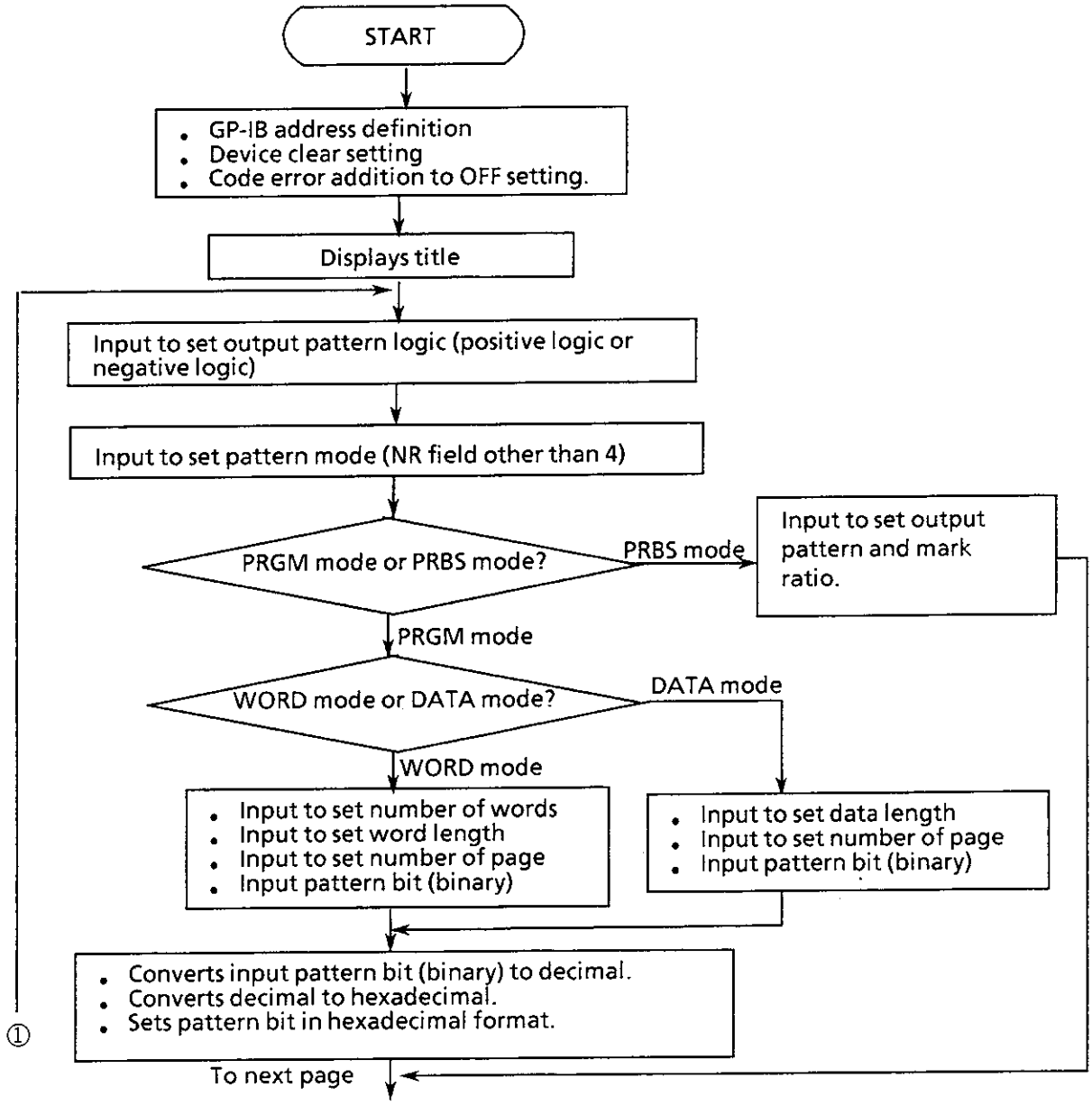
```
590 P5g3g:!---------------------------- MP1608A /MP1650A DATA INPUT
600   !
610   PRINT "  ***** "&Ppg$&" FREQUENCY SAMPLE SOFT *****"
620   PRINT ""
630   !
640   INPUT " START FREQUENCY DATA [ MHz=4 figures,MAX ]  ?",Startf$
650   INPUT " STOP  FREQUENCY DATA [ MHz=4 figures,MAX ]  ?",Stopf$
660   INPUT " STEP  FREQUENCY DATA [ MHz=4 figures,MAX ]  ?",Stepf$
670   !
680   RETURN
690   !
700   !
710 D_set:! ---------------------- MP1701B/MP1608A/MP1650A DATA OUTPUT
720   !
730   FOR I=VAL(Startf$) TO VAL(Stopf$) STEP VAL(Stepf$)
740     !
750     OUTPUT Add;"FRQ "&VAL$(I)          ! Send Frequency Data
760     !
770     IF I=9000 OR I=4500 OR I=2500 OR I=1000 OR I=500 OR I=250 THEN
780       WAIT 2
790       !
800     ELSE
810       WAIT .5
820         !
830     END IF
840       !
850   NEXT I
860   !
870   RETURN
880   !
890   !
900   END
```

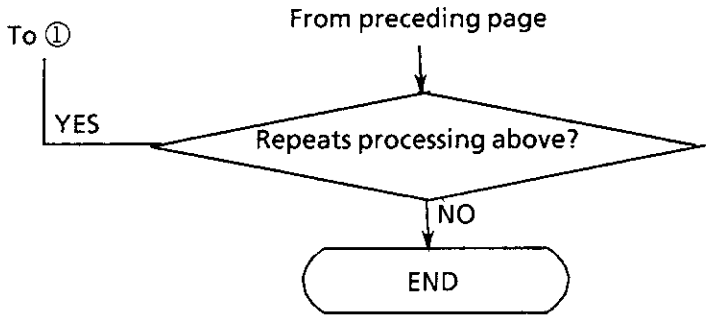
(3) Pattern setting

This program performs output pattern control.

It selects the output pattern logic, selects the PRGM or PRBS mode, and sets the necessary items of each output pattern for the MP1701B/MP1755A/MP1608A/MP1650A.

In the PRGM mode, the pattern data corresponding to the number of page input previously is set in hexadecimal format.




From preceding page
To ①
YES
Repeats processing above?
NO
END

PROGRAM LISTING

```
10    !*********************************************************************
20    !*                                                                   *
30    !*        MP1701B/MP1608A/MP1650A  PATTERN SAMPLE SOFT               *
40    !*                                                                   *
50    !*                                                          PATTERN  *
60    !*********************************************************************
70    !
80    !
90    !-------------------------------------------------------------------!
100   !                            MAIN ROUTINE                           !
110   !-------------------------------------------------------------------!
120   !
130   LET Add=700               ! Set Device Address
140   CLEAR Add                 ! Device Clear
150   OUTPUT Add;"EAD 0"        ! Error Addition mode : OFF
160   !
170   PRINT "*** MP1701B/MP1608A/MP1650A  PATTERN SAMPLE SOFT ***"
180   PRINT ""
190   !
200   LOOP
210     !
220     GOSUB Pattern
230     !
240     INPUT " NEXT DATA SET  [ YES=0 , NO=1 ]  ?",Loop$
250     !
260   EXIT IF Loop$="1"
270   !
280   END LOOP
290   !
300   !
310   STOP
320   !
330   !-------------------------------------------------------------------!
340   !                            SUB ROUTINE                            !
350   !-------------------------------------------------------------------!
360   !
370 Pattern:!--------------------------------- SET Logic , Pattern mode
380   !
390   LOOP
400     !
410     INPUT " LOGIC MODE [ POSITIVE=0 , NEGATIVE=1 ] ?",Lgc$
420     OUTPUT Add;"LGC "&Lgc$
430     !
440     PRINT "PATTERN MODE [ WORD=0, DATA=1, PN7=2, PN9=3, PN11=5, "
450     PRINT "                PN15=6, PN20=7, PN23=8, PN31=9 ] "
460     PRINT ""
470     INPUT  "PATTERN MODE [ 0 OR 1 OR 2 OR 3 OR 5 OR 6 OR 7 OR 8 OR 9 ]?",Ptn$
480     !
490   EXIT IF Ptn$<>"4"
500   !
510   END LOOP
520   !
530   OUTPUT Add;"PTN "&Ptn$
540   !
550   !
560   IF Ptn$="0" OR Ptn$="1" THEN
570     !
580     GOSUB Prog_mode
590     !
600   ELSE
610     !
```

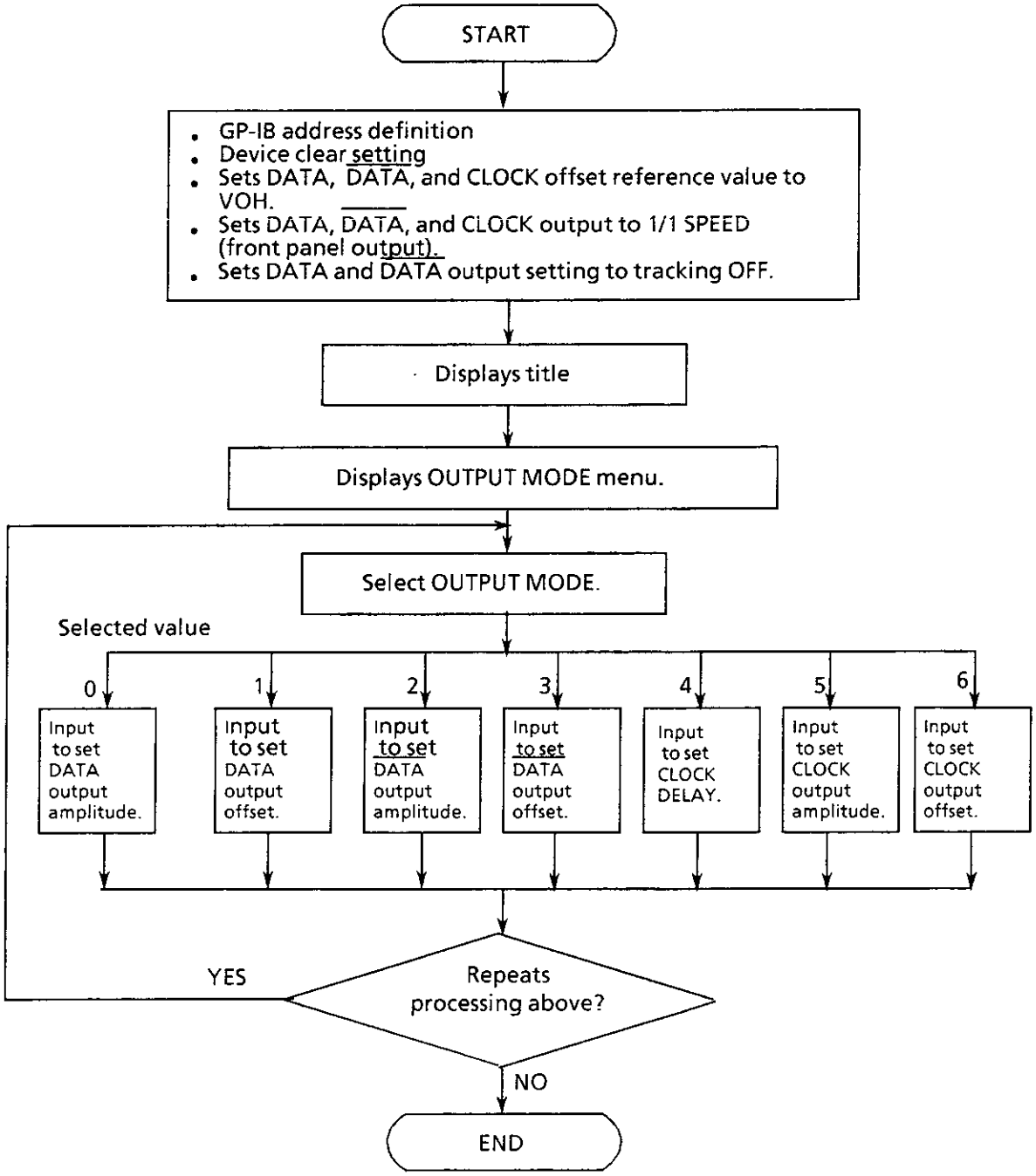
```
620       INPUT "MARK RATIO [ 0/8:8/8=0, 1/8:7/8=1, 1/4:3/4=2, 1/2:N1/2=3 ?",Mrk$
630       OUTPUT Add;"MRK "&Mrk$
640       !
650     END IF
660     !
670     RETURN
680     !
690     !
700 Prog_mode:!--------------------------- SET  PROG (Word),(Data)
710     !
720     IF Ptn$="1" THEN
730       !
740       PRINT "*** PATTERN MODE PROG (DATA) ***"
750       PRINT ""
760       !
770       INPUT " DATA LENGTH DATA ?",Dln$
780       OUTPUT Add;"DLN "&Dln$
790       !
800       INPUT " PAGE DATA ?",Pag$
810       OUTPUT Add;"PAG "&Pag$
820       !
830       INPUT " BIT PATTERN SET DATA  BIT16-->BIT1 [0/1] ?",Bit$
840       GOSUB Btoh
850       OUTPUT Add;"BIT #H"&B$
860       !
870     ELSE
880       !
890       PRINT "*** PATTERN MODE PROG (WORD) ***"
900       PRINT ""
910       !
920       INPUT " NUMBER OF WORD DATA ?",Wnb$
930       OUTPUT Add;"WNB "&Wnb$
940       !
950       INPUT " WORD LENGTH DATA ?",Wln$
960       OUTPUT Add;"WLN "&Wln$
970       !
980       INPUT " PAGE DATA ?",Pag$
990       OUTPUT Add;"PAG "&Pag$
1000      !
1010      INPUT " BIT PATTERN SET DATA  BIT16-->BIT1 [0/1] ?",Bit$
1020      GOSUB Btoh
1030      OUTPUT Add;"BIT #H"&B$
1040      !
1050    END IF
1060    !
1070    RETURN
1080    !
1090    !
1100 Btoh: !------------------------------------ BIN TO HEX
1110    !
1120    A=IVAL(Bit$,2)                ! BIN --> DIG
1130    B$=IVAL$(A,16)                ! DIG --> HEX
1140    !
1150    RETURN
1160    !
1170    !
1180    END
```

(4) Output signal setting

This program performs output signal control.

Select to set the necessary DATA, $\overline{\text{DATA}}$, and CLOCK output amplitudes and offsets.

The MP1701B/MP1755A/MP1608A/MP1650A is set to the offset reference value: VOH, 1/1SPEED (front panel output), and DATA/$\overline{\text{DATA}}$ tracking: OFF state.



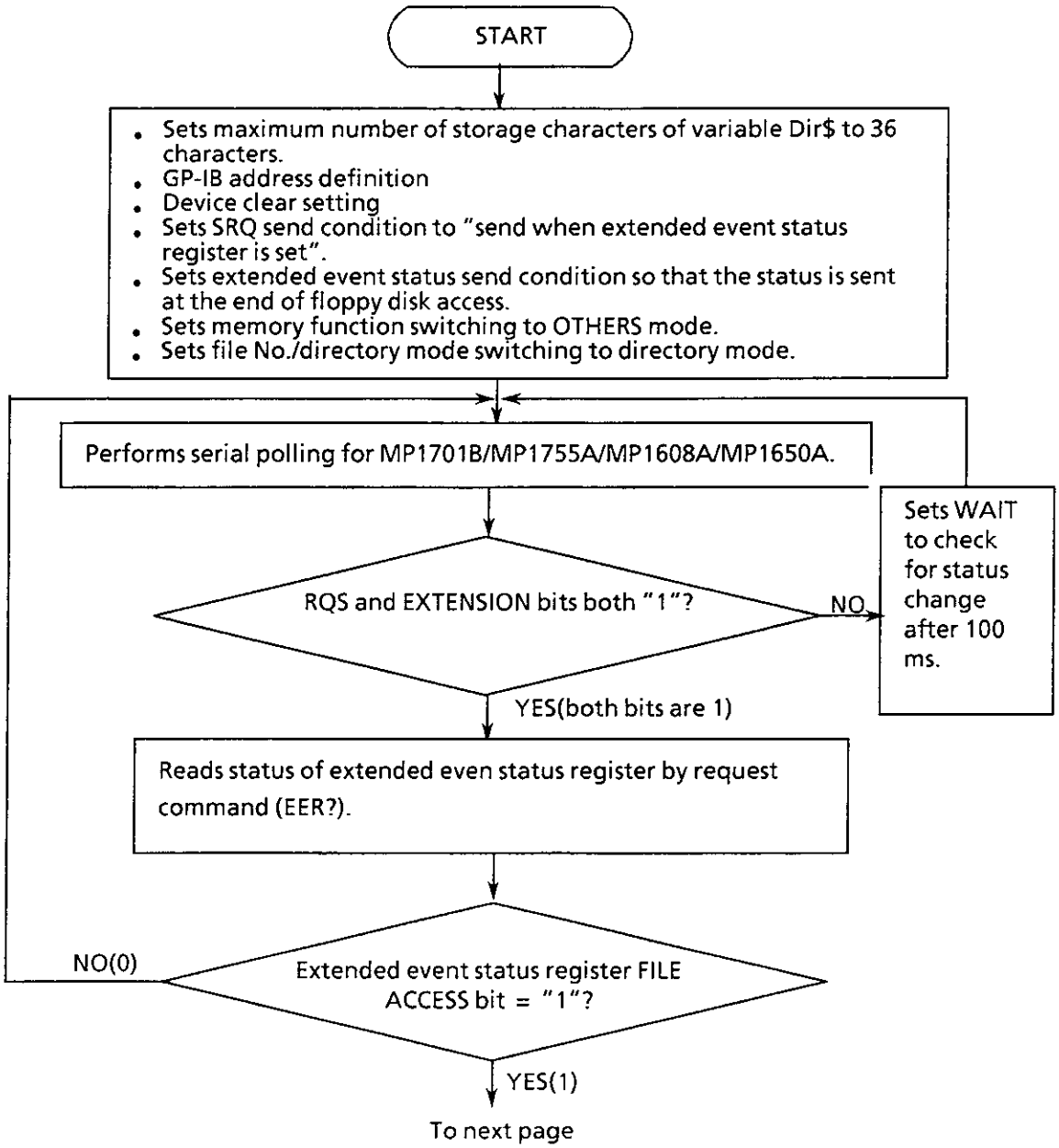
PROGRAM LISTING

```
10    !*********************************************************************
20    !*                                                                   *
30    !*          MP1701B/MP1608A/MP1650A   OUTPUT SAMPLE SOFT             *
40    !*                    ---  1/1(Speed),Voh mode ---                   *
50    !*                                                        OUTPUT     *
60    !*********************************************************************
70    !
80    LET Add=700
90    CLEAR Add
100   OUTPUT Add;"OFS 0;SPD 0;TRK 0" !SET Voh mode,1/1(Speed),Tracking off
110   !
120   PRINT "    ***** MP1701B/MP1608A/MP1650A  OUTPUT SAMPLE SOFT *****"
130   PRINT "           ---------  1/1(Speed) , Voh mode  ---------  "
140   PRINT ""
150   PRINT "OUTPUT MODE [DATA AMPLITUDE=0, DATA OFFSET=1, "
160   PRINT "              AMPLITUDE=2, NDATA OFFSET=3, CLOCK DELAY=4"
170   PRINT "              CLOCK AMPLITUDE=5, CLOCK OFFSET=6 ]"
180   PRINT
190   !
200   LOOP
210     !
220     INPUT "OUTPUT MODE SELECT [ 0 OR 1 OR 2 OR 3 OR 4 OR 5 OR 6 ]",Out$
230     !
240     SELECT Out$
250     !
260     CASE "0"
270       INPUT "* DATA AMPLITUDE  [ +0.50 ~ 2.00 V ] STEP 0.01 ",Dap$
280       OUTPUT Add;"DAP "&Dap$
290       !
300     CASE "1"
310       INPUT "* DATA OFFSET     [ -2.000 ~ 2.000 V ] STEP 0.005 ",Dos$
320       OUTPUT Add;"DOS "&Dos$
330       !
340     CASE "2"
350       INPUT "* NDATA AMPLITUDE [ +0.50 ~ 2.00 V ] STEP 0.01 ",Nap$
360       OUTPUT Add;"NAP "&Nap$
370       !
380     CASE "3"
390       INPUT "* NDATA OFFSET    [ -2.000 ~ 2.000 V ] STEP 0.005 ",Nos$
400       OUTPUT Add;"NOS "&Nos$
410       !
420     CASE "4"
430       PRINT "<<<  CLOCK DELAY  >>>"
440       PRINT "MP1701B/MP1608A --> -500 ~  500 ps   1ps STEP"
450       PRINT "MP1650A -->        -1000 ~ 1000 ps   2ps STEP"
460       INPUT "* CLOCK DELAY ",Cdl$
470       OUTPUT Add;"CDL "&Cdl$
480       !
490     CASE "5"
500       INPUT "* CLOCK AMPLITUDE [ +0.50 ~ 2.00 V ] STEP 0.01 ",Cap$
510       OUTPUT Add;"CAP "&Cap$
520       !
530     CASE "6"
540       INPUT "* CLOCK OFFSET    [ -2.000 ~ 2.000 V ] STEP 0.005",Cos$
550       OUTPUT Add;"COS "&Cos$
560       !
570     END SELECT
580     !
590     INPUT " NEXT DATA SET [ YES=0 , NO=1 ] ",Loop$
600     !
610   EXIT IF Loop$="1"
620   END LOOP
630   !
640   END
```

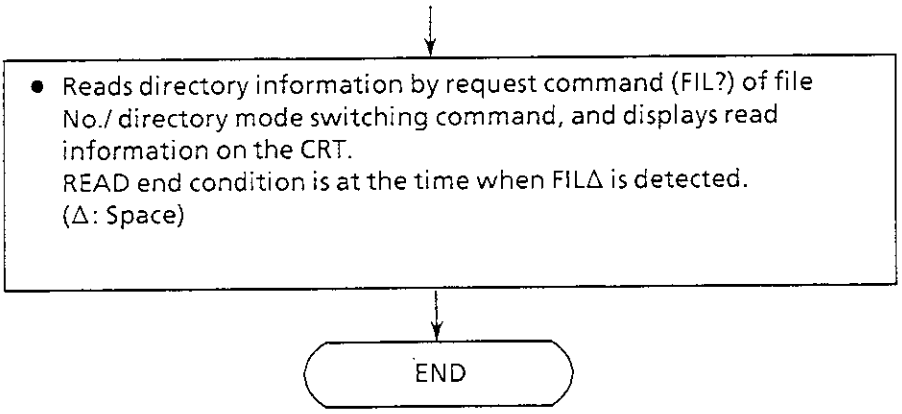
(5) Floppy disk file information read
(Floppy disk access status check → serial polling)

This program checks the directory information of the files stored on the floppy disk, and displays it on the CRT. It also shows an example of actual output.

Floppy disk access status check is performed by serial polling and by data request command that checks the extended event status information.



From preceding page



EXECUTED RESULT

```
T02      ,PTN,      104,89-09-02,16:22
T04      ,PTN,      104,89-09-27,15:53
T07      ,OTH,      108,89-10-06,09:56
T21      ,PTN,      104,89-09-27,15:53
T23      ,PTN,      108,89-10-06,09:55
T24      ,OTH,      108,89-09-27,15:54
T38      ,PTN,    65640,89-09-29,15:35
T99      ,PTN,    65640,89-10-06,09:58
FIL 1
```

PROGRAM LISTING

```
10    !*********************************************************************
20    !*                                                                   *
30    !* MP1701B/MP1608A/MP1650A  FILE DIRECTORY READ  SAMPLE SOFT_1       *
40    !*                                                                   *
50    !*                                                          F_DIR    *
60    !*********************************************************************
70    !
80    !-------------------------------------------------------------------!
90    !                          MAIN ROUTINE                             !
100   !-------------------------------------------------------------------!
110   !
120   DIM Dir$[36]
130   LET Add=700               ! Set Device Address
140   CLEAR Add                 ! Device Clear
150   !
160   OUTPUT Add;"SRQ 2"        ! SRQ : Extension bit
170   OUTPUT Add;"EES 32"       ! EES : Floppy Access End
180   OUTPUT Add;"MEM 1"        ! Memory mode : OTHERS
190   OUTPUT Add;"FIL 1"        ! FIL : Directory Mode
200   !
210   GOSUB Spoll_eer
220   GOSUB File_dir
230   !
240   STOP
250   !
260   !-------------------------------------------------------------------!
270   !                            SUB ROUTINE                            !
280   !-------------------------------------------------------------------!
290   !
300 Spoll_eer:!---------------------------------- Check Status Byte
310   !
320   LOOP
330     !
340     LOOP
350       !
360       A=SPOLL(Add)          ! Send Serial Poll
370       !
380     EXIT IF BIT(A,6)=1 AND BIT(A,1)=1 ! RQS bit,Extension bit = 1
390       WAIT .1
400       !
410     END LOOP
420     !
430     OUTPUT Add;"EER?"       ! REQUEST Extension Event Register ?
440     ENTER Add;Eer$          ! READ    Extension Event Register
450     !
460   EXIT IF Eer$[9,9]="1"     ! File Access bit = 1
470   !
480   END LOOP
490   !
500   RETURN
510   !
520   !
```

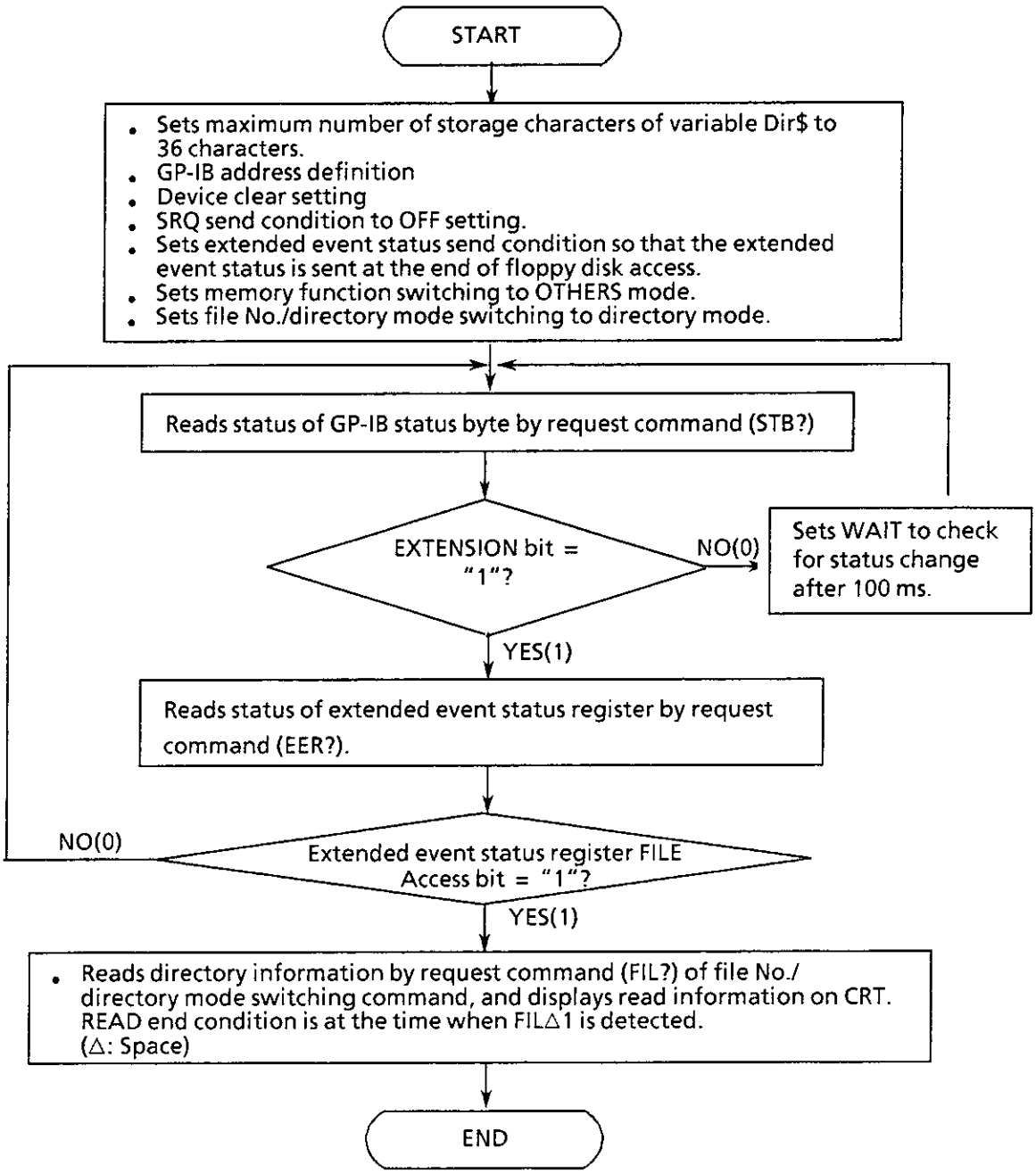
```
530 File_dir:! ---------------------------------- Read File Directory
540   !
550   OUTPUT Add;"FIL?"         ! REQUEST Directory ?
560   !
570   LOOP
580     !
590     ENTER Add;Dir$          ! READ    Directory
600     PRINT Dir$
610     !
620   EXIT IF Dir$="FIL 1"
630   !
640   END LOOP
650   !
660   RETURN
670   !
680   !
690   END
```

(6) Floppy disk file information read

(Floppy disk access status check → status byte register service request)

This program checks the directory information of the files stored on floppy disk, and displays it on the CRT. It also shows an actual output example.

Floppy disk access status check is performed by data request command that checks the status of the GP-IB status byte and by data request command that checks the extended event status information.



EXECUTED RESULT

```
T02      ,PTN,      104,89-09-02,16:22
T04      ,PTN,      104,89-09-27,15:53
T07      ,OTH,      108,89-10-06,09:56
T21      ,PTN,      104,89-09-27,15:53
T23      ,PTN,      108,89-10-06,09:55
T24      ,OTH,      108,89-09-27,15:54
T38      ,PTN,    65640,89-09-29,15:35
T99      ,PTN,    65640,89-10-06,09:58
FIL 1
```

PROGRAM LISTING

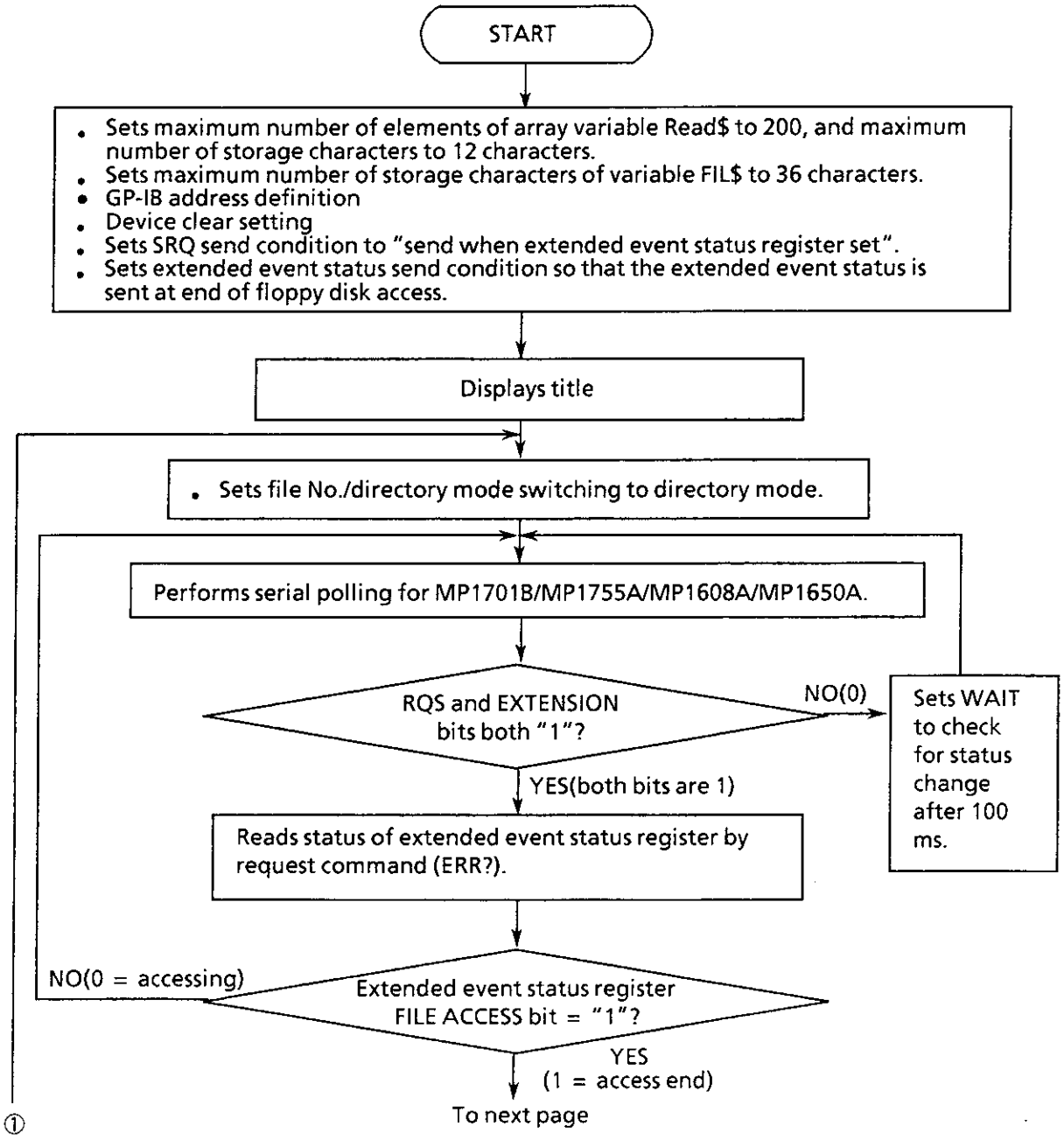
```
10    !*********************************************************************
20    !*                                                                   *
30    !* MP1701B/MP1608A/MP1650A  FILE DIRECTORY READ   SAMPLE SOFT_2 *
40    !*                                                                   *
50    !*                                                          F_DIR2   *
60    !*********************************************************************
70    !
80    !-------------------------------------------------------------------!
90    !                            MAIN ROUTINE                           !
100   !-------------------------------------------------------------------!
110   !
120   DIM Dir$[36]
130   LET Add=700                   ! Set Device Address
140   CLEAR Add                     ! Device Clear
150   !
160   OUTPUT Add;"SRQ 0"            ! SRQ : OFF
170   OUTPUT Add;"EES 32"           ! EES : Floppy Access End
180   OUTPUT Add;"MEM 1"            ! Memory mode : OTHERS
190   OUTPUT Add;"FIL 1"            ! FIL : Directory Mode
200   !
210   GOSUB Stb_reg
220   GOSUB File_dir
230   !
240   STOP
250   !
260   !
270   !-------------------------------------------------------------------!
280   !                           SUB ROUTINE                             !
290   !-------------------------------------------------------------------!
300   !
310 Stb_reg:!------------------------------------ Check Status Byte
320   !
330   LOOP
340     !
350     LOOP
360       !
370       OUTPUT Add;"STB?"         ! REQUEST Status Byte Register ?
380       ENTER Add;Stb$            ! READ    Status Byte Register
390       !
400     EXIT IF Stb$[13,13]="1"     ! Extention bit = 1
410       WAIT .1
420       !
430     END LOOP
440     !
450     OUTPUT Add;"EER?"           ! REQUEST Extension Event Register ?
460     ENTER Add;Eer$              ! READ    Extension Event Register
470     !
480   EXIT IF Eer$[9,9]="1"         ! File Access bit = 1
490   !
500   END LOOP
510   !
520   RETURN
530   !
540   !
```

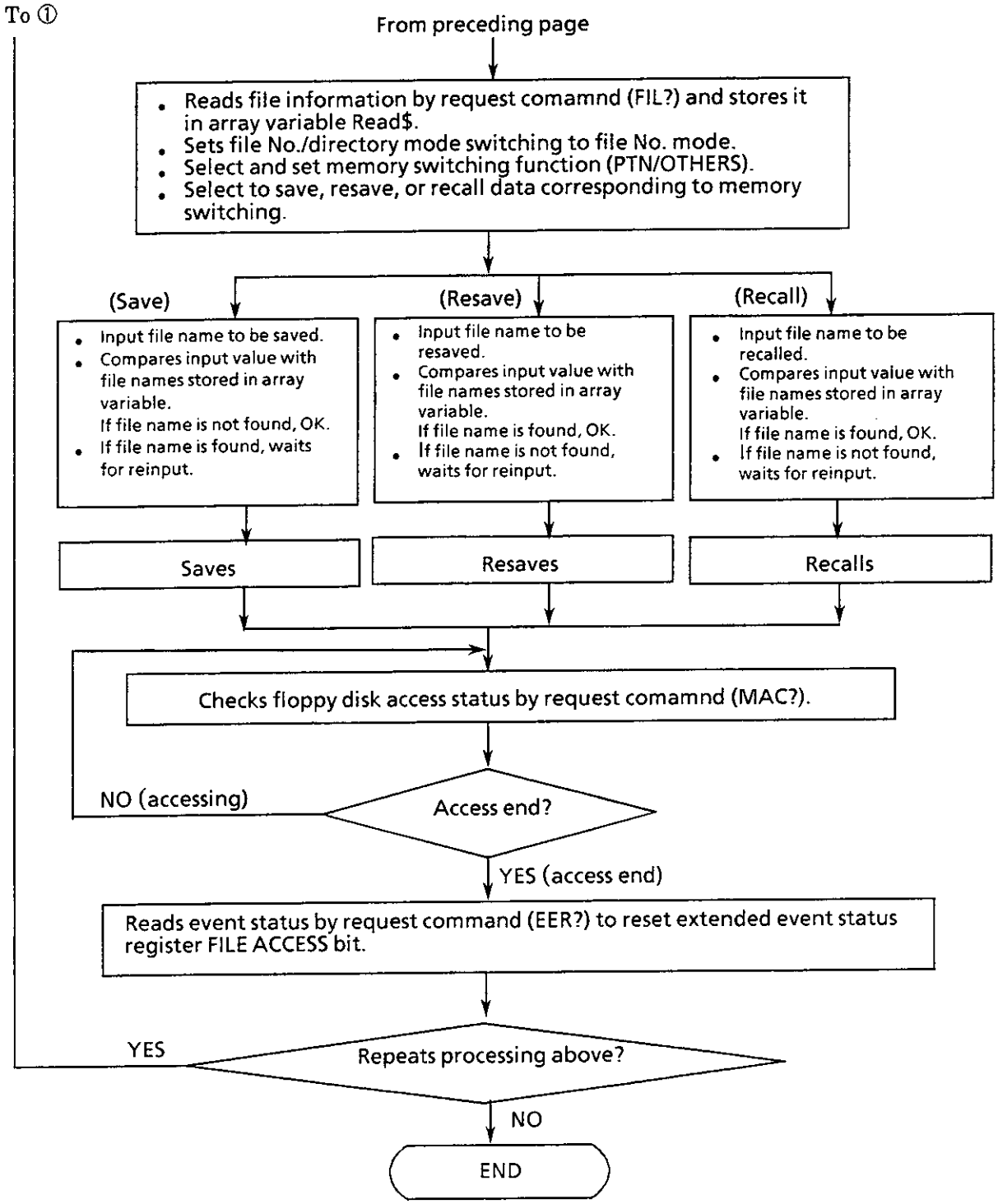
```
550 File_dir:  ! ------------------------------ Read File Directory
560   !
570   OUTPUT Add;"FIL?"            ! REQUEST Directory
580   !
590   LOOP
600     !
610     ENTER Add;Dir$             ! READ    Directory
620     PRINT Dir$
630     !
640   EXIT IF Dir$="FIL 1"
650   !
660   END LOOP
670   !
680   RETURN
690   !
700   END
```

(7) Data save, resave, and recall

This program checks the directory information of the files stored on floppy disk, saves or resaves the statuses set at the MP1701B/MP1755A/MP1608A/MP1650A corresponding to the memory switching function (PTN/OTHERS), and recalls the file stored on floppy disk.

The access status of the floppy disk to obtain the directory information is checked by serial polling and by data request command to check the extended event status . At save, resave, and recall, the floppy disk access status is checked by request command MAC?.




To ①
From preceding page
• Reads file information by request comamnd (FIL?) and stores it in array variable Read$.
• Sets file No./directory mode switching to file No. mode.
• Select and set memory switching function (PTN/OTHERS).
• Select to save, resave, or recall data corresponding to memory switching.
(Save)
(Resave)
(Recall)
• Input file name to be saved.
• Compares input value with file names stored in array variable.
If file name is not found, OK.
• If file name is found, waits for reinput.
• Input file name to be resaved.
• Compares input value with file names stored in array variable.
If file name is found, OK.
• If file name is not found, waits for reinput.
• Input file name to be recalled.
• Compares input value with file names stored in array variable.
If file name is found, OK.
• If file name is not found, waits for reinput.
Saves
Resaves
Recalls
Checks floppy disk access status by request comamnd (MAC?).
NO (accessing)
Access end?
YES (access end)
Reads event status by request command (EER?) to reset extended event status register FILE ACCESS bit.
YES
Repeats processing above?
NO
END

PROGRAM LISTING

```
10    !*****************************************************************
20    !*                                                               *
30    !*     MP1701B/MP1608A/MP1650A  MEMORY SAMPLE SOFT               *
40    !*                                                               *
50    !*                                                      MEMORY   *
60    !*****************************************************************
70    !
80    !
90    !/////////////////////////////////////////////////////////////////
100   !/                                                               /
110   !/                          MAIN ROUTINE                         /
120   !/                                                               /
130   !/////////////////////////////////////////////////////////////////
140   !
150   DIM Read$(199)[12]
160   DIM Fil$[36]
170   LET Add=700              ! Set Device Address
180   CLEAR Add                ! Device Clear
190   OUTPUT Add;"SRQ 2"       ! SRQ : EXTENSION bit
200   OUTPUT Add;"EES 32"      ! Floppy Access End
210   !
220   PRINT " ** MP1701B/MP1608A/MP1650A  MEMORY SAMPLE SOFT **"
230   PRINT
240   !
250   LOOP
260     !
270     GOSUB S_poll
280     GOSUB D_set
290     GOSUB Access
300     !
310     INPUT " NEXT DATA SET  [ YES=0 , NO=1 ]  ?",Loop$
320     !
330   EXIT IF Loop$="1"
340   !
350   END LOOP
360   !
370   !
380   STOP
390   !
400   !/////////////////////////////////////////////////////////////////
410   !/                                                               /
420   !/                          SUB ROUTINE                          /
430   !/                                                               /
440   !/////////////////////////////////////////////////////////////////
450   !
460   !---------------------------------------------------------------!
470   !   Serial Polling                                              !
480   !                 RQS,Extention bit=1 , File Access bit=1       !
490   !---------------------------------------------------------------!
500   !
510 S_poll:!
520   !
530   OUTPUT Add;"FIL 1"
540   !
550   LOOP
560     !
570     LOOP
580       !
590       A=SPOLL(Add)                        ! Serial polling
600     EXIT IF BIT(A,6)=1 AND BIT(A,1)=1     ! RQS,Extention bit=1
610       WAIT .1
```

```
620       !
630     END LOOP
640     !
650     OUTPUT Add;"EER?"              ! REQUEST Extension register ?
660     ENTER Add;Eer$                 ! READ Extension register
670     !
680   EXIT IF Eer$[9,9]="1"            ! File access is end
690   !
700   END LOOP
710   !
720   RETURN
730   !
740   !
750   !-------------------------------------------------------------!
760   !     Read File directory , Set Memory mode                   !
770   !                  & Select  SAVE  or  RESAVE  or  RECALL     !
780   !-------------------------------------------------------------!
790   !
800 D_set:!
810   ! ---------------------------------------- Read File directory
820   I=0
830   WAIT .3
840   OUTPUT Add;"FIL?"
850     !
860   LOOP
870     !
880     ENTER Add;Fil$
890     Read$(I)=Fil$[1,12]
900   EXIT IF Fil$="FIL 1"
910     !
920     I=I+1
930     !
940   END LOOP
950     !
960   ! ---------------------------------------- Set Memory mode
970     !
980   OUTPUT Add;"FIL 0"
990   !
1000  LOOP
1010    INPUT "MEMORY MODE SELECT [ PTN=0 , OTHERS=1 ] ?",Mem
1020  EXIT IF Mem=0 OR Mem=1
1030  END LOOP
1040  !
1050  OUTPUT Add;"MEM "&VAL$(Mem)
1060  !
1070  IF Mem=0 THEN
1080    Mem$="PTN"
1090  ELSE
1100    Mem$="OTH"
1110  END IF
1120  !
1130  !
1140  ! ----------------------------  Select SAVE,RESAVE,RECALL
1150  !
1160  LOOP
1170    INPUT "SELECT [ SAVE=0 , RESAVE=1 , RECALL=2 ] ?",Dta
1180  EXIT IF Dta=0 OR Dta=1 OR Dta=2
1190  END LOOP
1200  !
1210  IF Dta=0 THEN GOSUB Dsave
1220  IF Dta=1 THEN GOSUB Dresave
1230  IF Dta=2 THEN GOSUB Drecall
1240  !
1250  RETURN
1260  !
1270  !
```

```
1280  !-------------------------------------------------------------!
1290  !      * DATA SAVE *                                          !
1300  !            SAME Memory mode & File name --> ERROR !         !
1310  !-------------------------------------------------------------!
1320  !
1330 Dsave:!
1340  !
1350  LOOP
1360     !
1370    I=0
1380     !
1390    INPUT "** DATA SAVE **  FILE NAME [ 0~99 ] ?",Nam
1400     !
1410    Result$="     "
1420    LOOP
1430     !
1440      IF Mem$=Read$(I)[10,12] AND Nam=VAL(Read$(I)[2,3]) THEN
1450        Result$="SAME"
1460      END IF
1470      !
1480      I=I+1
1490     !
1500    EXIT IF Read$(I)[1,5]="FIL 1"
1510     !
1520    END LOOP
1530   !
1540  EXIT IF Result$<>"SAME"
1550   !
1560  END LOOP
1570   !
1580  OUTPUT Add;"SAV "&VAL$(Nam)
1590   !
1600  RETURN
1610   !
1620   !
1630  !-------------------------------------------------------------!
1640  !      * DATA RESAVE *                                        !
1650  !               SAME Memory mode & File name --> OK !         !
1660  !-------------------------------------------------------------!
1670   !
1680 Dresave:!
1690       !
1700  LOOP
1710   !
1720    I=0
1730    INPUT "** DATA RESAVE **  FILE NAME [ 0~99 ] ?",Nam
1740     !
1750    Result$="     "
1760    LOOP
1770     !
1780      IF Mem$=Read$(I)[10,12] AND Nam=VAL(Read$(I)[2,3]) THEN
1790        Result$="SAME"
1800      END IF
1810     !
1820      I=I+1
1830     !
1840    EXIT IF Read$(I)[1,5]="FIL 1"
1850     !
1860    END LOOP
1870   !
1880  EXIT IF Result$="SAME"
1890  END LOOP
1900  !
1910  OUTPUT Add;"RSV "&VAL$(Nam)
1920  !
1930  RETURN
```

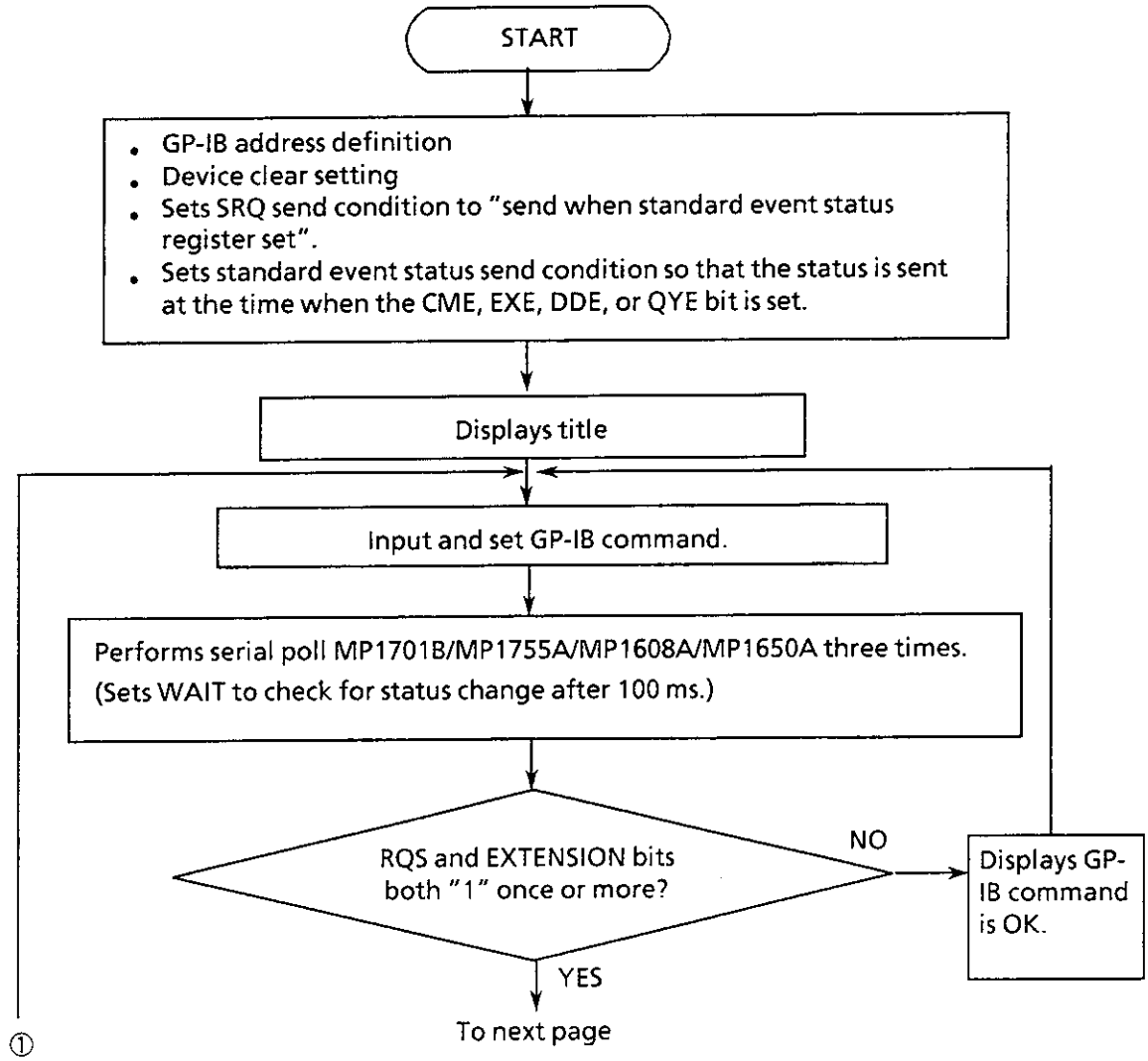
```
1940  !
1950  !
1960  !-------------------------------------------------------------!
1970  !      * DATA RECALL *                                        !
1980  !              SAME Memory mode & File name --> OK !          !
1990  !-------------------------------------------------------------!
2000  !
2010 Drecall:!
2020  !
2030  LOOP
2040  !
2050    I=0
2060   !
2070    INPUT "** DATA RECALL **  FILE NAME [ 0~99 ] ?",Nam
2080   !
2090    Result$="     "
2100    LOOP
2110     !
2120      IF Mem$=Read$(I)[10,12] AND Nam=VAL(Read$(I)[2,3]) THEN
2130        Result$="SAME"
2140      END IF
2150     !
2160      I=I+1
2170     !
2180    EXIT IF Read$(I)[1,5]="FIL 1"
2190   !
2200    END LOOP
2210   !
2220  EXIT IF Result$="SAME"
2230  END LOOP
2240  !
2250  OUTPUT Add;"RCL "&VAL$(Nam)
2260  !
2270  RETURN
2280  !
2290  !
2300  !-------------------------------------------------------------!
2310  !       MEMORY  ACCESS  CONDITION ?                           !
2320  !                            &  RESET FILE ACCESS bit         !
2330  !-------------------------------------------------------------!
2340  !
2350 Access:!
2360  !
2370  LOOP
2380    OUTPUT Add;"MAC?"
2390    ENTER Add;Mac$
2400  EXIT IF Mac$="MAC 0"      ! Memory access END
2410  END LOOP
2420  !
2430  OUTPUT Add;"EER?"         ! Reset FILE ACCESS bit
2440  ENTER Add;Eer$
2450  !
2460  RETURN
2470  !
2480  !
2490  END
```

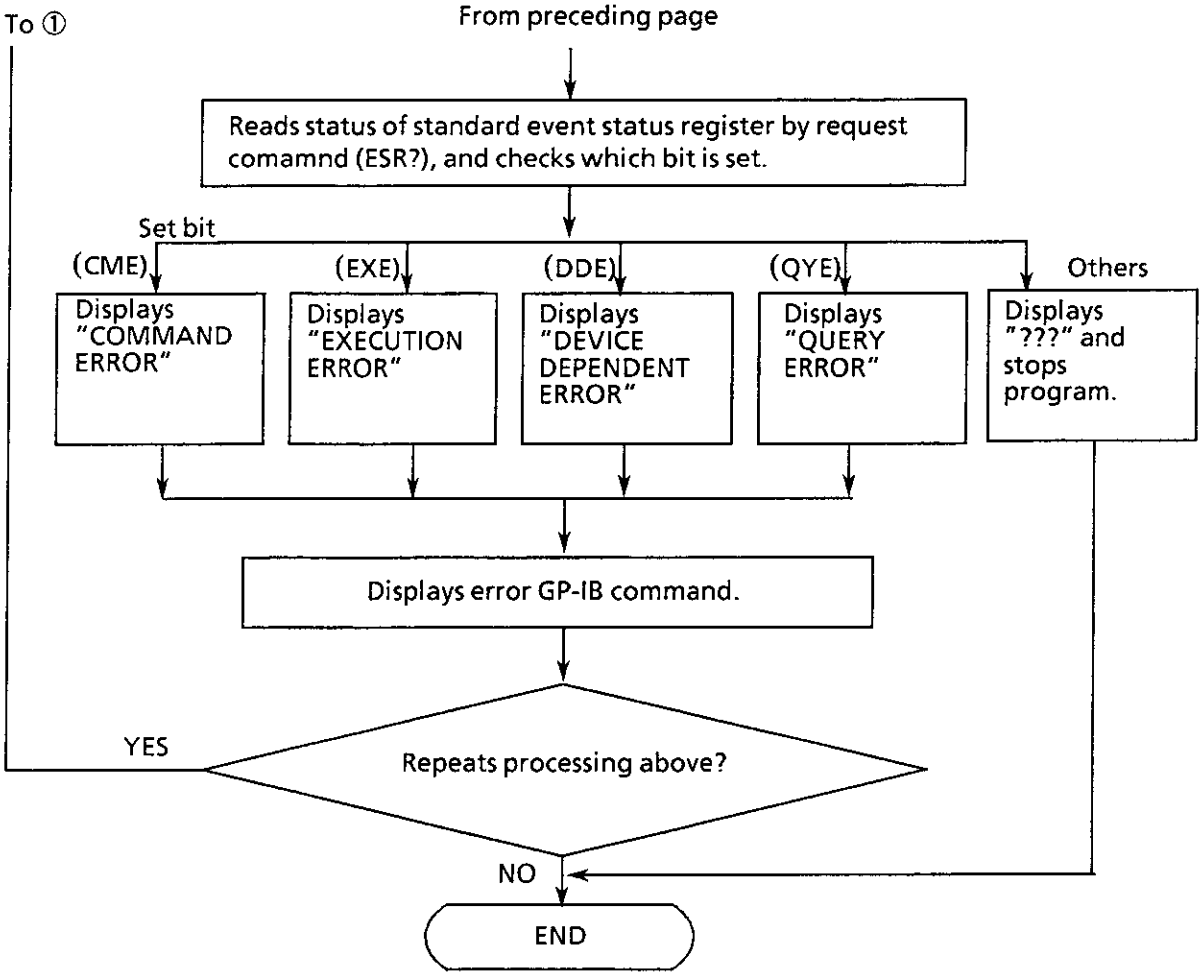
(8) Standard event status bytes check (COMMAND ERROR bit check → serial polling)

This program checks the CME, EXE, DDE, and QYE bits of the standard event status byte, and displays whether or not the input GP-IB command is normal on the CRT.

When the command is abnormal, the cause of the error at that time is displayed.

The GP-IB status byte is checked by serial polling and the status of the standard event status register which is obtained by data request command.




To ①
From preceding page
Reads status of standard event status register by request comamnd (ESR?), and checks which bit is set.
Set bit
(CME)
(EXE)
(DDE)
(QYE)
Others
Displays "COMMAND ERROR"
Displays "EXECUTION ERROR"
Displays "DEVICE DEPENDENT ERROR"
Displays "QUERY ERROR"
Displays "???" and stops program.
Displays error GP-IB command.
YES
Repeats processing above?
NO
END

PROGRAM LISTING

```
10    !*****************************************************************
20    !*                                                               *
30    !*                MP1701B / MP1608A / MP1650A                    *
40    !*    STANDARD EVENT STATUS REGISTER CHECK  SAMPLE SOFT           *
50    !*                                                        ESE    *
60    !*****************************************************************
70    !
80    !
90    !---------------------------------------------------------------!
100   !                          MAIN ROUTINE                         !
110   !---------------------------------------------------------------!
120   !
130   LET Add=700              ! Set Device Address
140   CLEAR Add                ! Device Clear
150   OUTPUT Add;"SRQ 32"      ! SRQ : COMMAND ERROR bit
160   OUTPUT Add;"ESE 60"      ! CME,EXE,DDE,QYE bit
170   !
180   PRINT "     ** MP1701B/MP1608A/MP1650A **"
190   PRINT "** STANDARD EVENT STATUS REGISTER CHECK **"
200   PRINT
210   !
220   LOOP
230     !
240     INPUT " INPUT ANY GP-IB COMMAND ?",Com$
250     OUTPUT Add;Com$
260     !
270     GOSUB S_poll
280     !
290     INPUT " NEXT COMMAND SET ?  [ YES=0 , NO=1 ] ?",Loop$
300     !
310   EXIT IF Loop$="1"
320   !
330   END LOOP
340   !
350   STOP
360   !
370   !---------------------------------------------------------------!
380   !                          SUB ROUTINE                          !
390   !---------------------------------------------------------------!
400   !
410 S_poll:!-------------------------------  Check Status byte
420   !
430   Byt=0
440   !
450   FOR I=0 TO 2
460     !
470     A=SPOLL(Add)                          ! Serial polling
480     !
490     IF BIT(A,6)=1 AND BIT(A,5)=1 THEN Byt=A ! RQS,COMMAND ERROR bit=1
500     !
510     WAIT .1
520     !
530   NEXT I
540    !
550   IF BIT(Byt,6)=1 AND BIT(Byt,5)=1 THEN
560     GOSUB Err
570   ELSE
580     PRINT " GP-IB COMMAND IS OK "
590     PRINT
600   END IF
610   !
620   !
630   RETURN
```

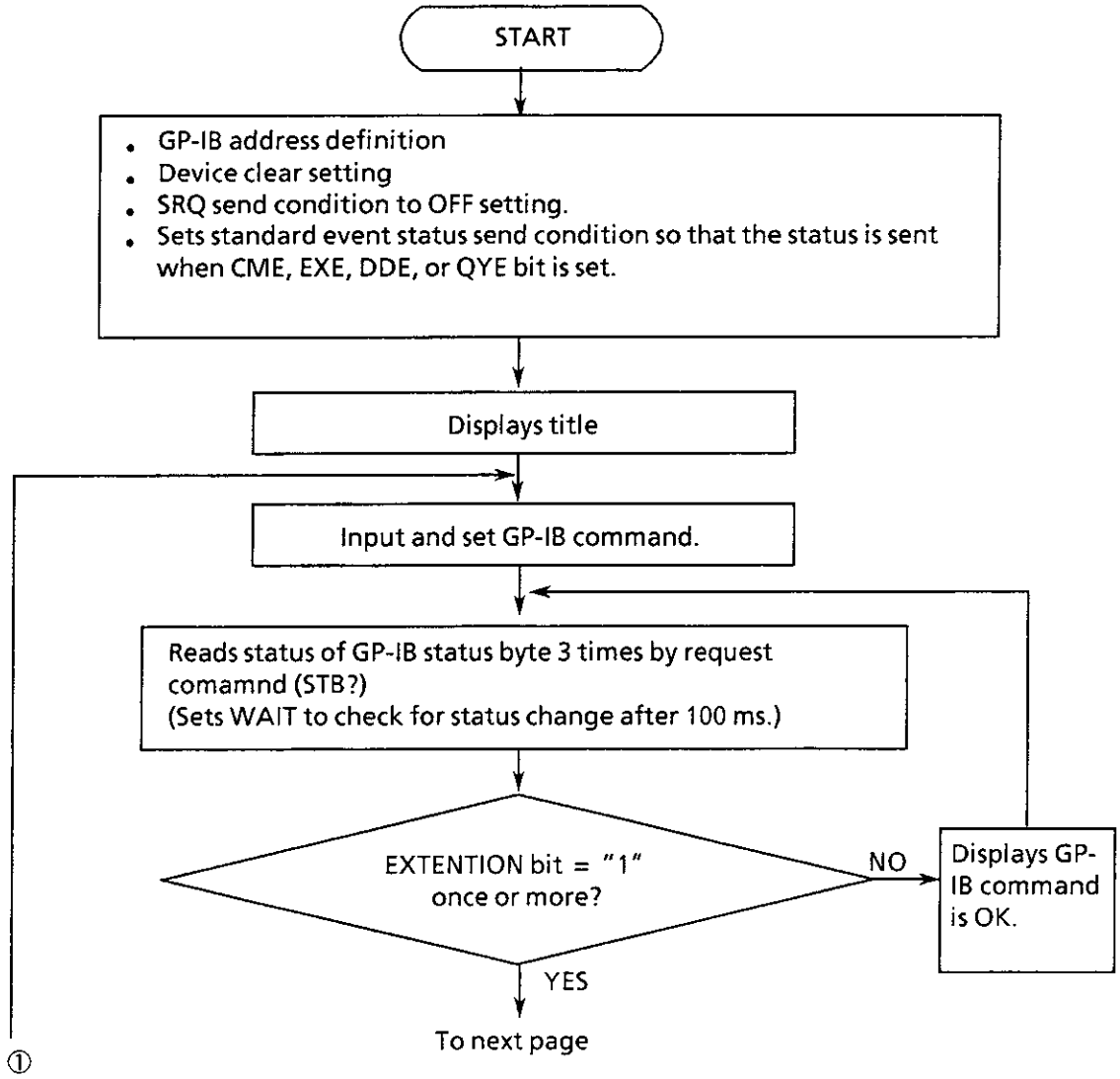
```
640   !
650   !
660 Err:!---------------------------------------- ERROR
670   !
680   OUTPUT Add;"ESR?"
690   ENTER Add;Er$
700   !
710   IF Er$[9,9]="1" THEN PRINT " COMMAND ERROR !!   "
720   IF Er$[10,10]="1" THEN PRINT " EXECUTION ERROR !! "
730   IF Er$[11,11]="1" THEN PRINT " DEVICE DEPENDENT ERROR !! "
740   IF Er$[12,12]="1" THEN PRINT " QUERY ERROR !! "
750   !
760   PRINT " INPUT COMMAND = "&Com$
770   PRINT
780   !
790   IF Er$[7,7]="1" OR Er$[8,8]="1" OR Er$[13,13]="1" OR Er$[14,14]="1" THEN
800     GOSUB Trap
810   END IF
820   !
830   RETURN
840   !
850   !
860 Trap:  !------------
870   !
880   PRINT "???"
890   STOP
900   !
910   !
920   END
```

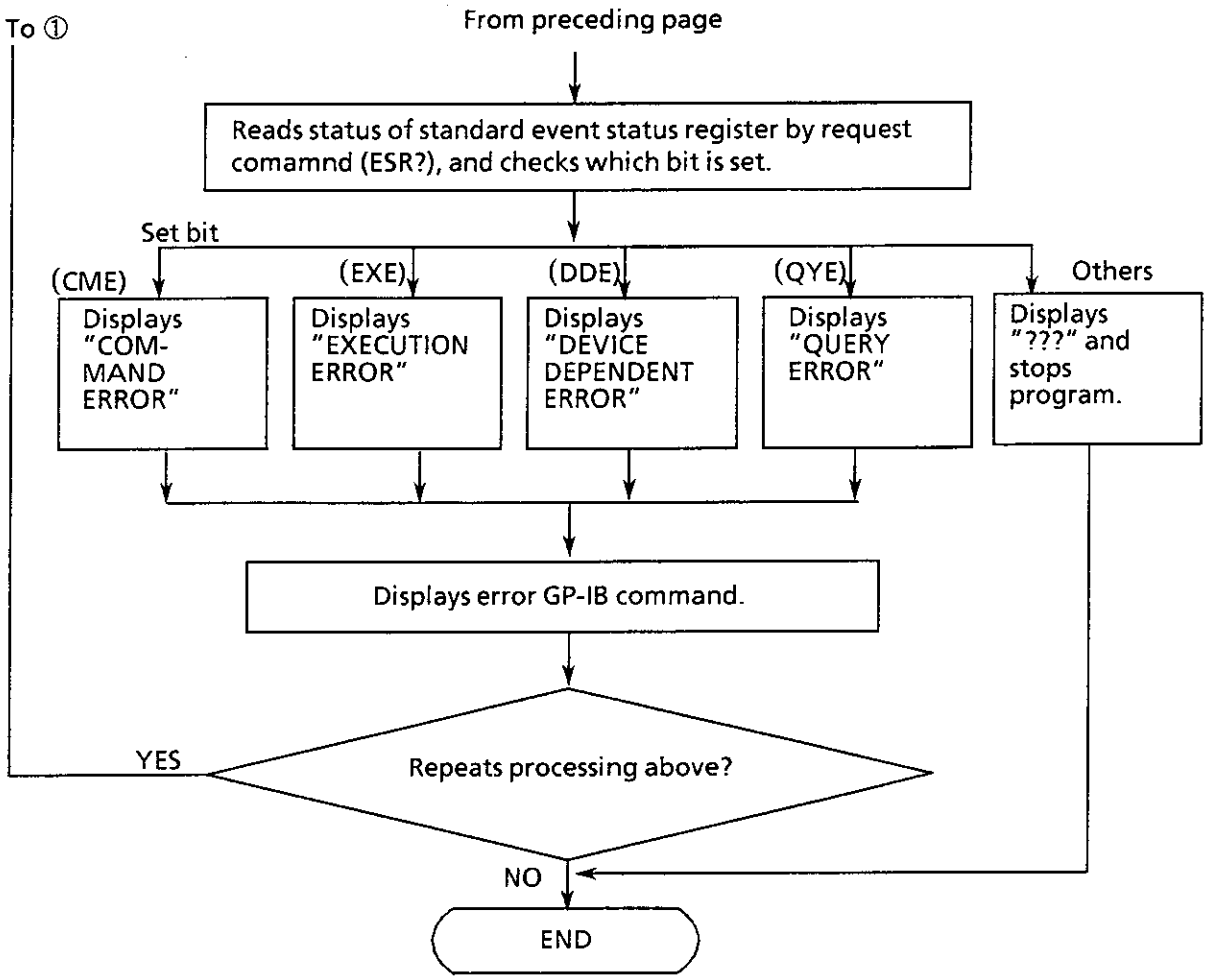
(9) Standard event status byte check
(COMAMND ERROR bit check → status byte register service request)

This program checks the CME, EXE, DDE, and QYE bits of the standard event status byte, and deisplays whether or not the input GP-IB command is normal on the CRT.

When the command is abnormal, the cause of the error at that time is displayed.

The GP-IB status byte and the status of the standard event status register are checked by data request command.




To ①
From preceding page
Reads status of standard event status register by request comamnd (ESR?), and checks which bit is set.
Set bit
(CME)
(EXE)
(DDE)
(QYE)
Others
Displays "COM-MAND ERROR"
Displays "EXECUTION ERROR"
Displays "DEVICE DEPENDENT ERROR"
Displays "QUERY ERROR"
Displays "???" and stops program.
Displays error GP-IB command.
YES
Repeats processing above?
NO
END

PROGRAM LISTING

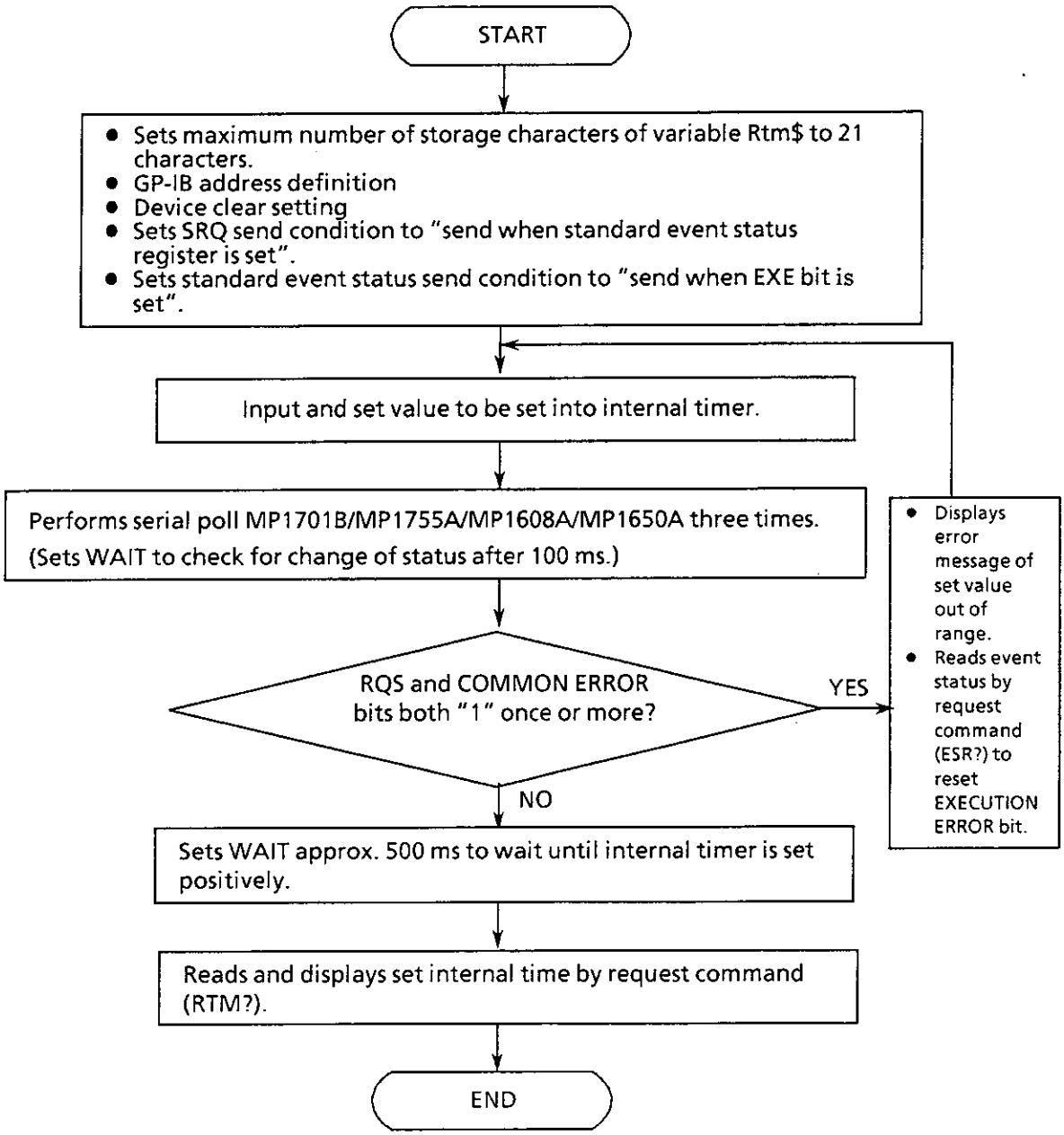
```
10    !*****************************************************************
20    !*                                                               *
30    !*               MP1701B / MP1608A / MP1650A                     *
40    !*      STANDARD EVENT STATUS REGISTER CHECK  SAMPLE SOFT         *
50    !*                                                        ESE2   *
60    !*****************************************************************
70    !
80    !
90    !---------------------------------------------------------------!
100   !                          MAIN ROUTINE                         !
110   !---------------------------------------------------------------!
120   !
130   Add=700                  ! Set Device address
140   CLEAR Add                ! Device Clear
150   OUTPUT Add;"SRQ 0"       ! SRQ : OFF
160   OUTPUT Add;"ESE 60"      ! CME,EXE,DDE,QYE bit
170   !
180   PRINT "       ** MP1701B/MP1608A/MP1650A **"
190   PRINT "** STANDARD EVENT STATUS REGISTER CHECK **"
200   PRINT
210   !
220   LOOP
230     !
240     INPUT " INPUT ANY GP-IB COMMAND ?",Com$
250     OUTPUT Add;Com$
260     !
270     GOSUB Stb_reg
280     !
290     INPUT " NEXT COMMAND SET ?  [ YES=0 , NO=1 ] ?",Loop$
300     !
310   EXIT IF Loop$="1"
320   !
330   END LOOP
340   !
350   STOP
360   !
370   !---------------------------------------------------------------!
380   !                          SUB ROUTINE                          !
390   !---------------------------------------------------------------!
400   !
410 Stb_reg: ! ---------------------------------  Check Status byte
420   !
430   Byt$="               "
440   !
450   FOR I=0 TO 2
460     !
470     OUTPUT Add;"STB?"      ! REQUEST Status byte register ?
480     ENTER Add;Stb$         ! READ Status byte register
490     !
500     IF Stb$[9,9]="1" THEN    ! COMMAND ERROR bit=1
510       Byt$=Stb$
520     END IF
530     !
540     WAIT .1
550     !
560   NEXT I
570    !
```

```
580   IF Byt$[9,9]="1" THEN
590     GOSUB Err
600   ELSE
610     PRINT " GP-IB COMMAND IS OK"
620     PRINT
630   END IF
640   !
650   !
660   RETURN
670   !
680   !
690 Err:!------------------------------------ ERROR
700   !
710   OUTPUT Add;"ESR?"
720   ENTER Add;Er$
730   !
740   IF Er$[9,9]="1" THEN PRINT " COMMAND ERROR !! "
750   IF Er$[10,10]="1" THEN PRINT " EXECUTION ERROR !! "
760   IF Er$[11,11]="1" THEN PRINT " DEVICE DEPENDENT ERROR !! "
770   IF Er$[12,12]="1" THEN PRINT " QUERY ERROR !! "
780   !
790   PRINT " INPUT COMMAND = "&Com$
800   PRINT
810   !
820   IF Er$[7,7]="1" OR Er$[8,8]="1" OR Er$[13,13]="1" OR Er$[14,14]="1" THEN
830     GOSUB Trap
840   END IF
850   !
860   RETURN
870   !
880   !
890 Trap: !----------
900   !
910   PRINT "???"
920   STOP
930   !
940   !
950   END
```

(10) Internal timer setting

This program sets the internal timer, reads its value by data request comamnd, and displays it on the CRT.

Input value is checked by the standard event status byte. The MP1701B/MP1755A/MP1608A/MP1650A needs several ms to set and start the timer positively. This program sets a WAIT of approximately 500 ms for this purpose.



PROGRAM LISTING

```
10    !*****************************************************************
20    !*                                                               *
30    !*  MP1701B/MP1608A/MP1650A   REAL TIME SETTING SAMPLE SOFT      *
40    !*                                                               *
50    !*                                                        TIME   *
60    !*****************************************************************
70    !
80    !---------------------------------------------------------------!
90    !                          MAIN  ROUTINE                        !
100   !---------------------------------------------------------------!
110   !
120   DIM Rtm$[21]
130   LET Add=700               ! Set Device address
140   CLEAR Add                 ! Device clear
150   OUTPUT Add;"SRQ 32"       ! SQR : COMMAND ERROR bit
160   OUTPUT Add;"ESE 16"       ! Execution error
170   !
180   GOSUB D_set
190   !
200   STOP
210   !
220   !---------------------------------------------------------------!
230   !                           SUB  ROUTINE                        !
240   !---------------------------------------------------------------!
250   !
260 D_set:  !----------------------  DATA SET  &  DISPLAY REAL TIME
270   !
280   LOOP
290    !
300     INPUT "REAL TIME SETTING DATA  ** YEAR ** [ 0~99 ]",Y$
310     INPUT "REAL TIME SETTING DATA  ** MONTH ** [ 1~12 ]",M$
320     INPUT "REAL TIME SETTING DATA  ** DAY ** [ 1~31 ]",D$
330     INPUT "REAL TIME SETTING DATA  ** HOURE ** [ 0~23 ]",H$
340     INPUT "REAL TIME SETTING DATA  ** MINUTE ** [ 0~59 ]",Mi$
350     INPUT "REAL TIME SETTING DATA  ** SECOND ** [ 0~59 ]",S$
360    !
370     Rtm$=Y$&","&M$&","&D$&","&H$&","&Mi$&","&S$
380     OUTPUT Add;"RTM "&Rtm$
390    !
400     GOSUB Check
410    !
420   EXIT IF Result$="OK"
430   !
440   END LOOP
450   !
460   WAIT .5
470   OUTPUT Add;"RTM?"
480   !
490   ENTER Add;Rtm$
500   PRINT Rtm$
510   !
520   RETURN
530   !
540   !
```

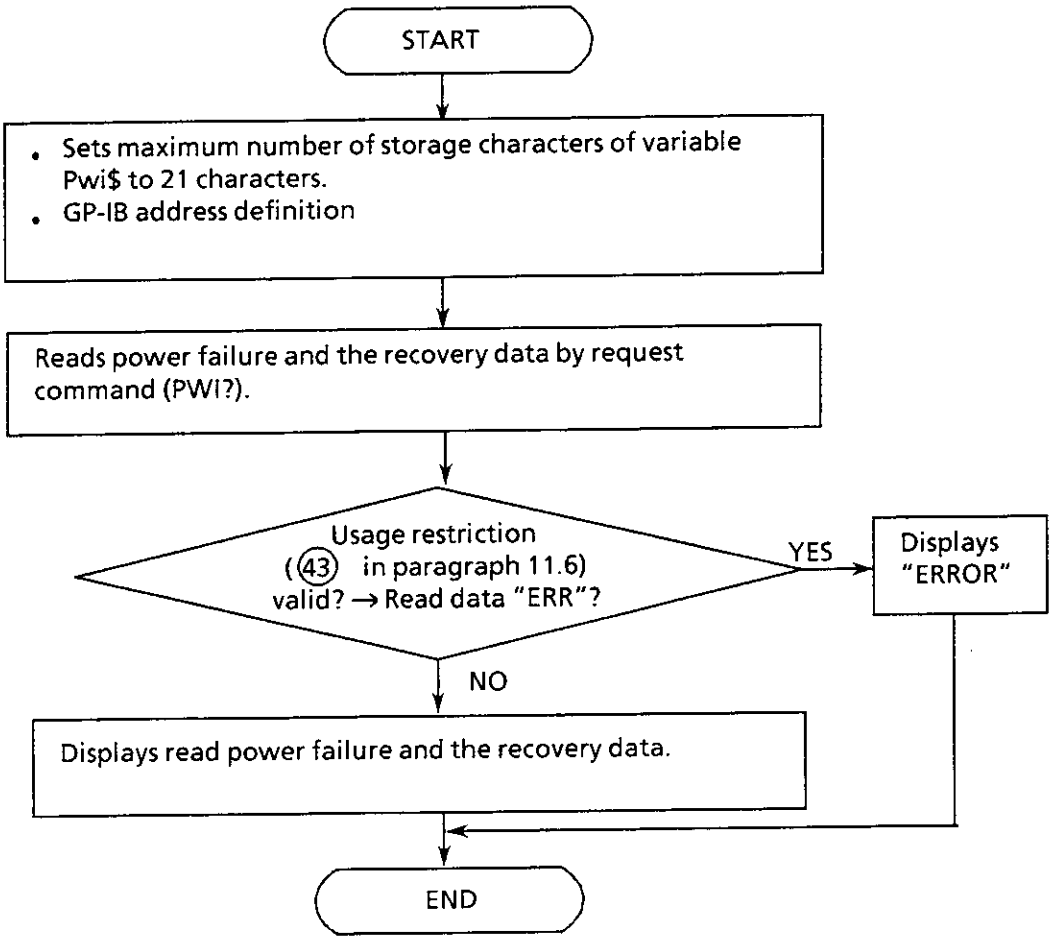
```
550 Check:  !----------------------------------  Check Set Data
560     !
570   Byt=0
580   !
590   FOR I=0 TO 2
600     !
610     A=SPOLL(Add)                          ! Serial polling
620     !
630     IF BIT(A,6)=1 AND BIT(A,5)=1 THEN   ! RQS,COMMAND ERROR bit=1
640       Byt=A
650     END IF
660     !
670     WAIT .1
680     !
690   NEXT I
700   !
710   IF BIT(Byt,6)=1 AND BIT(Byt,5)=1 THEN
720     PRINT "EXECUTION ERROR !!    INPUT AGAIN "
730     !
740     OUTPUT Add;"ESR?"                   ! Reset Execution error bit
750     !
760   ELSE
770     Result$="OK"
780     !
790   END IF
800   !
810   RETURN
820   !
830   !
840   END
```

(11) Power failure and power recovery status check

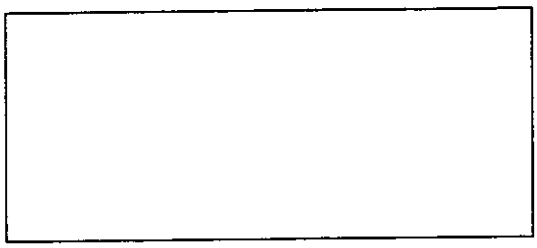
This program reads the MP1701B/MP1755A/MP1608A/MP1650A power failure and the recovery information by request command, and displays them on the CRT. It also shows an actual output example.

The time MP1701B/MP1755A/MP1608A/MP1650A power was turns OFF last can be checked by this.

The backup battery usage time can also be checked by recording the power failure interval time.



EXECUTED RESULT

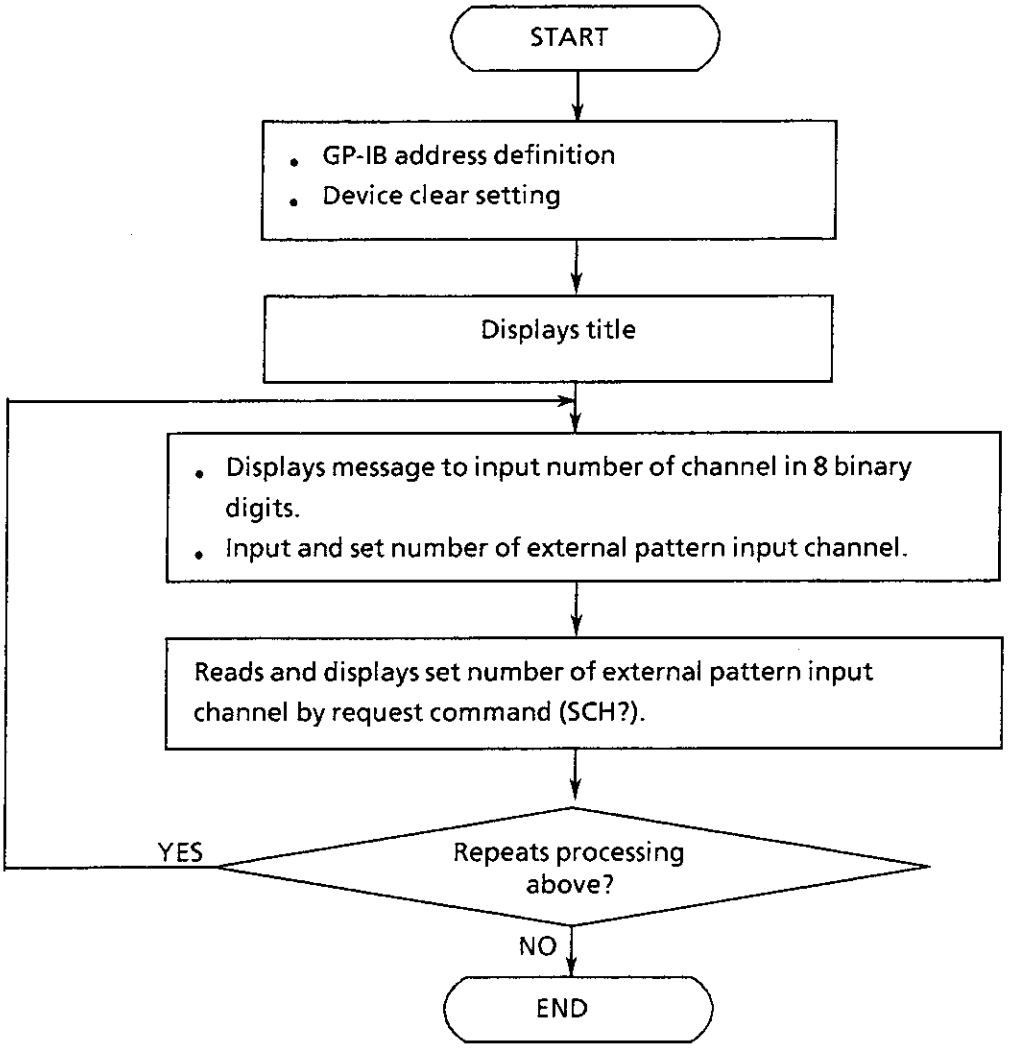


PROGRAM LISTING

```
10    !*********************************************************************
20    !*                                                                   *
30    !*  MP1701B/MP1608A/MP1650A  POWER FAIL INTERVAL? SAMPLE SOFT        *
40    !*                                                                   *
50    !*                                                          POWER    *
60    !*********************************************************************
70    !
80    DIM Pwi$[21]
90    LET Add=700
100   !
110   OUTPUT Add;"PWI?"
120   ENTER Add;Pwi$
130   !
140   IF Pwi$="ERR" THEN
150     PRINT "ERROR !!"
160   ELSE
170     PRINT Pwi$
180    !
190     FOR I=0 TO 1
200       ENTER Add;Pwi$
210       PRINT Pwi$
220     NEXT I
230    !
240   END IF
250   !
260   END
```

(12) Number of external pattern input channel setting

This program sets the number or external pattern input channel.



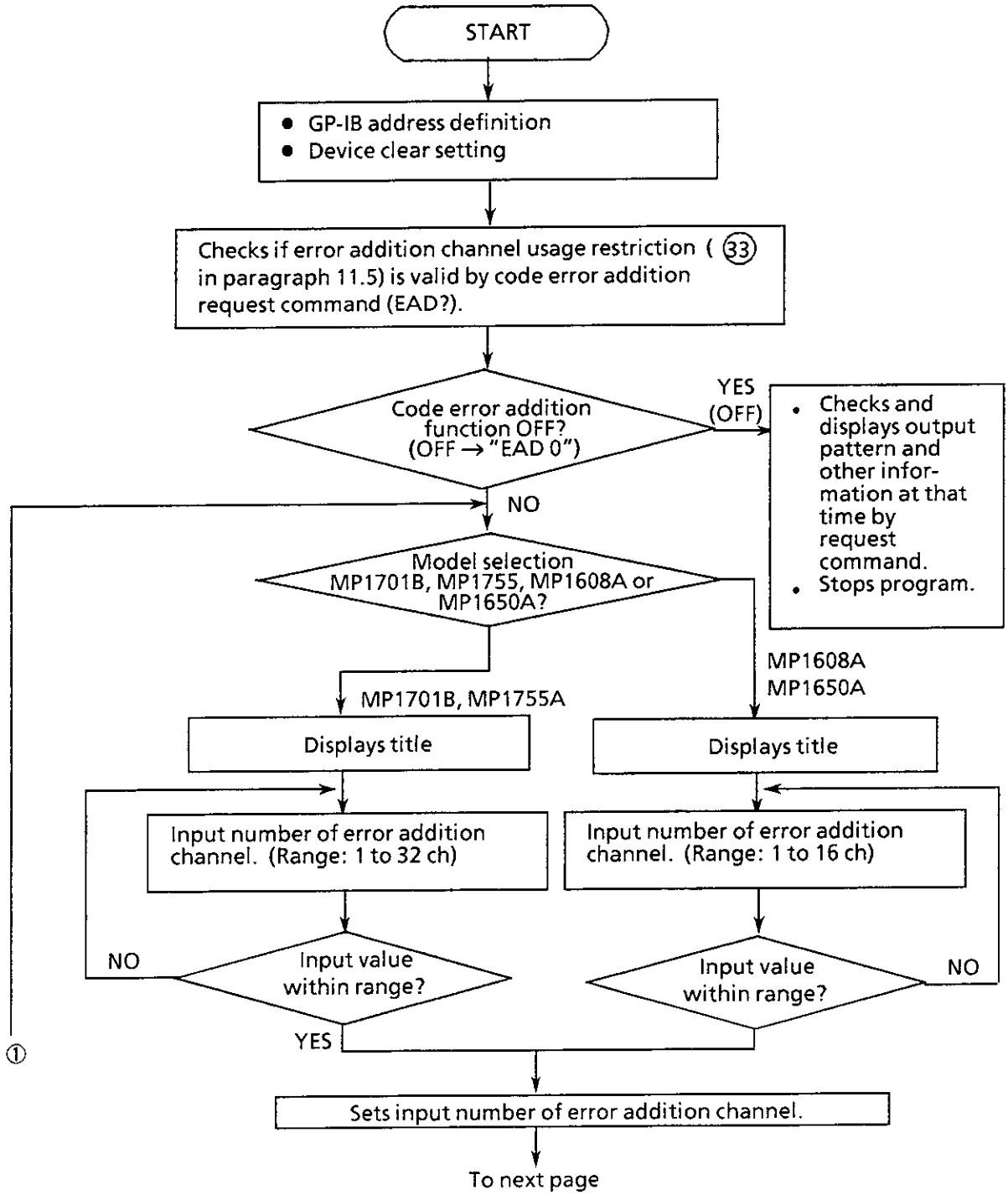
PROGRAM LISTING

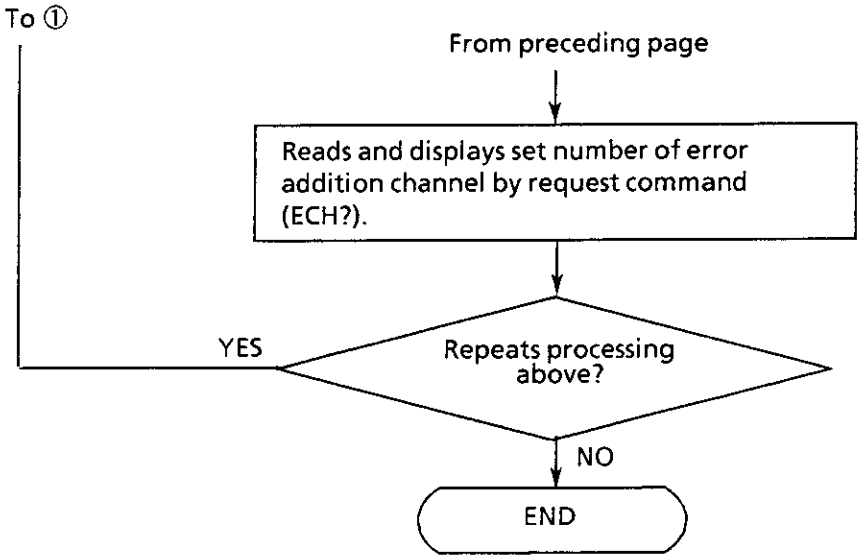
```
10    !*************************************************************************
20    !*                                                                       *
30    !* MP1701B/MP1608A/MP1650A 1/8 SPEED CHANNEL SELECT SAMPLE SOFT          *
40    !*                                                                       *
50    !*                                                              CHANNEL  *
60    !*************************************************************************
70    !
80    LET Add=700
90    CLEAR Add
100   PRINT "** MP1701B/MP1608A/MP1650A 1/8 SPEED ch SELECT SAMPLE SOFT **
110   PRINT
120   PRINT "CHANNEL 8 FIGURES [ 0=INT , 1=EXT ] "
130   PRINT
140   !
150   LOOP
160     !
170     INPUT "CHANNEL SET DATA  BIT8(8ch)-->BIT1(1ch)  [0/1]",Sch$
180     OUTPUT Add;"SCH #B"&Sch$
190     !
200     OUTPUT Add;"SCH?"
210     ENTER Add;Sch$
220     PRINT Sch$
230     !
240     INPUT " NEXT DATA SET ? [ YES=0 , NO=1 ]",Loop$
250     !
260   EXIT IF Loop$="1"
270   !
280   END LOOP
290   !
300   END
```

(13) Error addition channel setting

This program sets the error addition channel.

The error addition channel cannot be set when the code error addition function is OFF. At this time, the output pattern related information is displayed on the CRT and program execution ends.




To ①
From preceding page
Reads and displays set number of error addition channel by request command (ECH?).
Repeats processing above?
YES
NO
END

PROGRAM LISTING

```
10    !*********************************************************************
20    !*                                                                   *
30    !*  MP1701B/MP1608A/MP1650A  ERROR ADDITION ch SET SAMPLE SOFT       *
40    !*                                                                   *
50    !*                                                        ERR_ADD    *
60    !*********************************************************************
70    !
80    !-------------------------------------------------------------------!
90    !                       MAIN ROUTINE                                !
100   !-------------------------------------------------------------------!
110   !
120   LET Add=700                     ! Set Device Address
130   CLEAR Add                       ! Device Clear
140   !
150   OUTPUT Add;"EAD?"               ! REQUEST Error addition mode ?
160   ENTER Add;Ead$                  ! READ Error addition mode
170   !
180   IF Ead$="EAD 0" THEN            ! OFF --> error
190     GOSUB Err
200     PRINT
210     PRINT "PROGRAM STOP !"
220     STOP
230     !
240   END IF
250     !
260   LOOP
270     !
280     INPUT " MODE SELECT [ MP1701B=0, MP1608A=1, MP1650A=2 ]  ?",Mode$
290     !
300     SELECT Mode$
310     CASE "0"
320       GOSUB P10g
330     CASE "1"
340       Ppg$="MP1608A"
350       GOSUB P5g3g
360     CASE "2"
370       Ppg$="MP1650A"
380       GOSUB P5g3g
390     END SELECT
400     !
410     OUTPUT Add;"ECH "&VAL$(Ech)    ! Set Error addition channel
420     !
430     OUTPUT Add;"ECH?"
440     ENTER Add;Ech$
450     PRINT " ERROR ADDITION CHANNEL = "&Ech$[5,6]
460     !
470     INPUT " NEXT DATA SET [ YES=0 , NO=1 ]  ?",Loop$
480     !
490   EXIT IF Loop$="1"
500   !
510   END LOOP
520   !
530   STOP
540   !
```

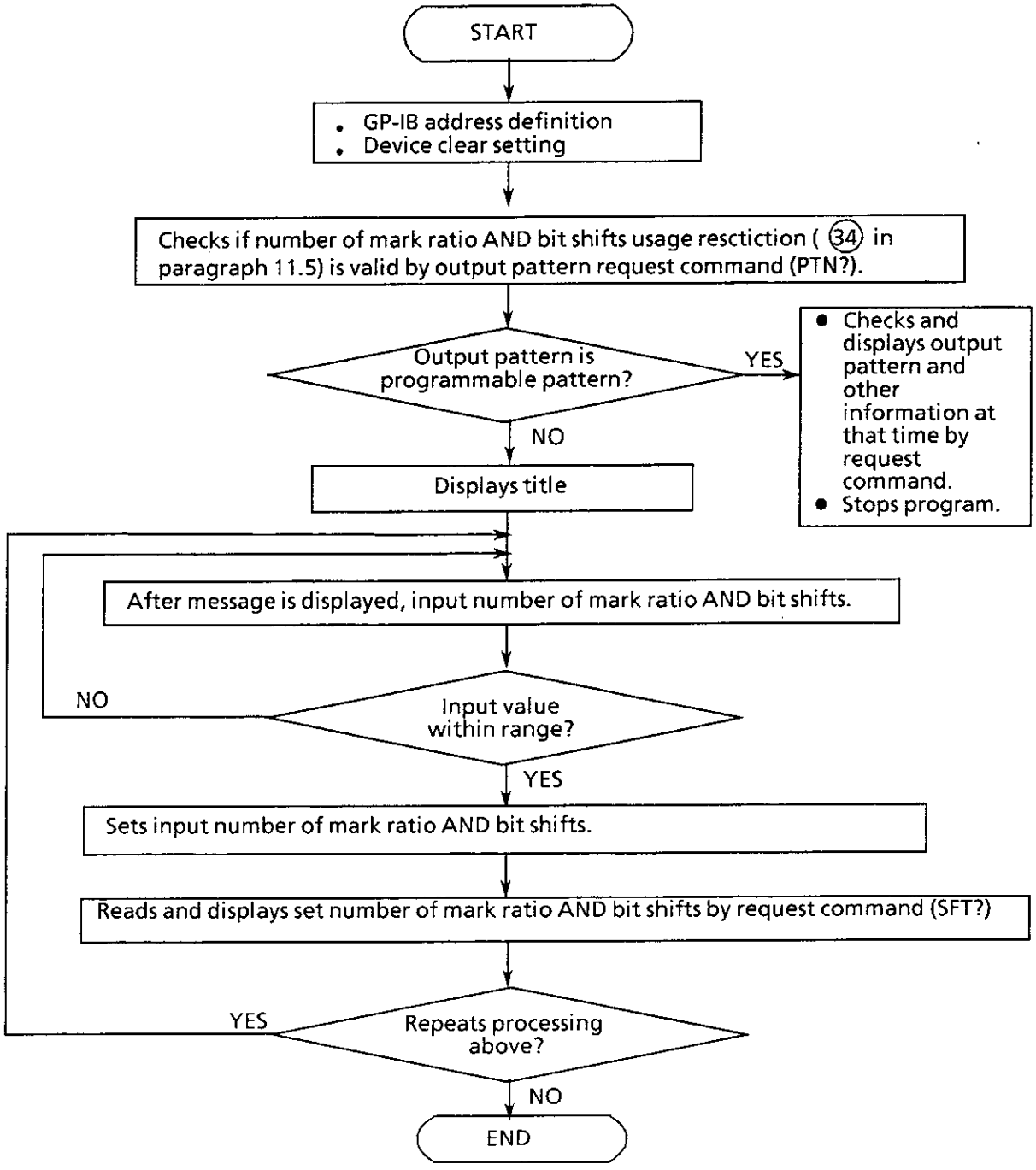
```
550   !-------------------------------------------------------------!
560   !                       SUB ROUTINE                           !
570   !-------------------------------------------------------------!
580    !
590 Mp1701b:!--------------------------------- MP1701B DATA INPUT
600    !
610   PRINT "** MP1701B ERROR ADDITON CHANNEL SETTING **"
620   PRINT
630   LOOP
640    !
650     INPUT " ERROR ADDTION ch SET DATA [ 1~32 ]  ?",Ech
660    !
670   EXIT IF Ech<33 AND Ech>0
680   END LOOP
690    !
700   RETURN
710    !
720    !
730 Mp1608a:!--------------------------------- MP1608A DATA INPUT
740    !
750   PRINT "** MP1608A ERROR ADDITON CHANNEL SETTING **"
760   PRINT ""
770   LOOP
780    !
790     INPUT " ERROR ADDTION ch SET DATA [ 1~16 ]  ?",Ech
800    !
810   EXIT IF Ech<17 AND Ech>0
820   END LOOP
830   !
840   RETURN
850   !
860   !
870 Err:!--------------------------------  Display Pattern mode
880    !
890   PRINT "ERROR !!  ERROR ADDTION MODE=OFF"
900   PRINT
910   !
920   OUTPUT Add;"PTN?"
930   ENTER Add;Ptn$
940   !
950   SELECT Ptn$[5,5]
960   !
970   CASE "0"
980     GOSUB Prog_w
990      !
1000  CASE "1"
1010    GOSUB Prog_d
1020     !
1030  CASE "2"
1040    PRINT "PATTERN MODE= PRBS.PN7"
1050     !
1060  CASE "3"
1070    PRINT "PATTERN MODE= PRBS.PN9"
1080     !
1090  CASE "5"
1100    PRINT "PATTERN MODE= PRBS.PN11"
1110     !
1120  CASE "6"
1130    PRINT "PATTERN MODE= PRBS.PN15"
1140     !
```

```
1150  CASE "7"
1160    PRINT "PATTERN MODE= PRBS.PN20"
1170     !
1180  CASE "8"
1190    PRINT "PATTERN MODE= PRBS.PN23"
1200     !
1210  CASE "9"
1220    PRINT "PATTERN MODE= PRBS.PN31"
1230     !
1240  END SELECT
1250   !
1260  RETURN
1270   !
1280 Prog_w:!-------------------------------------  WORD MODE
1290   !
1300  PRINT "PATTERN MODE=PROG.WORD MODE"
1310  PRINT
1320   !
1330  OUTPUT Add;"WNB?"
1340  ENTER Add;Wnb$
1350  OUTPUT Add;"WLN?"
1360  ENTER Add;Wln$
1370  OUTPUT Add;"PAG?"
1380  ENTER Add;Pag$
1390   !
1400  PRINT "NUMBER OF WORD="&Wnb$[4,9]
1410  PRINT "WORD LENGTH="&Wln$[4,6]
1420  PRINT "PAGE="&Pag$[4,9]
1430   !
1440  RETURN
1450   !
1460 Prog_d:!-------------------------------------  DATA MODE
1470   !
1480  PRINT "PATTERN MODE=PROG.DATA MODE"
1490  PRINT
1500   !
1510  OUTPUT Add;"DLN?"
1520  ENTER Add;Dln$
1530  OUTPUT Add;"PAG?"
1540  ENTER Add;Pag$
1550   !
1560  PRINT "DATA LENGTH="&Dln$[4,10]
1570  PRINT "PAGE="&Pag$[4,9]
1580   !
1590  RETURN
1600   !
1610   !
1620  END
```

(14) Number of mark ratio AND bit shifts setting

This program sets the number of mark ratio AND bit shifts.

The number of mark ratio AND bit shifts cannot be set when the output pattern is in the programmable mode. At that time, the information related to output pattern is displayed on the CRT and program execution is ended.



PROGRAM LITING

```
10    !*********************************************************************
20    !*                                                                   *
30    !* MP1701B/MP1608A/MP1650A MARK RATIO AND BIT SHIFT  SAMPLE SOFT     *
40    !*                                                                   *
50    !*                                                            MARK   *
60    !*********************************************************************
70    !
80    !
90    !-------------------------------------------------------------------!
100   !                          MAIN ROUTINE                             !
110   !-------------------------------------------------------------------!
120   !
130   LET Add=700                    ! Set Device Address
140   CLEAR Add                      ! Device Clear
150   !
160   PRINT "** MP1701B/MP1608A/MP1650A  MARK RATIO AND BIT SHIFT **"
170   PRINT
180   !
190   OUTPUT Add;"PTN?"              ! REQUEST Pattern mode ?
200   ENTER Add;Ptn$                 ! READ Pattern mode
210   !
220   IF Ptn$[5,5]="0" OR Ptn$[5,5]="1" THEN  ! Word/Data Mode-->ERROR
230     GOSUB Err
240     PRINT " PROGRAM STOP !"
250     STOP
260     !
270   END IF
280   !
290   LOOP
300     !
310     GOSUB Mark
320     !
330     INPUT " NEXT DATA SET  [ YES=0 , NO=1 ]  ?",Loop$
340     !
350   EXIT IF Loop$="1"
360   !
370   END LOOP
380   !
390   !
400   STOP
410   !
420   !-------------------------------------------------------------!
430   !                          SUB ROUTINE                        !
440   !-------------------------------------------------------------!
450   !
460 Mark:!------------------------------ Set Mark ratio bit shift
470   !
480   LOOP
490     !
500     INPUT "MARK RATIO  [ 1 BIT SHIFT=0, 3 BIT SHIFT=1 ] ?",Sft
510   EXIT IF Sft=0 OR Sft=1
520     !
530   END LOOP
540   !
550   OUTPUT Add;"SFT "&VAL$(Sft)
560   !
570   OUTPUT Add;"SFT?"
580   ENTER Add;Sft$
590   !
```

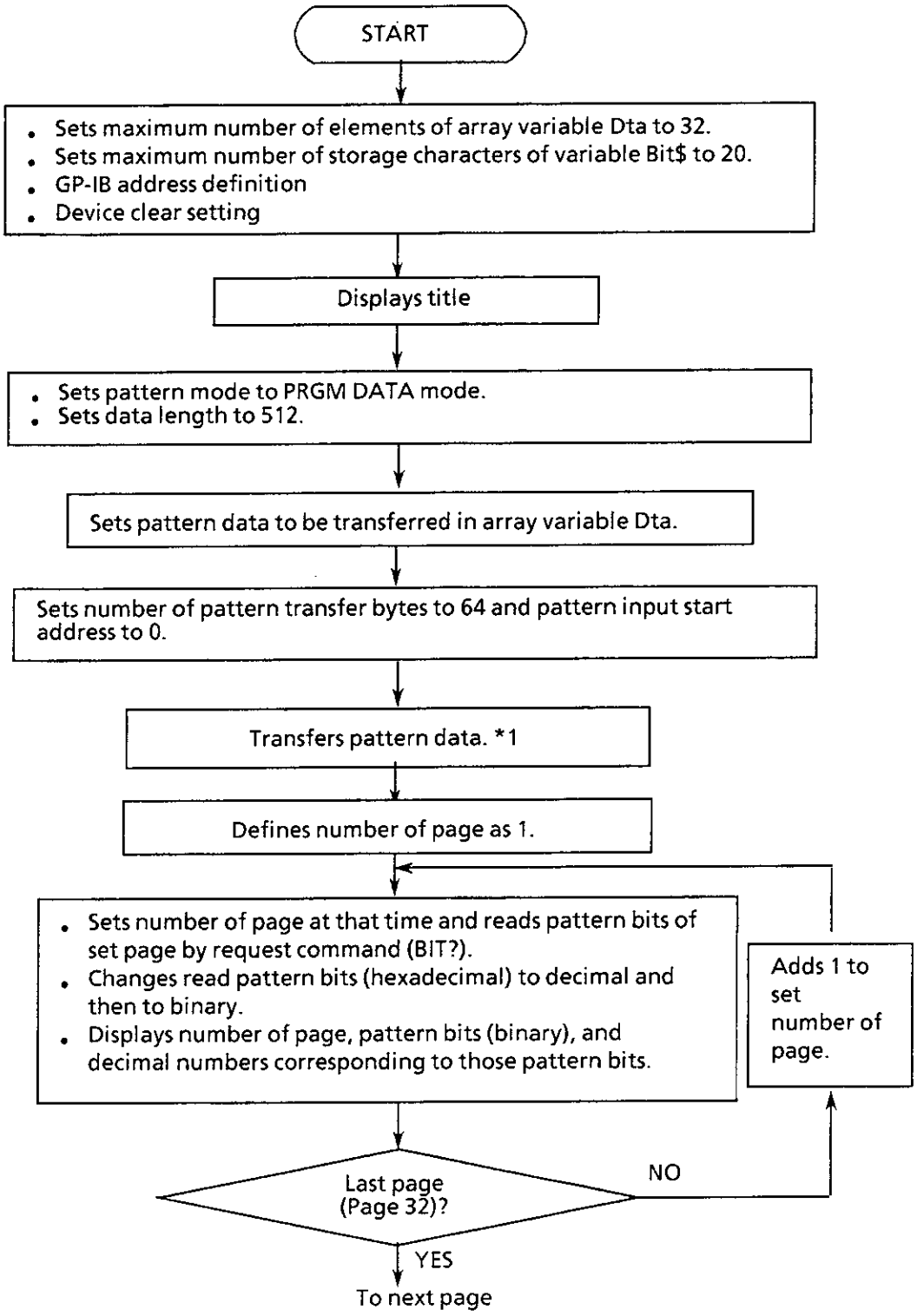
```
600   IF Sft$[5,5]="0" THEN
610     Sft$="1"
620   ELSE
630     Sft$="3"
640   END IF
650   !
660   PRINT "MARK RATIO AND BIT SHIFT = "&Sft$
670   !
680   RETURN
690   !
700   !
710 Err: !----------------------------------- Display Pattern data
720   !
730   IF Ptn$[5,5]="0" THEN
740   !
750     PRINT " ERROR !!   PATTERN MODE=PROG.WORD MODE"
760     PRINT
770     OUTPUT Add;"WNB?"
780     ENTER Add;Wnb$
790     OUTPUT Add;"WLN?"
800     ENTER Add;Wln$
810     OUTPUT Add;"PAG?"
820     ENTER Add;Pag$
830     !
840     PRINT " NUMBER OF WORD ="&Wnb$[4,9]
850     PRINT " WORD LENGTH ="&Wln$[4,6]
860     PRINT " PAGE ="&Pag$[4,9]
870     PRINT
880     !
890   ELSE
900   !
910     PRINT " ERROR !!   PATTERN MODE=PROG.DATA MODE"
920     PRINT
930     OUTPUT Add;"DLN?"
940     ENTER Add;Dln$
950     OUTPUT Add;"PAG?"
960     ENTER Add;Pag$
970     !
980     PRINT " DATA LENGTH ="&Dln$[4,10]
990     PRINT " PAGE ="&Pag$[4,9]
1000    PRINT
1010    !
1020  END IF
1030  !
1040  RETURN
1050  !
1060  !
1070  END
```

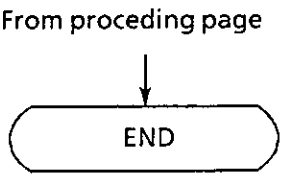
(15) Pattern data transfer by DMA

This program performs pattern data transfer by DMA with a HP9000 Series Computer as the controller. The actual executed result is shown. The relationship between each array variable Dta and the set value (decimal notation, binary notation, hexadecimal notation) in it is shown in Table 14-2. This relationship differs somewhat with the controller used.

Table 14-2 Relationship between Array Variable and Set

Array variable	Set value (Decimal number)	Corresponding binary number and BIT LED NO.																Corresponding hexadecimal number	Corresponding number of page
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
Dta(0)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1H	1
Dta(1)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2H	2
Dta(2)	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4H	3
Dta(3)	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8H	4
Dta(4)	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	10H	4
Dta(5)	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	20H	6
Dta(6)	64	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	40H	7
Dta(7)	128	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	80H	8
Dta(8)	256	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	100H	9
Dta(9)	512	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	200H	10
Dta(10)	1024	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	400H	11
Dta(11)	2048	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	800H	12
Dta(12)	4096	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1000H	13
Dta(13)	8192	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2000H	14
Dta(14)	16384	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4000H	15
Dta(15)	32767	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7FFFH	16
Dta(16)	−32768	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8000H	17
Dta(17)	−16384	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C000H	18
Dta(18)	−8192	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	E000H	19
Dta(19)	−4096	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	F000H	20
Dta(20)	−2048	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	F800H	21
Dta(21)	−1024	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	FC00H	22
Dta(22)	−512	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	FE00H	23
Dta(23)	−256	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	FF00H	24
Dta(24)	−128	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	FF80H	25
Dta(25)	−64	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	FFC0H	26
Dta(26)	−32	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	FFE0H	27
Dta(27)	−16	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	FFF0H	28
Dta(28)	−8	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	FFF8H	29
Dta(29)	−4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	FFFCH	30
Dta(30)	−2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	FFFEH	31
Dta(31)	−1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	FFFFH	32


START
• Sets maximum number of elements of array variable Dta to 32.
• Sets maximum number of storage characters of variable Bit$ to 20.
• GP-IB address definition
• Device clear setting
Displays title
• Sets pattern mode to PRGM DATA mode.
• Sets data length to 512.
Sets pattern data to be transferred in array variable Dta.
Sets number of pattern transfer bytes to 64 and pattern input start address to 0.
Transfers pattern data. *1
Defines number of page as 1.
• Sets number of page at that time and reads pattern bits of set page by request command (BIT?).
• Changes read pattern bits (hexadecimal) to decimal and then to binary.
• Displays number of page, pattern bits (binary), and decimal numbers corresponding to those pattern bits.
Adds 1 to set number of page.
Last page (Page 32)?
NO
YES
To next page



*1 Pattern data transfer using <OUPUT Add USING"W";Dta(*)>

W: Outputs an integer of the two's complement of 16 bits (two bits).

Since the GP-IB interface board is 8 bit I/O, the upper byte is transferred first and then the lower byte.

*: Outputs the entire defined array Dta.

EXECUTED RESULT

```
** MP1701B/MP1608A PATTERN DATA DMA TRANSFER **

PATTERN BIT PAGE=1     0000000000000001        1
PATTERN BIT PAGE=2     0000000000000010        2
PATTERN BIT PAGE=3     0000000000000100        4
PATTERN BIT PAGE=4     0000000000001000        8
PATTERN BIT PAGE=5     0000000000010000       16
PATTERN BIT PAGE=6     0000000000100000       32
PATTERN BIT PAGE=7     0000000001000000       64
PATTERN BIT PAGE=8     0000000010000000      128
PATTERN BIT PAGE=9     0000000100000000      256
PATTERN BIT PAGE=10    0000001000000000      512
PATTERN BIT PAGE=11    0000010000000000     1024
PATTERN BIT PAGE=12    0000100000000000     2048
PATTERN BIT PAGE=13    0001000000000000     4096
PATTERN BIT PAGE=14    0010000000000000     8192
PATTERN BIT PAGE=15    0100000000000000    16384
PATTERN BIT PAGE=16    0111111111111111    32767
PATTERN BIT PAGE=17    1000000000000000   -32768
PATTERN BIT PAGE=18    1100000000000000   -16384
PATTERN BIT PAGE=19    1110000000000000    -8192
PATTERN BIT PAGE=20    1111000000000000    -4096
PATTERN BIT PAGE=21    1111100000000000    -2048
PATTERN BIT PAGE=22    1111110000000000    -1024
PATTERN BIT PAGE=23    1111111000000000     -512
PATTERN BIT PAGE=24    1111111100000000     -256
PATTERN BIT PAGE=25    1111111110000000     -128
PATTERN BIT PAGE=26    1111111111000000      -64
PATTERN BIT PAGE=27    1111111111100000      -32
PATTERN BIT PAGE=28    1111111111110000      -16
PATTERN BIT PAGE=29    1111111111111000       -8
PATTERN BIT PAGE=30    1111111111111100       -4
PATTERN BIT PAGE=31    1111111111111110       -2
PATTERN BIT PAGE=32    1111111111111111       -1
```

PROGRAM LISTING

```
10    !*************************************************************
20    !                                                            *
30    !              MP1701B / MP1608A / MP1650A                   *
40    !    PROGRAMMABLE PATTERN DATA DMA TRANSFER  SAMPLE SOFT     *
50    !                                                      DMA   *
60    !*************************************************************
70    !
80    DIM D(31)
90    DIM Bit$[20]
100   LET Add=700               ! DEVICE ADDRESS
110   CLEAR Add                 ! DEVICE CLEAR
120   !
130   PRINT "** MP1701B/MP1608A/MP1650A PATTERN DATA DMA TRANSFER **"
140   PRINT
150   !
160   OUTPUT Add;"PTN 1"        ! PATTERN MODE : PROG.DATA
170   OUTPUT Add;"DLN 512"      ! DATA LENGTH : 512
180   !
190   !--------- SET PATTERN BIT DATA ---------
200   !
210   D(0)=1
220   D(1)=2
230   D(2)=4
240   D(3)=8
250   D(4)=16
260   D(5)=32
270   D(6)=64
280   D(7)=128
290   D(8)=256
300   D(9)=512
310   D(10)=1024
320   D(11)=2048
330   D(12)=4096
340   D(13)=8192
350   D(14)=16384
360   D(15)=32767
370   D(16)=-32768
380   D(17)=-16384
390   D(18)=-8192
400   D(19)=-4096
410   D(20)=-2048
420   D(21)=-1024
430   D(22)=-512
440   D(23)=-256
450   D(24)=-128
460   D(25)=-64
470   D(26)=-32
480   D(27)=-16
490   D(28)=-8
500   D(29)=-4
510   D(30)=-2
520   D(31)=-1
530   !
540   OUTPUT Add;"WRT 64,0"
550   !
560   OUTPUT Add USING "W";D(*)
570   !
580   !
```

```
590   FOR I=1 TO 32
600   !
610     OUTPUT Add;"PAG "&VAL$(I)
620     OUTPUT Add;"BIT?"
630     ENTER Add;Bit$
640     Bit$=Bit$[17,20]
650     !
660     Bt=IVAL(Bit$,16)                ! HEX --> DIG
670     Bit$=IVAL$(Bt,2)                ! DIG --> BIN
680     !
690     IMAGE "PATTERN BIT PAGE=",AA,XXX,AAAAAAAAAAAAAAAA,XX,DDDDDD
700     PRINT USING 690;VAL$(I);Bit$;Dta(I-1)
710   !
720   NEXT I
730   !
740   END
```

(16) Pattern data transfer by DMA

This program performs pattern data transfer by DMA with the HP9000 Series computer as the controller.

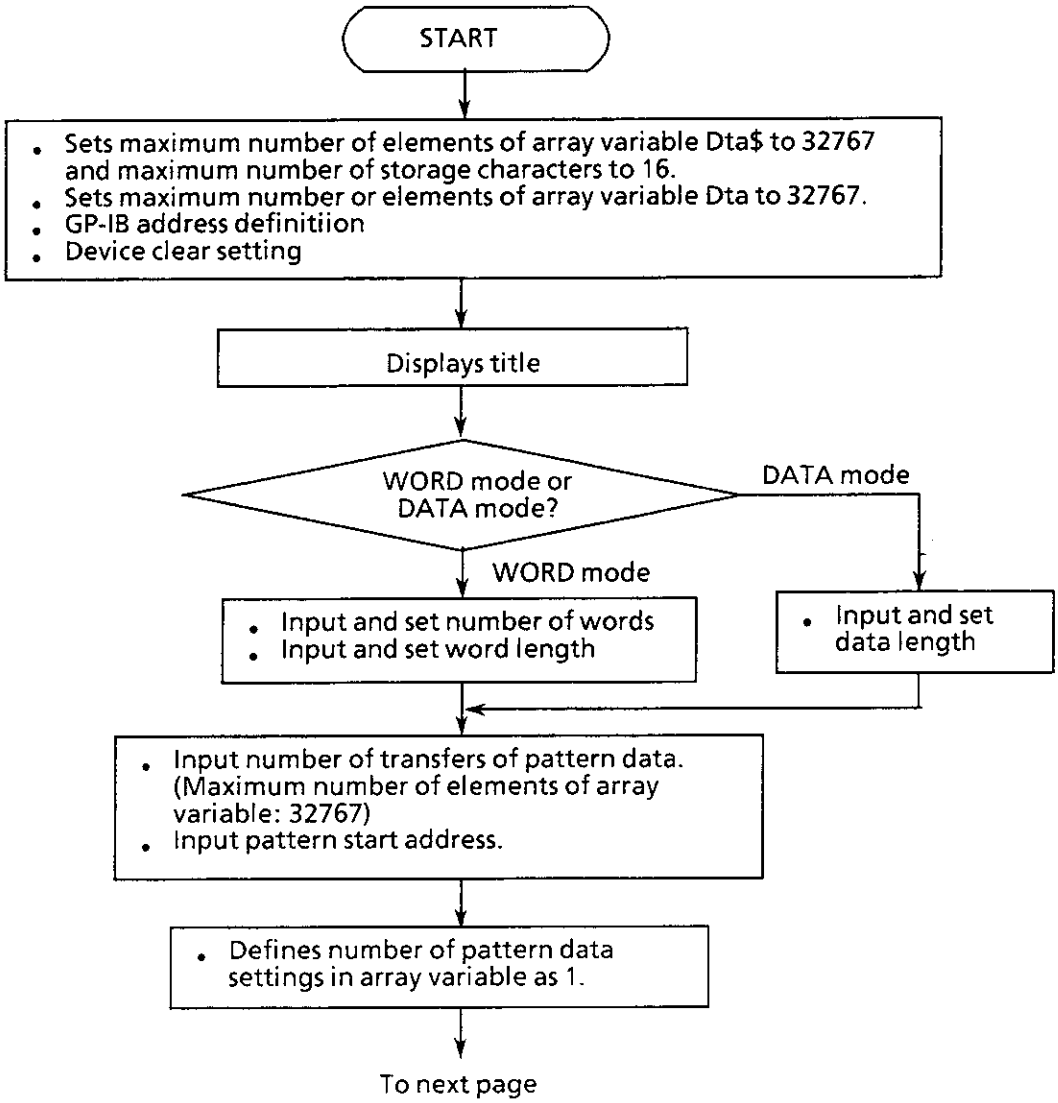
When this program is executed, output pattern selection and conditions setting are performed.

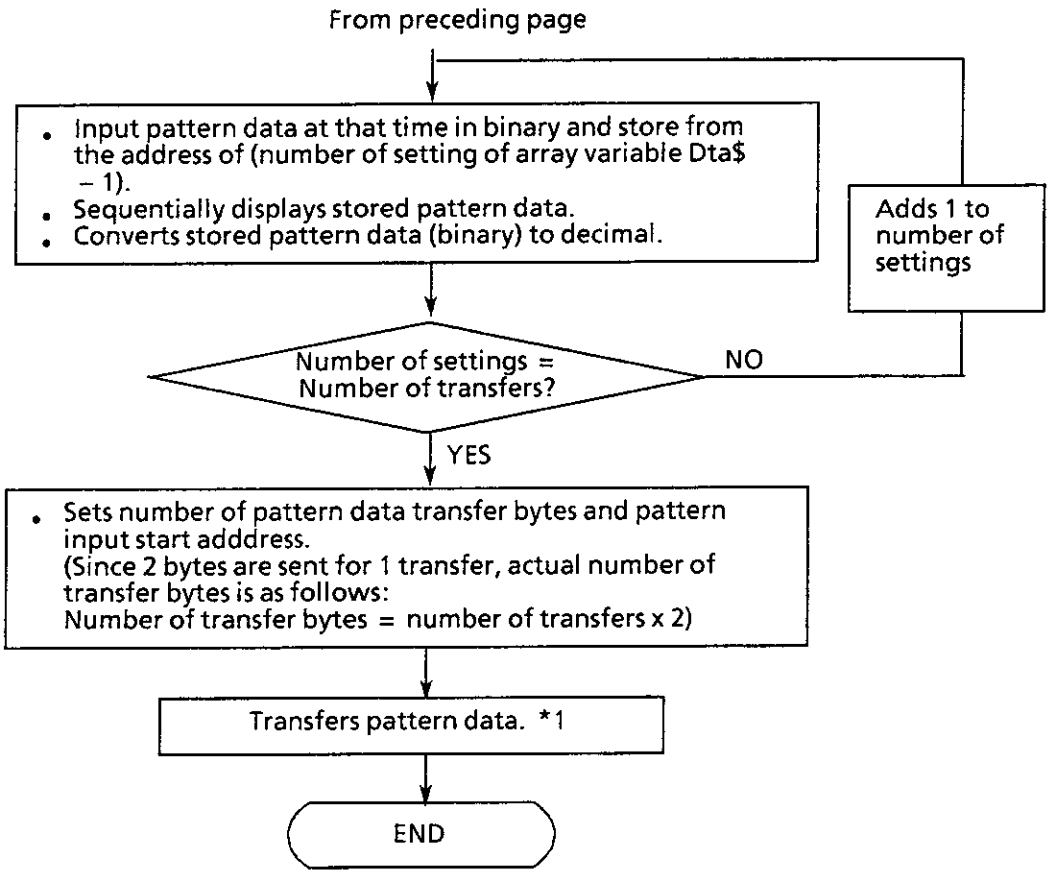
Next, the number of pattern data to be output (number of pages to be transferred = number of transfer operations) and the pattern input start address (start page: [number of start page −1] = pattern input start address) are defined.

Next, the necessary number of pattern data are input in binary. When all the data has been input, the pattern data is transferred by DMA to the MP1701B/MP1755A/MP1608A/MP1650A.

The pattern data actually transferred uses the HP9000 Series command Dta(*), and all the necessary elements of the defined array variable are output.

Therefore, it takes 20 s or less for the program to end.





*1: Pattern data transfer using <OUTPUT Add USING "W";Dta(*)>

W: Outputs an integer of the two's complement of 16 bytes (two bytes).

Since the GP-IB interface board is 8 bit I/O, the upper byte is transferred first and then the lower byte.

*: Outputs the entire defined array Dta.

PROGRAM LISTING

```
10    !*************************************************************
20    !                                                            *
30    !              MP1701B / MP1608A / MP1650A                   *
40    !   PROGRAMMABLE PATTERN DATA DMA TRANSFER  SAMPLE SOFT      *
50    !                                                      DMA2 *
60    !*************************************************************
70    !
80    !-------------------------------------------------------------!
90    !                          MAIN ROUTINE                       !
100   !-------------------------------------------------------------!
110   !
120   DIM Dta$(32766)[16]
130   DIM Dta(32766)
140   LET Add=700
150   CLEAR Add
160   !
170   PRINT " *** PROGRAMMABLE PATTERN BIT  DMA TRANSFER *** "
180   PRINT
190   !
200   LOOP
210     INPUT "PROGRAMMABLE PATTERN MODE  [ WORD=0 , DATA=1 ]?",Ptn
220   EXIT IF Ptn=0 OR Ptn=1
230   END LOOP
240   !
250   OUTPUT Add;"PTN "&VAL$(Ptn)
260   !
270   IF Ptn=1 THEN
280     GOSUB Prog_d
290   ELSE
300     GOSUB Prog_w
310   END IF
320   !
330   GOSUB D_set
340   !
350   STOP
360   !
370   !-------------------------------------------------------------!
380   !                          SUB ROUTINE                        !
390   !-------------------------------------------------------------!
400   !
410 Prog_w:  !--------------------------------- PROG.Word  mode
420   !
430   PRINT "                ** PROG.WORD MODE **"
440   PRINT
450   !
460   LOOP
470     INPUT "NUMBER OF WORD DATA [ 1~32768 ] ?",Wnb
480   EXIT IF Wnb>0 AND Wnb<32769
490   END LOOP
500   !
510   OUTPUT Add;"WNB "&VAL$(Wnb)
520   !
530   !
540   LOOP
550     INPUT "WORD LENGTH [ 2^16 ] ?",Wln
560   EXIT IF Wln>1 AND Wln<17
570   END LOOP
580   !
590   OUTPUT Add;"WLN "&VAL$(Wln)
600   !
610   RETURN
```

```
620   !
630   !
640 Prog_d:  !--------------------------------- PROG.Data  mode
650   !
660   PRINT "                ** PROG.DATA MODE **"
670   PRINT
680   !
690   LOOP
700     INPUT "DATA LENGTH [ 2^524288] ?",Dln
710   EXIT IF Dln>1 AND Dln<524289
720   END LOOP
730   !
740   OUTPUT Add;"DLN "&VAL$(Dln)
750   RETURN
760   !
770   !
780 D_set:   !---------------------------- SET Bit pattern data
790   !
800   INPUT "PATTERN DATA SETTING COUNT ? [ MAX 32767 ]",Cnt
810   INPUT "PATTERN DATA WRITE TOP ADDRESS ? [ 0 ~ 32767 ]",Top$
820   !
830   FOR I=1 TO Cnt
840    !
850     INPUT "BIT PATTERN DATA  BIT16-->BIT1 [0/1]?",Dta$(I-1)
860     PRINT "BIT PATTERN DATA= "&Dta$(I-1)
870    !
880     Dta(I-1)=IVAL(Dta$(I-1),2)          ! BIN --> DIG
890    !
900   NEXT I
910    !
920   OUTPUT Add;"WRT "&VAL$(Cnt*2)&","&Top$
930   !
940   OUTPUT Add USING "W";Dta(*)
950   !
960   RETURN
970   !
980   !
990   END
```

14.5 Sample Programs Using J3100 as the Controller

< Description of common parts of sample programs >

① <common shared IBSTA%, IBERR, IBCNT> is defined at the beginning of the program for GP-IB control.

② *1 500 ms WAIT after interface clear executed

Before the next command is executed after interface clear was executed, an approximately 500 ms WAIT is inserted until the MP1701B/MP1755A/MP1608A/MP1650A receives and executes interface clear from the J3100 and becomes stable.

③ *2 Trap

When a GP-IB commmand is received from the J3100 or when data is read from the MP1701B/MP1755A/MP1608A/MP1650A, the command's normal execution is checked. If there was an error, the error information is displayed and the program stops.

Similar processing is also performed for IBFIND (device definition), IBSIC (interface clear), and IBRSP (serial polling).

④ wrtcmd: '- - - - -Write comamnd - - - - -

wrt$ = wrt$ + chr$(13) + chr$(10)

CR, LF are connected to the end of the data stored in variable wrt$ and reassigned to the same variable.

CR: chr$(13)

LF: chr$(10)

CALL IBWRT(PPG%, wrt$) sends the data stored in variable wrt$ to the MP1701B/MP1755A/MP1608A/MP1650A.

⑤ readcmd:'- - - - - Read command - - - - -

rd$ = SPACE$(○○)

Initializes variable rd$ that stores the data read from the MP1701B/MP1755A/MP1608A/MP1650A to spaces.

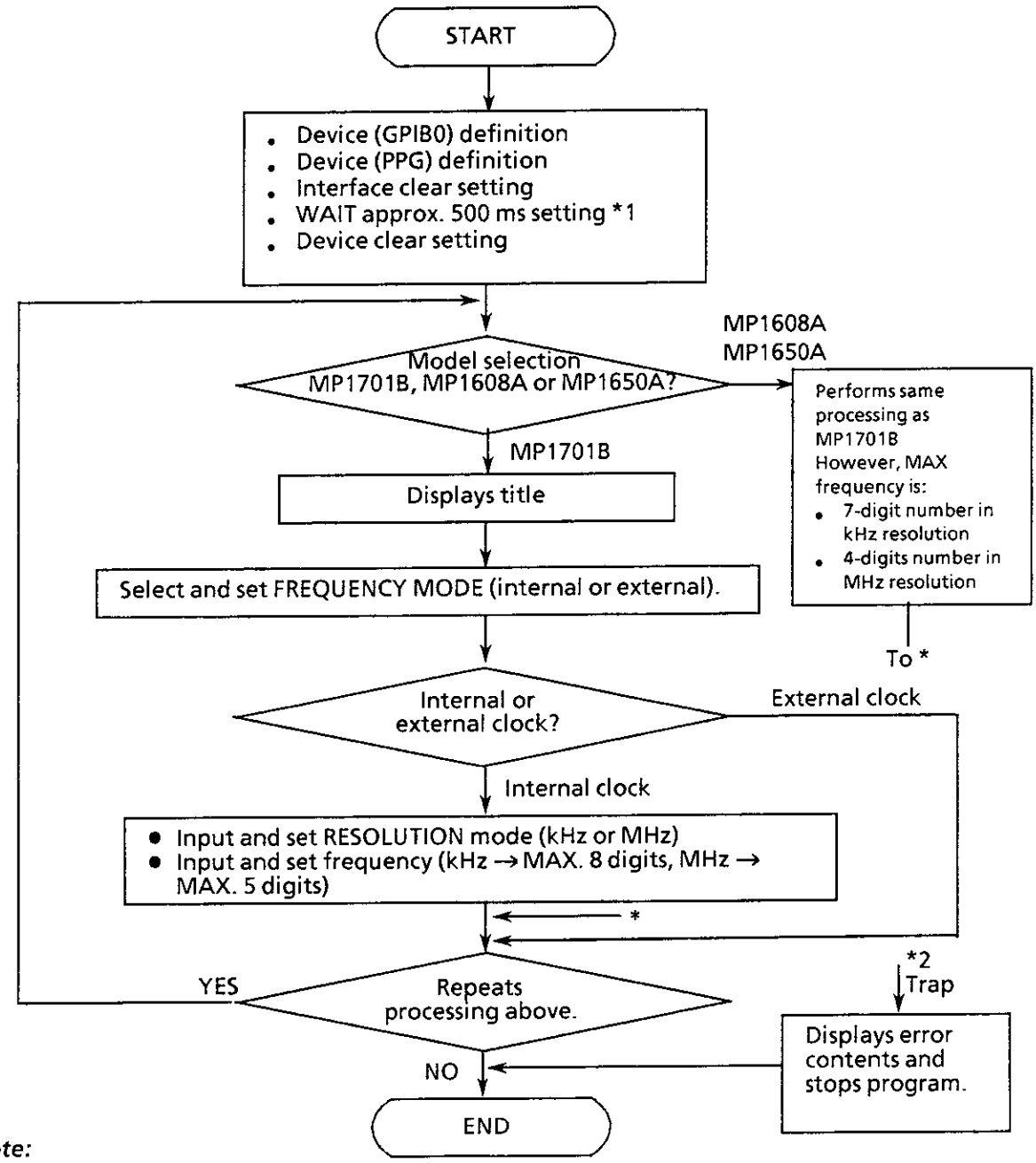
○○ in SPACE$ (○○) is [number of characters of read data + 2 characters (CR and LF)].

CALL IBRD(PPG%,rd$) reads data from the MP1701B/MP1755A/MP1608A/MP1650A and stores it in variable rd$.

(1) Frequency setting

This program performs clock frequemcy control.

It selects internal or external clock, and inputs the frequency resolution and clock frequency.



Note:

See the preceding page for *1 and *2.

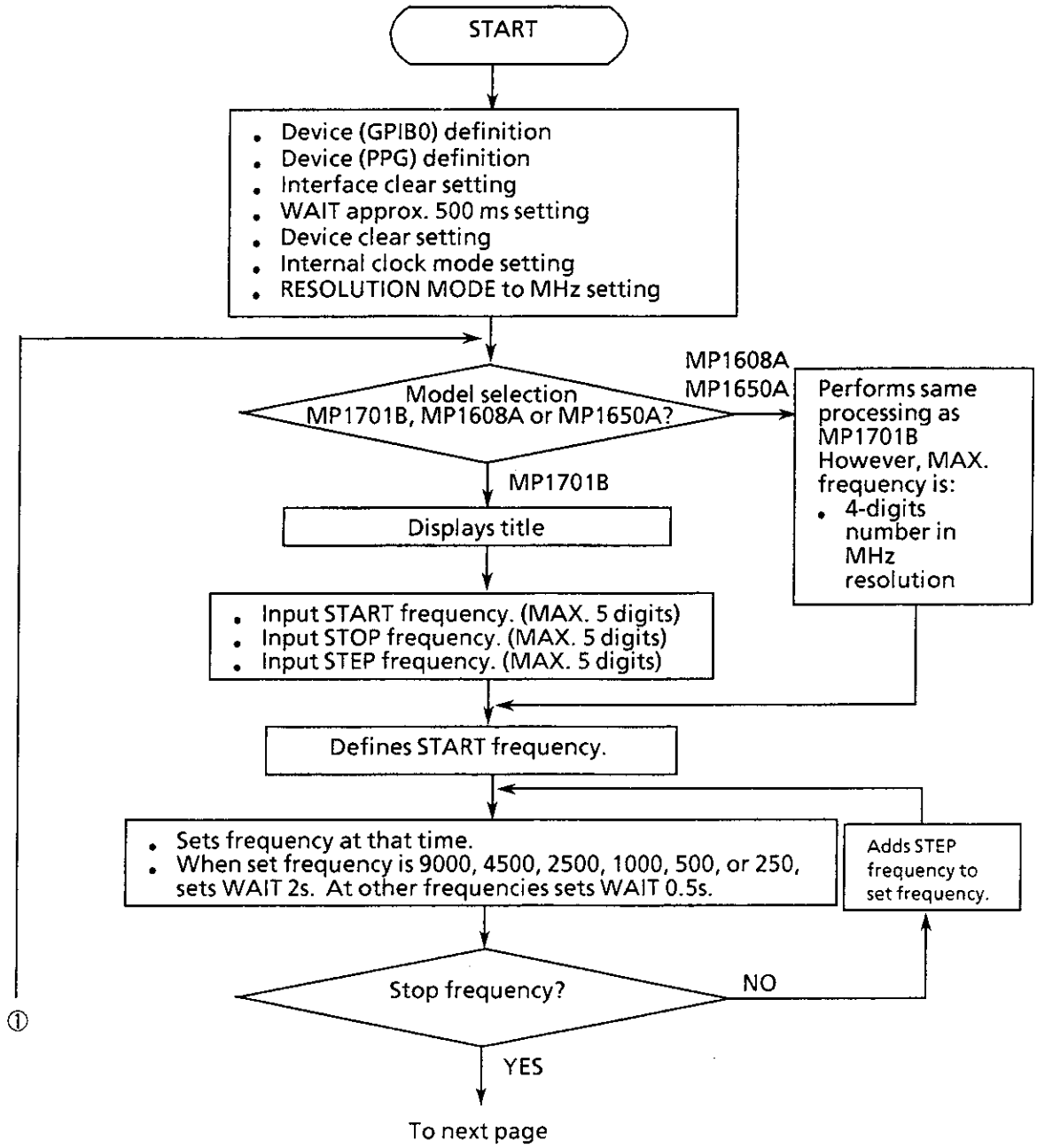
```
' ************************************************************
' *                                                          *
' *     MP1701B/MP1608A/MP1650A  FREQUENCY SAMPLE SOFT_1     *
' *                                                          *
' *                                                 FRQ_1    *
' ************************************************************
'
'------------------------------------------------------------'
'                          MAIN  ROUTINE                     '
'------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%    ' Setup GPIB-PC functions
GOSUB gpinit                          ' Setup GPIB interface
'
DO
  CLS
  '
  INPUT " MODE SELECT [ MP1701B=0, MP1608A=1, MP1650A=2 ]";mode$
  PRINT
  '
  SELECT CASE mode$
      CASE "0": GOSUB 10G
      CASE "1": ppg$="MP1608A": GOSUB 5G3G
      CASE "2": ppg$="MP1650A": GOSUB 5G3G
  END SELECT
  '
  INPUT " NEXT DATA SET [ YES=0 , NO=1 ] ";loop$
  '
LOOP UNTIL loop$="1"
'
STOP
'
'------------------------------------------------------------'
'                          SUB  ROUTINE                      '
'------------------------------------------------------------'
'
10G: ' ----------  MP1701B Data set  ----------
'
PRINT " ***** MP1701B FREQUENCY SAMPLE SOFT *****"
PRINT ""
INPUT " FREQUENCY MODE [ EXTERNAL=0 , INTERNAL=1 ] ";clk$
wrt$ = "CLK "+clk$ : GOSUB wrtcmd
'
IF clk$ = "1" THEN
  '
  INPUT " FREQUENCY RESOLUTION [ kHz=0 , MHz=1 ] ";res$
  wrt$ = "RES "+res$ : GOSUB wrtcmd
  '
  IF res$ = "1" THEN
     INPUT " FREQUENCY DATA [ MHz=5 figures ] ";frq$
  ELSE
     INPUT " FREQUENCY DATA [ Khz=8 figures ] ";frq$
  END IF
  '
  wrt$ = "FRQ "+frq$ : GOSUB wrtcmd
  '
END IF
'
RETURN
'
```

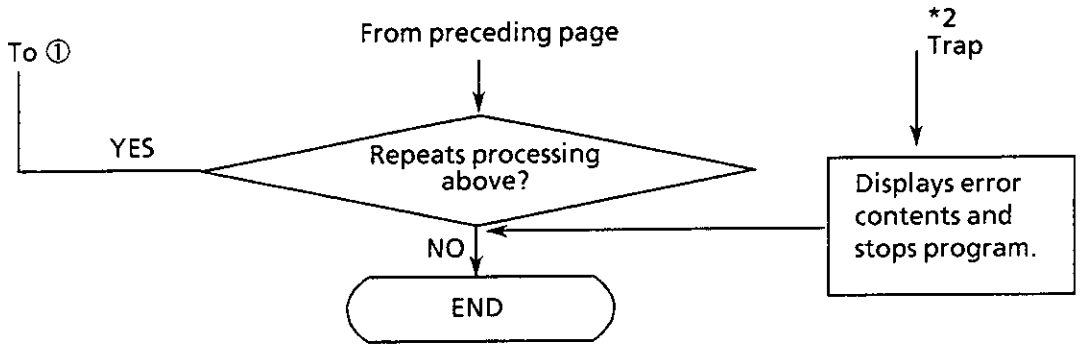
```
5G3G:' ----------  MP1608A,MP1650A Data set  ----------
     '
     PRINT " ***** "+ppg$+" FREQUENCY SAMPLE SOFT *****"
     PRINT ""
     INPUT " CLOCK MODE SELECT [ EXTERNAL=0 , INTERNAL=1 ] ";clk$
     wrt$ = "CLK "+clk$ : GOSUB wrtcmd
     IF clk$ = "1" THEN
          '
          INPUT " FREQUENCY RESOLUTION [ kHz=0 , MHz=1 ] ";res$
          wrt$ = "RES "+res$ : GOSUB wrtcmd
          '
          IF res$ = "1" THEN
              INPUT " FREQUENCY DATA [ MHz=4 figures ] ";frq$
          ELSE
              INPUT " FREQUENCY DATA [ Khz=7 figures ] ";frq$
          END IF
          '
          wrt$ = "FRQ "+frq$ : GOSUB wrtcmd    ' Send Frequency data
          '
     END IF
     '
     RETURN
          '
gpinit: ' ----------  Setup GPIB interface  ----------
          '
     CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
     IF GPIB0% < 0 THEN GOTO trap          ' system error
     '
     CALL IBFIND("PPG", PPG%)              ' Open device (PPG)
     IF PPG% < 0 THEN GOTO trap            ' system error
     '
     CALL IBSIC(GPIB0%)                    ' Interface clear
     IF IBSTA% < 0 THEN GOTO trap          ' system error
     '
     tim = 0.5
     GOSUB waidly
     '
     CALL IBCLR(PPG%)                      ' Device clear
     '
     RETURN
          '
wrtcmd: ' ----------  Write command  ----------
          '
     wrt$=wrt$+chr$(13)+chr$(10)
     CALL IBWRT(PPG%, wrt$)                ' Write command
     IF IBSTA% < 0 THEN GOTO trap          ' Trap
     '
     RETURN
          '
waidly: ' ----------  Wait delay  ----------
          '
     stm = TIMER
     etm = TIMER
     WHILE etm - stm < tim
         etm = TIMER
         IF etm < stm THEN etm = etm + 86400
     WEND
     '
     RETURN
          '
trap:    ' ----------  System trap  ----------
          '
     PRINT "IBERR%:" + STR$(IBERR%)
     STOP
     '
     END
```

(2) Frequency setting

This program increases the internal clock frequency from a start frequency to a stop frequency in a certain step width.

The frequency switching speed is every 0.5 second, but the set state is held for 2 seconds at 250, 500, 1000, 2500, 4500, and 9000 MHz.





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

```
' ****************************************************************
' *                                                              *
' *      MP1701B/MP1608A/MP1650A  FREQUENCY SAMPLE SOFT_2        *
' *                                                      FRQ_2   *
' ****************************************************************
'
'--------------------------------------------------------------'
'                          MAIN  ROUTINE                       '
'--------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%   ' Setup GPIB-PC  functions
GOSUB gpinit                         ' Setup GPIB interface
wrt$ = "CLK 1" : GOSUB wrtcmd        ' Send Clock mode : INTERNAL
wrt$ = "RES 1" : GOSUB wrtcmd        ' Send Resolution mode : MHz
'
DO
    CLS
    '
    INPUT " MODE SELECT [ MP1701B=0, MP1608A=1, MP1650A=2 ] ";mode$
    PRINT
    '
    SELECT CASE mode$
        CASE "0": GOSUB 10G
        CASE "1": ppg$="MP1608A": GOSUB 5G3G
        CASE "2": ppg$="MP1650A": GOSUB 5G3G
    END SELECT
    '
    INPUT " NEXT DATA SET [ YES=0 , NO=1 ] ";loop$
    '
LOOP UNTIL loop$="1"
'
STOP
'
'--------------------------------------------------------------'
'                          SUB  ROUTINE                        '
'--------------------------------------------------------------'
'
10G: ' ----------  MP1701B Data set  ----------
'
    PRINT " ***** MP1701B FREQUENCY SAMPLE SOFT *****"
    PRINT ""
    '
    INPUT " START FREQUENCY DATA [ MHz=5 figures,MAX ] ";startf$
    INPUT " STOP  FREQUENCY DATA [ MHz=5 figures,MAX ] ";stopf$
    INPUT " STEP  FREQUENCY DATA [ MHz=5 figures,MAX ] ";stepf$
    '
    GOSUB SetFrq
    '
    RETURN
    '
5G3G: ' ----------  MP1608A,MP1650A Data set  ----------
    '
    PRINT " ***** "+ppg$+" FREQUENCY SAMPLE SOFT *****"
    PRINT ""
    '
    INPUT " START FREQUENCY DATA [ MHz=4 figures,MAX ] ";startf$
    INPUT " STOP  FREQUENCY DATA [ MHz=4 figures,MAX ] ";stopf$
    INPUT " STEP  FREQUENCY DATA [ MHz=4 figures,MAX ] ";stepf$
    '
    GOSUB SetFrq
    '
    RETURN
```

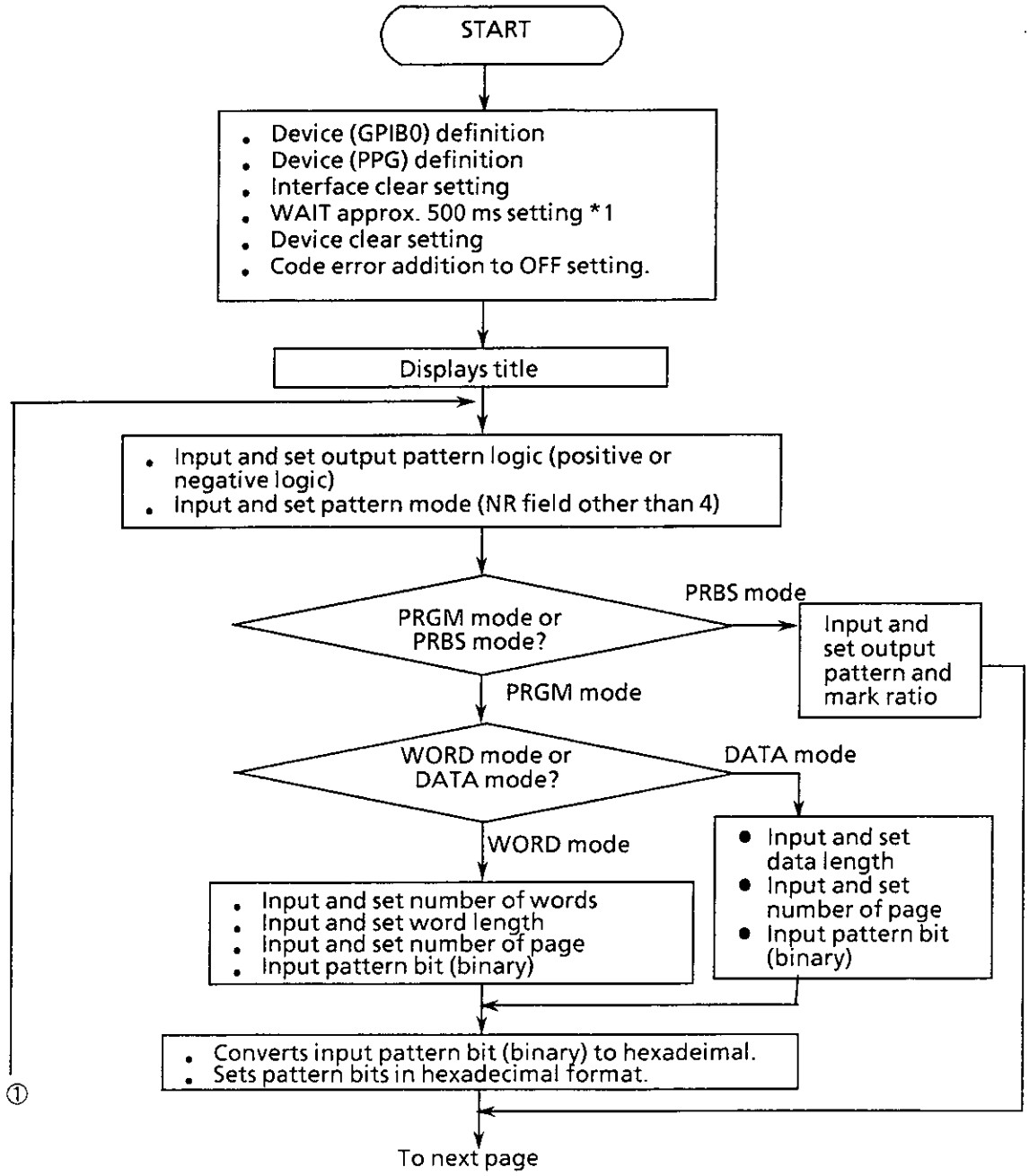
```
'
SetFrq:  '----------  Set frequency data  ---------
'
    FOR I=VAL(startf$)  TO VAL(stopf$)  STEP VAL(stepf$)
'
        wrt$ = "FRQ " + STR$(I) : GOSUB wrtcmd
'
        IF I=9000 OR I=4500 OR I=2500 OR I=1000 OR I=500 OR I=250 THEN
            tim = 2   : GOSUB waidly
        ELSE
            tim = 0.5 : GOSUB waidly
        END IF
'
    NEXT I
'
    RETURN
'
gpinit:  ' ----------  Setup GPIB interface  ----------
'
    CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap          ' system error
'
    CALL IBFIND("PPG", PPG%)              ' Open device (PPG)
    IF PPG% < 0 THEN GOTO trap            ' system error
'
    CALL IBSIC(GPIB0%)                    ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap          ' system error
'
    tim = 0.5
    GOSUB waidly
'
    CALL IBCLR(PPG%)                      ' Device clear
'
    RETURN
'
wrtcmd:  ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                ' Write command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
'
    RETURN
'
waidly:  ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
'
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
'
    RETURN
'
trap:    ' ----------  System trap  ----------
'
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
'
    END
```

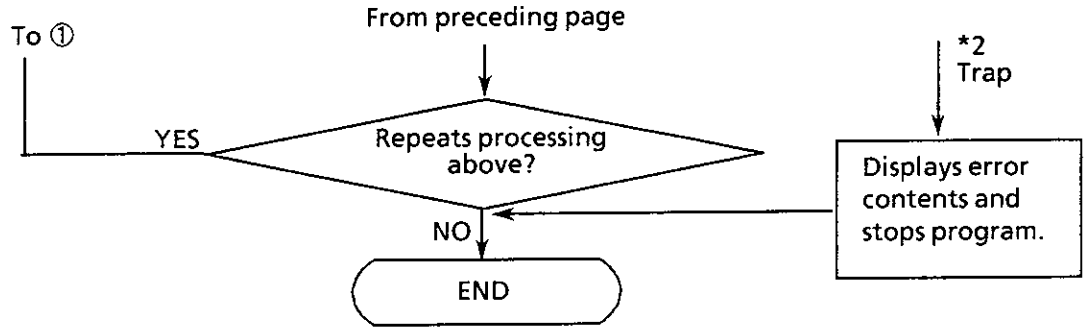
(3) Pattern setting

This program performs output pattern control.

It selects the output pattern logic, selects the PRGM or PRBS mode, and sets the necessary items of each output pattern for the MP1701B/MP1755A/MP1608A/MP1650A.

In the PRGM mode, the pattern data corresponding to the number of page input previously is set in a hexadecimal format.





Note: See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *      MP1701B/MP1608A/MP1650A  PATTERN  SAMPLE SOFT       *
' *                                                          *
' *                                                 PATTERN  *
' ************************************************************
'
'-----------------------------------------------------------'
'                          MAIN  ROUTINE                    '
'-----------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%   ' Setup GPIB-PC functions
GOSUB gpinit                         ' Setup GPIB interface
wrt$ = "EAD 0" : GOSUB wrtcmd        ' Error addition mode : OFF
'
DO
     CLS
     '
     PRINT " *** MP1701B/MP1608A/MP1650A PATTERN SAMPLE SOFT ***"
     PRINT ""
     '
     GOSUB pattern
     '
     INPUT " NEXT DATA SET [ YES=0 , NO=1 ]";loop$
     '
LOOP UNTIL loop$ = "1"
'
STOP
'
'-----------------------------------------------------------'
'                          SUB ROUTINE                      '
'-----------------------------------------------------------'
     '
pattern:'----------  Set Logic,Pattern mode ----------
     '
     INPUT " LOGIC MODE [ POSITIV=0 , NEGATIV=1 ]";lgc$
     PRINT ""
     WRT$= "LGC "+lgc$ : GOSUB wrtcmd
     '
     DO
       PRINT " PATTERN MODE [ WORD=0, DATA=1, PN7=2, PN9=3, PN11=5"
       INPUT "                PN15=6, PN20=7, PN23=8, PN31=9 ] ";ptn$
       PRINT ""
       PRINT ""
       '
     LOOP UNTIL ptn$ <> "4"
     '
     wrt$ = "PTN "+ptn$ : GOSUB wrtcmd
     '
     IF ptn$ = "0" OR ptn$ ="1" THEN
         GOSUB ProgMode
     ELSE
       PRINT " MARK RATIO MODE [ 0/8:8/8 = 0,  1/8:7/8 = 1, "
       INPUT "                   1/4:3/4 = 2,  1/2:N1/2 = 3 ] "; mrk$
       wrt$ = "MRK "+mrk$ : GOSUB wrtcmd
       '
     END IF
     '
     RETURN
```

```
ProgMode: '----------  SET Prog(Word),(Data)  ----------
    IF ptn$ = "1" THEN
        PRINT " *** PATTERN MODE PROG (DATA) ***"
        PRINT ""
        INPUT " DATA LENGTH DATA ";dln$
        wrt$ = "DLN "+dln$ : GOSUB wrtcmd
        INPUT " PAGE DATA ";pag$
        wrt$ = "PAG "+Pag$ : GOSUB wrtcmd
        INPUT " BIT PATTERN SET DATA  BIT16-->BIT1 [0/1]";bit$
        GOSUB BtoH
        wrt$ = "BIT #H"+B$ : GOSUB wrtcmd
    ELSE
        PRINT " *** PATTERN MODE PROG (WORD) ***"
        PRINT ""
        INPUT " NUMBER OF WORD DATA ";wnb$
        wrt$ = "WNB "+wnb$ : GOSUB wrtcmd
        INPUT " WORD LENGTH DATA ";wln$
        wrt$ = "WLN "+wln$ : GOSUB wrtcmd
        INPUT " PAGE DATA ";pag$
        wrt$ = "PAG "+Pag$ : GOSUB wrtcmd
        INPUT " BIT PATTERN SET DATA  BIT16-->BIT1 [0/1]";bit$
        GOSUB BtoH
        wrt$ = "BIT #H"+B$ : GOSUB wrtcmd
    END IF
    RETURN
gpinit: ' ---------- Set up GP-IB functions  ----------
    CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap          ' system error
    CALL IBFIND("PPG", PPG%)              ' Open device
    IF PPG% < 0 THEN GOTO trap            ' system error
    CALL IBSIC(GPIB0%)                    ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap          ' system error
    tim = 0.5
    GOSUB waidly
    CALL IBCLR(PPG%)                      ' Device clear
    RETURN
```

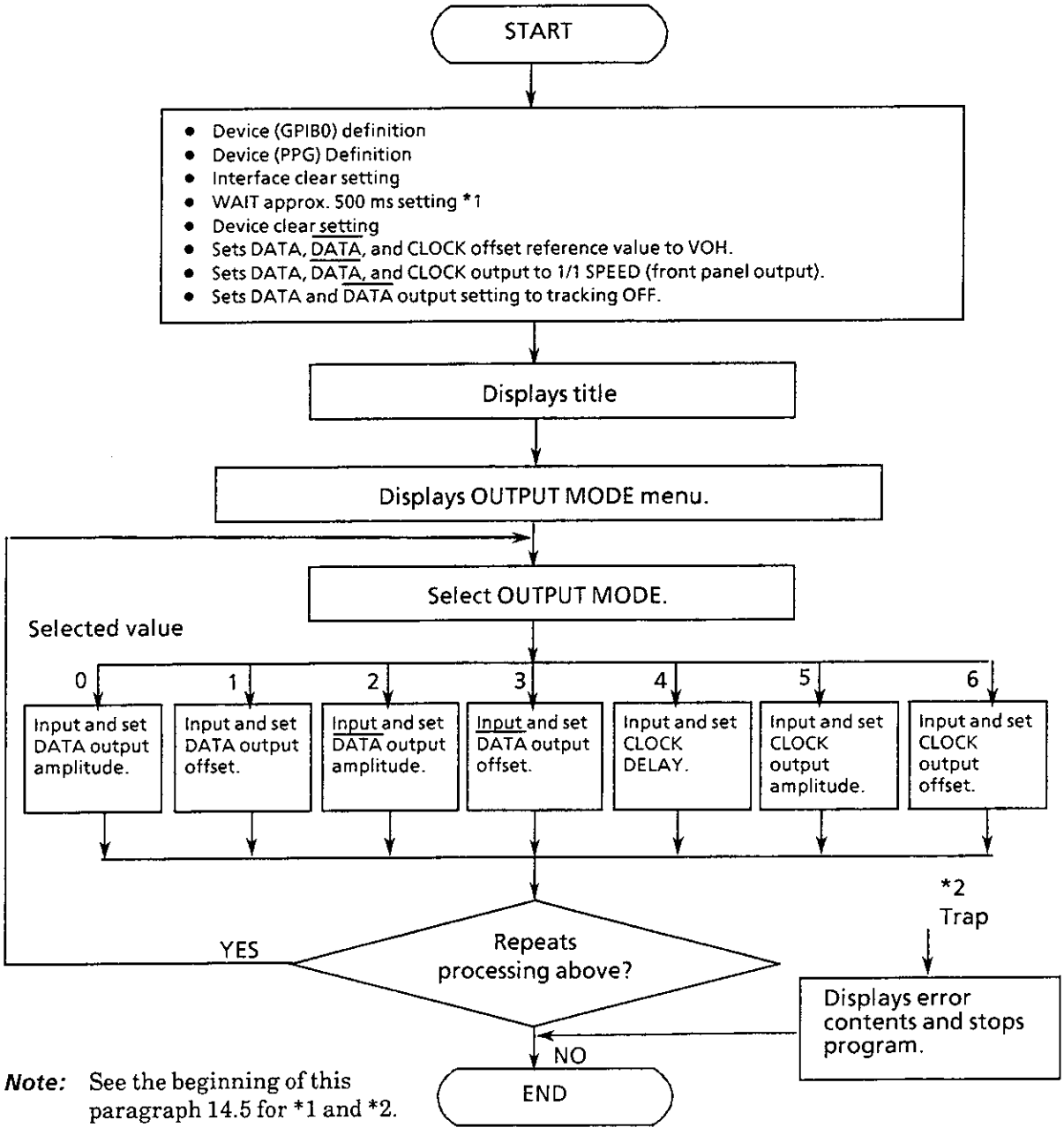
```
'
BtoH:    ' ----------  Bin to Hex     ----------
'
    A=0
    FOR I=15 TO 0 STEP -1
        IF MID$(bit$,16-I,1) = "1" THEN
            A = A + 2^I
        END IF
    NEXT I
'
    B$ = HEX$(A)
'
    RETURN
'
wrtcmd:  ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                ' Write command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
'
    RETURN
'
waidly:  ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
'
    RETURN
'
trap:    ' ----------  System trap  ----------
'
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
'
'
    END
```

(4) Output signal setting

This program performs output signal control.

This selects and sets the necessary DATA, $\overline{\text{DATA}}$, and CLOCK output amplitudes and offsets.

The MP1701B/MP1755A/MP1608A/MP1650A is set to the offset reference value: VOH, 1/1 SPEED (front panel output), DATA/$\overline{\text{DATA}}$ tracking: OFF.



Note: See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

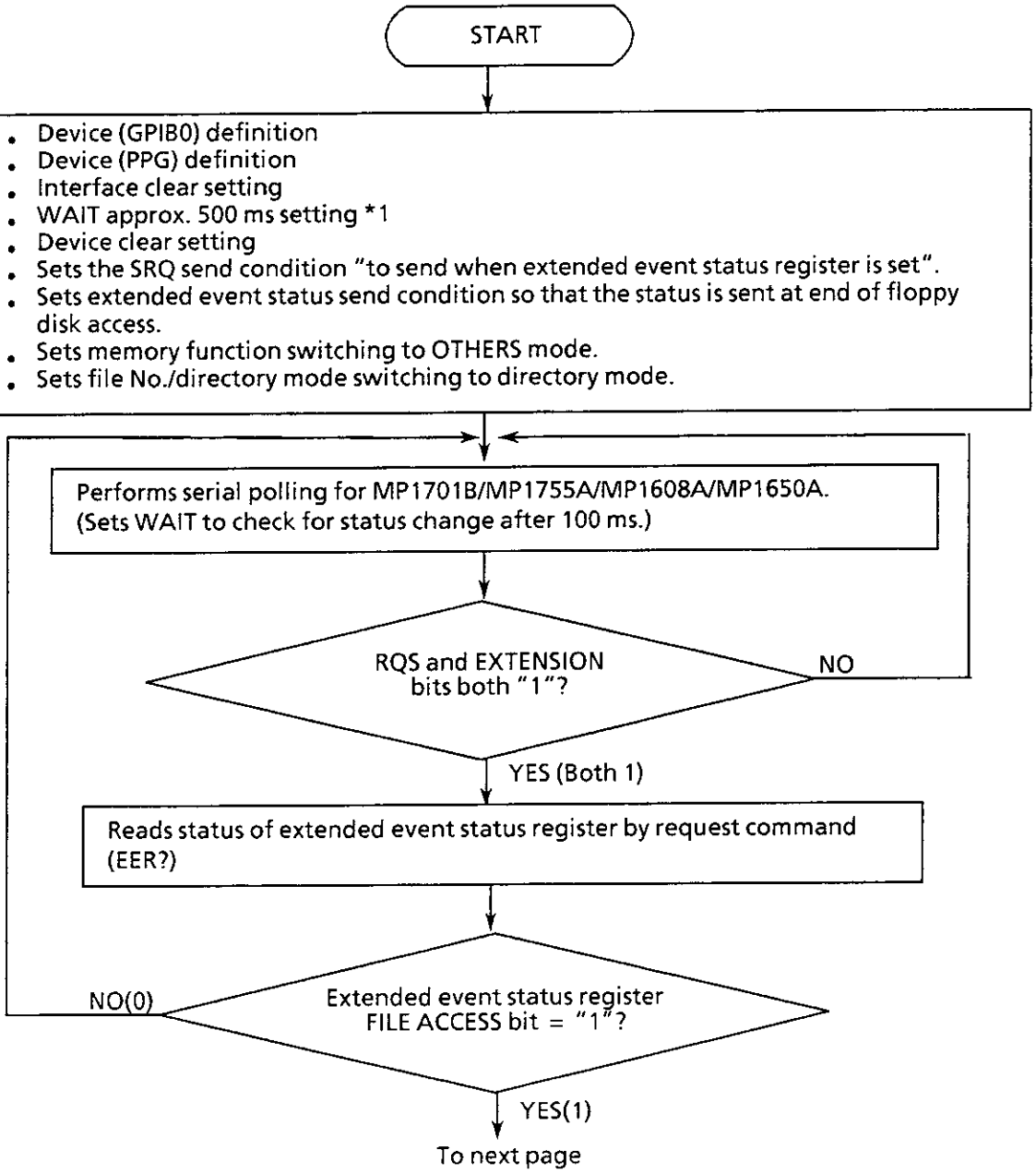
```
' ************************************************************
' *                                                          *
' *      MP1701B/MP1608A/MP1650A  OUTPUT SAMPLE SOFT_1       *
' *              --- 1/1(Speed),Voh mode---                  *
' *                                                 OUTPUT   *
' ************************************************************
'
common shared IBSTA%,IBERR%,IBCNT%        ' Setup GPIB-PC functions
GOSUB gpinit                              ' Setup GPIB interface
wrt$ = "OFS 0" : GOSUB wrtcmd             ' Set Offset mode : Voh
wrt$ = "SPD 0" : GOSUB wrtcmd             ' Set 1/1(speed)
wrt$ = "TRK 0" : GOSUB wrtcmd             ' Set Tracking : off
'
DO
  CLS
  PRINT "**** MP1701B/MP1608A/MP1650A  OUTPUT SAMPLE SOFT ****"
  PRINT "          ---  1/1(speed) , Voh mode ---"
  PRINT ""
  PRINT "    [ DATA AMPLITUDE=0, DATA OFF SET=1, NDATA AMPLITUDE=2 "
  PRINT "      NDATA OFFSET=3,   CLOCK DELAY=4, CLOCK AMPLITUDE=5"
  PRINT "      CLOCK OFFSET=6 ]"
  PRINT ""
  INPUT " MODE SELECT [ 0 or 1 or 2 or 3 or 4 or 5 or 6 ]";out$
  PRINT ""

  SELECT CASE out$

  CASE "0"
       INPUT "DATA AMPLITUDE [+0.50 ~ 2.00 V ] STEP 0.01 ";dap$
       wrt$ = "DAP " + dap$ : GOSUB wrtcmd
       '
  CASE "1"
       INPUT "DATA OFFSET [ -2.000 ~ 2.000 V ] STEP 0.005 ";dos$
       wrt$ = "DOS " + dos$ : GOSUB wrtcmd
       '
  CASE "2"
       INPUT "NDATA AMPLITUDE [ +0.50 ~ 2.00 V ] STEP 0.01 ";nap$
       wrt$ = "NAP " + nap$ : GOSUB wrtcmd
       '
  CASE "3"
       INPUT "NDATA OFFSET [ -2.000 ~ 2.000 V ] STEP 0.005 ";nos$
       wrt$ = "NOS " + nos$ : GOSUB wrtcmd
       '
  CASE "4"
       PRINT "          <<<   CLOCK DELAY   >>>"
       PRINT "MP1701B,MP1608A --> -500 ~  500 ps  1ps STEP"
       PRINT "MP1650A -->        -1000 ~ 1000 ps  2ps STEP"
       PRINT
       INPUT "CLOCK DELAY ";cdl$
       wrt$ = "CDL " + cdl$ : GOSUB wrtcmd
       '
  CASE "5"
       INPUT "CLOCK AMPLITUDE [ +0.50 ~ 2.00 V ] STEP 0.01 ";cap$
       wrt$ = "CAP " + cap$ : GOSUB wrtcmd
       '
  CASE "6"
       INPUT "CLOCK OFFSET [ -2.000 ~ 2.000 V ] STEP 0.005 ";cos$
       wrt$ = "COS " + cos$ : GOSUB wrtcmd
       '
  END SELECT
  '
```

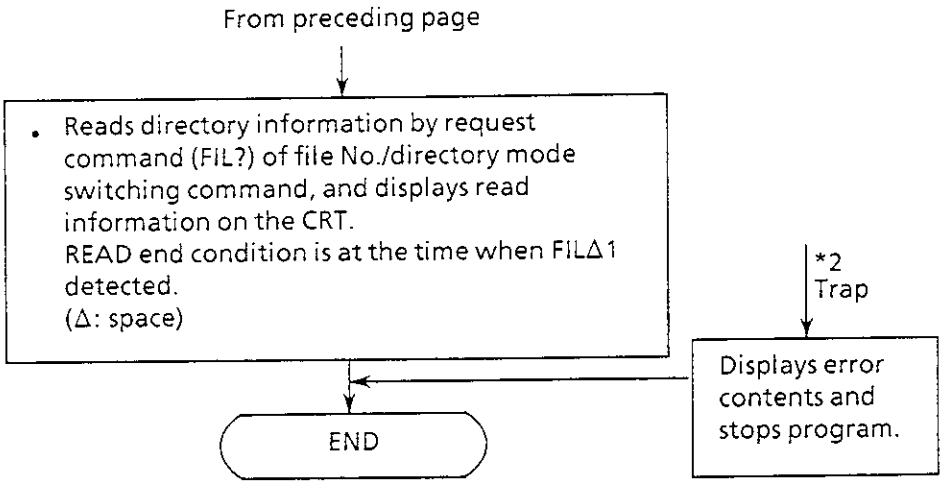
```
      INPUT "NEXT DATA SET  [ YES=0 , NO=1 ]";loop$
      '
    LOOP UNTIL loop$ = "1"
    '
    STOP
      '
gpinit: ' ---------- Setup GPIB interface  ----------
      '
    CALL IBFIND("GPIB0", GPIB0%)              ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap              ' system error
    '
    CALL IBFIND("PPG", PPG%)                  ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap                ' system error
    '
    CALL IBSIC(GPIB0%)                        ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap              ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                          ' Device clear
    '
    RETURN
      '
wrtcmd: ' ----------  Write command  ----------
      '
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                    ' Write command
    IF IBSTA% < 0 THEN GOTO trap              ' Trap
    '
    RETURN
      '
waidly: ' ----------  Wait delay  ----------
      '
    stm = TIMER
    etm = TIMER
    WHILE etm - stm < tim
        etm = TIMER
        IF  etm < stm THEN etm = stm + 86400
    WEND
    '
    RETURN
      '
trap:   ' ----------  System trap  ----------
      '
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    '
    END
```

(5) Floppy disk file information read
(Floppy disk access status check → serial polling)

This program checks the directory information of the files stored on the floppy disk, and displays it on the CRT. It also shows an example of actual output.

Floppy disk access status check is performed by serial polling and by data request command that checks the extended event status information.





Note: See the beginning of this paragraph 14.5 for *1 and *2.

EXECUTED RESULT

```
T02      ,PTN,      104,89-09-02,16:22
T04      ,PTN,      104,89-09-27,15:53
T07      ,OTH,      108,89-10-06,09:56
T21      ,PTN,      104,89-09-27,15:53
T23      ,PTN,      108,89-10-06,09:55
T24      ,OTH,      108,89-09-27,15:54
T38      ,PTN,    65640,89-09-29,15:35
T99      ,PTN,    65640,89-10-06,09:58
FIL 1
```

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1650A                 *
' *          FILE DIRECTORY READ SAMPLE SOFT_1               *
' *                                                  F_DIR   *
' ************************************************************
'
'-----------------------------------------------------------'
'                          MAIN  ROUTINE                    '
'-----------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%      ' Setup GPIB-PC functions
GOSUB gpinit                            ' Setup GPIB interface
'
wrt$ = "SRQ 2"   : GOSUB wrtcmd         ' SRQ : Extension bit
wrt$ = "EES 32" : GOSUB wrtcmd          ' Floppy access end
wrt$ = "MEM 1"   : GOSUB wrtcmd         ' Memory mode : OTHERS
wrt$ = "FIL 1"   : GOSUB wrtcmd         ' Directory mode
'
GOSUB SpollEer
GOSUB FileDir
'
STOP
'
'-----------------------------------------------------------'
'                          SUB  ROUTINE                     '
'-----------------------------------------------------------'
'
SpollEer:'----------  Check Status Byte  ----------
'
    DO
      DO
        CALL IBRSP(PPG%,SPR%)           ' Send Serial poll
        IF IBSTA% < 0 THEN GOTO trap
        '
        tim = 0.1 : GOSUB waidly
        '
      LOOP UNTIL SPR%=66        ' RQS bit,Extension bit = 1
      '
      wrt$ = "EER?"
      GOSUB wrtcmd              ' REQUEST Extension Event Register ?
      GOSUB readcmd             ' READ Extension Event Register
      '
    LOOP UNTIL MID$(rd$,9,1) = "1"      ' File Access bit = 1
    '
    RETURN
'
FileDir:' ----------  File directory  ----------
'
    wrt$ = "FIL?" : GOSUB wrtcmd        ' REQUEST Directory ?
    '
    DO
      GOSUB readcmd                     ' READ    Directory
      PRINT rd$
    LOOP UNTIL MID$(rd$,1,5) = "FIL 1"
    '
    RETURN
```

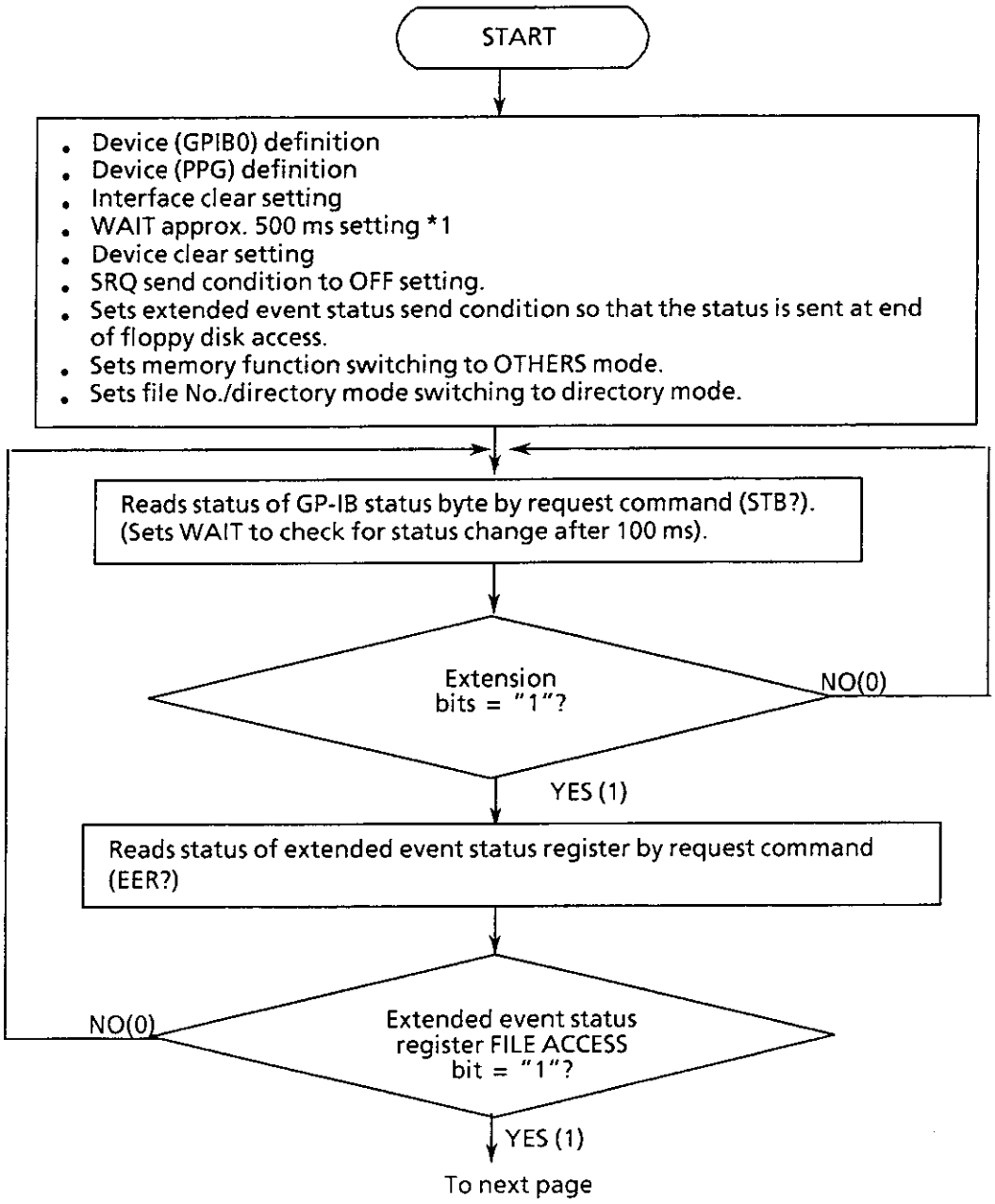
```
'
gpinit:  ' ---------- Setup GPIB interface  ----------
'
    CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap          ' system error
    '
    CALL IBFIND("PPG", PPG%)              ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap            ' system error
    '
    CALL IBSIC(GPIB0%)                    ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap          ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                      ' Device clear
    '
    RETURN
'
wrtcmd:  ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                ' Write command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
    '
    RETURN
'
readcmd:  ' ----------  Read command  ----------
'
    rd$ = SPACE$(38)
    CALL IBRD(PPG%, rd$)                  ' Read command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
    '
    RETURN
'
waidly:  ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
    '
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
    '
    RETURN
'
trap:    ' ----------  System trap  ----------
'
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    '
    END
```

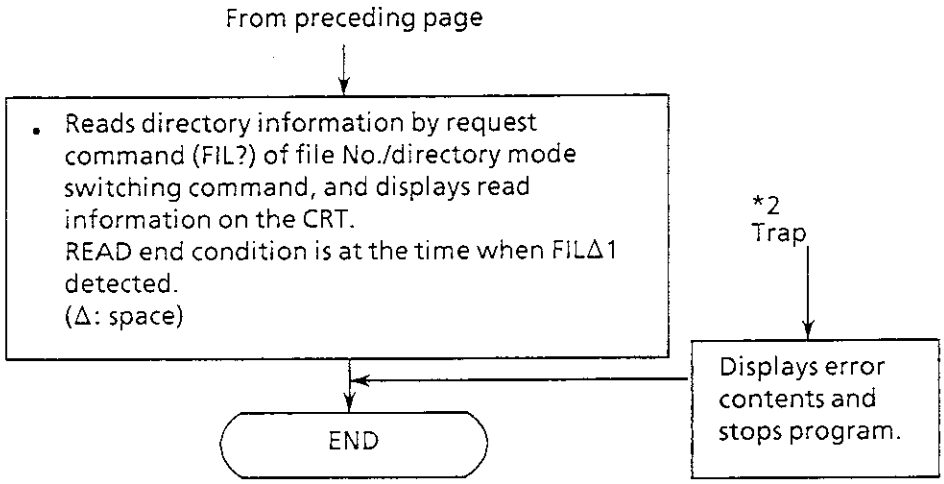
(6) Floppy disk file information read

(Floppy disk access status check → status byte register service request)

This program checks the directory information of the files stored on the floppy disk, and displays it on the CRT. It also shows an actual output example.

Floppy disk access status check is performed by data request command that checks the status of the GP-IB status byte and by data request command that checks the extended event status informaiton.





Note: See the beginning of this paragraph 14.5 for *1 and *2.

EXECUTED RESULT

```
T02      ,PTN,      104,89-09-02,16:22
T04      ,PTN,      104,89-09-27,15:53
T07      ,OTH,      108,89-10-06,09:56
T21      ,PTN,      104,89-09-27,15:53
T23      ,PTN,      108,89-10-06,09:55
T24      ,OTH,      108,89-09-27,15:54
T38      ,PTN,    65640,89-09-29,15:35
T99      ,PTN,    65640,89-10-06,09:58
FIL 1
```

PROGRAM LISTING

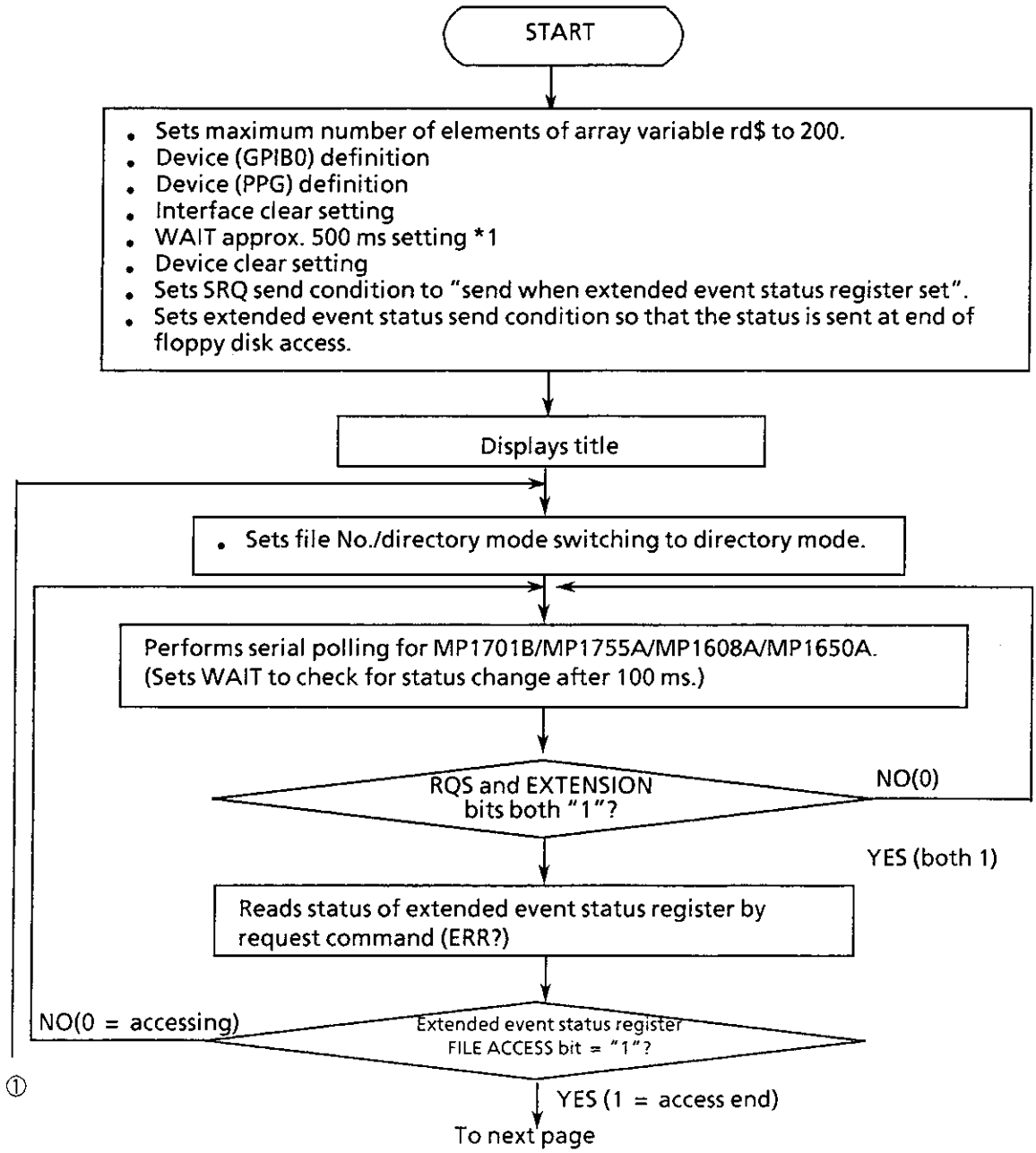
```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1650A                 *
' *            FILE DIRECTORY READ SAMPLE SOFT_2             *
' *                                                  F_DIR2  *
' ************************************************************
'
'-----------------------------------------------------------'
'                          MAIN  ROUTINE                    '
'-----------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%    ' Set up GP-IB functions
GOSUB gpinit
'
wrt$ = "SRQ 0"   : GOSUB wrtcmd      ' SRQ : Off
wrt$ = "EES 32"  : GOSUB wrtcmd      ' EES : Floppy access end
wrt$ = "MEM 1"   : GOSUB wrtcmd      ' FIL : Memory mode : OTHERS
wrt$ = "FIL 1"   : GOSUB wrtcmd      ' FIL : Directory mode
'
'
GOSUB StbReg
GOSUB FileDir
'
STOP
'
'-----------------------------------------------------------'
'                          SUB  ROUTINE                     '
'-----------------------------------------------------------'
'
StbReg: '----------  Check Status Byte  ----------
'
  DO
    DO
      wrt$ = "STB?" : GOSUB wrtcmd   ' REQUEST Status Byte Register?
      '
      GOSUB readcmd                  ' READ Status Byte Register
      tim = 0.1 : GOSUB waidly
      '
    LOOP UNTIL MID$(rd$,13,1) = "1"  ' Extension bit = 1
    '
  wrt$ = "EER?" : GOSUB wrtcmd       ' REQUEST Extension Register?
  '
  GOSUB readcmd                      ' READ Extension Register
  '
  LOOP UNTIL MID$(rd$,9,1) = "1"     ' File Access bit = 1
  '
  RETURN
'
FileDir: ' ----------  File directory  ----------
'
  wrt$ = "FIL?" : GOSUB wrtcmd         ' REQUEST Directory?
  '
  DO
    '
    GOSUB readcmd                      ' READ Directory
    PRINT rd$
    '
  LOOP UNTIL MID$(rd$,1,5) = "FIL 1"   '  File Access bit = 1
  '
  RETURN
```

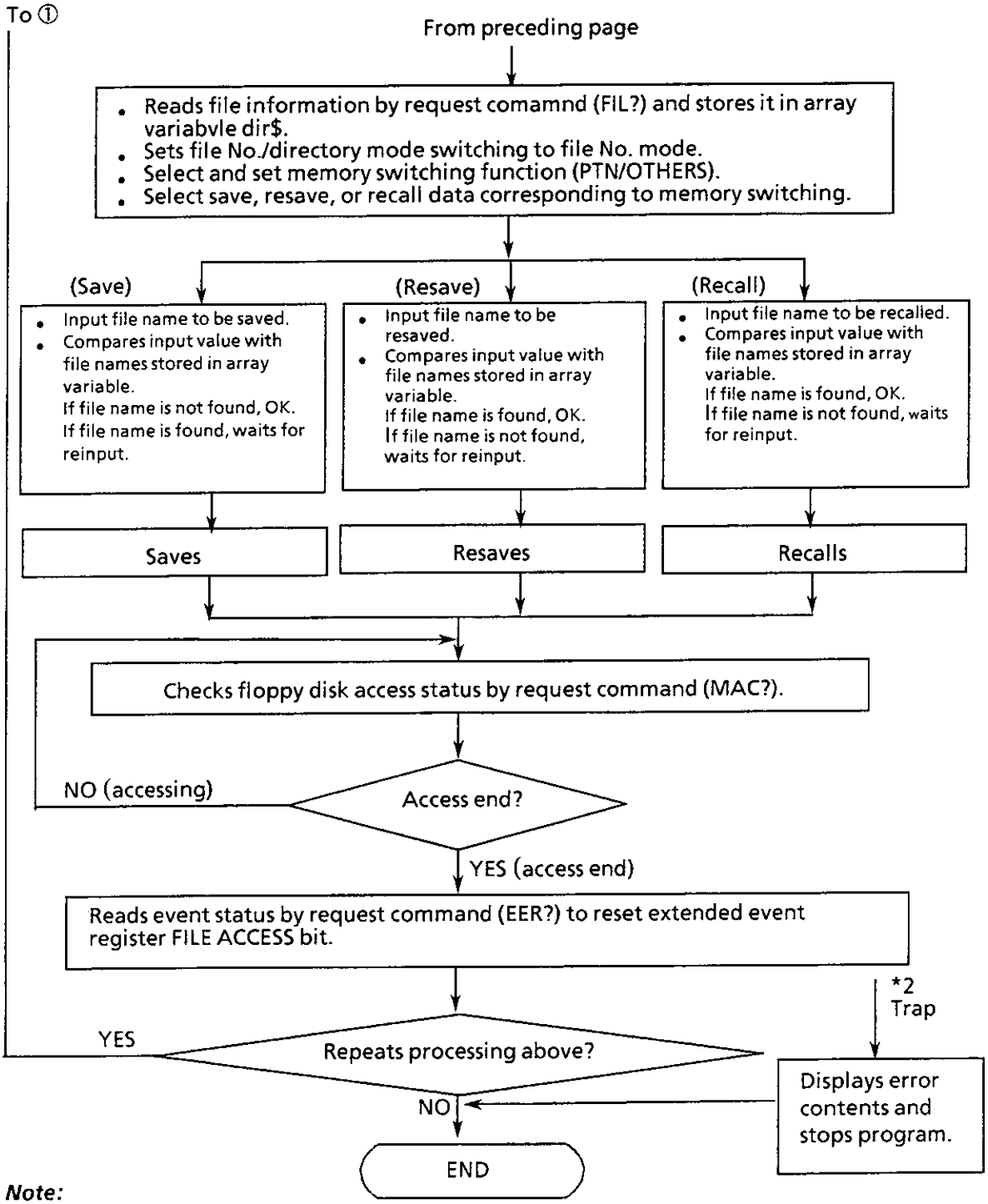
```
'
gpinit: ' ---------- Set up GP-IB functions  ----------
'
    CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap          ' system error
    '
    CALL IBFIND("PPG", PPG%)              ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap            ' system error
    '
    CALL IBSIC(GPIB0%)                    ' Open device
    IF IBSTA% < 0 THEN GOTO trap          ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                      ' Device clear
    '
    RETURN
'
wrtcmd: ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                ' Write command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
    '
    RETURN
'
readcmd:' ----------  Read command  ----------
'
    rd$=SPACE$(38)
    CALL IBRD(PPG%, rd$)                  ' Read command
    IF IBSTA% < 0 THEN GOTO trap          ' Trap
    '
    RETURN
'
waidly: ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
    '
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
    '
    RETURN
'
trap:   ' ----------  System trap  ----------
'
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    '
    END
```

(7) Data save, resave, and recall

This program checks the directory information of the files stored on floppy disk, saves or resaves the statuses set at the MP1701B/MP1755A/MP1608A/MP1650A corresponding to the memory switching function (PTN/OTHERS), and recalls the file stored on floppy disk.

The access status of the floppy disk to obtain the directory information is checked by serial polling and by data request command to check the extended event status. At save, resave, and recall, the floppy disk access status is checked by request comamnd MAC?





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *        MP1701B/MP1608A/MP1650A  MEMORY  SAMPLE SOFT      *
' *                                                          *
' *                                                  MEMORY  *
' ************************************************************
'
'-----------------------------------------------------------'
'                          MAIN  ROUTINE                    '
'-----------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%   ' Setup GPIB-PC  functions
GOSUB gpinit                         ' Setup GPIB interface
'
DIM dir$(199)
wrt$ = "SRQ 2"   : GOSUB wrtcmd      ' SRQ : Extension bit
wrt$ = "EES 32" : GOSUB wrtcmd       ' Floppy access end
'
PRINT " *** MP1701B/MP1608A/MP1650A  MEMORY  SAMPLE SOFT "
PRINT
DO
    '
    GOSUB SPoll : GOSUB DSet : GOSUB Floppy
    '
    INPUT " NEXT DATA SET [ YES=0 , NO=1 ] ";loop$
    PRINT
    '
LOOP UNTIL loop$="1"
'
STOP
'
'-----------------------------------------------------------'
'                          SUB  ROUTINE                     '
'-----------------------------------------------------------'
'
SPoll:  '////////////////////////////////////////////////////////////
        '/                                                          /
        '/   Serial polling                                        /
        '/         RQS,Extension bit = 1   ,  File access bit = 1  /
        '/                                                          /
        '////////////////////////////////////////////////////////////
        '
        wrt$="FIL 1" : GOSUB wrtcmd          ' Directory mode
        '
        DO
          DO
            CALL IBRSP(PPG%,SPR%)            ' Serial polling
            IF IBSTA < 0 THEN GOTO TRAP
            '
            tim = 0.1 : GOSUB waidly
            '
          LOOP UNTIL SPR%=66                 ' RQS,Extension bit = 1
          '
          wrt$="EER?" : GOSUB wrtcmd   ' REQUEST Extension event register
          GOSUB readcmd                ' READ Extension event register
          '
        LOOP UNTIL MID$(rd$,9,1)="1"   ' File access bit = 1
        '
        RETURN
        '
```

```
DSet:   '////////////////////////////////////////////////////////////////
        '/                                                              /
        '/   Read file directory , Set Memory mode   &                 /
        '/                 Select  SAVE  or  RESAVE  or  RECALL        /
        '/                                                              /
        '////////////////////////////////////////////////////////////////
        '
        '---------------------------------------- Read File directory
        '
        I=0
        tim=0.3 : GOSUB waidly
        '
        wrt$="FIL?" :GOSUB wrtcmd              ' REQUEST File directory
        '
        DO
          GOSUB readcmd                        ' READ File directory
          dir$(I)=MID$(rd$,1,12)
          I=I+1
        LOOP UNTIL MID$(rd$,1,5)="FIL 1"       ' File end
        '
        '------------------------------------------- Set Memory mode
        '
        wrt$="FIL 0" : GOSUB wrtcmd
        '
        DO
          INPUT " MEMORY MODE SELECT [ PTN=0 , OTHERS=1 ] ";mem
        LOOP UNTIL mem=0 OR mem=1
        '
        wrt$="MEM "+STR$(mem) : GOSUB wrtcmd
        '
        IF mem=0 THEN mem$="PTN"
        IF mem=1 THEN mem$="OTH"
        '
        '----------------------------- Select SAVE or RESAVE or RECALL
        '
        DO
          INPUT " SELECT [ SAVE=0 , RESAVE=1 , RECALL=2 ]";dta
        LOOP UNTIL dta=0 OR dta=1 OR dta=2
        '
        IF dta=0 THEN GOSUB DSave
        IF dta=1 THEN GOSUB DResave
        IF dta=2 THEN GOSUB DRecall
        '
        RETURN
        '
DSave:  '////////////////////////////////////////////////////////////////
        '/                                                              /
        '/   *  Data Save *                                            /
        '/                  SAME Memory mode & File name --> ERROR !    /
        '/                                                              /
        '////////////////////////////////////////////////////////////////
        '
        DO
          I=0
          result$=SPACE$(4)
          INPUT " ** Data Save **  File Name [ 0~99 ] ";nam
          '
          DO
            IF mem$=MID$(dir$(I),10,3) AND nam=VAL(MID$(dir$(I),2,2)) THEN
            result$="SAME"
            END IF
            '
            I=I+1
```

```
    LOOP UNTIL MID$(dir$(I),1,5)="FIL 1"
    '
  LOOP UNTIL result$ <> "SAME"
  '
  wrt$="SAV "+STR$(nam) : GOSUB wrtcmd
  '
  RETURN
  '
DResave:'////////////////////////////////////////////////////////////////
  '/                                                                    /
  '/   *  Data Resave *                                                /
  '/                    SAME Memory mode & File name --> OK !          /
  '/                                                                    /
  '////////////////////////////////////////////////////////////////////
  '
  DO
    I=0
    result$=SPACE$(4)
    INPUT " ** Data Resave **  File Name [ 0~99 ] ";nam
    '
    DO
      IF mem$=MID$(dir$(I),10,3) AND nam=VAL(MID$(dir$(I),2,2)) THEN
      result$="SAME"
      END IF
      '
      I=I+1
      '
    LOOP UNTIL MID$(dir$(I),1,5)="FIL 1"
    '
  LOOP UNTIL result$ = "SAME"
  '
  wrt$="RSV "+STR$(nam) : GOSUB wrtcmd
  '
  RETURN
  '
DRecall:'////////////////////////////////////////////////////////////////
  '/                                                                    /
  '/   *  Data Recall *                                                /
  '/                    SAME Memory mode & File name --> OK !          /
  '/                                                                    /
  '////////////////////////////////////////////////////////////////////
  '
  DO
    I=0
    result$=SPACE$(4)
    INPUT " ** Data Recall **  File Name [ 0~99 ] ";nam
    '
    DO
      IF mem$=MID$(dir$(I),10,3) AND nam=VAL(MID$(dir$(I),2,2)) THEN
      result$="SAME"
      END IF
      '
      I=I+1
      '
    LOOP UNTIL MID$(dir$(I),1,5)="FIL 1"
    '
  LOOP UNTIL result$ = "SAME"
  '
  wrt$="RCL "+STR$(nam) : GOSUB wrtcmd
  '
  RETURN
  '
```

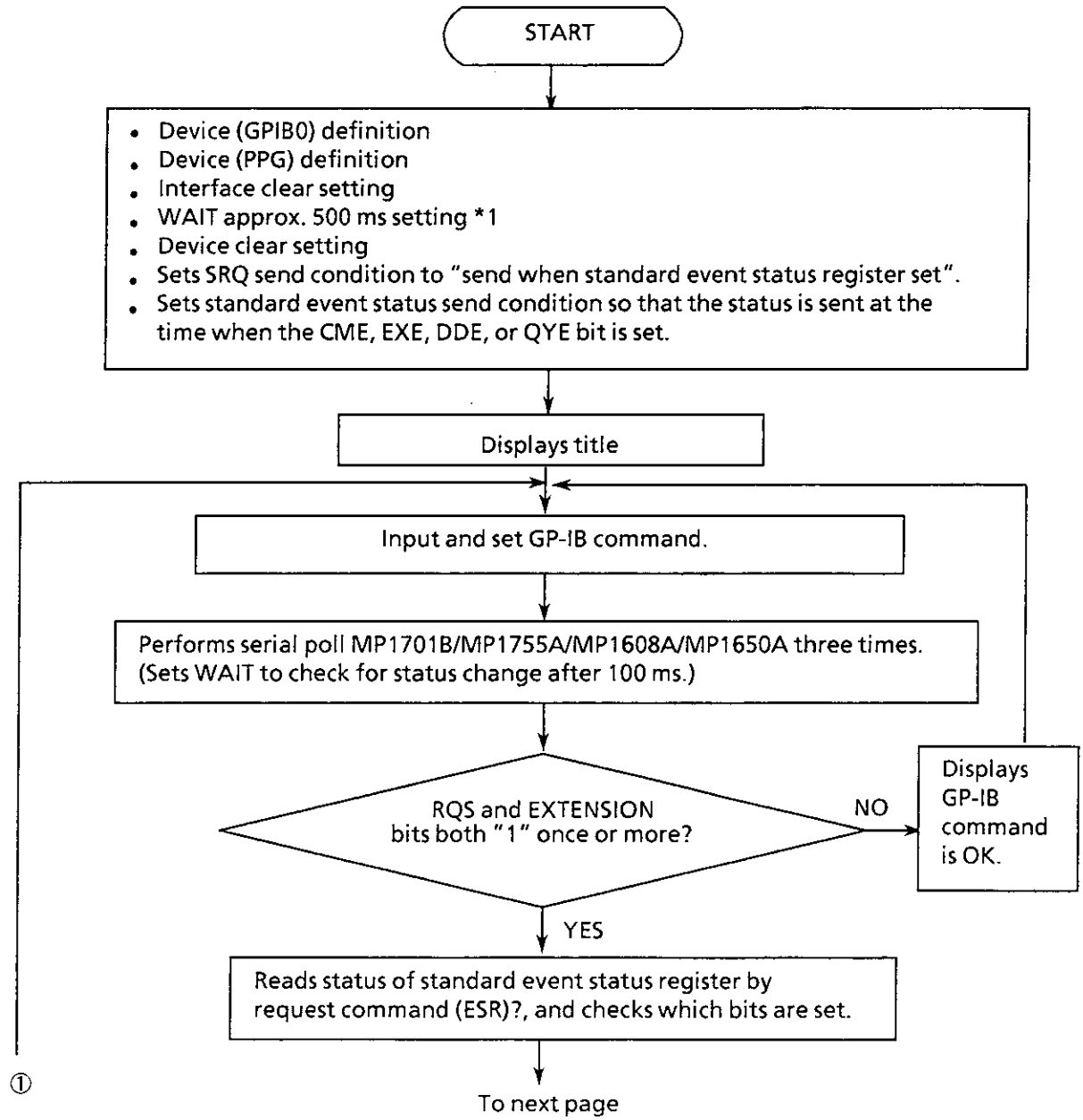
```
Floppy: '////////////////////////////////////////////////////////////
        '/                                                          /
        '/     Memory Access Condition ?                            /
        '/                        &  Reset  FILE ACCESS bit         /
        '/                                                          /
        '////////////////////////////////////////////////////////////
        '
        DO
            wrt$="MAC?" : GOSUB wrtcmd : GOSUB readcmd
        LOOP UNTIL MID$(rd$,1,5)="MAC 0"
        '
        wrt$="EER?" : GOSUB wrtcmd : GOSUB readcmd
        RETURN
        '
gpinit: ' ----------  Setup GPIB interface  ----------
        '
        CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
        IF GPIB0% < 0 THEN GOTO trap          ' system error
        '
        CALL IBFIND("PPG", PPG%)              ' Open device (PPG)
        IF PPG% < 0 THEN GOTO trap            ' system error
        '
        CALL IBSIC(GPIB0%)                    ' Interface clear
        IF IBSTA% < 0 THEN GOTO trap          ' system error
        '
        tim = 0.5
        GOSUB waidly
        '
        CALL IBCLR(PPG%)                      ' Device clear
        '
        RETURN
        '
wrtcmd: ' ----------  Write command  ----------
        '
        wrt$=wrt$+chr$(13)+chr$(10)
        CALL IBWRT(PPG%, wrt$)                    ' Write command
        IF IBSTA% < 0 THEN GOTO trap              ' Trap
        '
        RETURN
        '
readcmd:' ----------  Read command  ----------
        '
        rd$=SPACE$(38)
        CALL IBRD(PPG%, rd$)                      ' Read command
        IF IBSTA% < 0 THEN GOTO trap              ' Trap
        '
        RETURN
        '
waidly: ' ----------  Wait delay  ----------
        '
        stm = TIMER
        etm = TIMER
        '
        WHILE etm - stm < tim
            etm = TIMER
            IF etm < stm THEN etm = etm + 86400
        WEND
        '
        RETURN
        '
trap:   ' ----------  System trap  ----------
        '
        PRINT "IBERR%:" + STR$(IBERR%)
        STOP
        '
        END
```

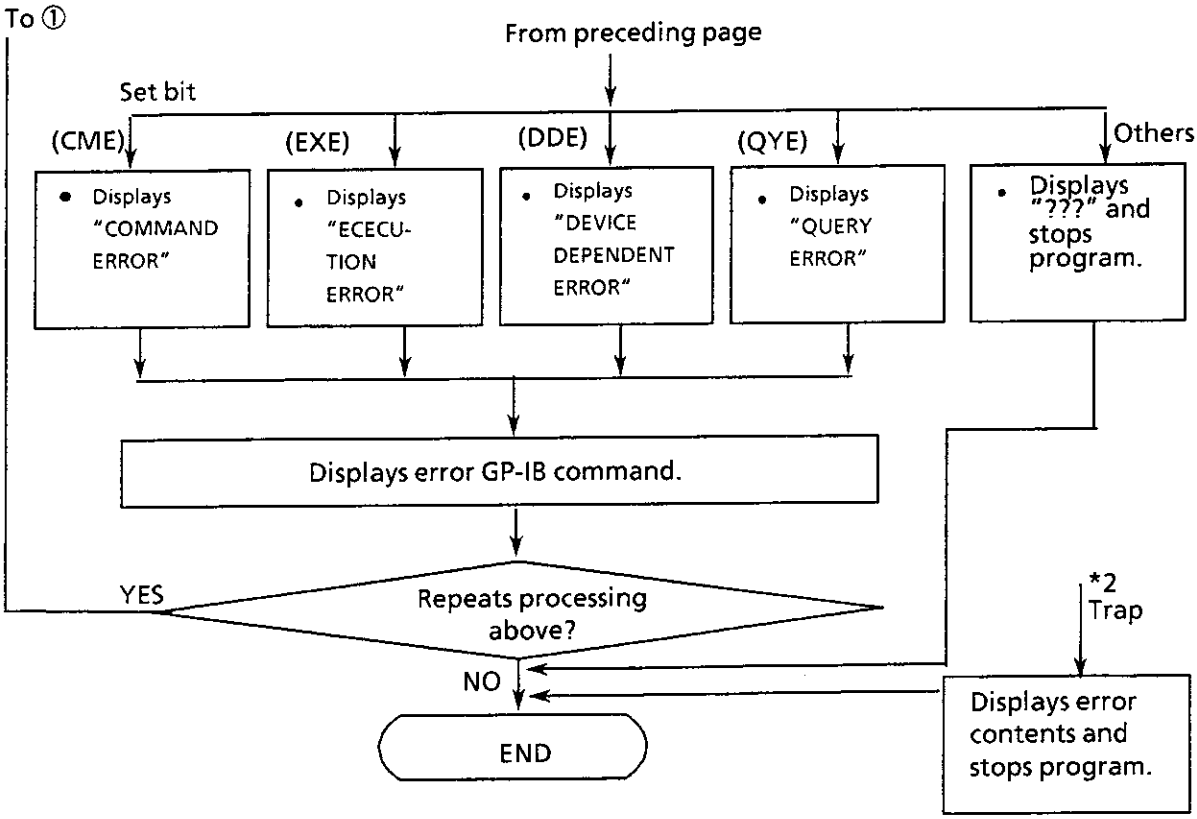
(8) Standard event status byte check (COMMAND ERROR bit check → serial polling)

This program checks the CME, EXE, DDE, and QYE bits of the standard event status byte, and displays whether or not the input GP-IB command is normal on the CRT.

When the command is abnormal, the cause of the error at that time is displayed.

The GP-IB status byte is checked by serial polling and by the status of the standard event status register which is obtained by data request comamnd.





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1650A                 *
' *    STANDERD EVENT STATUS REGISTER CHECK  SAMPLE SOFT     *
' *                                                    ESE   *
' ************************************************************
'
'-------------------------------------------------------------'
'                           MAIN  ROUTINE                     '
'-------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%    ' Setup GPIB-PC functions
GOSUB gpinit                          ' Setup GPIB interface
'
wrt$ = "SRQ 32"   : GOSUB wrtcmd      ' SRQ : Command error bit
wrt$ = "ESE 60"   : GOSUB wrtcmd      ' CME,EXE,DDE,QYE bit
'
PRINT "* MP1701B/MP1608A/MP1650A STANDERD STATUS REGISTER CHECK *"
PRINT
'
DO
    INPUT " INPUT ANY GP-IB COMMAND,Please.",com$
    '
    wrt$ =com$   : GOSUB wrtcmd
    '
    GOSUB Check
    '
    INPUT " NEXT COMMAND SET?  [ YES=0 , NO=1 ]";loop$
    PRINT
    '
LOOP UNTIL loop$="1"
'
STOP
'
'-------------------------------------------------------------'
'                           SUB  ROUTINE                      '
'-------------------------------------------------------------'
    '
Check:  '----------  Serial polling  ----------
    '
    byt=0
    '
    FOR I=0 TO 2
        '
        CALL IBRSP(PPG%,SPR%)             ' Serial polling
        IF IBSTA% < 0 THEN GOTO trap
        '
        tim = 0.1 : GOSUB waidly
        '
        IF SPR%=96 THEN byt=SPR%          ' RQS,Comand Error bit=1
        '
    NEXT I
    '
    IF byt=96 THEN
        GOSUB Ero
    ELSE
        PRINT " GP-IB COMMAND IS OK !"
    END IF
    '
    RETURN
```

```
'
Ero:    ' ----------  ERROR  ----------
'
    wrt$ = "ESR?" : GOSUB wrtcmd    ' REQUEST standard event status?
    GOSUB readcmd                   ' READ standard event status
'
    IF MID$(rd$,9,1)="1" THEN PRINT "* COMMAND ERROR !!"
    IF MID$(rd$,10,1)="1" THEN PRINT "* EXECUTION  ERROR !!"
    IF MID$(rd$,11,1)="1" THEN PRINT "* DEVICE DEPENDENT ERROR !!"
    IF MID$(rd$,12,1)="1" THEN PRINT "* QUERY ERROR !!"
    PRINT " INPUT COMMAND = "+com$
'
    IF MID$(rd$,7,1)="1" OR MID$(rd$,8,1)="1" OR MID$(rd$,13,1)="1" OR MID$(rd$,
14,1)="1"  THEN GOSUB Bug
'
    RETURN
'
gpinit: ' ---------- Setup GPIB interface  ----------
'
    CALL IBFIND("GPIB0", GPIB0%)        ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap        ' system error
'
    CALL IBFIND("PPG", PPG%)            ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap          ' system error
'
    CALL IBSIC(GPIB0%)                  ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap        ' system error
'
    tim = 0.5
    GOSUB waidly
'
    CALL IBCLR(PPG%)                    ' Device clear
'
    RETURN
'
wrtcmd: ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)              ' Write command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
'
    RETURN
'
readcmd:' ----------  Read command  ----------
'
    rd$=SPACE$(16)
    CALL IBRD(PPG%, rd$)                ' Read command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
'
    RETURN
'
waidly: ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
'
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
'
    RETURN
```

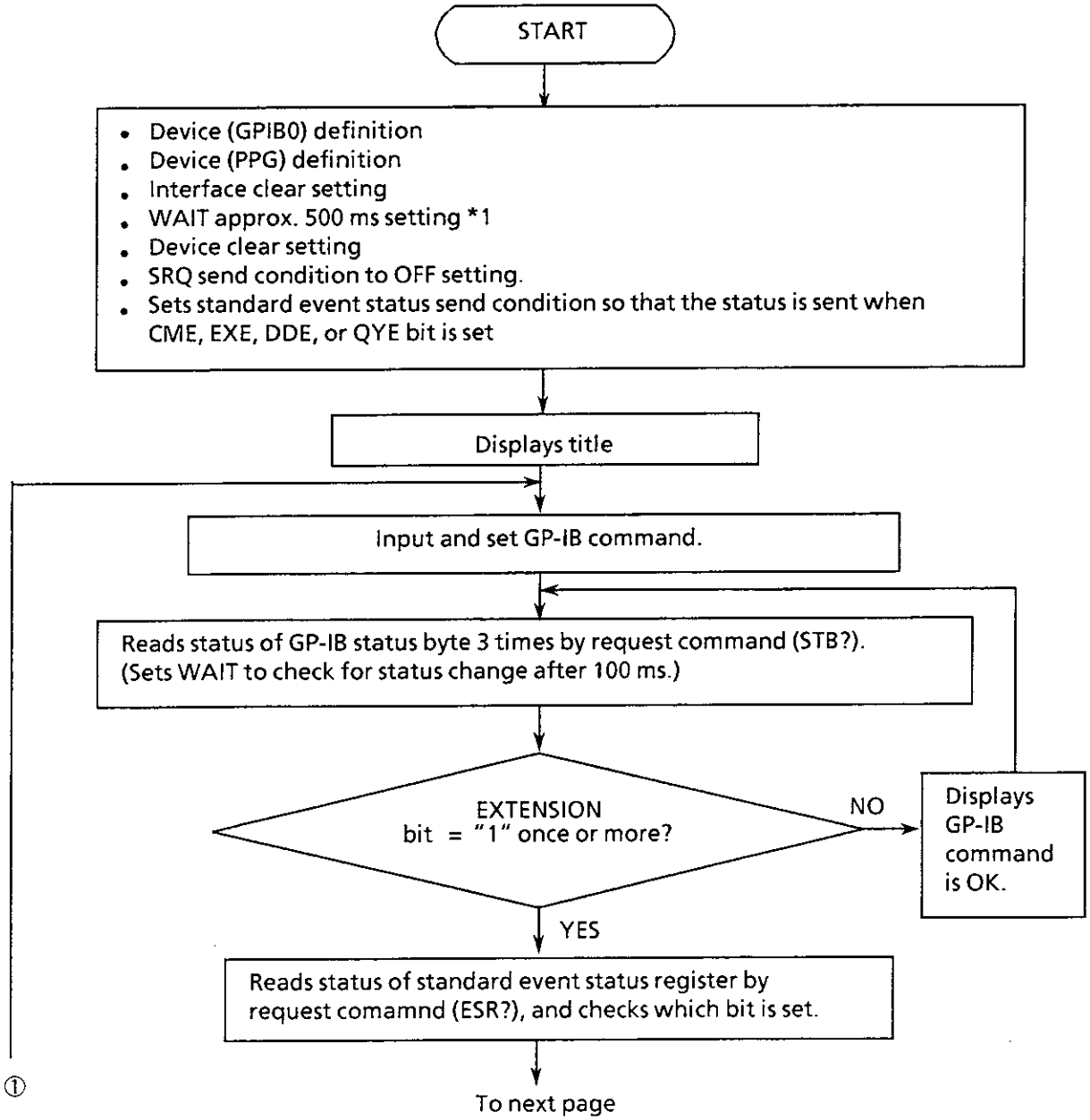
```
        '
Bug:    ' ----------  BUG  ----------
        '
    PRINT "???"
    '
    STOP
        '
trap:   ' ----------  System trap  ----------
        '
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    '
    END
```

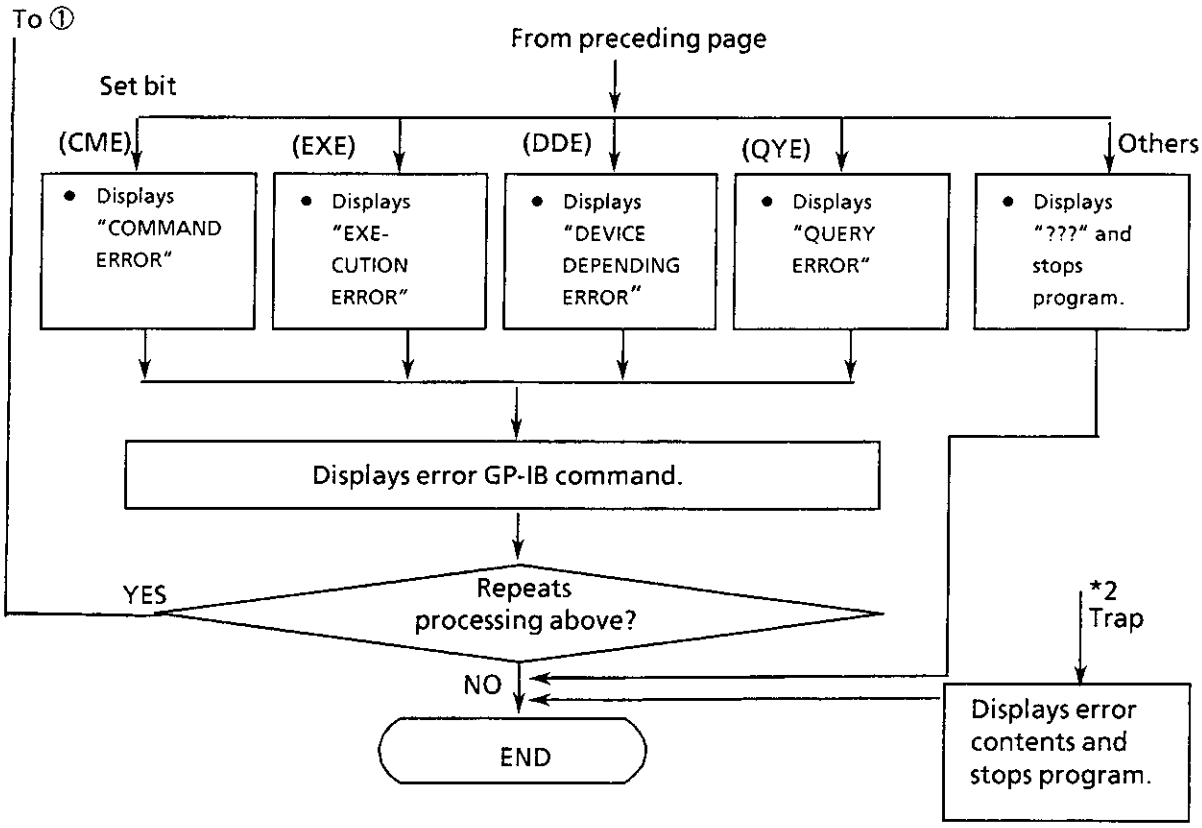
(9) Standard event status byte check
(COMMAND ERROR bit check → status byte register service request)

This program checks the CME, EXE, DDE, and QYE bits of the standard event status byte, and displays whether or not the input GP-IB command is normal on the CRT.

When the command is abnormal, the cause of the error at that time is displayed.

The GP-IB status byte and the status of the standard event status register are checked by data request command.





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1650A                 *
' *     STANDERD EVENT STATUS REGISTER CHECK  SAMPLE SOFT    *
' *                                                    ESE2  *
' ************************************************************
'
'-------------------------------------------------------------'
'                           MAIN  ROUTINE                     '
'-------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%    ' Setup GPIB-PC functions
GOSUB gpinit                          ' Setup GPIB interface
'
wrt$ = "SRQ 0 "   : GOSUB wrtcmd      ' SRQ :OFF
wrt$ = "ESE 60"   : GOSUB wrtcmd      ' CME,EXE,DDE,QYE bit
'
PRINT "* MP1701B/MP1608A/MP1650A STANDERD STATUS REGISTER CHECK *"
PRINT
'
DO
  INPUT " INPUT ANY GP-IB COMMAND,Please.",com$
  '
  wrt$ =com$  : GOSUB wrtcmd
  '
  GOSUB Check
  '
  INPUT " NEXT COMMAND SET?  [ YES=0 , NO=1 ] ";loop$
  PRINT
  '
LOOP UNTIL loop$="1"
'
STOP
'
'-------------------------------------------------------------'
'                           SUB  ROUTINE                      '
'-------------------------------------------------------------'
    '
Check:  '----------  Check Status byte  ----------
    '
byt$=SPACE$(16)
FOR I=0 TO 2
  '
  wrt$="STB?" : GOSUB wrtcmd    ' REQUEST Status byte register?
  GOSUB readcmd                 ' READ Status byte register
  '
  IF MID$(rd$,9,1)="1" THEN byt$=rd$    ' Command error bit = 1
  '
  tim=0.1 : GOSUB waidly
  '
NEXT I
'
IF MID$(byt$,9,1)="1" THEN
   GOSUB Ero
ELSE
   PRINT " GP-IB COMMAND IS OK !"
END IF
'
RETURN
```

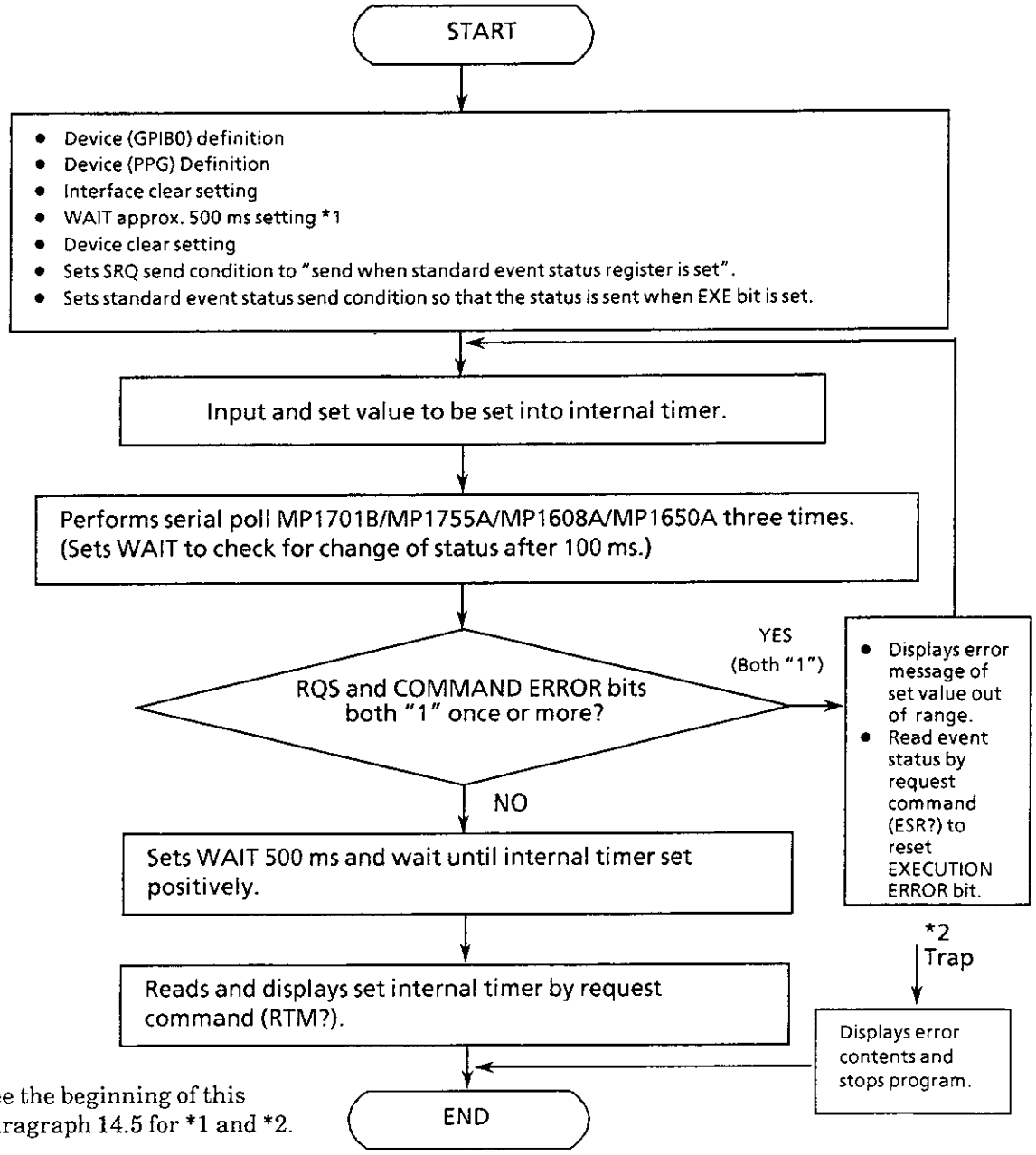
```
Ero:      ' ---------- ERROR ----------

     wrt$ = "ESR?" : GOSUB wrtcmd    ' REQUEST Standard event status?
     GOSUB readcmd                   ' READ Standard event status

     IF MID$(rd$,9,1)="1" THEN PRINT "* COMMAND ERROR !! "
     IF MID$(rd$,10,1)="1" THEN PRINT "* EXECUTION  ERROR !! "
     IF MID$(rd$,11,1)="1" THEN PRINT "* DEVICE DEPENDENT ERROR !! "
     IF MID$(rd$,12,1)="1" THEN PRINT "* QUERY ERROR !!   "
     PRINT " INPUT  COMMAND = "+com$

     IF MID$(rd$,7,1)="1" OR MID$(rd$,8,1)="1" OR MID$(rd$,13,1)="1" OR MID$(rd$,
14,1)="1"  THEN GOSUB Bug

     RETURN

gpinit:  ' ---------- Setup GPIB interface ----------

     CALL IBFIND("GPIB0", GPIB0%)        ' Open device (GPIB0)
     IF GPIB0% < 0 THEN GOTO trap        ' system error

     CALL IBFIND("PPG", PPG%)            ' Open device(PPG)
     IF PPG% < 0 THEN GOTO trap          ' system error

     CALL IBSIC(GPIB0%)                  ' Interface clear
     IF IBSTA% < 0 THEN GOTO trap        ' system error

     tim = 0.5
     GOSUB waidly

     CALL IBCLR(PPG%)                    ' Device clear

     RETURN

wrtcmd:  ' ----------  Write command  ----------

     wrt$=wrt$+chr$(13)+chr$(10)
     CALL IBWRT(PPG%, wrt$)              ' Write command
     IF IBSTA% < 0 THEN GOTO trap        ' Trap

     RETURN

readcmd: ' ----------  Read command  ----------

     rd$=SPACE$(16)
     CALL IBRD(PPG%, rd$)                ' Read command
     IF IBSTA% < 0 THEN GOTO trap        ' Trap

     RETURN

waidly:  ' ----------  Wait delay  ----------

     stm = TIMER
     etm = TIMER

     WHILE etm - stm < tim
          etm = TIMER
          IF etm < stm THEN etm = etm + 86400
     WEND

     RETURN
```

```
Bug:    ' ----------  BUG  ----------
        '
        PRINT "???"
        '
        STOP
        '
trap:   ' ----------  System trap  ----------
        '
        PRINT "IBERR%:" + STR$(IBERR%)
        STOP
        '
        '
        END
```

(10) Internal timer setting

This program sets the internal timer, reads its value by data request command, and displays it on the CRT.

Input value is checked by the standard event status byte.
The MP1701B/MP1755A/MP1608A/MP1650A needs several ms to set and start the timer positively.
This program sets a WAIT of approximately 500 ms for this purpose.



Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1650A                 *
' *             REAL TIME SETTING SAMPLE SOFT                *
' *                                                    TIME  *
' ************************************************************
'
'------------------------------------------------------------'
'                          MAIN  ROUTINE                     '
'------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%      ' Setup GPIB-PC functions
GOSUB gpinit                            ' Setup GPIB interface
'
wrt$ = "SRQ 32"   : GOSUB wrtcmd        ' SRQ : Command error bit
wrt$ = "ESE 16"   : GOSUB wrtcmd        ' Extution error bit
'
GOSUB DSet
'
STOP
'
'------------------------------------------------------------'
'                          SUB  ROUTINE                      '
'------------------------------------------------------------'
'
DSet:    '----------  Data Check & Display real time  ----------
'
  DO
    CLS
    INPUT "Real time setting data * YEAR *    [ 0~99 ] ";Y$
    INPUT "Real time setting data * MONTH *   [ 1~12 ] ";M$
    INPUT "Real time setting data * DAY *     [ 1~31 ] ";D$
    INPUT "Real time setting data * HOURE *   [ 0~23 ] ";H$
    INPUT "Real time setting data * MINUTE *  [ 0~59 ] ";Mi$
    INPUT "Real time setting data * SECOND *  [ 0~59 ] ";S$
    PRINT
    '
    rtm$=Y$+","+M$+","+D$+","+H$+","+Mi$+","+S$
    wrt$="RTM "+rtm$   : GOSUB wrtcmd
    '
    GOSUB check
    '
  LOOP UNTIL Result$="OK"
  '
  tim = 0.5 : GOSUB waidly
  '
  wrt$="RTM?" : GOSUB wrtcmd
  GOSUB readcmd : PRINT rd$
  '
  RETURN
  '
check:   '---------- Check Set data ----------
  '
  byt=0
  '
  FOR I=0 TO 2
  '
    CALL IBRSP(PPG%,SPR%)                ' Serial polling
    IF IBSTA% < 0 THEN GOTO trap
    '
    tim = 0.1 : GOSUB waidly
    '
```

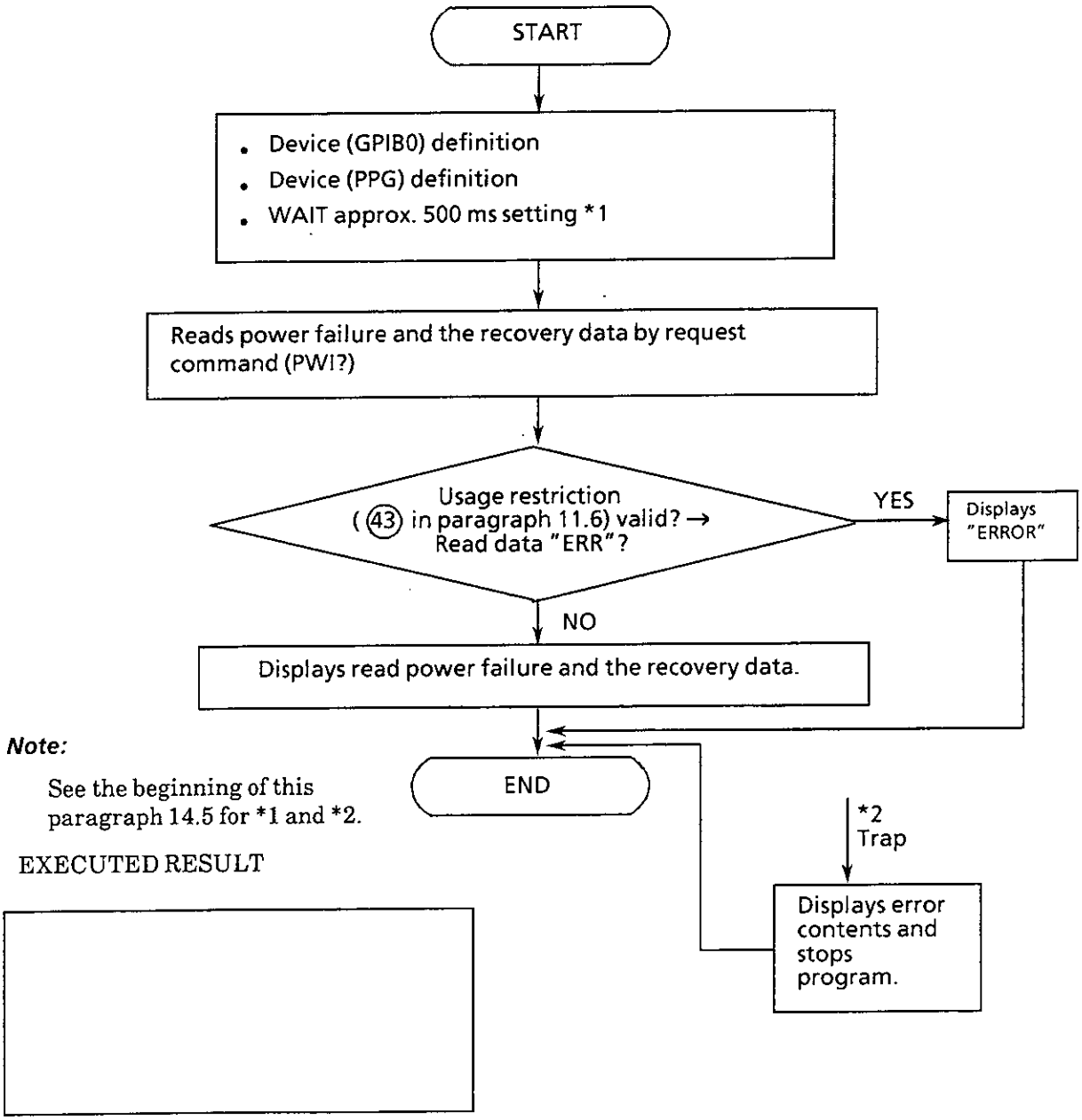
```
      IF SPR%=96 THEN byt=SPR%                ' RQS,Comand Error bit=1
      '
    NEXT I
    '
    IF byt=96 THEN
      INPUT " EXECUTION ERROR !!  Press ENTER key ";A
      wrt$="ESR?" : GOSUB wrtcmd              ' Reset Execution error bit
    ELSE
       Result$="OK"
    END IF
    '
    RETURN
    '
gpinit: ' ---------- Setup GPIB interface  ----------
    '
    CALL IBFIND("GPIB0", GPIB0%)              ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap              ' system error
    '
    CALL IBFIND("PPG", PPG%)                  ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap                ' system error
    '
    CALL IBSIC(GPIB0%)                        ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap              ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                          ' Device clear
    '
    RETURN
    '
wrtcmd: ' ----------  Write command  ----------
    '
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)                    ' Write command
    IF IBSTA% < 0 THEN GOTO trap              ' Trap
    '
    RETURN
    '
readcmd:' ----------  Read command  ----------
    '
    rd$=SPACE$(23)
    CALL IBRD(PPG%, rd$)                      ' Read command
    IF IBSTA% < 0 THEN GOTO trap              ' Trap
    '
    RETURN
    '
waidly: ' ----------  Wait delay  ----------
    '
    stm = TIMER
    etm = TIMER
    '
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
    '
    RETURN
    '
trap:   ' ----------  System trap  ----------
    '
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    END
```

(11) Power failure and power recovery status check

This program reads the MP1701B/MP1755A/MP1608A/MP1650A power failure and the recovery information by request comamnd, and displays them on the CRT. It also shows an actual output example.

The time the MP1701B/MP1755A/MP1608A/MP1650A power was turned OFF the last time can be checked by this.

The backup battery usage time can also be checked by recording the power failure interval time.



Note:

See the beginning of this paragraph 14.5 for *1 and *2.

EXECUTED RESULT

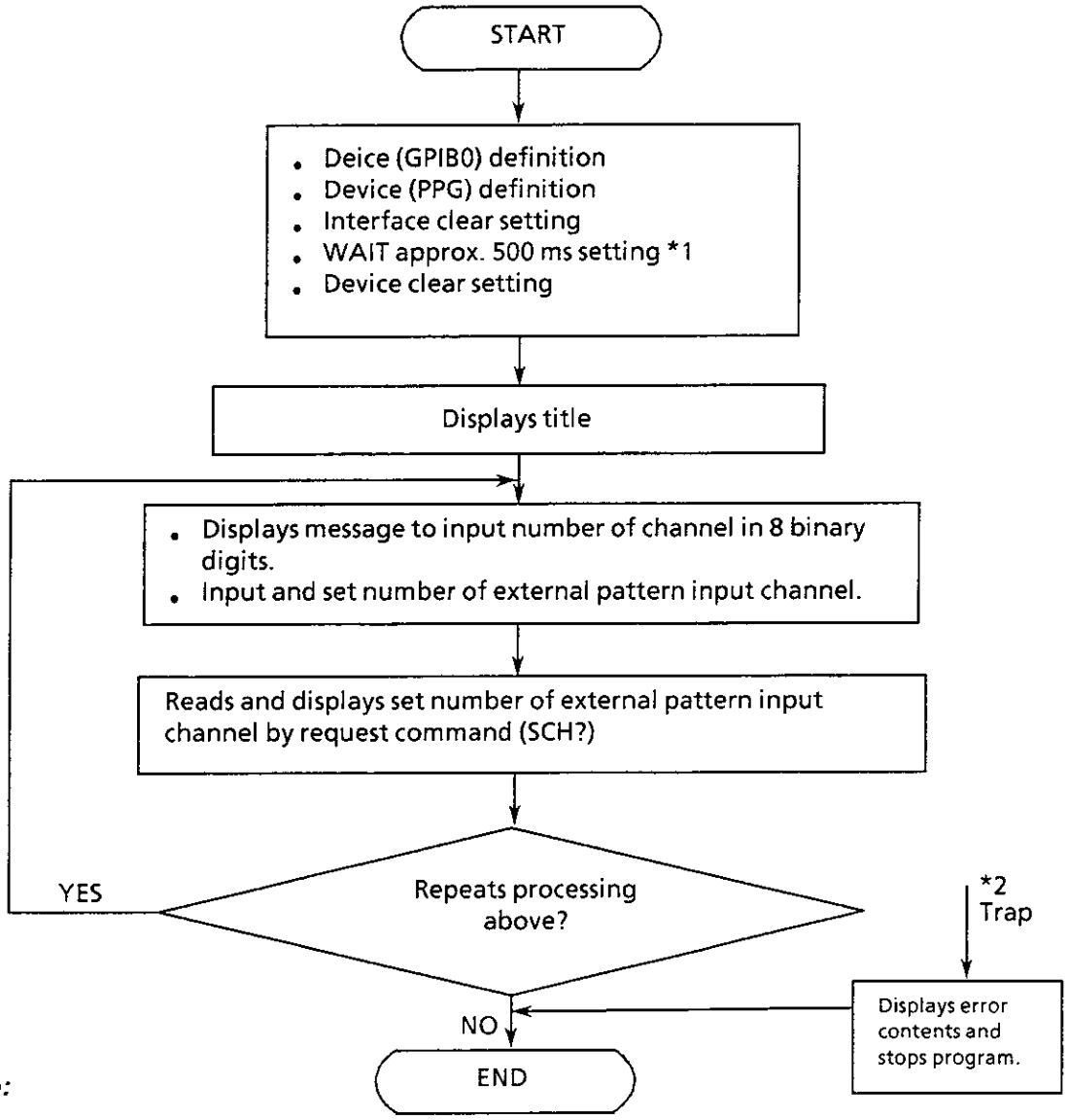
PROGRAM LISTING

```
' ************************************************************
' *                                                          *
' *              MP1701B / MP1608A / MP1750A                 *
' *           POWER FAIL INTERVAL ? SAMPLE SOFT              *
' *                                                  POWER   *
' ************************************************************
'
common shared IBSTA%,IBERR%,IBCNT%    ' Setup GPIB-PC functions
GOSUB gpinit                          ' Setup GPIB interface
wrt$ = "PWI?" : GOSUB wrtcmd      ' REQUEST Power fail interval?
GOSUB readcmd                         ' READ Power fail interval
'
IF MID$(rd$,1,3)="ERR" THEN
  PRINT "ERROR !!"
ELSE
  PRINT  rd$
  '
  FOR I=0 TO 1
    GOSUB readcmd : PRINT rd$
  NEXT I
  '
END IF
'
STOP
'
gpinit: ' ----------  Setup GPIB interface  ----------
'
CALL IBFIND("GPIB0", GPIB0%)          ' Open device (GPIB0)
IF GPIB0% < 0 THEN GOTO trap          ' system error
'
CALL IBFIND("PPG", PPG%)              ' Open device (PPG)
IF PPG% < 0 THEN GOTO trap            ' system error
'
CALL IBSIC(GPIB0%)                    ' Interface clear
IF IBSTA% < 0 THEN GOTO trap          ' system error
'
tim = 0.5
GOSUB waidly
'
RETURN
'
wrtcmd: ' ----------  Write command  ----------
'
wrt$=wrt$+chr$(13)+chr$(10)
CALL IBWRT(PPG%, wrt$)                ' Write command
IF IBSTA% < 0 THEN GOTO trap          ' Trap
'
RETURN
'
readcmd:' ----------  Read command  ----------
'
rd$=SPACE$(23)
CALL IBRD(PPG%, rd$)                  ' Read command
IF IBSTA% < 0 THEN GOTO trap          ' Trap
'
RETURN
'
```

```
waidly:  ' ----------  Wait delay  ----------
         '
     stm = TIMER
     etm = TIMER
     WHILE etm - stm < tim
          etm = TIMER
          IF etm < stm THEN etm = etm + 86400
     WEND
     '
     RETURN
         '
trap:    ' ----------  System trap  ----------
         '
     PRINT "IBERR%:" + STR$(IBERR%)
     STOP
     '
     '
     END
```

(12) Number of external pattern input channel setting

This program sets the number of external pattern input channel.



Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAM LISTING

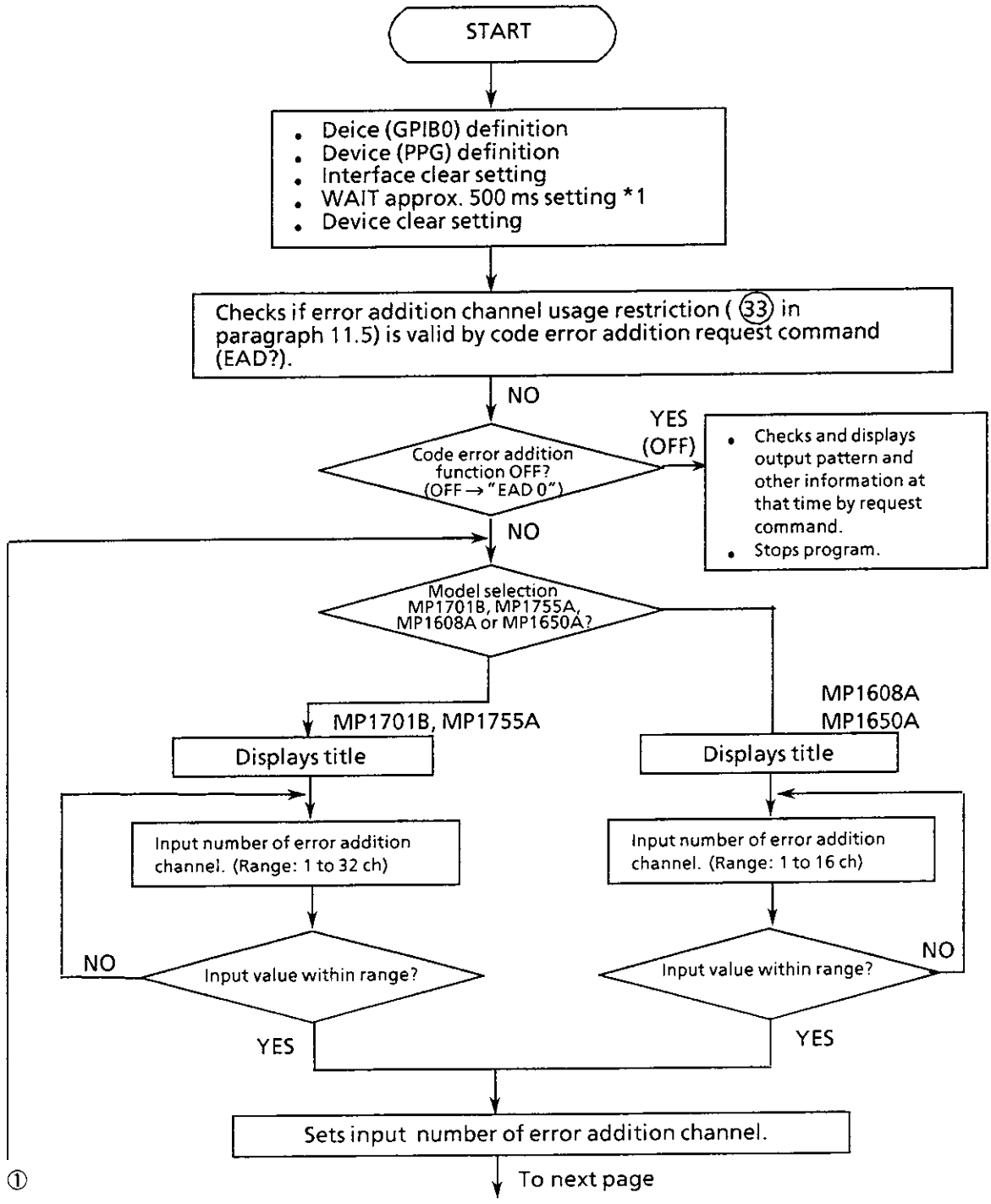
```
' ***************************************************************
' *                                                             *
' *               MP1701B / MP1608A / MP1650A                   *
' *          1/8 SPEED CHANNEL SELECT SAMPLE SOFT               *
' *                                                    CHANNEL  *
' ***************************************************************
'
common shared IBSTA%,IBERR%,IBCNT%     ' Setup GPIB-PC functions
GOSUB gpinit                           ' Setup GPIB interface
'
PRINT "* MP1701B/MP1608A/MP1650A 1/8 SPEED ch SELECT SAMPLE SOFT *"
PRINT
PRINT " CHANNEL 8 FIGURES  [ INT =0 , EXT =1 ]
PRINT
PRINT
'
DO
  INPUT "CHANNEL SET DATA BIT8(8ch)-->BIT1(1ch)  [0/1] ";SCH$
  wrt$ = "SCH #B"+sch$ : GOSUB wrtcmd
  '
  wrt$="SCH?" : GOSUB wrtcmd
  GOSUB readcmd : PRINT rd$
  '
  INPUT "NEXT DATA SET [ YES=0 , NO=1 ] ";loop$
  PRINT
  '
LOOP UNTIL loop$="1"
'
STOP
'
gpinit: ' ----------  Setup GPIB interface  ----------
'
    CALL IBFIND("GPIB0", GPIB0%)         ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap         ' system error
    '
    CALL IBFIND("PPG", PPG%)             ' Open device (PPG)
    IF PPG% < 0 THEN GOTO trap           ' system error
    '
    CALL IBSIC(GPIB0%)                   ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap         ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                     ' Device clear
    '
    RETURN
'
wrtcmd: ' ----------  Write command  ----------
'
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)               ' Write command
    IF IBSTA% < 0 THEN GOTO trap         ' Trap
    '
    RETURN
```

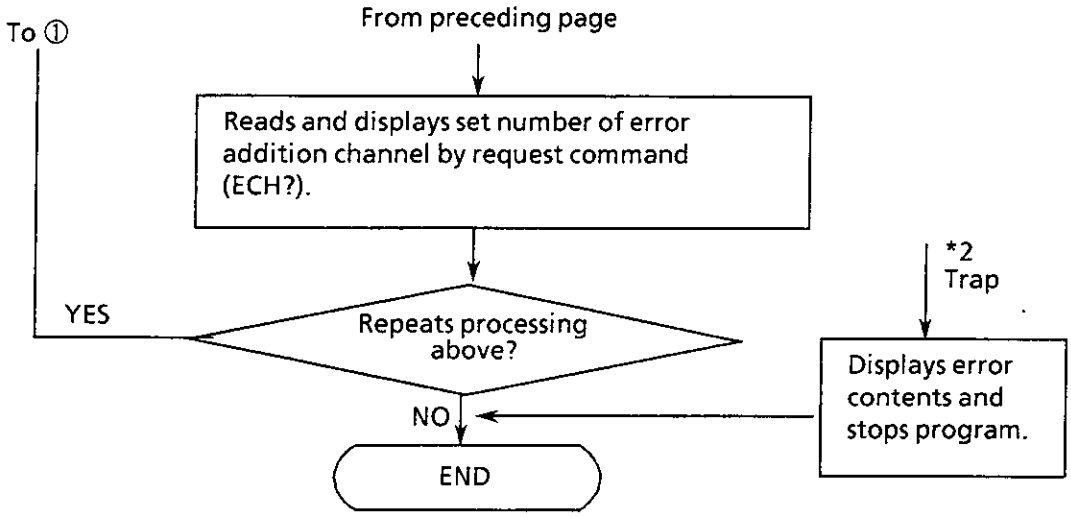
```
'
readcmd: ' ----------  Read command  ----------
'
    rd$=SPACE$(16)
    CALL IBRD(PPG%, rd$)                    ' Read command
    IF IBSTA% < 0 THEN GOTO trap            ' Trap
    '
    RETURN
'
waidly:  ' ----------  Wait delay  ----------
'
    stm = TIMER
    etm = TIMER
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
    '
    RETURN
'
trap:    ' ----------  System trap  ----------
'
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    '
    END
```

(13) Error addition channel setting

This program sets the error addition channel.

The error addition channel cannot be set when the code error addition function is OFF. At this time, the output pattern related information is displayed on the CRT and program execution ends.





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAMING LISTING

```
' ****************************************************************
' *                                                              *
' *  MP1701B/MP1608A/MP1650A ERROR ADDITION ch SET SAMPLE SOFT   *
' *                                                              *
' *                                                    ERR_ADD   *
' ****************************************************************
'
'--------------------------------------------------------------'
'                          MAIN  ROUTINE                       '
'--------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%    ' Setup GPIB-PC functions
GOSUB gpinit                          ' Setup GPIB interface
'
wrt$ = "EAD?" : GOSUB wrtcmd          ' REQUEST Error addition mode
GOSUB readcmd                         ' READ Error addition mode
IF MID$(rd$,1,5)="EAD 0" THEN             '       OFF --> ERROR
  GOSUB Ero: PRINT " **PROGRAM STOP**"
  STOP
END IF
'
DO
  CLS
  '
  INPUT " MODE SELECT [ MP1701B=0, MP1608A=1, MP1650A=2 ]";mode$
  PRINT
  '
  SELECT CASE mode$
      CASE "0": GOSUB 10G
      CASE "1": ppg$="MP1608A": GOSUB 5G3G
      CASE "2": ppg$="MP1650A": GOSUB 5G3G
  END SELECT
  '
  wrt$ = "ECH "+STR$(ech) : GOSUB wrtcmd  'Set Error addition ch
  '
  wrt$="ECH?" : GOSUB wrtcmd
  GOSUB readcmd
  PRINT " ERROR ADDTION CHANNEL = "+MID$(rd$,5,2)
  '
  INPUT " NEXT DATA SET [ YES=0 , NO=1 ]";loop$
  '
LOOP UNTIL loop$="1"
'
STOP
'
'--------------------------------------------------------------'
'                          SUB  ROUTINE                        '
'--------------------------------------------------------------'
'
10G:'----------  MP1701B DATA INPUT  ----------
'
PRINT " ***  MP1701B ERROR ADDTION ch SAMPLE SOFT ***"
PRINT
DO
  INPUT " ERROR ADDITION ch SET DATA [ 1~32 ] ";ech
  '
LOOP UNTIL ech < 33  AND ech > 0
'
RETURN
```

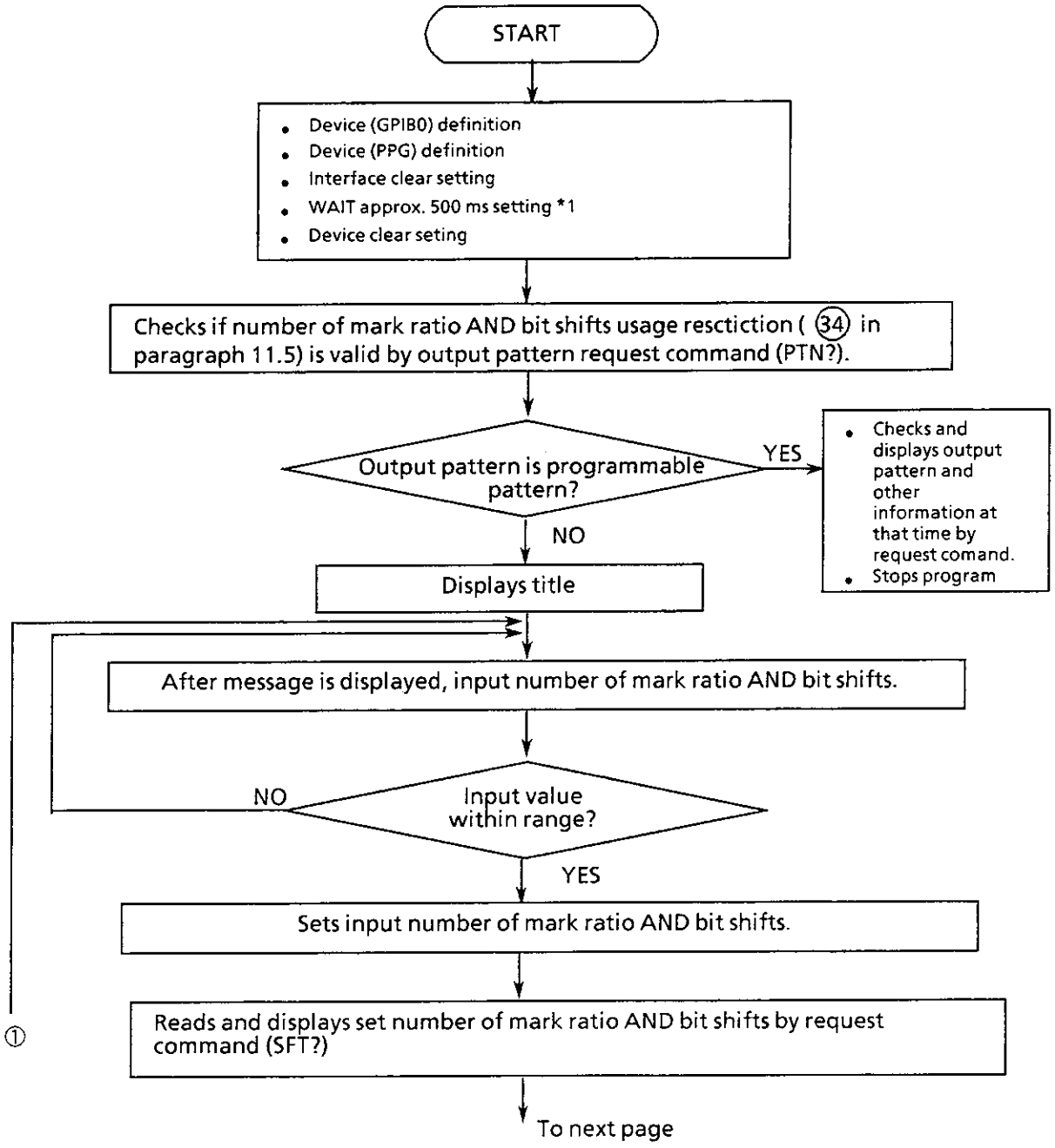
```
5G3G:'----------  MP1608A,MP1650A DATA INPUT  ----------
     '
     PRINT " ***  "+ppg$+" ERROR ADDTION ch SAMPLE SOFT ***"
     PRINT
     DO
       INPUT " ERROR ADDITION ch SET DATA [ 1~16 ] ";ech
     '
     LOOP UNTIL ech < 17  AND ech > 0
     '
     RETURN
     '
Ero:   ' ----------  Display Pattern mode  ----------
     '
     PRINT "ERROR !!  ERROR ADDITION MODE =  OFF "
     PRINT
     wrt$ = "PTN? " : GOSUB wrtcmd        ' REQUEST Pattern mode ?
     GOSUB readcmd                        ' READ Pattern mode ?
     '
     SELECT CASE MID$(rd$,5,1)
     '
         CASE "0": GOSUB ProgW
         '
         CASE "1": GOSUB ProgD
         '
         CASE "2": PRINT "PATTERN MODE = PRBS.PN7 "
         '
         CASE "3": PRINT "PATTERN MODE = PRBS.PN9 "
         '
         CASE "5": PRINT "PATTERN MODE = PRBS.PN11 "
         '
         CASE "6": PRINT "PATTERN MODE = PRBS.PN15 "
         '
         CASE "7": PRINT "PATTERN MODE = PRBS.PN20 "
         '
         CASE "8": PRINT "PATTERN MODE = PRBS.PN23 "
         '
         CASE "9": PRINT "PATTERN MODE = PRBS.PN31 "
         '
     END SELECT
     '
     RETURN
     '
ProgW:   ' ----------  PROG.WORD MODE  ----------
     '
     PRINT " Pattern mode is PROG.WORD MODE "
     PRINT
     '
     wrt$ = "WNB?" : GOSUB wrtcmd : GOSUB readcmd
     PRINT "NUMBER OF WORD ="+MID$(rd$,4,6)
     '
     wrt$ = "WLN?" : GOSUB wrtcmd : GOSUB readcmd
     PRINT "WORD LENGTH ="+MID$(rd$,4,3)
     '
     wrt$ = "PAG?" : GOSUB wrtcmd : GOSUB readcmd
     PRINT "PAGE ="+MID$(rd$,4,6)
     '
     RETURN
     '
ProgD:   ' ----------  PROG.DATA MODE  ----------
     '
     PRINT "Pattern mode is PROG.DATA MODE "
     PRINT
     '
```

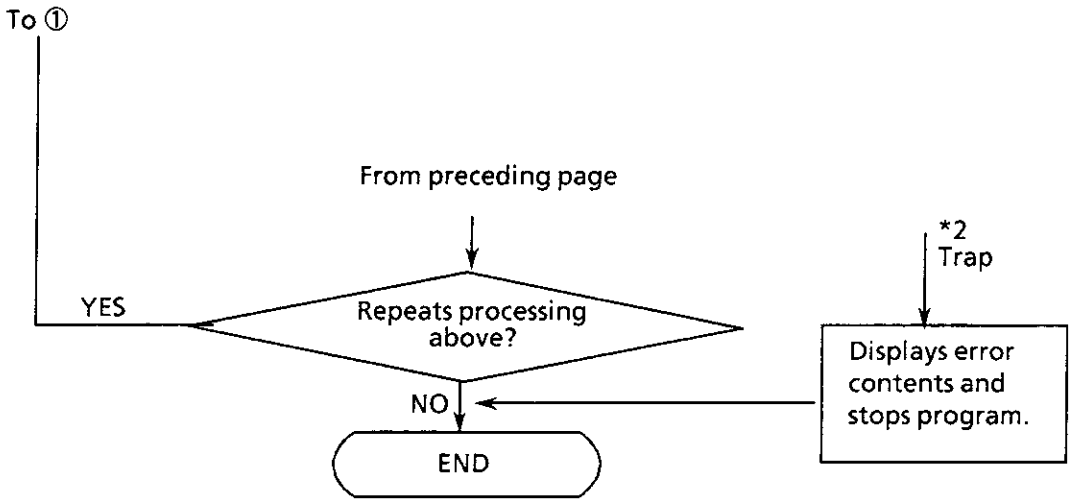
```
    wrt$ = "DLN?" : GOSUB wrtcmd : GOSUB readcmd
    PRINT "DATA LENGTH ="+MID$(rd$,4,7)
    '
    wrt$ = "PAG?" : GOSUB wrtcmd : GOSUB readcmd
    PRINT "PAGE ="+MID$(rd$,4,6)
    '
    RETURN
    '
gpinit: ' ----------  Set up GP-IB functions  ----------
    '
    CALL IBFIND("GPIB0", GPIB0%)        ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap        ' system error
    '
    CALL IBFIND("PPG", PPG%)            ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap          ' system error
    '
    CALL IBSIC(GPIB0%)                  ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap        ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                    ' Device clear
    '
    RETURN
    '
wrtcmd: ' ----------  Write command  ----------
    '
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)              ' Write command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
    '
    RETURN
    '
readcmd: ' ----------  Read command  ----------
    '
    rd$= SPACE$(12)
    CALL IBRD(PPG%,rd$)                 ' Read command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
    '
    RETURN
    '
waidly: ' ----------  Wait delay  ----------
    '
    stm = TIMER
    etm = TIMER
    '
    WHILE etm - stm < tim
        etm = TIMER
        IF etm < stm THEN etm = etm + 86400
    WEND
    '
    RETURN
    '
trap:   ' ----------  System trap  ----------
    '
    PRINT "IBERR%:" + STR$(IBERR%)
    STOP
    '
    END
```

(14) Number of mark ratio AND bit shifts setting

This program sets the number of mark ratio AND bit shifts.

The number of mark ratio AND bit shifts cannot be set when the output pattern is in the programmable mode. At that time, the information related to output pattern is displayed on the CRT and program execution is ended.





Note:

See the beginning of this paragraph 14.5 for *1 and *2.

PROGRAMING LISTING

```
' ****************************************************************
' *                                                              *
' *      MP1701B/MP1608A/MP1650A  MARK RATIO SAMPLE SOFT         *
' *                                                              *
' *                                                      MARK    *
' ****************************************************************
'
'--------------------------------------------------------------'
'                          MAIN  ROUTINE                       '
'--------------------------------------------------------------'
'
common shared IBSTA%,IBERR%,IBCNT%      ' Setup GPIB-PC functions
GOSUB gpinit                            ' Setup GPIB interface
'
PRINT " *** MP1701B/MP1608A/MP1650A  MARK RATIO  SAMPLE SOFT ***"
PRINT
'
wrt$ = "PTN?" : GOSUB wrtcmd            ' REQUEST Pattern mode ?
GOSUB readcmd                           ' READ Pattern mode
'
IF MID$(rd$,5,1)="0" OR MID$(rd$,5,1)="1" THEN
  GOSUB Ero                             ' Word/Data mode-->Error
  PRINT "** PROGRAM STOP ** "
  STOP
END IF
'
DO
  GOSUB Mark
  '
  INPUT " NEXT DATA SET [ YES=0 , NO=1 ]";loop$
  PRINT
  '
LOOP UNTIL loop$="1"
'
STOP
'
'--------------------------------------------------------------'
'                          SUB  ROUTINE                        '
'--------------------------------------------------------------'
      '
Mark:   ' ----------  SET Mark ratio bit shift ----------
      '
  DO
    INPUT "MARK RATIO SHIFT [ 1 BIT Shift=0 , 3 BIT Shift=1 ] ";sft
  LOOP UNTIL sft=0 OR sft=1
  '
  wrt$ = "SFT " +STR$(sft) : GOSUB wrtcmd
  wrt$="SFT?" : GOSUB wrtcmd : GOSUB readcmd
  '
  IF MID$(rd$,1,5)="SFT 0" THEN
   rd$="1"
  ELSE
    rd$="3"
  END IF
  '
  PRINT "MARK RATIO BIT SHIFT= "+rd$
  '
  RETURN
```

```
'
Ero:    ' ----------  Error --> Display Pattern data  ----------
'
    IF MID$(rd$,5,1)="0" THEN
        PRINT "ERROR !!  Pattern mode = PROG.WORD MODE "
        PRINT
        '
        wrt$ = "WNB?" : GOSUB wrtcmd : GOSUB readcmd
        PRINT "NUMBER OF WORD ="+MID$(rd$,4,6)
        '
        wrt$ = "WLN?" : GOSUB wrtcmd : GOSUB readcmd
        PRINT "WORD LENGTH ="+MID$(rd$,4,3)
        '
        wrt$ = "PAG?" : GOSUB wrtcmd : GOSUB readcmd
        PRINT "PAGE ="+MID$(rd$,4,6)
        '
    ELSE
        PRINT "ERROR !!  Pattern mode = PROG.DATA MODE "
        PRINT
        '
        wrt$ = "DLN?" : GOSUB wrtcmd : GOSUB readcmd
        PRINT "DATA LENGTH ="+MID$(rd$,4,7)
        '
        wrt$ = "PAG?" : GOSUB wrtcmd : GOSUB readcmd
        PRINT "PAGE ="+MID$(rd$,4,6)
        '
    END IF
    '
    RETURN
    '
gpinit: ' ----------  Set up GP-IB functions  ----------
    '
    CALL IBFIND("GPIB0", GPIB0%)        ' Open device (GPIB0)
    IF GPIB0% < 0 THEN GOTO trap        ' system error
    '
    CALL IBFIND("PPG", PPG%)            ' Open device(PPG)
    IF PPG% < 0 THEN GOTO trap          ' system error
    '
    CALL IBSIC(GPIB0%)                  ' Interface clear
    IF IBSTA% < 0 THEN GOTO trap        ' system error
    '
    tim = 0.5
    GOSUB waidly
    '
    CALL IBCLR(PPG%)                    ' Device clear
    '
    RETURN
    '
wrtcmd: ' ----------  Write command  ----------
    '
    wrt$=wrt$+chr$(13)+chr$(10)
    CALL IBWRT(PPG%, wrt$)              ' Write command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
    '
    RETURN
    '
readcmd: ' ----------  Read command  ----------
    '
    rd$= SPACE$(12)
    CALL IBRD(PPG%, rd$)                ' Read command
    IF IBSTA% < 0 THEN GOTO trap        ' Trap
    '
    RETURN
    '
```

```
waidly:  ' ----------  Wait delay  ----------
         '
     stm = TIMER
     etm = TIMER
     '
     WHILE etm - stm < tim
         etm = TIMER
         IF etm < stm THEN etm = etm + 86400
     WEND
     '
     RETURN
         '
trap:    ' ----------  System trap  ----------
         '
     PRINT "IBERR%:" + STR$(IBERR%)
     '
     STOP
     '
     '
     END
```