CHAPTER 5 GP-IB

5-1 SUMMARY

The GP-IB (General Purpose Interface Bus) is a general purpose interface bus system for digital equipment approved in 1975 by the Institute of Electrical and Electronics Engineers (IEEE).

The GP-IB interface for this equipment is based on IEEE 488-1978. It can perform remote setting of all parameters which can be set on the panel. It also comes with a program mode function.

Further, it can read back the measured values of current and voltage and can easily be used to build an automatic testing system.

5-2 GP-IB SPECIFICATIONS

(1) Interface functions

Function	Sub set	Description
Sourcehandshaking	SH 1	Source handshaking function available
Acceptor handshaking	AH 1	Acceptor handshaking function available
Talker	T 5	All basic talker functions available. Talk only mode function available. Serial pole function available. Function of talker cancellation bv designating listener available
Listener	L 4	Basic listener functions available. Function of listener cancellation by designating talker available.
Service	SR 1	Service demanding function available
Remote/local	RL 1	Remote/local switching function available
Parallel pole	PR 0	Parallel pole function not available
Device clear	DC 1	Device clear function available
Device trigger	DT 1	Device trigger function available
Controller	CO	Controller function not available

(2) Codes used

The codes to be used in this equipment are ISO7 bit codes (JIS/ASCII) without parity.Control codes are neglected. It is not case sensitive, but reads both lower case and upper case. When the talker function is used, the letters are transmitted in upper case.

(3) Responses to interface messages

IFC	GP-IB interface initialized. Listener/talker canceled.
DCL and SDC	GP-IB input and output buffer cleared. SRQ canceled. Errors canceled. Initial resetting made.
LLO	Local key of the operation switch invalidated.
GTL	Set to local condition.

(4) Addresses

Addresses from 0 to 30 can be used.

(5) Others

•Number of device to be connected :15 maximum (including a controller)

•Lengthofcables :20 m or less (total length of cables for one system) .Cable length for connection between devices must be 2 m or less.

•When connecting bus cables using three or more connectors, do not place them on top of each other.

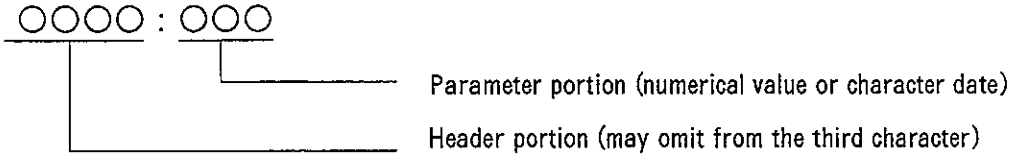
•Always turn the device's power OFF before connecting and disconnecting connectors.

•Check power conditions, grounding states, etc. for each device before turning their power ON. Turn the power ON for all connected devices without fail.

5-3 FORMATS

5-3-1 COMMAND MESSAGE FORMAT

The command message format is as shown below. The symbol ":" is used for division between the header portion and the parameter portion. The symbol "," or "," is used for designating commands continuously. In this case, the command must not exceed 128 characters. No assurance is provided for the extra portion. Space and control codes are all ignored. When changing the range and data specify the range and data in this order. The specified values are automatically arranged within the range and resolution which can be set.



5-3-2 NUMERICAL VALUE FORMAT

The numerical value formats to be used in this equipment include the following three types. When using the listener function, any type is received, But if the number of signifi cant digits is exceeded, the setting is incorrect.

(1) Integer type (NR1) : Numerical values without a decimal point

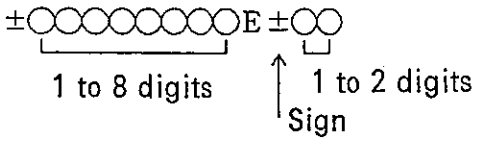
Symbol+1 to 8 digits

(2) Real number type (NR2) : Numerical values including a decimal point ("." (period) used as a decimal point)

Symbol+1 to 8 digits

(3) Exponent type (NR3) : The exponent portion is shown after the letter E. (The sign for the exponent must be inserted with fail.)

Number of characters to be used : 13 or less



5-3-3 RESPONSE FORMAT

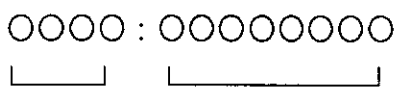
Response data formats are as follows, depending on the command. Plural responses are divided by "," and output continuously. In the event the response.
exceeds 128 characters, the following data will be neglected

1) Response format for an inquiry

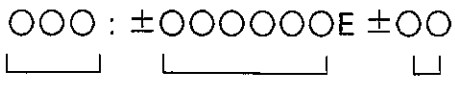
○○○○ : ○○○

2) Response format for setting and measured data

①NR1



②NR3



5-3-4 DELIMITER

When using the listener/talker function, it is possible to set delimiters as shown in item 5-4 (2).

5-4 GP-IB DIP SWITCH SETTING

Addresses, delimiters, and modes are set by the dip switch on the rear panel of this equipment.

GP-IB address switch (rear panel)

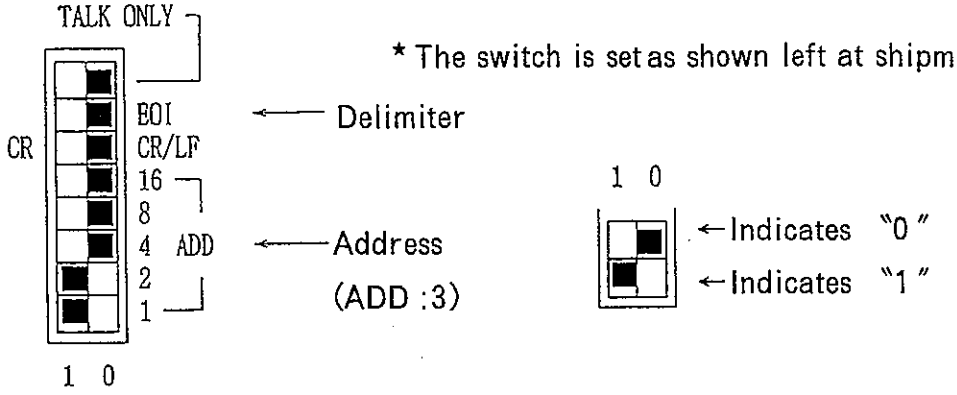


Fig. 5-4 GP-IB dip switch

(1) Address

These switches set the GP-IB address of this equipment. It is possible to set the addresses of the binary five bits from 0 to 30. The setting of 31 (1 for all five bits) cannot be used. To set the address to 3, for example, set the switches 1 and 2 to "1."

(2) Delimiter

<CR>, <LF>+EOI (END message)	0	0
<CR>, +EOI (END message)	1	0
<CR>, <LF>	0	1
<CR>	1	1

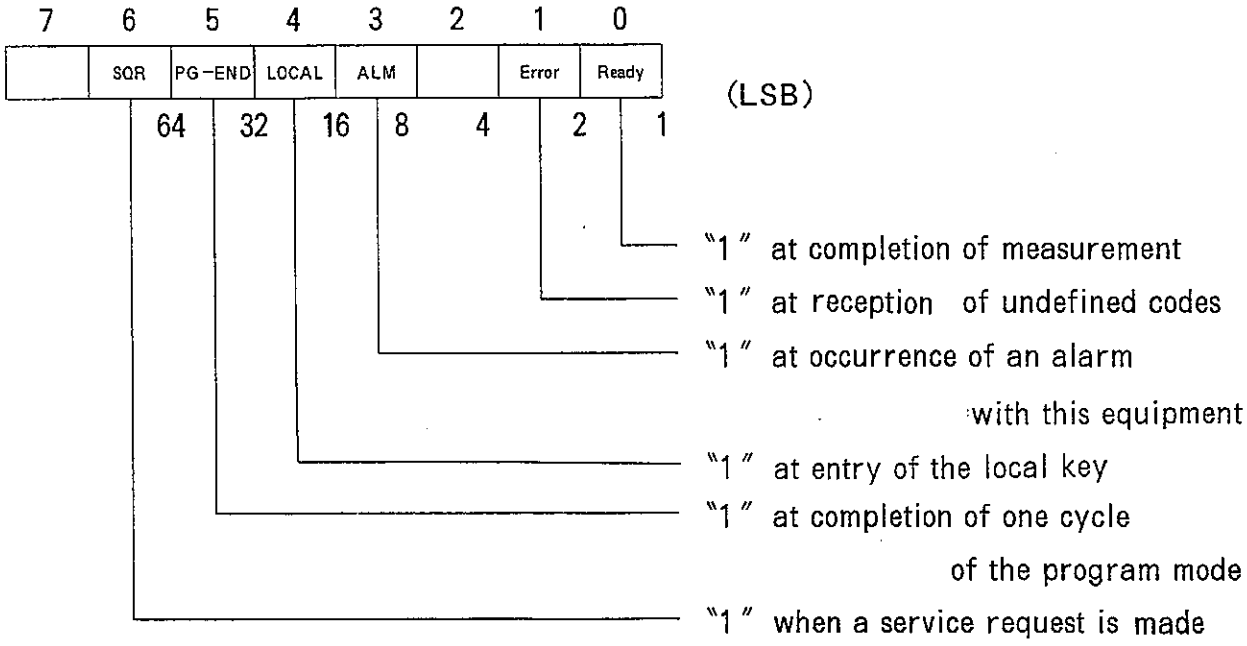
(3) TALK ONLY

By setting the switch to "1," this equipment will shift to the TALK ONLY mode. If 5 of the address bit (AD16) is set to "1," data will automatically be output every two seconds.

5-5 REMOTE CONTROL

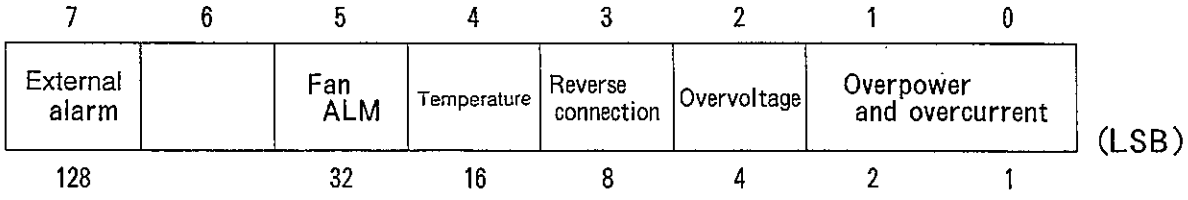
5-5-1 SERVICE REQUEST (SRQ)

When the mode is set to the service request mode, a service request is made to the controller with completion of measurement, reception of undefined codes, occurrence of alarms, etc. The following flags are effective only when SRQ is sent.



5-5-2 ALARM STATUS

When an alarm occurs with this device, a service request is made. The cause for the alarm can be checked by the alarm status. An alarm is sent by decimal ASCII code. For example, in the event that the alarm status is fan ALM and temperature ALM, the code will be ALMS :48.



5-5-3 INITIAL STATUS

When it receives the reset command "REST", this device is set to the initial status as shown below.

LOAD : OFF
SLEW RATE : 100 μS
FRQ : 1000Hz
DUTY : 50%
HEAD : OFF
SRQ : OFF

Load data CC : OA
CR : OPEN
CV : Maximum
CP : Maximum

5-5-4 COMMAND MESSAGES

Command messages are shown in Table 5-5-4, program mode command messages in Table 5-6-2, and load setting in Table 5-8 (αXL series) and Table 5-9 (αXH series).
When command messages are set continuously, they are divided by the characters ";" or ";." In this case, command messages must not exceed 128 characters. The extra portion is not assured.

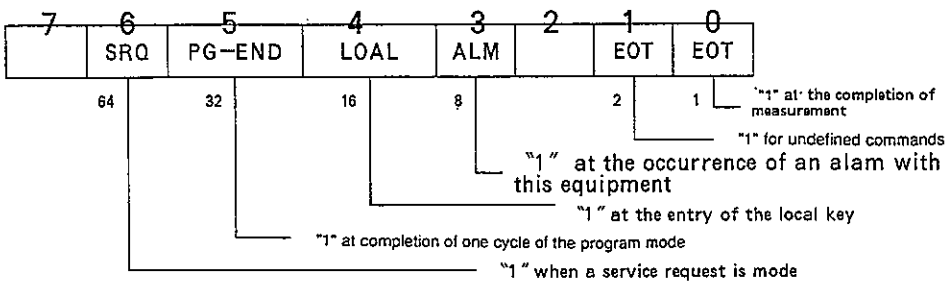
When changing the range and data, set the range and data in this order. The set values are automatically rounded within a range and resolution that can be set.

Table 5-5-4 List of Command Messages (1/3)

Item	Command message	Abbreviation	Descriptions	Notes
LOAD ON/OFF	LOAR : ?		Inquiry about the load status.	ILOAD : n
	LOAD :OFF LOAD :ON	LO0 LO1	Command to set the load to OFF. Command for setting the load to ON.	
ACTION MODE	AMODE : ? or MODE : ?	AM? MO0	Inquiry about the action mode.	MODE : X
	AMODE :C or MODE :C	AM0 MO0	Command to set the mode to the constant current (CC) mode. Constant voltage (CV) mode to be set to off.	
	AMODE :V	AM1	Command to set the mode to the constant current (CC) +Constant voltage (CV) mode.	
	AMODE :P	AM2	Command to set the mode to the constant power (CP) mode. Constant voltage (CV) mode to be set to off.	
	AMODE :S	AM3	Command to set the mode to the constant power (CP) +Constant voltage (CV) mode.	
	AMODE :R or MODE :R	AM45 MO1	Command to set the mode to the constant current (CR) mode. Constant voltage (CV) mode to be set to off.	
	AMODE :U	AM5	Command to set the mode to the constant resistance(CR)+Constant voltage (CV) mode.	
	AMODE :V	MO2	Command to set the mode to the constant current (CC) +Constant voltage (CV) mode. The range to be fixed to 30 A-range and 120 V-range.	
CC,CR,CP RANGE	VRANG :?	RA?	Inquiry about the range (CC,CR,CP-mode)	ILOAD : n
	RANGE :n		Command to set the range (Example:150αXL)	
	0	RA0	n: 0 — CC: 30 A — CR: 0.05 Ω — CP: 150 W	
	1	RA1	n: 1 — CC: 3 A — CR: 0.5 Ω — CP: 15 W	
	2	RA2	n: 2 — CC: 0.3 A — CR: 5 Ω — CP: 1.5 W	
			This isineffective after the execution of "MO2".	
CV RANGE	VRANG :?	VR?	Inquiry about the range (CV mode)	VRNG : n
	VRANG :n			
	0	VR0	120V	
	1	VR1	20V This isineffective after the execution of "MO2".	
SLEW RATE	SLEW : ?	SL?	Inquiry about the slew rate	SLEW : n
	SLEW :n		Command to set the slew rate	
	0	SL0	10 μS	
	1	SL1	20 μS	
	2	SL2	50 μS	
	3	SL3	100 μS	
	4	SL4	200 μS	
	5	SL5	500 μS	
	6	SL6	1000 μS	
	7	SL7	2000 μS	

Table 5-5-4 List of Command Messages (2/3)

Item	Command message	Abbreviation	Descriptions	Notes
FUNCTION	FUNC : ?		Inquiry about the function status.	FUNC : n
	FUNC : A FUNC : B FUNC : C FUNC : INT FUNC : STOP	FU0 FU1 FU2 FU3 FU4	Command to shift the function to A Command to shift the function to B Command to shift the function to C Command to turn ON the function SW Command to turn OFF the function SW	
Switching frequency	FRQ:?	FR?	Inquiry about the switching frequency	* H FREQ : x
	FRQ:D	FRd	Command to set the switching frequency d : 1–10000Hz	* H DUTY : x
Duty	DUTY : ?	DU ?	Inquiry about the duty ratio	
	DUTY : d	DUd	Command to set the duty ratio d:5–95%	
Header	HEAD : ?	HE?	Inquiry about the header	HEAD:n
	HEAD : OFF HEAD : ON	HE0 HE1	Command for not using a header Command for using a header	
Service request	SRQ : ?	SR?	Inquiry about the service request sending more	SRQ : x
	SRQ : OFF SRQ : ON	SQ0 SR1	Command for not sending a service request Command for sending a service request	
Reset	RESET	RE	Command for setting the equipment to its initialstatus LOAD : OFF Load data FREQ : 1000 ├ CC : OA DUTY : 50 ├ CR : MAX HEAD : ON ├ CP : OW SRQ : OFF └ CV : OV(CHG)/MAX(DIS)	* H MDEL : m
Model name	MDEL : ?	MD?	Inquiry about the model name Example) 150 αXL : "EUL–150aXL ___" 600 αXH : "EUL–600aXH ___" 5spaces	* H MDEL : m
Alarm	ALMS : ?	AD?	Inquiry about the alarm status	* H ALMS : n



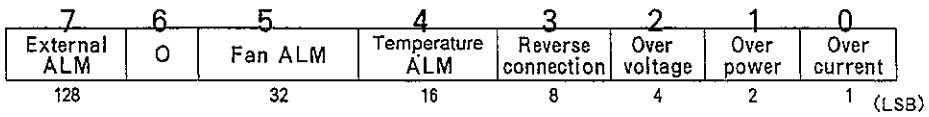


Table 5-5-4 List of Command Messages (3/3)

Item	Command message	Abbreviation	Descriptions	Notes
Set data	SETD :?	SE?	Inquiry about the set data current, resistance, power or voltage values	*H
	SETD :d	SEd	Command to set the data of current, resistance, power , or voltage values AMO, MO 0 | AM1,AM3,AM5,MO2 | AM2 CC | CV | CP	CSET :m RSET :m VSET :m PSET :m
CC, CR Set data	CSET : ?	CS?	Inquiry about the data of current or resistance values	*H
	CSET :d	CSd	Command to set the data of current or resistance values. Ineffective after execution of "MO2".	CSET :m RSET :m
CV Set data	VSET : ?	VS?	Inquiry about the data of voltage values	*H
	VSET :d	VSd	Command to set the data of voltage values	VSET :m
CP Set data	PSET:?	PS?	Inquiry about the set data of power values	*H
	PSET:d	PSd	Command to set the data of power values	PSET :m
Set data Function	DASE:? DBSE:? DCSE:?	DA? DB? DC?	Inquiry about the data set to FUNCTION A Inquiry about the data set to FUNCTION B Inquiry about the data set to FUNCTION C	*H
	DASE :d DBSE :d DCSE :d	DAd DBd DCd	Command to set the data to FUNCTION A Command to set the data to FUNCTION B Command to set the data to FUNCTION C AMO, MO 0 | AM1,AM3,AM5,MO2 | AM2 CV | CP	DAST :m DBST :m DCST :m
Mode and data setting	CCSE :d CRSE :d CVSE :d CPSE :d	CCd CRd CVd CPd	Command for CC mode and measurement of current values Command for CR mode and measurement of resistance values Command for CV mode (30A, 120V range) and measurement of voltage values Command for CP mode and measurement of power values	
Measuremennt	MEAS : ? MEAS :C ? MEAS :V ? MEAS :W ? MEAS :S ?	ME?	Command for measuring input voltage and current values Command for measuring input current values Command for measuring input voltage values Command for measuring input power values Command for measuring input voltage and power values	*H CURR :m VOLT :m WATT :m
Indication	WIND :0 WIND :1 WIND :2	WI 0 WI 2 WI 1	Command for indicating input voltage and current values Command for indicating input power and current values Command for indicating input voltage and power values	
Total current fuction	CIND :?	CI?	Inquiry about the total current mode	
	CIND :0 CIND :1 CIND :2	CI 0 CI 1 CI 2	Nomal mode :One-time mode 5-time mode 25-time mode	A-1 A-5 A-25

Note 1 :The header marked *in the response can be deleted by HEADER OFF.

5-6 PROGRAM MODE

5-6-1 SUMMARY OF THE PROGRAM MODE

In the program mode, the equipment can operate with loads controlled up to 2048 steps maximum. This enables various load simulations.

5-6-2 PROGRAM MODE COMMAND MESSAGES

Table 5-6-2 List of Command Messages (1/1)

Item	Command message	Abbreviation	Descriptions	
Program load			The program starts by the trigger command.	
PG mode	PRGM :?	PG?	Inquiry about PG mode	
	PRGM :? :1 :2	PG 0 PG 1 PG 2	Command to cancel thePG mode PG mode (LOAD OFF at completion) PG mode (LOAD ON at completion) *A	
Program steps	PNST :?	PN?	Inquiry about the number of program steps	
	PNST :n	PNn	Command to set the number of program steps n=2 ~2048	
Program interval	PTST :?	PT?	Inquiry about the program interval	*2
	PTST :t	PTT	Command to set the program interval t =1 to 60000 (unit :0.1 mS) (0.1mS -6sec)	
Data setting	PDST :n ;d or PDST ;n ;dn+1 - - :dn+m	PDN1:d	Command to set program data n :Data number d :Data	
	PCST :n1 :n2 :d	PCn: n2:d	Command to set program data continuously. Set n1-n2 to d. n1:Data number n2:Data number n2 >n1 d :Data	
Number of cycles	PLST :?	PL?	Inquiry about the number of program cycles	
	PLST :c	PLC	Command to set the number of program cycles c =1 ~9999	

5-6-3 NOTES

(1) Do not change the mode, range, and function during operation in program mode.

(2) Measurement and indication of voltage and current is not made during operation in the program mode.

(3) The program mode is started using the GP-IB trigger command.

5-7 TALK ONLY MODE

When this device is set to the talk-only mode, data can be output to listeners such as a printer without going through the controller. In this case, set the listener to the talk-only mode, and do not operate the controller simultaneously.

Two versions of the talk-only mode of this equipment are available.

(1) Automatic output : Data is output at an interval of approximately 2 seconds.

(2) Output at a specified time : With the load on, data is output when the DUTY key is pushed.

Output format (numerical value format NR3)

VOLT : +xxx. xxe+xx, CURR : +xx, xxxe+xx