ADVANTEST

ADVANTEST CORPORATION

R9211 Series

Digital Spectrum Analyzer

GPIB Handbook

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Safety Summary

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

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

- **Warning Labels**

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

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

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

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

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

- **Basic Precautions**

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

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

product.

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

- **Caution Symbols Used Within this Manual**

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

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

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

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

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

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

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

Main Parts with Limited Life

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

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.

- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.

- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

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

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

Example: fluorescent tubes, batteries

Environmental Conditions

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

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

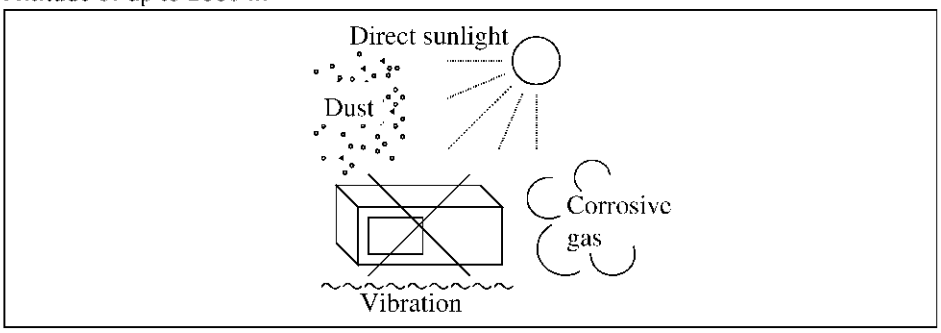


Figure-1 Environmental Conditions

- Operating position

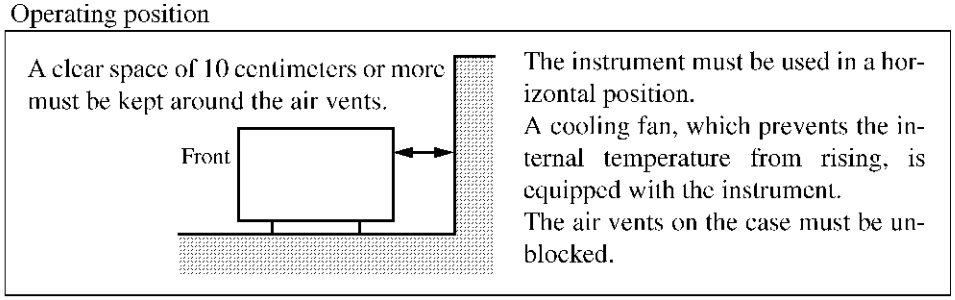


Figure-2 Operating Position

- Storage position

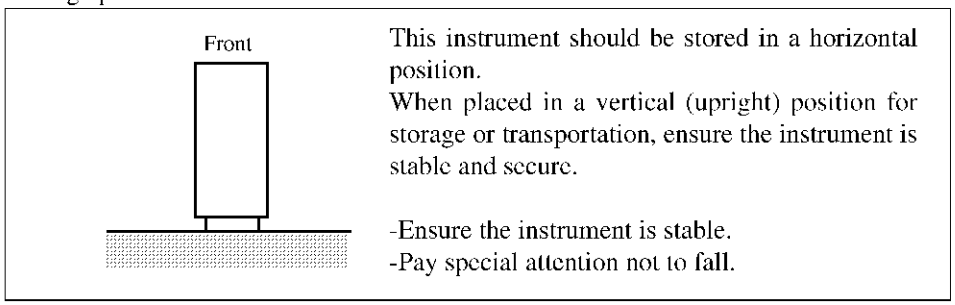


Figure-3 Storage Position

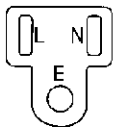
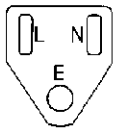
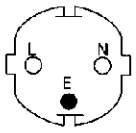
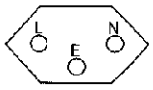
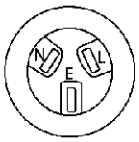
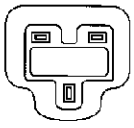
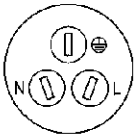
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

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

  Pollution Degree 2

Types of Power Cable

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

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

OVERVIEW

This handbook describes GPIB interface of R9211 series digital spectrum analyzer. Read this handbook for description of GPIB.
For description and handling method for R9211 series instruments, refer to their respective manuals.

HOW TO READ THIS HANDBOOK

This handbook desribes outline of GPIB, and electric specifications, connector specifications, interface function, operation procedures and program codes of GPIB, etc.
For system construction, refer to the program examples in Chapter 5.

Contents of R9211 series manuals

Introduction of R9211
Preparation before use and general notes
Fundamental operation
Explanation of functions
Example of measurement
Description of keys
Handling method of floppy disks, etc.
Performance and accessories
X and Y software menu configuration
Description of terms

Contents of GPIB handbook

Outline of GPIB
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GPIB operation procedures
GPIB commands
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GPIB program codes

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1. OUTLINE

The R9211 series digital spectrum analyzer provided with a GPIB interface as standard equipment can be remotely controlled by the measurement bus (GPIB: General purpose interface bus) of IEEE standard 488-1978.

The GPIB interface of the R9211 series provides the following functions:

Setting	Panel setting: Provides the same function as manual operation setting from the panel face (including label setting).
	Data transfer mode setting: Various data transfer format setting, delimiter selection, header on/off, read command setting.
Reading	Reading panel setting conditions
	Reading data: Reading cursor data, ASCII block, binary block, SET REF. (set reference), overall, partial, list data
Service request	Service request function for input over, setting error, and operation completion
	Specific service request factor can be masked.

An outline of the GPIB is desribed below.

(1) GPIB is an interface system that can connect a measuring device, controller, and peripheral devices using a exclusive cable (bus line).

(2) GPIB features excellent expandability compared with former interface, is easy to use, and electrically, mechanically, and functionally, compatible with products of other manufactures. Therefore, various types of system, ranging from a simple system to a high performance automatic measurement system can be configured by using a single bus cable.

(3) In the GPIB system, an address of each device connected to the bus line must be set. Each device can function as a controller, talker, and listener.

(4) While the system operates, only one talker can transfer data to the bus line and multiple listeners can receive that data.

(5) The controller specifies addresses of a talker and listener to transfer data from a talker to a listener, or sets the measurement conditions to a listener from a controller self (works as a talker).

(6) Eight bit parallel and byte serial format data lines are used for data transfer between devices, thus enabling bidirectional transfer asynchronously.

(7) The asynchronous system allows a high-speed and a low-speed device to be connected together to the same equipment.

(8) Data (message) sent/received between devices consists of measurement data, measurement condition (program), and various commands. The ASCII code is used when sending/receiving these data.

(9) GPIB is provided with three handshake lines for controlling send/receive of asynchronous data between devices, five control lines for controlling the information flow on the bus, in addition to the eight data lines described above.

- The following signals are used for the handshake lines:

DAV (Data Valid)	Signal indicating the data valid state
NRFD (Not Ready For Data)	Signal indicating the data receive enable state
NDAC (Not Data Accepted)	Signal indicating receive completion state

- The following signals are used for the control line:

ATN (Attention)	Signal used for distinguishing, whether a signal on the data line is an address, command, or other information
IFC (Interface Clear)	Signal for clearing the interface
EOI (End or Identify)	Signal used when information transfer is completed
SRQ (Service Request)	Signal for requesting a service to the controller from any device
REN (Remote Enable)	Signal used for remote control of a device where the remote program is enabled

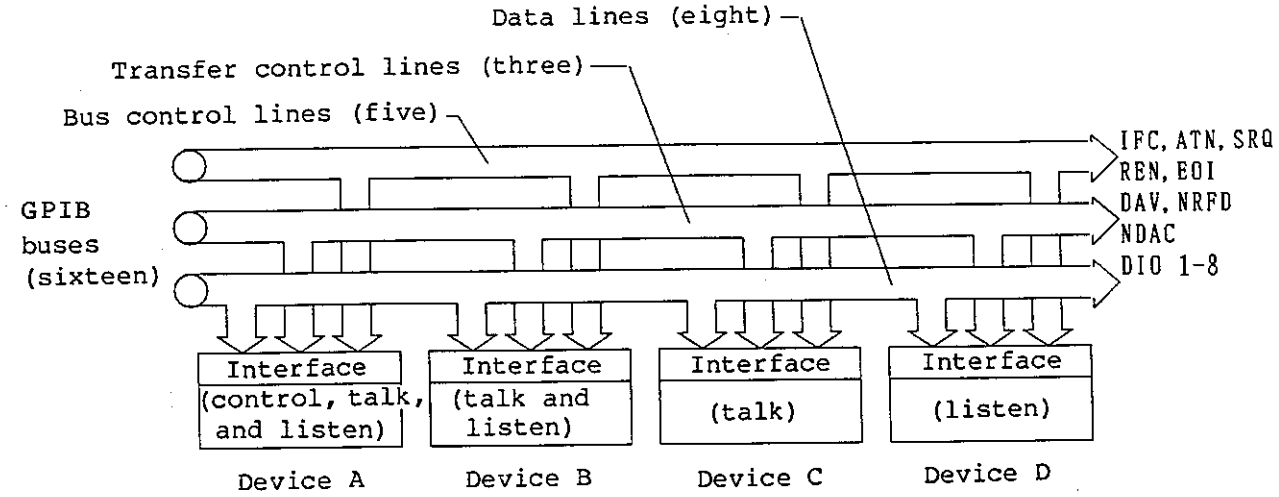


Figure 1 - 1 Outline of GPIB

MEMO

2. STANDARD

2.1 GPIB Specifications

Standard	:	IEEE488-1978
Code used	:	ASCII code. Or binary code for packed format.
Logical level	:	Logical '0' (high status) + 2.4V or more Logical '1' (low status) + 0.4V or less
End of signal line	:	Sixteen bus lines are terminated, as shwon in Figure 2-1.
Driver specifications	:	Open corrector format (excluding EOI and DAV) 'Low' status output voltage: +0.4V or less, 48mA 'High' status output voltage: +2.4V or less, -5.2mA
Receiver specifications:		'Low' status for +0.6V or less 'High' status for +2.0V or more
Bus cable length	:	All bus cable length must be (the number of devices connected with the bus) x 2m or less and must not exceed 20m.
Address specification	:	31 types of talk address/listen address can be set optionally, using the address selection switches on the rear panel.
Connector	:	24-pin GPIB connector 57-20240-D35A (equivalent of a product from Anphenol Corp.)

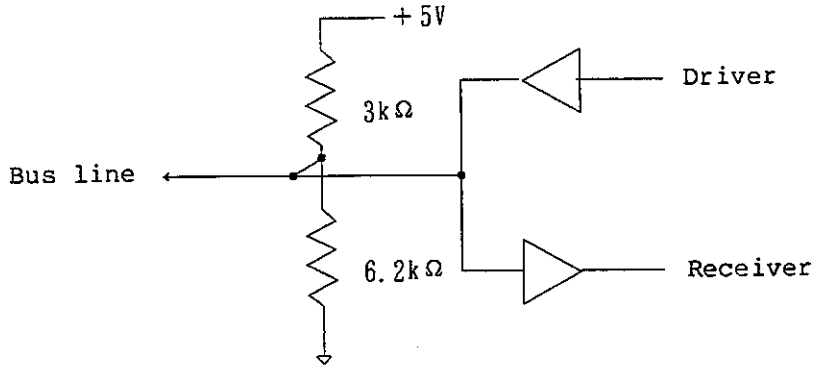


Figure 2 - 1 End of Signal Line

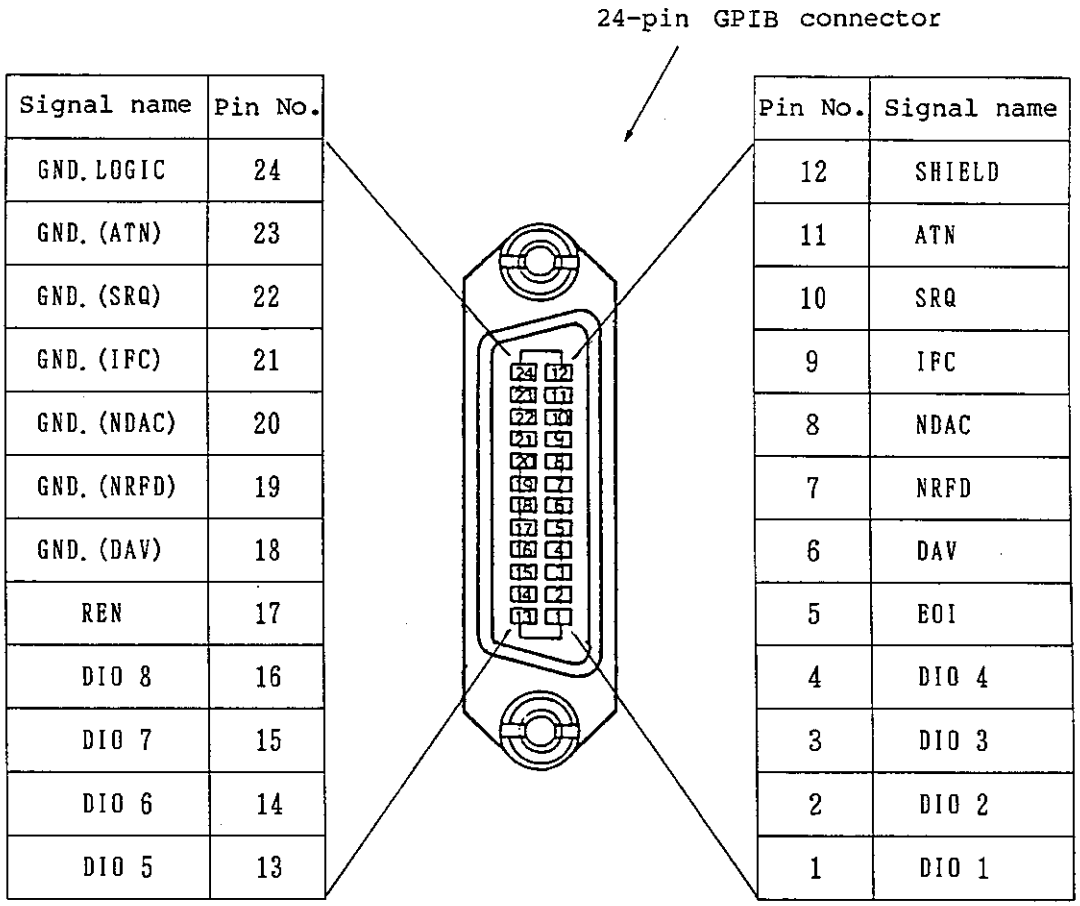


Figure 2 - 2 GPIB Connector Pin Configuration

2.2 Interface Function

Table 2-1 shows the GPIB interface function.

Table 2 - 1 Interface Function

Code	Function and explanation
SH1	Source and handshake function
AH1	Acceptor handshake function
T5	Basic talker function, serial poll function, talker only function *, and talker clear function by listener specification
L4	Basic listener function and listener clear function by talker specification
SR1	Service request function
RL1	Remote function
PR0	No parallel function
DC0	No device clear function
DT0	No device trigger function
C0	No controller function
E1	Open correct bus driver. EOI and DAV uses E2 (three-state bus driver is used).

* Talker-only function functions for plotter.

MEMO

3. GPIB OPERATION PROCEDURES

3.1 Connecting the Components

The GPIB system consists of multiple equipment. Care must be taken with the following steps to ready the system.

(1) Before making connections, consult with the operation guides and carry out a preliminary check of the ready state and operations of each component, such as R9211, the controller, and peripheral equipment.

(2) The connection cable with the measurement equipment or the bus cable with the controller etc. must not be longer than necessary. The bus cable must not be longer than specified. Total length of the bus cables must not be longer than either twenty meters, or, two meters multiplied by the number of units to be connected to the bus.

ADVANTEST provides the cables shown in Table 3-1 as standard bus cables.

(3) Do not stack three or more connectors to connect the bus cable. The connector must be fixed securely with connector fixing screws.

(4) Each component may be powered up only after the power supply, grounding, and setting conditions have been properly checked.

The power supply for all the equipment being connected to the bus must be turned on. Otherwise, operation of the whole system cannot be assured.

Table 3 - 1 Standard Bus Cables (Provided Separately from the System)

Length	Name
0.5m	408JE-1P5
1m	408JE-101
2m	408JE-102
4m	408JE-104

3.2 Description of GPIB Panel

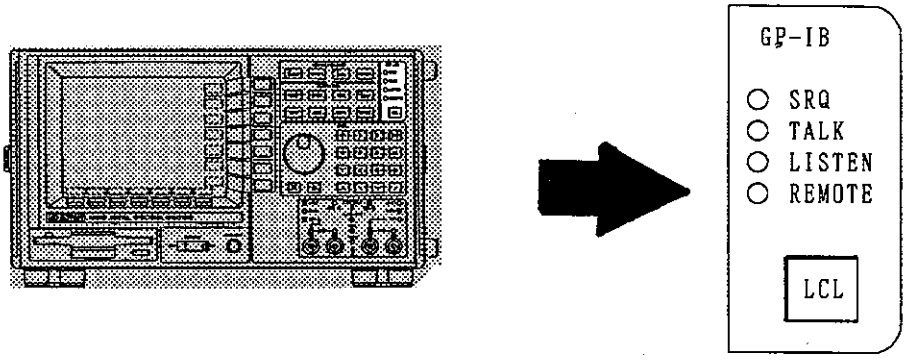


Figure 3 - 1 GPIB Interface Panel

① SRQ lamp

Indicates that the analyzer is sending a service request to the controller.

② TALK lamp

Indicates that the analyzer is in the talk mode wherein it sends data.

③ LISTEN lamp

Indicates that the analyzer is in the listen mode wherein it receives data.

④ REMOTE lamp

This lamp lights when the analyzer is not set via the front panel, but by commands from the controller. The analyzer cannot be set by key operations on the front panel while this lamp is on.

⑤ LCL (LOCAL)

This key releases the remote control state (indicated by the remote lamp) and enables control through the front panel.

This key is disabled, when the analyzer is set in the local lock-out mode. The analyzer is set to the local mode (the local key is not locked out) when the system is powered.

4. GPIB COMMANDS

4.1 Panel/Display Control through GPIB

(1) Toggle setup

Add number 0 or 1 after the GPIB code as follows:
Add number 1 for setup at the left to the toggle.
Add number 0 for setup at the right to the toggle.

Example

(GPIB)	(Menu)	(GPIB input)
BUZZER	BUZZER ON/OFF	BUZZER1
BUZZER	BUZZER ON/ OFF	BUZZER0
SENSA	CH-A AUTO/MAN	SENSA1
SENSA	CH-A AUTO/ MAN	SENSA0

(2) Numeric data input

The sampling rate, sense range, and frequency range can be input from the software menu. There are two types of GPIB input.

① If the basic unit system is not set in the GPIB code

The basic unit of numeric data can be input. The numeric data must be input after the GPIB code.
The basic units are seconds, herz (Hz), and volts(V).

Example: Sampling rate in WAVEFORM mode

(GPIB)	(Menu)	(GPIB input)
SAMPLRAT	SAMPLE RAT 3.91μsec	SAMPLRAT3.91E-6 or SAMPLRAT0.00000391)

The other example

(GPIB)	(Menu)	(GPIB input)
FRAMEP	FRAME TIM 4msec	FRAMEP4E-3 or FRAMEP0.004
SENSADV	SET CH-A -30dBV	SENSADV-30
TRGLEVEL	LEVEL 0.5V	TRGLEVEL5E-1 or TRGLEVEL0.5

NOTE

Some values may not be set as they are. An example is the sampling rate* that is fixed to each product. In such case, the nearest sampling rate is set.
If the frequency range is set to 25 kHz with the GPIB code, 20 kHz are internally set.

*: Frame time, sence range, frequency range, etc.

② If the basic unit system is already set in the GPIB code

Enter the numeric data after the GPIB code.

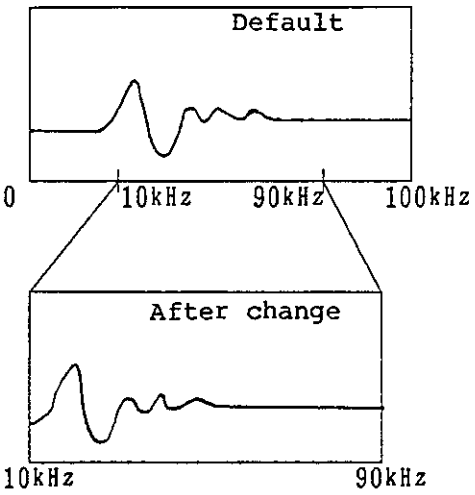
Example If the TIME axis is displayed by the [XSCALE] key in the [VIEW] key mode

(GPIB)	(Menu)	(GPIB input)
XSCLFTS XSCLFTMS XSCLFTUS	LEFT 1.1sec	XSCLFTS1.1
XSCLFTS XSCLFTMS XSCLFTUS	LEFT 10msec	XSCLFTMS10
XSCLFTS XSCLFTMS XSCLFTUS	LEFT 1μsec	XSCLFTUS1

If the frequency axis is displayed by the [XSCALE] key in the [VIEW] key mode

(GPIB)	(Menu)	(GPIB input)
XSCLFTKH XSCLFTHZ XSCLFTMZ	LEFT 10Hz	XSCLFTHZ10
XSCLFTKH XSCLFTHZ XSCLFTMZ	LEFT 1kHz	XSCLFTKH1
XSCLFTKH XSCLFTHZ XSCLFTMZ	LEFT 100mHz	XSCLFTMZ100

When changing the scale on axis X



If "XSCLFTKH10"
and "XSCRITKH90"
are set

Frequency range setup example

(GPIB)	(Menu)	(GPIB input)
FRANGKH FRANGHZ FRANGMZ	FREQ RNG 100kHz	FRANGKH100
FRANGKH FRANGHZ FRANGMZ	FREQ RNG 10Hz	FRANGHZ10
FRANGKH FRANGHZ FRANGMZ	FREQ RNG 100mHz	FRANGMZ100

4.2 GPIB Control Commands

The available GPIB control commands are listed in Table 4-1. The ASCII character codes are listed in Table 4-2.

NOTE

The measuring condition setting commands should be issued in the following sequence:
1. MODE setting command
2. SETUP setting command (The FUNC parameter setting command must be issued first in the SETUP command.)
3. VIEW setting command
4. MATH and MKR setting commands

Table 4 - 1 GPIB Control Commands (1 of 2)

Item	Program code		Explanation	Setting readout
	Function	Setup		
SRQ control	SRQ	0, 1	0: SRQ not issued 1: SRQ issued	○
SRQ mask	MSK	0 to 255		○
Error status send request	REQER			×
Clear status byte	CSB			×
Clear error	CES			×
Specification of block data send format	FMT	0 to 2	0:ASCII 1:16 bit binary 2:64 bit IEEE float	○
Select block data	SELXY	0 to 1	0:Vertical (Y) axis data 1:Horizontal (X) axis data	○
Block data send request	REQDT			×
Block data send Data count send request	REQDTN			×

Table 4 - 1 GPIB Control Commands (2 of 2)

Item	Program code		Explanation	Setting readout
	Function	Setup		
Subblock setup	SBN	0 to 32	0 or 1 :Releases the subblock control 2 to 32:Sets the specified number of character strings in the subblock, defines a comma (,) as the delimiter of the character strings in the subblock, and difines the delimiter of CR or LF of the subblock.	○
Selection of readout send request data	SELRD	0 to 4	0:Sends all lines displayed on the screen. 1:Sends the first line. 2:Sends the second line. 3:Sends the third line. 4:Sends the fourth line.	○
Readout data send request	SEQRD			×
Header control	HED	0 or 1	0:Header not displayed (OFF) 1:Header displayed (ON)	○
String delimiter	SDL	0 to 2	0:Comma (,) 1:Space (␣) 2:CR, LF	○
Block delimiter	DEL	0 to 2	0:CRLF(EOI) 1:LF 2:(EOI)	○

If the setting readout field is identified by symbol "0", its command can be read by adding a question mark (?) to the program code. An example of "SRQ?".

NOTE

Up to 64 characters can be written on a single remote command line. For MEAS command for MODE selection, only one program code is allowed on a line.

Table 4 - 2 ASCII Character Codes

ASCII character	Equivalent codes Binary	Octal	Decimal	ASCII character	Equivalent codes Binary	Octal	Decimal	ASCII character	Equivalent codes Binary	Octal	Decimal	ASCII character	Equivalent codes Binary	Octal	Decimal
NULL	00000000	000	0	space	00100000	040	32	@	01000000	100	64	`	01100000	140	96
SOH	00000001	001	1	!	00100001	041	33	A	01000001	101	65	a	01100001	141	97
STX	00000010	002	2	"	00100010	042	34	B	01000010	102	66	b	01100010	142	98
ETX	00000011	003	3	#	00100011	043	35	C	01000011	103	67	c	01100011	143	99
EOT	00000100	004	4	$	00100100	044	36	D	01000100	104	68	d	01100100	144	100
ENQ	00000101	005	5	%	00100101	045	37	E	01000101	105	69	e	01100101	145	101
ACK	00000110	006	6	&	00100110	046	38	F	01000110	106	70	f	01100110	146	102
BELL	00000111	007	7	'	00100111	047	39	G	01000111	107	71	g	01100111	147	103
BS	00001000	010	8	(	00101000	050	40	H	01001000	110	72	h	01101000	150	104
H_{TAB}	00001001	011	9	)	00101001	051	41	I	01001001	111	73	i	01101001	151	105
LF	00001010	012	10	*	00101010	052	42	J	01001010	112	74	j	01101010	152	106
V_{TAB}	00001011	013	11	+	00101011	053	43	K	01001011	113	75	k	01101011	153	107
FF	00001100	014	12	,	00101100	054	44	L	01001100	114	76	l	01101100	154	108
CR	00001101	015	13	-	00101101	055	45	M	01001101	115	77	m	01101101	155	109
SO	00001110	016	14	.	00101110	056	46	N	01001110	116	78	n	01101110	156	110
SI	00001111	017	15	/	00101111	057	47	O	01001111	117	79	o	01101111	157	111
DLE	00010000	020	16	0	00110000	060	48	P	01010000	120	80	p	01110000	160	112
DC_1	00010001	021	17	1	00110001	061	49	Q	01010001	121	81	q	01110001	161	113
DC_2	00010010	022	18	2	00110010	062	50	R	01010010	122	82	r	01110010	162	114
DC_3	00010011	023	19	3	00110011	063	51	S	01010011	123	83	s	01110011	163	115
DC_4	00010100	024	20	4	00110100	064	52	T	01010100	124	84	t	01110100	164	116
NAK	00010101	025	21	5	00110101	065	53	U	01010101	125	85	u	01110101	165	117
SYNC	00010110	026	22	6	00110110	066	54	V	01010110	126	86	v	01110110	166	118
ETB	00010111	027	23	7	00110111	067	55	W	01010111	127	87	w	01110111	167	119
CAN	00011000	030	24	8	00111000	070	56	X	01011000	130	88	x	01111000	170	120
EM	00011001	031	25	9	00111001	071	57	Y	01011001	131	89	y	01111001	171	121
SUB	00011010	032	26	:	00111010	072	58	Z	01011010	132	90	z	01111010	172	122
ESC	00011011	033	27	;	00111011	073	59	[	01011011	133	91	{	01111011	173	123
FS	00011100	034	28	<	00111100	074	60	\	01011100	134	92	:	01111100	174	124
GS	00011101	035	29	=	00111101	075	61	]	01011101	135	93	}	01111101	175	125
RS	00011110	036	30	>	00111110	076	62	^	01011110	136	94	~	01111110	176	126
US	00011111	037	31	?	00111111	077	63	_	01011111	137	95	DEL	01111111	177	127

Table 4 - 3 R9211 Label Characters

Label	(Hex)	Label	(Hex)	Label	(Hex)	Label	(Hex)	Label	(Hex)	Label	(Hex)
A	41	a	61	0	30	#	23	↑	1C	α	80
B	42	b	62	1	31	%	25	↓	1D	β	81
C	43	c	63	2	32	&	26	→	1E	γ	82
D	44	d	64	3	33	∫	EF	←	1F	δ	83
E	45	e	65	4	34	:	3A	°	DF	ε	84
F	46	f	66	5	35	;	3B	Ω	FA	ζ	85
G	47	g	67	6	36	(	28			η	86
H	48	h	68	7	37	)	29			θ	87
I	49	i	69	8	38	[	5B			ι	88
J	4A	j	6A	9	39	]	5D			κ	89
K	4B	k	6B	.	2E	<	3C			λ	8A
L	4C	l	6C	,	2C	>	3E			μ	8B
M	4D	m	6D	−	2D	"	22			ν	8C
N	4E	n	6E	+	2B	!	21			ξ	8D
O	4F	o	6F	*	2A	?	3F			o	8E
P	50	p	70	/	2F	SP	20			π	8F
Q	51	q	71	=	3D					ρ	90
R	52	r	72							σ	91
S	53	s	73							τ	92
T	54	t	74							υ	93
U	55	u	75							ϕ	94
V	56	v	76							χ	95
W	57	w	77							ψ	96
X	58	x	78							ω	97
Y	59	y	79							Δ	F1
Z	5A	z	7A							Σ	F7

SP : Space

(2) Character data Input method

When a label or filename is input with the GPIB, enclose the character string with the same character as special character in the following table to check that the label or filename with the command analyzer.

Special character	ASCII code
!	21 (hex)
"	22
#	23
$	24
%	25
/	2F
[	5B

Note 1: For example When a special character is input as a label, enclose it with the other special characters.

Example of input of #$ by UNITLBL as a label

```
PRINT @FFT;"UNITLBL 0 0 %#$%"
```

Note 2: When special character " is input as a label.

Even if special character " is a PRINT instruction of personal computer, it cannot be described directly.
Because it is used to select the character string.
To input ", use CHR$ to set " to CHR$ (&H22).

When " ABC" is input as a label for example

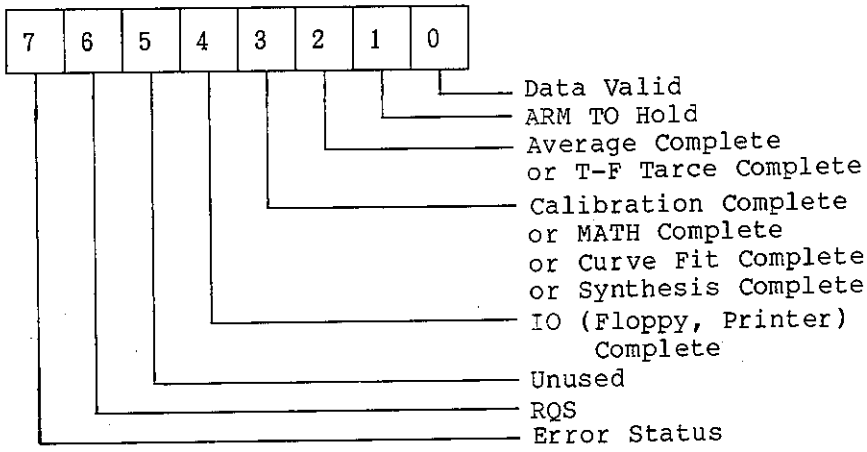
```
PRINT @FFT;"command name" +CHR$ (&H22)+" ABC" + CHR$ (&H22)
```

4.3 Service Request

If the analyzer is set in the SRQ1 mode, it can issue a service request to the controller according to the various operations. If a service request is issued, the status byte is sent during serial polling of the controller. (The status byte can also be issued in the SRQ0 mode.) Each bit of the status byte can be masked by the program code of "MSKnnn". (All bits are cleared when the system power supply is turned on or when program code "CSB" is issued.)

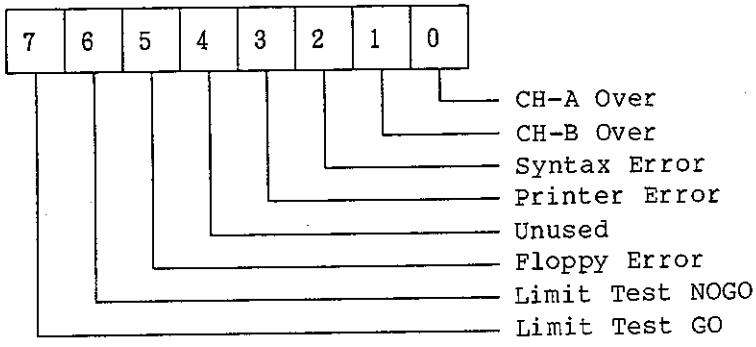
(1) Issue of SRQ

The RQS request is set when either of bits 0 to 4 and 7 is set to logical 1.



(2) Error status

If one of bits 0 to 7 is set to logical 1, the Error Status bit of the SRQ is set to 1. When this status is read, the error status bit is cleared automatically.



4.4 Talker Format of Block Data

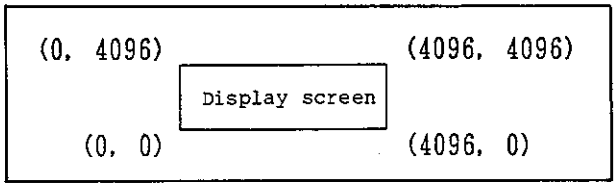
(1) Talker format of block data (1) there are 3 talker formats of the block data.

① ASCII format

Data is converted into ASCII format. The standard unit of the data is used. (Examples are 100000 Hz for 100 kHz and 0.001 V for 1 mV.)

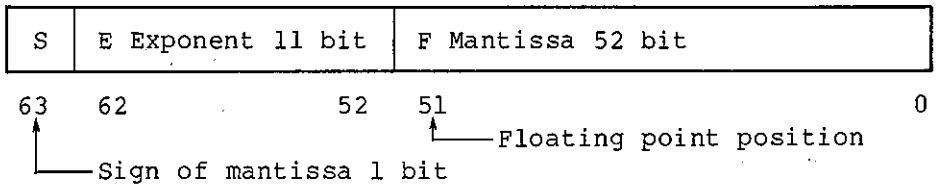
② 16-bit binary format

Data is displayed within the range of 0 to 4096 according to the screen display mode. The following provides the relation of display.



③ 64-bit binary format

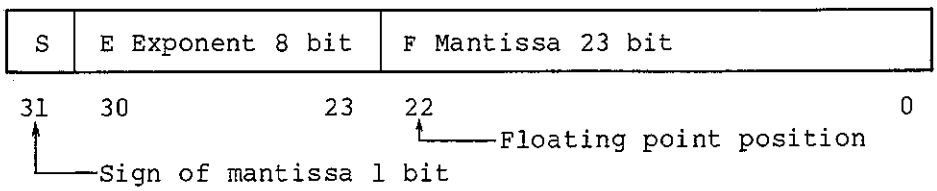
Data is output in the IEEE double-density, floating point format as follows:



$$\text{Value} = (-1)^S \times 2^{(E-1023)} \times (1.\ F)$$

④ 32-bit binary format

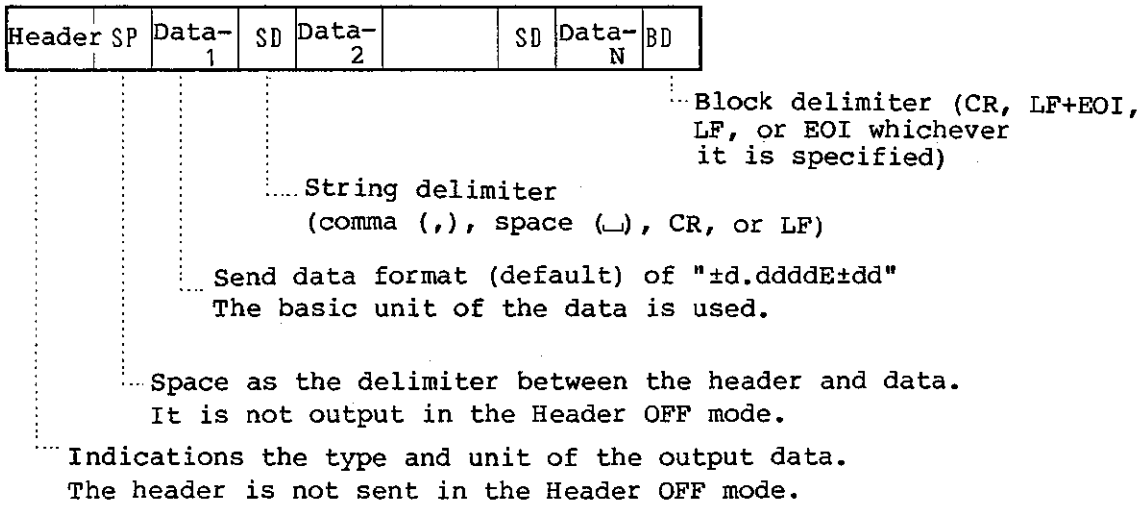
Data is output in the IEEE single-density, floating point format as follows:



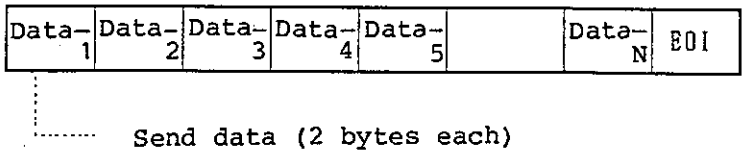
$$\text{Value} = (-1)^S \times 2^{(E-127)} \times (1.\ F)$$

(2) Block format

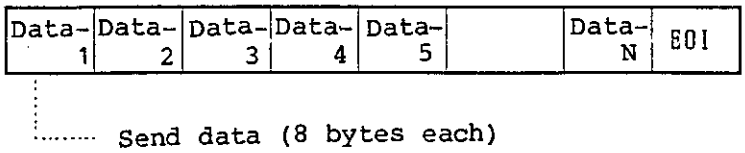
① ASCII format



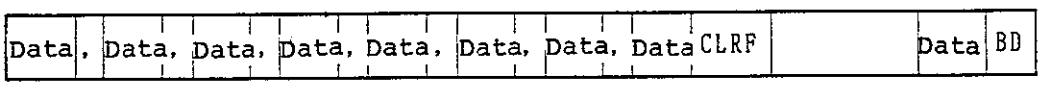
② 16-bit binary format



③ 64-bit binary format



④ ASCII data output example in subblock mode



4.5 GPIB Talker Commands

When a data output request is issued, the controller receives the data. If the controller attempts to receive data without receiving the output request, the readout (cursor) data will be sent.

(1) Block data

① Send data select command

The block data consists of the vertical (Y) axis and horizontal (X) axis data. This command selects one of them to be sent.

```
SELXY┬---0: Outputs the Y axis data. (DEFAULT)
     └---1: Outputs the X axis data.
```

② Format set command

Specifies the block data send format.

```
FMT--┬---0: ASCII mode (DEFAULT)
     ├--1: 16-bit binary mode
     ├-- 2: 64-bit binary (double-precision floating point)
     └-- 3: 32-bit binary (single-precision floating point)
```

③ Data request command

Requests to sent data.
REQDT: Requests for an output of Y or X axis block data.

④ Send data count read command

The number of display data sets vary according to the user setup. This command reads the number of data sets to be sent.
REQDTN: Sends the number of data sets output by the REQDT command.

(2) Cursor data (readout data)

Multiple lines of data are displayed, and they can be sent on line at a time.

① Send data select command

```
SELRD┬---0: Sends all lines. (DEFAULT)
     ├--1: Sends the first line of the readout data.
     ├--2: Sends the second line of the readout data.
     ├--3: Sends the third line of the readout data.
     └--4: Sends the fourth line of the readout data.
```

② Data request command

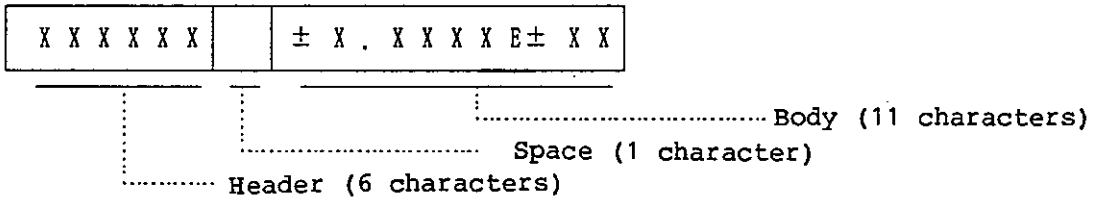
REDRD: Requests for an output of the specified readout data.

4.6 Talker Format of Readout Data

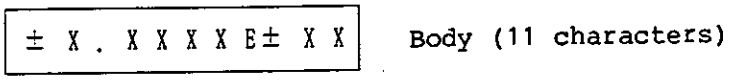
(1) Basic configuration

The send data consists of the header and body which are always separated by a space. In the Header Off mode, the delimiter of this space is not sent. The header consists of data (3 characters), channel (1 character), and unit (2 characters). The body consists of the basic unit data and it always has the positive or negative sign. The body consists of 11 characters including character E.

① Send data in Header ON mode

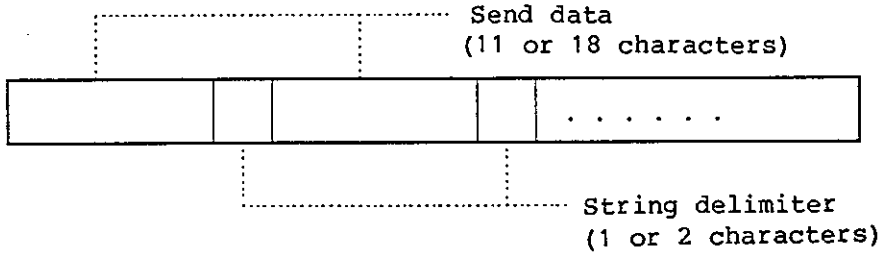


② Send data in Header OFF mode



③ Send multiple data simultaneously

If multiple data sets are sent simultaneously, they are separated by a space from each other. The send data ends with the block delimiter.



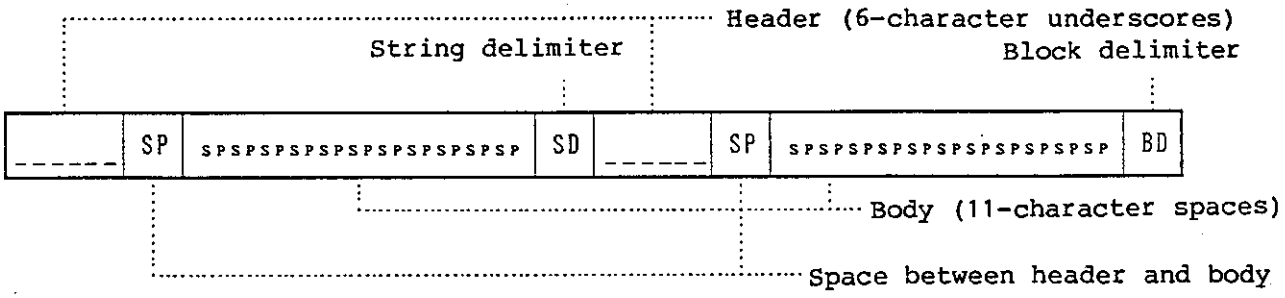
(2) Send format of each line data

There are 3 send formats of each line data.

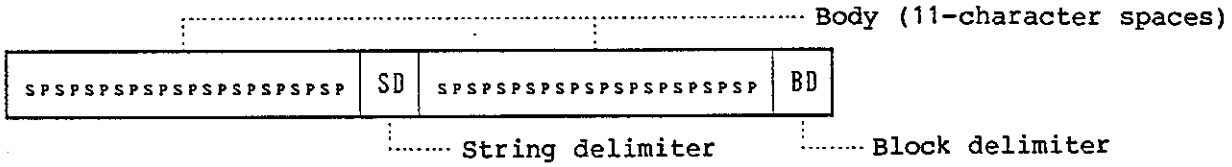
① If there is no send data

Header: 6 characters of underscores Body: 11 characters of space

a. Header ON mode

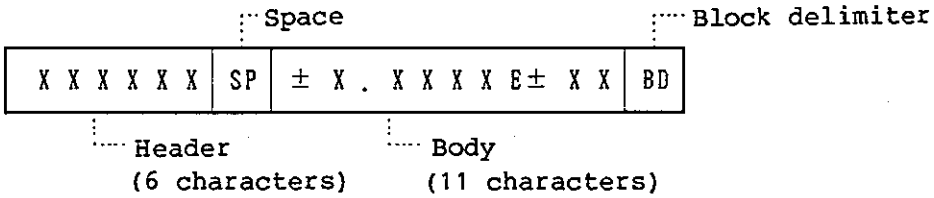


b. Header OFF mode

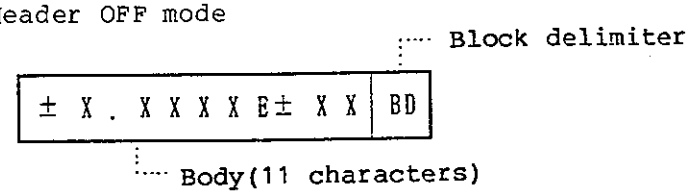


② If there is one data set to be sent

a. Header ON mode

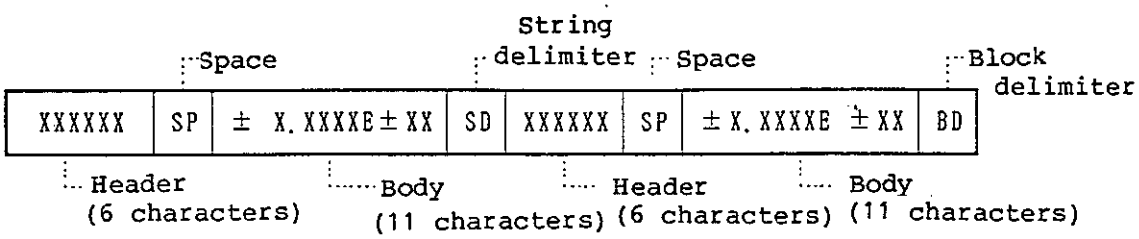


b. Header OFF mode

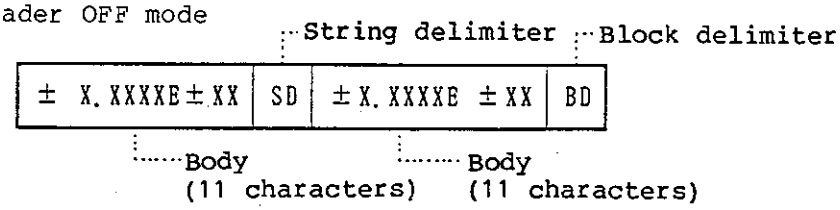


③ If there are two send data sets to be sent

a. Header ON mode



b. Header OFF mode



NOTE

The data send formats explained above are used as the standard data send format of each line data. If multiple lines of data are sent, the format varies according to the selected mode.

(3) Display of readout data

① Single marker and single peak marker

1	X axis readout　　Y axis readout
2	—— ——
3	—— ——
4	—— ——

- If SELRD=0 or 1, data send format (3) of Item (2) above is used.
- If SELRD=2, 3 or 4, data send format (1) of Item (2) is used.

② Positive/negative peak marker

1	X axis readout (X_1)　　Y axis readout (Y_1)
2	X axis readout (X_2)　　Y axis readout (Y_2)
3	X axis readout (X_3)　　Y axis readout (Y_3)
4	——　　——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data Y_2	SD	Data X_3	SD	Data Y_3	BD

SD: Specified string delimiter
BD: Specified block delimiter

- If SELRD=0, 2 or 3, data send format (3) of Item (2) above is used.
- If SELRD=4, data send format (1) of Item (2) is used.

③ Pulse parameter marker, attenuation power marker, band peak, overall, average, covariance, RMS value, and ripple markers

1	X axis readout (X_1)	Y axis readout (Y_1)
2	X axis readout (X_2)	Y axis readout (Y_2)
3	Analysis result(X_3)	——
4	——	——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data Y_2	SD	Data X_3	BD

- If SELRD=1 or 2, data send format (3) of Item (2) above is used.
- If SELRD=3, data send format (2) of Item (2) is used.
- If SELRD=4, data send format (1) of Item (2) is used.

④ Harmonic marker and sideband marker

1	X axis readout (X_1)	Y axis readout (Y_1)
2	X axis readout (X_2)	Y axis readout (Y_2)
3	Analysis result-1(X_3)	——
4	Analysis result-2(X_4)	——

(Note) Analysis result 1: Total harmonic wave data or higher side-band power data
Analysis result 2: Total harmonic distortion data or lower side-band power data

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data Y_2	SD	Data X_3	SD	Data X_4	BD

- If SELRD=1 or 2, data send format (3) of Item (2) above is used.
- If SELRD=3 or 4, data send format (2) of Item (2) is used.

⑤ XdB marker

1	X axis readout (X_1)	Y axis readout (Y_1)
2	Bandwidth (X_2)	——
3	Center frequency (X_3)	——
4	——	——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data X_3	BD

- If SELRD=1, data send format (3) of Item (2) above is used.
- If SELRD=2 or 3, data send format (2) of Item (2) is used.
- If SELRD=4, data send format (1) of Item (2) is used.

⑥ Shape factor marker

1	X axis readout (X_1)	Y axis readout (Y_1)
2	Bandwidth (X_2)	——
3	Center frequency (X_3)	——
4	Shape factor (X_4)	——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data X_3	SD	Data X_4	BD

- If SELRD=1, data send format (1) of Item (2) above is used.
- If SELRD=2, 3 or 4, data send format (2) of Item (2) is used.

⑦ Board marker

1	Gain margin (X_1)	——
2	Phase margin(X_2)	——
3	Cross frequency(X_3)	——
4	——	——

- If SELRD=0

Data X_1	SD	Data X_2	SD	Data X_3	BD

- If SELRD=1, 2 or 3, data send format (2) of Item (2) above is used.
- If SELRD=4, data send format (1) of Item (2) is used.

⑧ Closed loop gain marker

1	Frequency (X_1)	Gain (Y_1)
2	Bandwidth (X_2)	——
3	——	——
4	——	——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	BD

- If SELRD=1, data send format (3) of Item (2) above is used.
- If SELRD=2, data send format (2) of Item (2) is used.
- If SELRD=3 or 4, data send format (1) of Item (2) is used.

⑨ Dual X marker

1	X axis readout-1 (X_1)	axis readout-1 (Y_1)
2	X axis readout-2 (X_2)	axis readout-2 (Y_2)
3	——	——
4	——	——

- If SELRD=0

Data X_1	SD	Data Y_1	SD	Data X_2	SD	Data Y_2	BD

- If SELRD=1 or 2, data send format (3) of Item (2) above is used.
- If SELRD=3 or 4, data send format (1) of Item (2) is used.

⑩ Dual Y marker

1	Y axis readout-1	Y axis readout-2
2	——	——
3	——	——
4	——	——

- If SELRD=0 or 1, data send format (3) of Item (2) above is used.
- If SELRD=2, 3 or 4, data send format (1) of Item (2) is used.

(4) Header

① Data channel header table

	Data type	Data header	Channel header
Vertical axis	Time data	TIM	A/B/C
	Selfcorrelation	ACR	A/B/C
	Cross correlation	CCR	X
	Amplitude probable density funtion	HST	A/B/C
	Spectrum	SPC	A/B/C
	Cross spectrum	CSP	X
	Transfer function	FRF	X
	Coherent function	COH	X
	Impulse response	IMR	X
	COP	COP	X
	SNR	SNR	X
	Cepstrum	CEP	A/B/C
	1/3 octave	OCT	A/B/C
	1/1 octave	OCO	A/B/C
Horizontal axis	Time	CLK	X
	Frequency	FRQ	X
	Amplitude	AMP	X
	Delay	LAG	X
	Quefrency	CEF	X

② Unit header table

Unit	Unit header	Remarks
No unit	__	
Time	_S	
Frequency	HZ	
Voltage	_V	
Angle (degrees)	DG	
Percentage (%)	PC	
dB	DB	
dBV	DV	
V/ Hz	VZ	:Power Spectrum density for linear expression
dBV/Hz	DH	:Power Spectrum density for dB expression
EU (Engineering Unit)	EU	
dBEU	DE	

NOTE: _ shows a space.

4.7 Set Condition Output (Talker Function)

In the R9211, the set conditions can be read out from the GPIB.
The set conditions are expressed in codes. If header-OFF is set, only the codes are output. If header-ON, the codes are preceded by the command name.
Table 4-4 shows a list of the GPIB commands together with codes returned in response to the commands.

[Example]

An example, where the setting value of the trigger source is read using GPIB for IBM PC, is shown below. When the program described below is executed, "TRGSOR 2" is read from the GPIB. You can see, from the talker function command table, the trigger source is set to CHA.

[Example of Programming]

```
10 REM ************************************************
20 REM **      R9211 DATA OUTPUT MODE :                **
30 REM **                  ASCII BLOCK EXAMPLE PROGRAM **
40 REM ************************************************
50 REM
60 REM                  DATE : '89/02/20
70 REM
80      CLEAR    ,59000!
90      IBINIT1 = 59000!
100     IBINIT2 = IBINIT1 + 3
110     BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
120     CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130     CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDN$="GPIB0"
150 D1$="DEV1"
160 CALL IBFIND(D1$,DV1%)
170 CALL IBFIND(BDN$,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 '
210 '
220 A$ = SPACE$(13)
230 WRT$ = "TRGSOR?"+CHR$(&HA)
240 CALL IBWRT(DV1%,WRT$)
250 CALL IBRD(DV1%,A$)
260 PRINT A$
270 END
```

[Pair Command]

ACOUPLE? ⟷ BCOUPLE? (Channel A/B)
AICP? ⟷ BICP? (Channel A/B)
ATEST? ⟷ BTEST? (Channel A/B)
LWBAND? ⟷ UPBAND? (Limit Upper/Lower)
SENSA? ⟷ SENSB? (Channel A/B)
SENSADV? ⟷ SENSBDV? (Channel A/B)
WINDOWA? ⟷ WINDOWB? (Channel A/B)

Table 4 - 4 Talker Function Commands (1 of 4)

Command	Value	Description	Remarks
MEAS?	0	WAVEFORM	
	1	SPECTRUM	
	2	TIME-FREQ	
	3	FRF	
	4	SERVO	
FUNC?	0	TIME	
	1	AUTOCORR	
	2	CROSS-CORR	
	3	AUTOCORR	
	4	POWER SPECT	
	5	CROSS SPECT	
	6	COMPLEX SPECT	
	10	FRF	
ACTIVE?	0	CH-A	Active channel of analyzer
	1	CH-B	
	3	CH-A&B	
HISTP?	Numeral	Histogram point number	64, 128, 256, 512, 1024, 2048
SENSA?	1/0	AUTO/MAN	
SENSB?	1/0	AUTO/MAN	
SENSADV?	Numeral	-60(dBV) to 30(dBV)	Read of set sense range
SENSBDV?	Numeral	-60(dBV) to 30(dBV)	
ACOUPLE?	0/1	AC/DC	<Note> Set and reverse
BCOUPLE?	0/1	AC/DC	<Note> Set and reverse
FRANGE?	Numeral	Frequency range (Hz)	
FILTER?	1/0	ON/OFF	Read of set input filter ON or OFF
ATEST?	1/0	ON/OFF	
BTEST?	1/0	ON/OFF	
ZOOM?	0	Zero start	
	1	Zoom	
LWBAND?	Numeral	START (Hz)	Zoom start frequency
UPBAND?	Numeral	STOP (Hz)	Zoom stop frequency
TRGSOR?	1024	CH-A	
	1280	CH-B	
	2	EXT	
ARMHLD?	0	ARM, HOLD, FREE-RUN	
	1	AUTO_ARM	

Table 4 - 4 Talker Function Commands (2 of 4)

Command	Value	Description	Remarks
WINDOWA?	1	RECT	Read of set CHA window function
	2	HANNING	
	3	MINIMUM	
	4	FLAT-PASS	
	5	FORCE	
	6	RESPONS	
WINDOWB?	1-6		Same as WINDOWA?
WEIGHT?	0	No-Weight	
	1	A-WGT	
	2	B-WGT	
	3	C-WGT	
	4	C-MES-WGT	
AVGNO?	Numeral	Average	
AVGLIMIT?	Numeral	Average	When AVGMODE is EXP
AVGMODE?	1	SUM	
	2	EXP	
	3	PEAK	
	4	SUB	
FREQRES?	0	LIN f	Read of analysis range setting
	1	LOG f	
	2	1/3 OCT f	
	3	1/1 OCT f	
LINESPAN?	Numeral		(Example) For 400, 401 is displayed. For 800, 801 is displayed.
DECADES?	1-3		1CH:1-3, 2CH:1-2
VDEFIN?	0	Vdefind	Normal display
	1	Vmem	Memory is displayed.
	2	Vmath	Result of function is displayed.
	3	Vth	T-F is displayed.
	4	Curve fit	
	5	Synthesis	
VTYPE?	2	zWaveform	Time waveform
	7	Rxx	Auto-correlation
	8	Rxy	Cross-correlation
	9	ImpResp	Impulse
	10	Step response	
	11	Cx	Cepstrum
	12	PDF	Histogram
	14	Sx	Complex spectrum
	15	Gxx	Power spectrum
	24	Gxy	Cross spectrum
	29	Hxy	
	32	OdyCohFctn	Coherent
	35	t_f_ Gxx	T-F Gxx(f) Σ Gxx(f)
	36	t_f_ fPk	T-F f-PEAK
	37	t_f_ Cplx	T-F REAL IMAG PHASE

Table 4 - 4 Talker Function Commands (3 of 4)

Command	value	Description	Remarks
VCHNL?	0	CH-A	Display data channel
	1	CH-B	
	65	CH-A&B	
VDSW?	0	Instantaneous waveform	
	1	Average waveform	
VXCORD?	0	LINX	X-axis display coordinate
	1	LOGX	
	2	1/3 OCT	
	3	1/1 OCT	
VYCORD?	0	REAL	Y-axis display coordinate
	1	IMAG	
	2	Mag	
	3	Mag2	
	4	dBMag	
	5	PHASE	
	6	-PHASE	
	7	GROUP DELAY	
	8	NYQUEST/Orbit	
	9	Cole-Cole	
	11	NICHOLS	
TFID?	1-4		
TFDATA?	0	Gxx(f)	
	1	Σ Gxx(f)	
	2	REAL	
	3	IMAC	
	4	PHASE	
	5	f PEAK	
TFCH?	0	CH-A	Channel selected by TF analysis
	1	CH-B	
	2	CH-A&B	
AICP?	1/0	ON/OFF	
BICP?	1/0	ON/OFF	
TFTIME?	Numeral, Numeral, Numeral	START, STOP, STEP(sec)	t RANG for INST t-f
TFFREQ?	Numeral, Numeral	STARTorSTOP, STEP(Hz)	t-f MODE for INST t-f

Table 4 - 4 Talker Function Commands (4 of 4)

Command	Value	Description	Remarks
XSCLFT?	Numeral	X-axis left end value	The industrial units such as "m" and "k" are excluded. For example, 100E+3 is output for 100kHz. This cannot be used if the screen is set to list display.
XSCRIT?	Numeral	X-axis right end value	
XSCUP?	Numeral	Y-axis top value	
YSCLOW?	Numeral	Y-axis bottom value	

Note 1 : Set the mode of R9211 to T-F, and use commands related to the T-F mode. When data displayed (selected) is except the T-F data, setting of ID=1 is read as a default.

Note 2 : For VDEFIN?, VTYPE?, VCHNL?, VDSW?, CXCORP?, and VYCORD?, setting for the screen selected by SEL is transferred.

4.8 GPIB Data Input/output Command

(1) Reading and writing data from/into the input buffer by the GPIB

In the R9211, the input buffer data can be read out, and any data can be written into the input buffer by the GPIB.
Before using this function, please read the paragraphs on the input buffer and the two types of pointer.

① Input buffer

The input buffer is a buffer for storing the time data converted from analog to digital by the A/D converter and the data coming directly from the digital input terminal. This is a buffer shaped in a ring, around which a write-in pointer is turning. The maximum buffer size varies depending on the memory structure and the ARM/HOLD setting.

[Buffer Size]
(In wave form mode or linear frequency analysis (excluding zoom analysis))

(a) "FREE RUN" or "HOLD" (point count per 1CH)

Operation CH \ Memory structure	Standard	[I/O + Memory] or [CMOS memory]	[I/O + Memory] + [CMOS memory]
2CH	64k points	512k	1M
1CH	128k	1M	2M

(b) "ARM" or "AUTO ARM" (point count per 1CH)

- Other than T-F analysis

Frame time/ Line count	Input buffer size
1024spl/400 lines or below	1024 points
2048spl/800 lines or above	Frame time

- T-F analysis mode

The values from the minimum 8k points up to the maximum value of "FREE RUN" or "HOLD" can be selected depending on the Arm length setting menu.

② Input buffer write-in pointer

This pointer writes into the input buffer the data sampled by the A/D converter or the data which has been input directly from the digital input terminal. The pointer writes the data, turning around the ring-shaped input buffer according to the sampling clock of the A/D converter or the external clock input.
When the input buffer becomes full, the older data is rewritten by new data.
Normally, the input buffer write-in pointer position indicates the location where a new data is to be written. That is, the pointer is located at the oldest data fetched. The momentous data displayed on the screen is the latest data located behind the pointer position viewed in the pointer turning direction.
The "input buffer HOLD state" means that the pointer operation (write and move) is in stop state.

③ GPIB write-in/read-out pointer

This is a pointer for writing into/reading out of the input buffer from the GPIB. Normally, write/read starts at the position of this pointer. (In case an offset can be set, read/write starts at the position added by the offset amount.)
The pointer position is indefinite while the input buffer is in operation. When the input buffer is set to HOLD state, set this pointer at the same position as the input buffer write-in pointer by issuing the "IBRESET" command described later.

(2) GPIB write-in/read-out pointer position reset

[Command]

IBRESET

[Description]

Set the GPIB write-in/read-out pointer at the position identical to that of the input buffer write-in pointer.
This command is normally used to reset the GPIB write-in/read-out pointer position before executing the IBWRITE or IBREAD command.
When executing the IBWRITE or EBREAD command, be sure to set the input buffer to the HOLD state.

[Parameters]

None

NOTE

Before executing this command, be sure to set the input buffer to the HOLD state by issuing the "HOLD", "ARM" or "AUTO ARM". (Because the position of the input buffer write-in pointer is indefinite while the input buffer is in operation.)

(3) Data read from the input buffer

[Command]

```
IBREAD mode ch size offset
```

[Description]

Data is read out of the input buffer.
The data read starts at the GPIB write-in/read-out position added by the offset amount.
When the read is completed, the GPIB write-in/read-out pointer position advances by the distance size + offset from the previous position.
If the offset is equal to or greater than 1, the same processing as the IBRSET is executed before internally executing the IBREAD processing.

[Parameters]

mode : Transfer data format
2: ASCII data (see Example 10 in Section 5.1.)
3: 64-bit, floating point

ch : Transfer data channel
0: CH-A
1: CH-B

size : Transfer data size (Point)
Minimum: 1
Maximum: Input buffer size or 32768 which is smaller

offset : Distance from the transfer data top (Point)
Minimum: 0
Maximum: Input buffer size - 1 or 32767 which is smaller

Relation between the size and the offset:
The size is equal to or greater than the offset.

NOTE

- Since the GPIB write-in/read-out pointer position becomes indefinite when the input buffer is in operation, be sure to set the input buffer to the HOLD state by issuing the IBRESET command before executing the first IBREAD command.
- This command is valid when the measurement mode is set to Waveform mode or Linear frequency analysis (excluding the zoom analysis); and the operation channel is CH-A&B.
- When executing this command, set the input buffer to the HOLD state by issuing the "HOLD", "ARM".

(4) Data write into the input buffer

[Command]

```
IBWRITE mode ch size
```

[Description]

Any data can be written into the input buffer.
The data write starts at the GPIB write-in/read-out pointer position.
When the data write is completed, the GPIB write-in/read-out pointer position advances by the distance of size from the previous position.

[Parameters]

mode : Transfer data format
2: ASCII data
3: 64-bit, floating point (See Example 11 in Section 5.1.)

ch : Data transfer channel
0: CH-A
1: CH-B

size : Transfer data size (Point)
Minimum: 1
Maximum: Input buffer size

NOTE

- Since the GPIB write-in/read-out pointer position becomes indefinite when the input buffer is in operation, be sure to set the input buffer to the HOLD state by issuing the IBRESET command before executing the first IBWRITE command.
- This command is valid when the measurement mode is set to Waveform mode or Linear frequency analysis (excluding the zoom analysis); and the operation channel is CH-A&B.
- When executing this command, set the input buffer to the HOLD state by issuing the "HOLD", "ARM".

(5) Data Write in Data Save Area

[Command]

```
SVWRITE svnum mode type
```

[Description]

SVWRITE : Passes write parameter for data save area, and prepares for receiving data.

The parameter has the following meanings.

svnum : Transfer data area specification code
0 : Save 1 area
1 : Save 2 area

mode : Transfer data format specification
2 : ASCII data
3 : 64bit floating point data

type : Transfer data type
0 : Real type
1 : Complex type (real part)
2 : Complex type (imaginary part)
3 : Complex type (real part/imaginary part)

Save data (dummy data) that is the same as transfer data in the transfer area, and transfer data.
Data transferred can be checked by recalling data.

[Data Written to The Data Save Area and Data Type]

	Real type	Complex type (real part)	Complex type (imaginary part)	Complex type (real part/ imaginary part)
Time waveform	○	—	—	—
Gaa	○	—	—	—
<Hab>	—	○	○	○
<IMP>	—	○	○	○
<COH>	○	—	—	—
$S_{a\ Img}$, $S_{a\ Real}$	—	○	○	○

*** Write squard value in <COH>.**

(6) Transfer Proper Waveform Data, and Generate It from The SG.

[Command] (R9211B/C only)

TOARBIT size

[Description]

TOARBIT : Passes parameter in waveform data area, and prepares for receiving data.

The parameter has the following meanings.

size : Specifies data transferred (512-65536) (number of data)

SGCONT ⇨ SIGNAL ⇨ ARBITRAY

Press the above keys, and transfer data.

OUT CTRL ⇨ GENERATOR START

ORP ..... When ON is set, transferred waveform can be output from the SG.

NOTE

- Sizes to be set internally are listed below. When the other size is specified, it is set to be smaller than specified value and an excessive part is ignored.
  512, 1024, 2048, 4096, 8192, 16384, 32768, 65536

  (Example) When 800 is specified, 512 is set.
  When 8000 is specified, 4096 is set.

- If a value more than 65536 is specified, it is not transferred.

- If a value less than 512 is specified, old data is left in the difference [512-(specified size)].

(7) Call Data from The Curve Fit Table.

[Command] (R9211C only)

CVFITDT mode size

[Description]

Data is read from the table for curve fit and synthesis.

mode : Specifies the format of data transferred.
2 : ASCII data
3 : 64bit

type : Specifies data transferred.
0 : Curve fit
1 : Synthesis
10: Curve fit gain, delay time
11: Synthesis gain, delay time

(8) Read The Polar and Zero Number from The Curve Fit Table

[Command] (R9211C only)

CVFTN type

[Description]

The polar and zero number are read from the curve fit table in the ASCII format.

type : Specifies data transferred.
0 : Curve fit
1 : Synthesis

(9) Read The Polar Line Number and Zero Line Number to be Displayed from The Curve Fit Table

[Command] (R9211C only)

CVFTSIZE type

[Description]

Polar line number and zero line number are read in the ASCII format from the curve fit table.

type : Specifies data transferred.
0 : Curve fit
1 : Synthesis

(10) Output Data on The Screeen

[Command]

```
REQDT
 or
REQDT mode start stop
```

[Description]

When no parameter is specified, the screen selected by SEL is read in the data format specified by FMT.

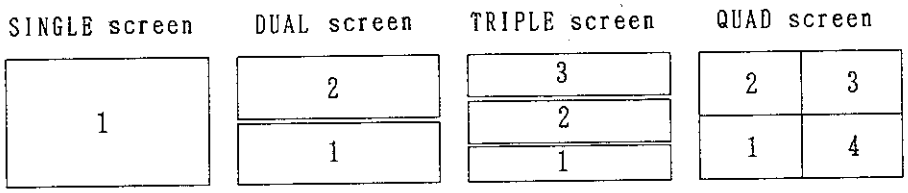
When the parameter is specified, it has the following meanings.

mode : Specifies transferred data format.
- 2 : ASCII data
- 3 : 64bit floating point data
- 4 : 32bit floating point data

start : Specifies the start screen of transferred data.
- 1 : First screen
- 2 : Second screen
- 3 : Third screen
- 4 : Fourth screen

stop : Specifies the end screen of transferred data.
- 1 : First screen
- 2 : Second screen
- 3 : Third screen
- 4 : Fourth screen

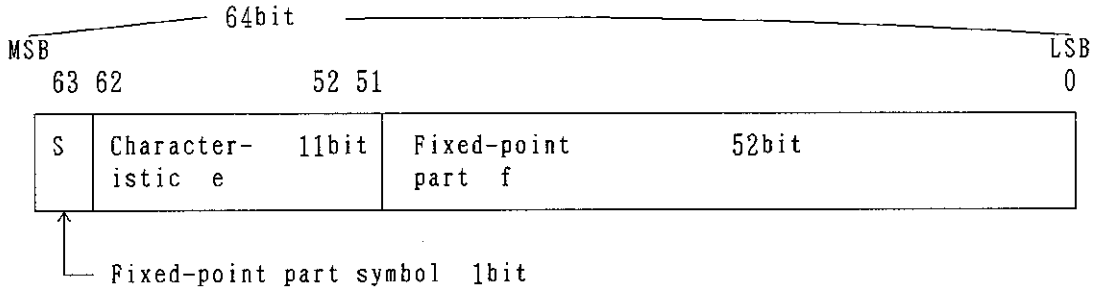
The screen number is changed as follows.



NOTE

When REQADT is used by specifying the parameter, the parameter is enabled for the command once only.
Thus, FMT prior to the REQADT is ignored and the following FMT is not influenced.

[64bit IEEE double precision floating point format]



Numeral : $(-1)^s * 2^{(e-1023)} * (1.f)$

Using the following expressions, the logarithm can be obtained.

$A = 2^{(e-1023)} * (1+f)$

$Log_2 A = e-1023 + Log_2 (1+f)$

$1>f>0 \qquad 1>Log_2 (1+f)>0$

$Log_2 A = e-1023 + Log_2(1+f) = a+b$ { a: Integral part, b: Fraction part

$\therefore \begin{cases} e = a + 1023 \\ f = 2^b - 1 \end{cases}$

4.9 Reading Data from the Marker List by GPIB

(1) Reading the number of reference markers set

[Command]

REFLINE

[Explanation]

The maximum number set by the reference marker is read out in the ASCII block format.
If no reference marker has been set, 0 (zero) is read out. In case multi-screen display has been selected, the data of the screen selected with the SEL key is read out.
This command is used to specify the reference marker of the maximum number before executing the REFLIST command.

[Parameter]

None

(2) Reading reference marker list display

[Command]

REFLIST

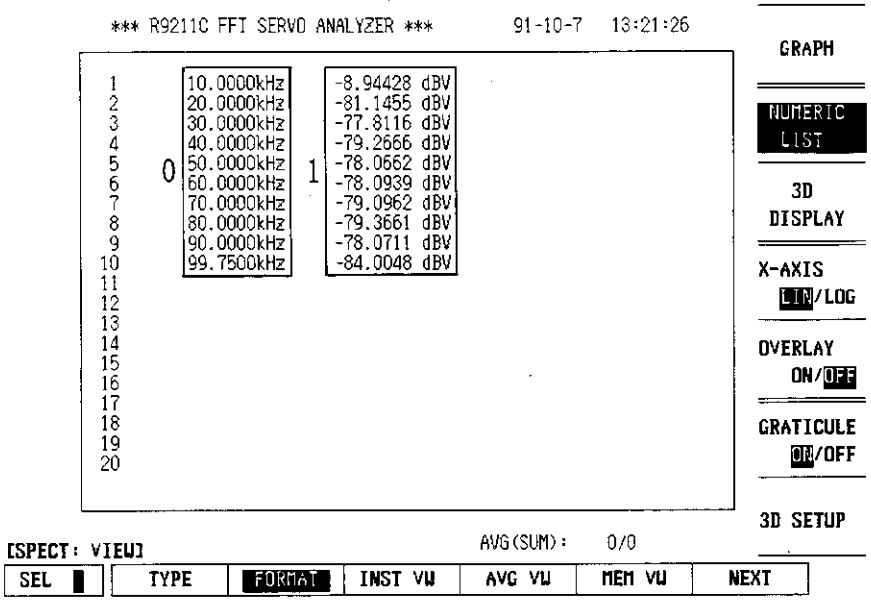
[Explanation]

The reference marker list display data is read out.
Only the maximum numbers set by the reference marker (which can be read out with the REFLINE command) are continuously transmitted.
If no reference marker has been set or no data is contained due to erase, 0 (zero) is read out even if the number is smaller than the maximum one.
In case of the multi-screen, the data of the screen selected with the [SEL] key is read out.

[Parameters]

mode : Transfer data format
2: ASCII (no header)
3: 64-bit, floating point

type : Transfer data type (see the illustration)
0: Set frequency, Time
1: Measurement level



NOTE

This command is valid when the reference marker is executed on the screen to be read out. Before executing this command, be sure to check the maximum number set with the REFLINE command.

(3) Reading the number of higher harmonics searched by Harmonic markers

[Command]

HRMLINE

[Explanation]

The maximum number of the higher harmonic which is searched by the Harmonic marker is read out in the ASCII block format. If the harmonic marker is not executed on the screen to be read out or if no higher harmonic has been found, 0 (zero) is read out. In case of the multi-screen, the data of the screen selected with the [SEL] key is read out.
This command is used to find the higher harmonic of the maximum number searched before executing the HRMLIST command.

[Parameters]

None

(4) Reading harmonic marker list

[Command]

HRMLIST mode type

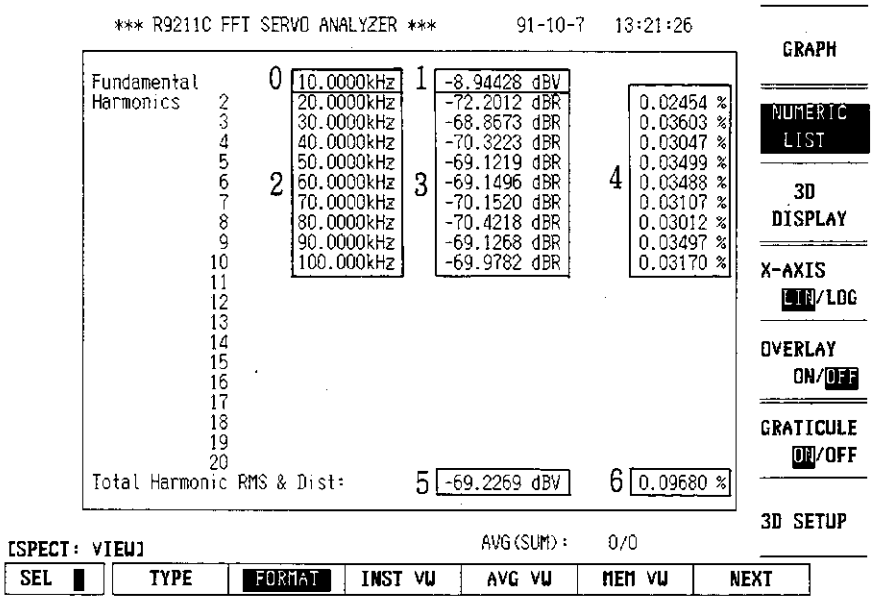
[Explanation]

The harmonic marker list display data is read out.
If the data types are higher harmonic frequency, higher harmonic ratio against the reference wave, and higher harmonic distortion, the data are continuously output for the number of the higher harmonics searched (the maximum number can be read out with the HRMLINE command). For the other types of data, only one data is output. In case of the multi-screen, the data of the screen selected with the SEL key is read out.

[Parameters]

mode : Transfer data format
- 2: ASCII (no header)
- 3: 64-bit, floating point

type : Transfer data type (see the illustration)
- 0: Reference wave frequency
- 1: Reference wave level
- 2: Higher harmonic frequency
- 3: Higher harmonic ratio against the reference wave
- 4: Higher harmonic distortion
- 5: Total harmonic level
- 6: Total harmonic distortion



NOTE

This command is valid when the harmonic maker is executed on the screen to be read out.
In case no higher harmonic can be found even if the harmonic marker has been executed, no data is read out on the higher harmonic frequency, higher harmonic ratio against the reference wave and the higher harmonic distortion. Be sure to check in advance the maximum number of the higher harmonic searched with the HRMLINE command.

(5) Reading the maximum number of side bands searched by side band markers

[Command]

SIDLINE type

[Explanation]

The maximum number of the side band searched by the side band marker is read out in the ASCII block format.
If the side marker has not been executed on the screen to be read out or if no side wave is found, 0 (zero) is read out. In case of the multi-screen, the data of the screen selected with the SEL key is read out.
This command is used to specify the maximum number of the side band searched, before executing the SIDLIST command.

[Parameters]

type : Type of the side wave to be read out
0: Lower wave
1: Upper wave

(6) Reading side band marker list

[Command]

SIDLIST mode type

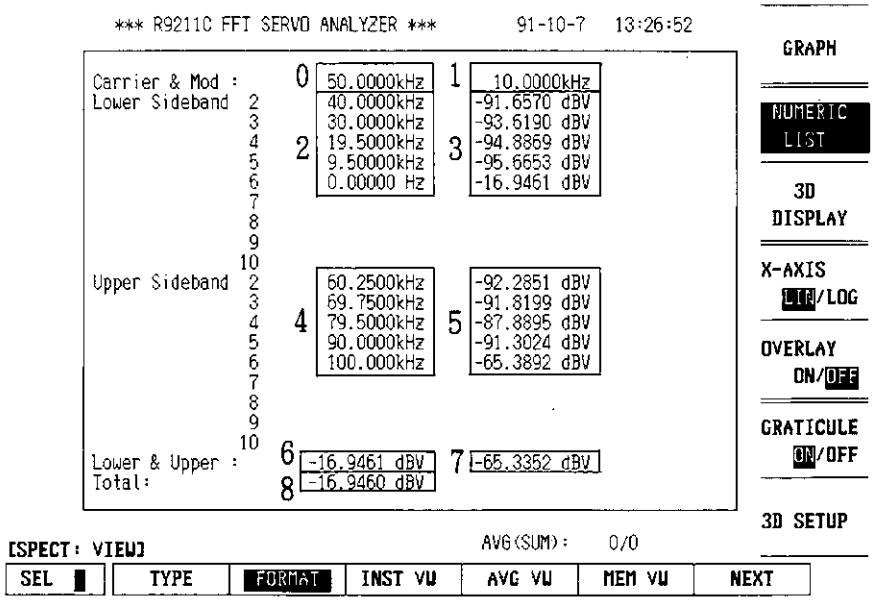
[Explanation]

The side band marker list display data is read out.
When the transfer data types are the side band frequency and the side band level, the data are continuously output for the number of side bands (the maximum number can be read out with the HRMODR command.) For the other data types, only one data is output. In case of the multi-screen, the data of the screen selected with the SEL key is read out.

[Parameters]

mode : Transfer data format
- 2: ASCII (no header)
- 3: 64-bit, floating point

type : Transfer data type (see the illustration)
- 0: Carrier frequency
- 1: Modulated wave frequency
- 2: Lower wave level
- 3: Lower wave frequency
- 4: Upper wave level
- 5: Upper wave frequency
- 6: Total lower wave level
- 7: Total upper wave level
- 8: Total side band level



4.9 Reading data from the marker list by GPIB

NOTE

This command is valid if the side band marker is executed on the screen to be read out.
If no side band is found even after the side band marker has been executed, no data is read out on the higher harmonic frequency, higher harmonic ratio against the reference wave and the higher harmonic distortion. Be sure to check in advance the number of side bands searched with the SIDLINE command.

4.10 Floppy Disk Operation by GPIB

(1) Recording a data file

There are two methods for recording a data file: you can specify a file name, or the R9211 automatically creates a file name.

[Command]

If you do not specify a file name

```
EXESAVE
```

If you specify a file name

```
EXESAVE #FNAME#
```

[Explanation]

(a) If you do not specify a file name

The measured data, setting conditions and table information are recorded in the floppy disk. The name and type of the recorded file are automatically determined according to the setting status at that time.

(b) If you specify a file name

The measured data, setting conditions and table information are recorded in the floppy disk with the specified file name. The type of the recorded file is automatically determined according to the setting status at that time.

[Parameters]

(a) If you do not specify a file name

None

(b) If you specify a file name

File name string of up to seven characters (without file type).
The file name must be enclosed with special characters for label input (see "(2) Character data input method" in "4.2 GPIB Control Commands").

[Cautions]

Do not execute any other command after issuing this command until the data recording to the floppy disk is completed. You can identify the end of the recording by checking the fourth bit (IO END) of the status byte by a service request. If the data has not been recorded, the fifth bit (FLOPPY ERROR) of the error status byte is set to 1.

(2) Recalling a data file

[Command]

```
EXERECAL #FNAME. TYP#
```

[Explanation]

The data of a specified file is recalled from the floppy disk.

[Parameters]

File name string (with the file type).
The file name must be enclosed with special characters for label input (see "(2) Character data input method" in "4.2 GPIB Control Commands").

[Cautions]

Do not execute any other command after issuing this command until the data recalling is completed. You can identify the end of the recalling operation by checking the fourth bit (IO END) of the status byte by a service request. If the data has not been recalled, the fifth bit (FLOPPY ERROR) of the error status byte is set to 1.
This command cannot be executed when the multi-screen display is set.

(3) Copying a data file

[Command]

```
EXECOPY #FNAME1. TYP# #FNAME2#
```

[Explanation]

The data of the specified file is copied to a new file in the floppy disk with the specified name. The type of the new file is the same as that of the original file.

[Parameters]

#FNAME1. TYP# (Original filename)

File name string (with the file type).
The file name must be enclosed with special characters (see "(2) Character data input method" in "4.2 GPIB Control Commands").

#FNAME2# (New filename)

File name string of up to seven characters (without file type).
The file name must be enclosed with special characters (see "(2) Character data input method" in "4.2 GPIB Control Commands").

[Cautions]

Do not execute any other command after issuing this command until the data copy operation is completed. You can identify the end of the copy operation by checking the fourth bit (IO END) of the status byte by a service request. If the data has not been copied, the fifth bit (FLOPPY ERROR) of the error status byte is set to 1.
This command cannot be executed when the multi-screen display is set.

(4) Deleting a data file

[Command]

```
EXEDELET #FNAME. TYP#
```

[Explanation]

The specified file is deleted from the floppy disk.

[Parameters]

File name string (with the file type).
The file name must be enclosed with special characters (see "(2) Character data input method" in "4.2 GPIB Control Commands").

[Cautions]

Do not execute any other command after issuing this command until the data deleting is completed. You can identify the end of the deleting operation by checking the fourth bit (IO END) of the status byte by a service request. If the data has not been deleted, the fifth bit (FLOPPY ERROR) of the error status byte is set to 1.
This command cannot be executed when the multi-screen display is set.

(5) Initializing a floppy disk

[Command]

EXEINIT

[Explanation]

The floppy disk is initialized.

[Cautions]

Do not execute any other command after issuing this command until the floppy disk initialization is completed. You can identify the end of the initialization by checking the fourth bit (IO END) of the status byte by a service request. If the floppy disk has not been initialized, the fifth bit (FLOPPY ERROR) of the error status byte is set to 1.
This command cannot be executed when the multi-screen display is set.

MEMO

5. GPIB PROGRAMMING EXAMPLES

The following programming examples are assumed to be executed on the IBM and HP personal computer series.

5.1 Program Examples for IBM PC

5.2 Program Examples for HP200, 300

5.1 Program Examples for IBM PC

Program examples 1 to 4 are for Model GPIB-PC2A and DOS Handler provided by National Instruments Inc. and are assumed to be executed on the IBM personal computer with installing GW-BASIC.

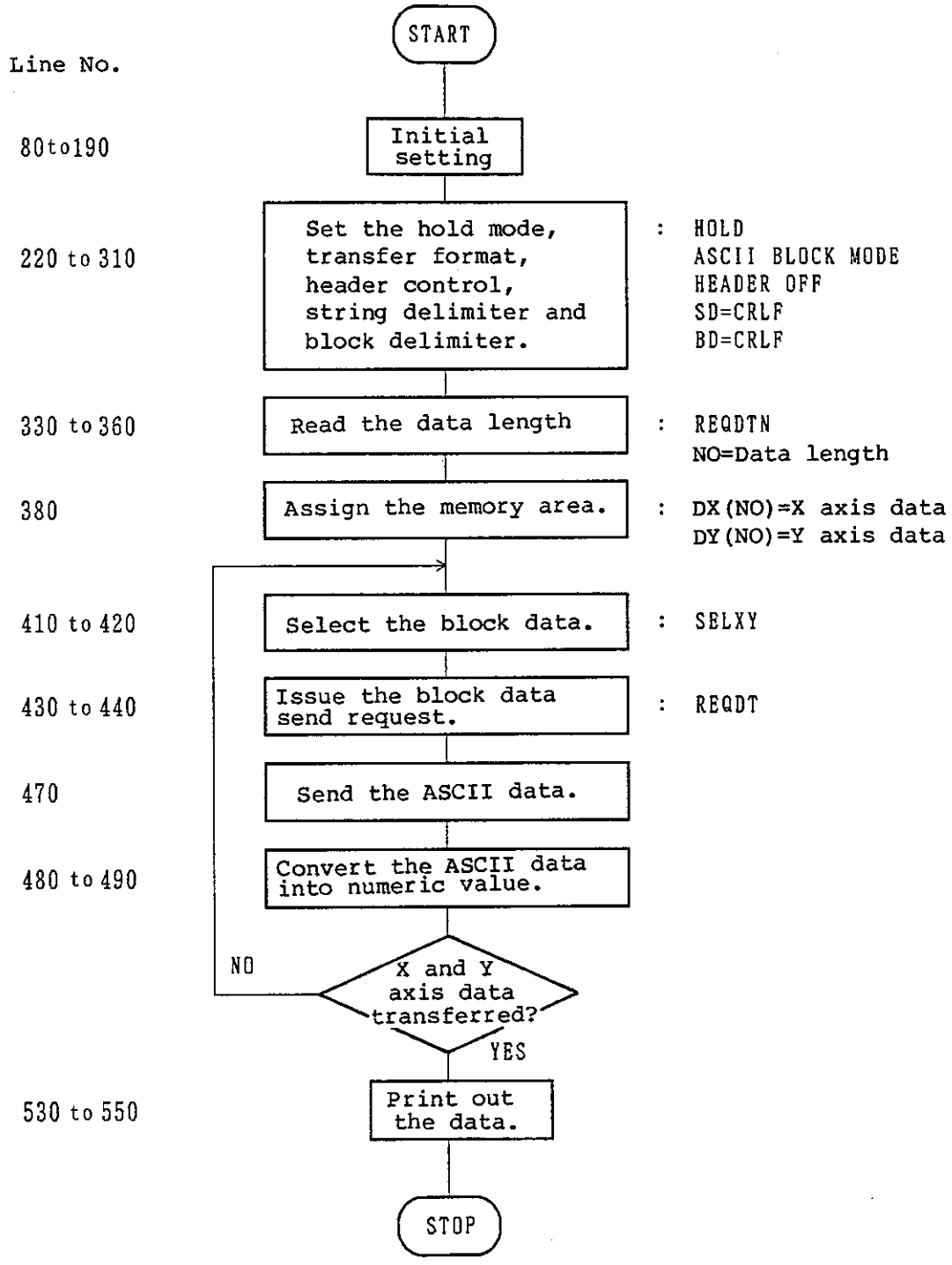
Description of the initial setting (on lines 80 to 190)

- Assign the memory area (80 lines)
- Load the subprogram, such as IBFIND and IBTRG onto the assigned memory area. (90 to 130 lines)
- Specify the specific names (140 to 180) for exchanging data between personal computer and GPIB or equipment connected with the personal computer.
- Set the equipment connected with the personal computer to remote control mode. (190 lines)

Example 1. Data transfer in the ASCII block transfer mode

Read data from the R9211 display, assign the required memory area, and transfer the data to the controller in the ASCII block transfer mode.

[Flowchart]



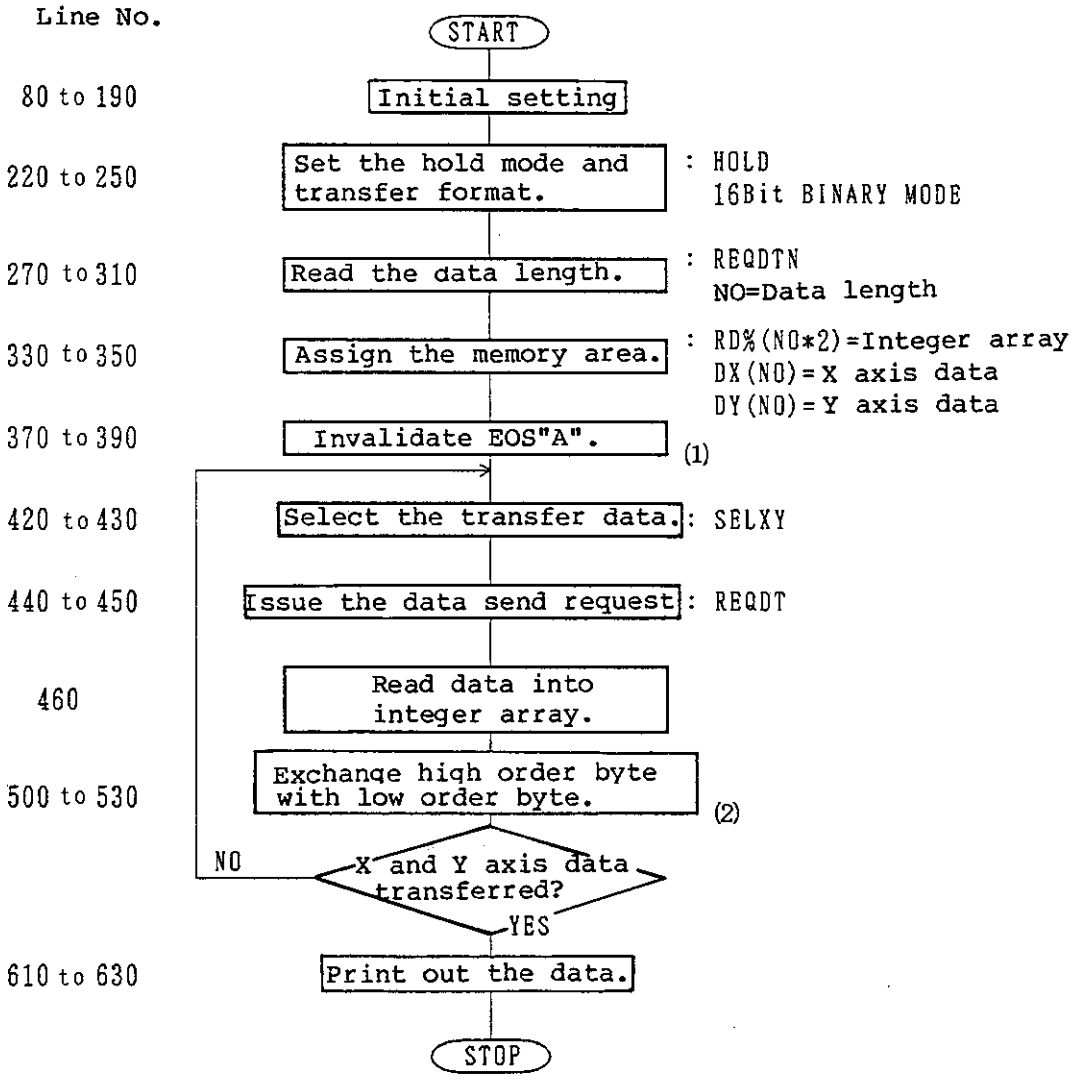
```
10 REM ************************************************************
20 REM **      R9211 DATA OUTPUT MODE :                            **
30 REM **                        ASCII BLOCK EXAMPLE PROGRAM       **
40 REM ************************************************************
50 REM
60 REM                     DATE : '89/02/08
70 REM
80       CLEAR    ,59000!
90       IBINIT1 = 59000!
100      IBINIT2 = IBINIT1 + 3
110      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
120      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDN$="GPIB0"
150 D1$="DEV1"
160 CALL IBFIND(D1$,DV1%)
170 CALL IBFIND(BDN$,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 REM
210 REM
220 WRT$="HOLD"+CHR$(&HA)                    'HOLD
230 CALL IBWRT(DV1%,WRT$)
240 WRT$="FMT0"+CHR$(&HA)                    'ASCII BLOCK MODE
250 CALL IBWRT(DV1%,WRT$)
260 WRT$="HED0"+CHR$(&HA)                    'HEADER OFF
270 CALL IBWRT(DV1%,WRT$)
280 WRT$="SDL2"+CHR$(&HA)                    'STRING DELIMITER CRLF
290 CALL IBWRT(DV1%,WRT$)
300 WRT$="DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CRLF
310 CALL IBWRT(DV1%,WRT$)
320 REM
330 WRT$="REQDTN"+CHR$(&HA)                  'DATA NUMBER REQUEST
340 CALL IBWRT(DV1%,WRT$)
350 RD$=SPACE$(10)
360 CALL IBRD(DV1%,RD$):ND=VAL(RD$)          'DATA NUMBER INPUT
370 REM
380 DIM DX(ND),DY(ND)                        'DIMENSION CHANGE
390 REM
400 FOR J=1 TO 2
410   WRT$="SELXY"+STR$(J-1)+CHR$(&HA)       'X or Y-axis DATA SELECT
420   CALL IBWRT(DV1%,WRT$)
430   WRT$="REQDT"+CHR$(&HA)                 'DATA REQUEST
440   CALL IBWRT(DV1%,WRT$)
450   A$=SPACE$(13)                          'ASCII DATA INPUT
460   FOR N=1 TO ND
470     CALL IBRD(DV1%,A$)
480     IF J=1 THEN DY(N)=VAL(A$)            'Y-axis DATA INPUT
490     IF J=2 THEN DX(N)=VAL(A$)            'X-axis DATA INPUT
500   NEXT N
```

```
510 NEXT J
520 REM
530 FOR N=1 TO NO                          'PRINT ASCII DATA
540 PRINT DX(N),DY(N)
550 NEXT N
560 REM
570 V%=0                                   'CLEAR REMOTE ENABLE LINE
580 CALL IBSRE(BO%,V%)
590 END
```

Example 2. Data transfer in the 16-bit binary transfer mode

Read the data length from the R9211 display, assign the memory area on the controller, and transfer the data to the controller in the 16-bit binary data transfer mode.
In 16-bit binary transfer mode, IBM personal computer reads the data length in the integer array format. When reading the data length, "OA" must be invalidated by EOS (Step (1) in the following flowchart) to avoid interruption of the reading.
In the step (2), exchange the high order byte with low order byte before storing the data to the memory because high and low order bytes are sent inversely.

[Flowchart]



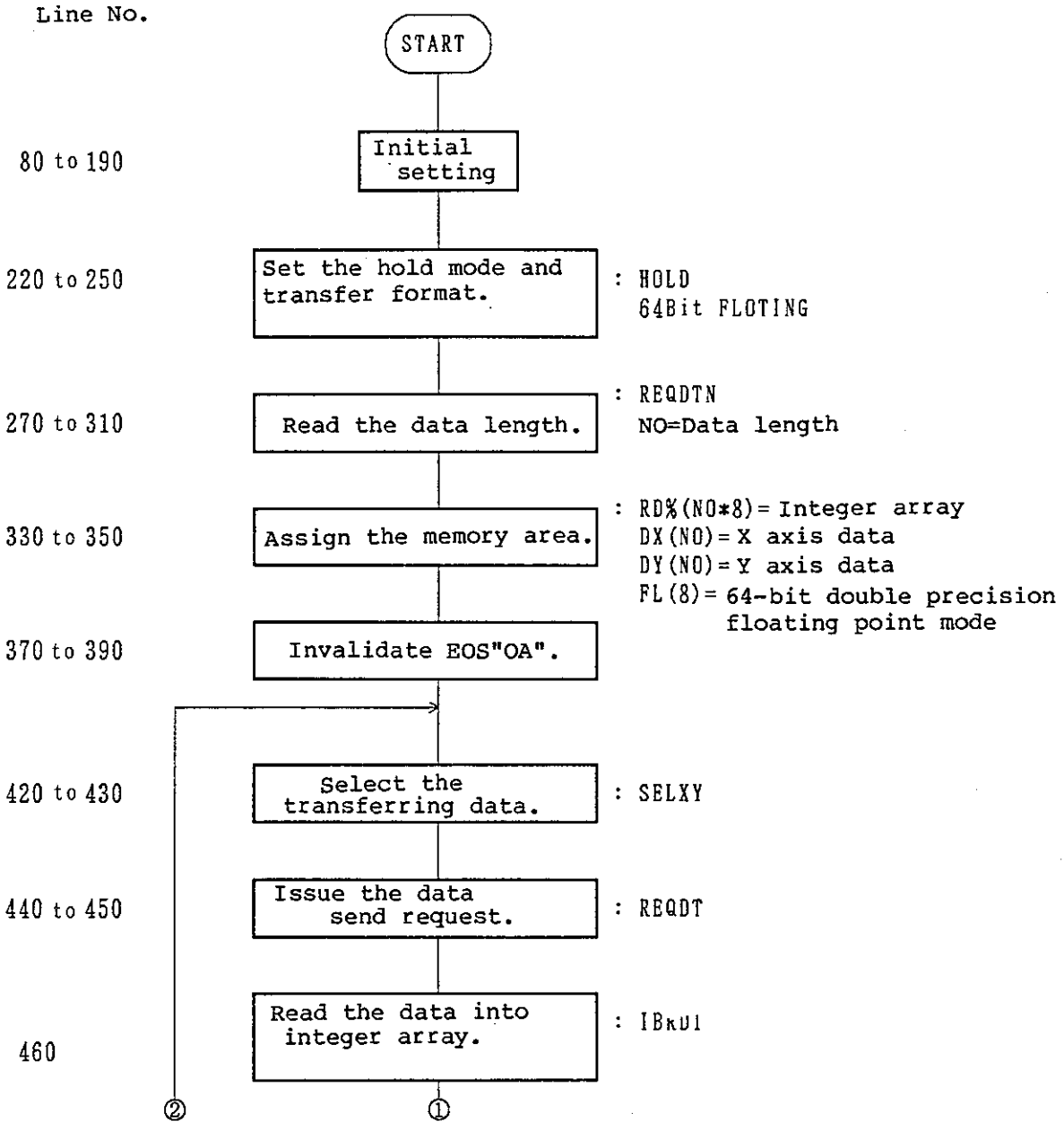
```
10 REM ************************************************************
20 REM **       R9211 DATA OUTPUT MODE :                          **
30 REM **              16 Bit BINARY OUTPUT EXAMPE PROGRAM        **
40 REM ************************************************************
50 REM
60 REM                    DATE : '89/02/08
70 REM
80       CLEAR    ,59000!
90       IBINIT1 = 59000!
100      IBINIT2 = IBINIT1 + 3
110      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
120      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDN$="GPIB0"
150 D1$="DEV1"
160 CALL IBFIND(D1$,DV1%)
170 CALL IBFIND(BDN$,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 REM
210 REM
220 WRT$="HOLD"+CHR$(&HA)                    'HOLD
230 CALL IBWRT(DV1%,WRT$)
240 WRT$="FMT1"+CHR$(&HA)                    'DATA OUTOUT MODE "16Bit BINARY
250 CALL IBWRT(DV1%,WRT$)
260 REM
270 WRT$="REQDTN"+CHR$(&HA)                  'DATA NUMBER REQUEST
280 CALL IBWRT(DV1%,WRT$)
290 REM
300 RD$=SPACE$(10)                           'DATA NUMBER INPUT
310 CALL IBRD(DV1%,RD$):ND=VAL(RD$)
320 REM
330 CNT%=ND*2                                'DIMENSION CHANGE
340 DIM RD%(ND*2)
350 DIM DX(ND),DY(ND)
360 REM
370 EOSV%=&HA                                'DISABLE END-OF-STRING "0A"
380 V%=EOSV%+&H0
390 CALL IBEOS(DV1%,V%)
400 REM
410 FOR J=1 TO 2
420   WRT$="SELXY"+STR$(J-1)+CHR$(&HA)       'X or Y axis DATA SELECT
430   CALL IBWRT(DV1%,WRT$)
440   WRT$="REQDT"+CHR$(&HA)                 'DATA REQUEST
450   CALL IBWRT(DV1%,WRT$)
460   CALL IBRDI(DV1%,RD%(1),CNT%)           'READ DATA TO INTEGER ARRAY
470   REM
480   FOR I=1 TO ND
490     REM
500     A=RD%(I)                             'EXCHANGE LOW-BYTE AND HIGH-BYTE
510     IF A<0 THEN LET A=A+65536!
520     B=INT(A/256)
530     C=A-B*256
540     REM
550     IF J=1 THEN LET DY(I)=C*256+B        'Y axis DATA INPUT
560     IF J=2 THEN LET DX(I)=C*256+B        'X axis DATA INPUT
570     REM
580   NEXT I
590 NEXT J
600 REM
```

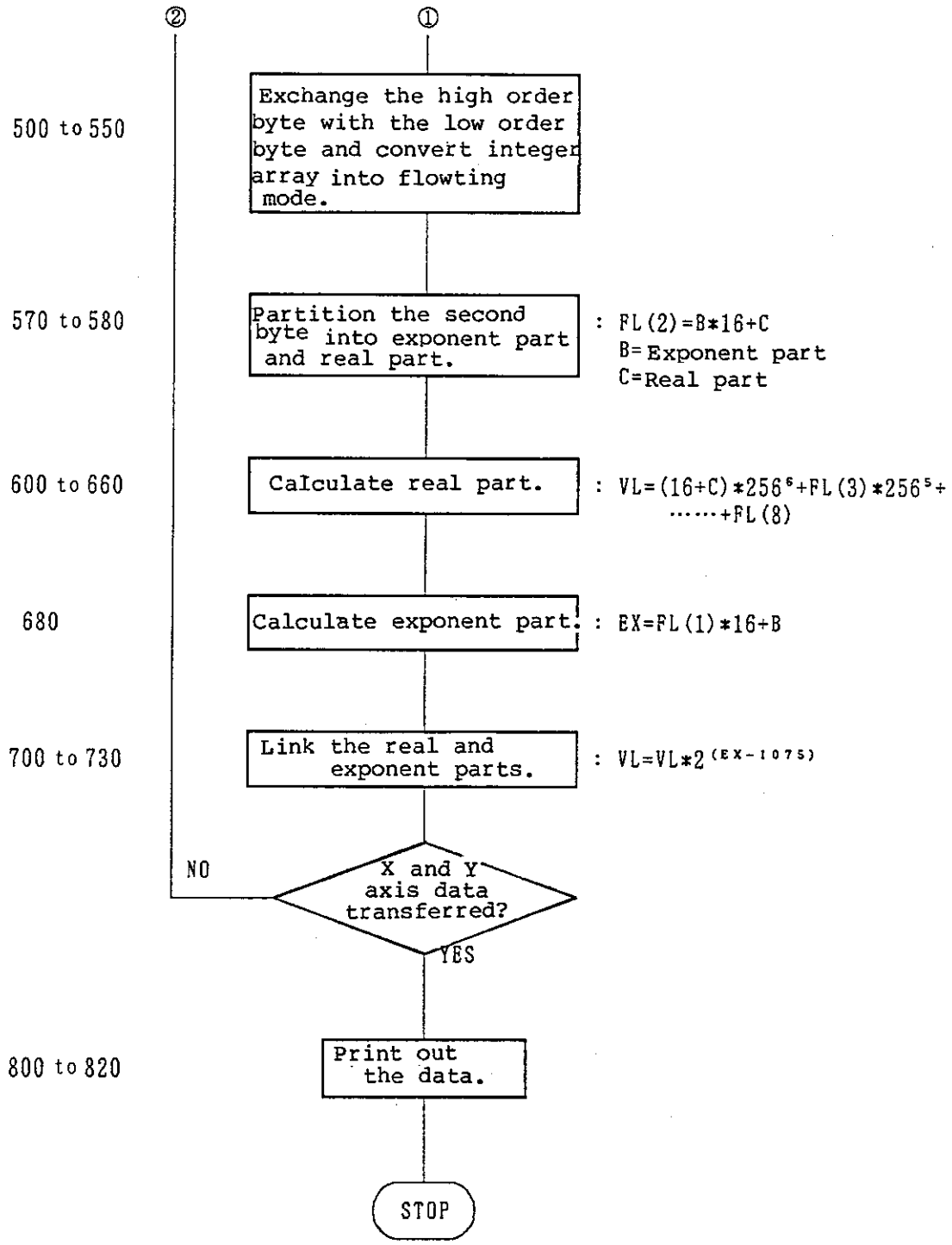
```
610 FOR I=1 TO NO                          'PRINT DATA
620 PRINT DX(I),DY(I)
630 NEXT I
640 REM
650 V%=0                                   'CLEAR REMOTE ENABLE LINE
660 CALL IBSRE(B0%,V%)
670 END
```

Example 3. Data transfer in the 64-bit, IEEE double precision floating point data transfer mode

Read the data length from the R9211 display, assign the memory area and convert the data read in the 16-bit binary format into the 64-bit data. In the same way as the 16-bit binary transfer mode, EOS "OA" is invalidated and calculation is made with exchanging between high order byte and low order byte.

[Flowchart]




②
①
500 to 550
Exchange the high order byte with the low order byte and convert integer array into flowting mode.
570 to 580
Partition the second byte into exponent part and real part.
: FL(2)=B*16+C
B=Exponent part
C=Real part
600 to 660
Calculate real part.
: VL=(16+C)*256^6+FL(3)*256^5+
……+FL(8)
680
Calculate exponent part.
: EX=FL(1)*16+B
700 to 730
Link the real and exponent parts.
: VL=VL*2^(EX-1075)
NO
X and Y axis data transferred?
YES
800 to 820
Print out the data.
STOP

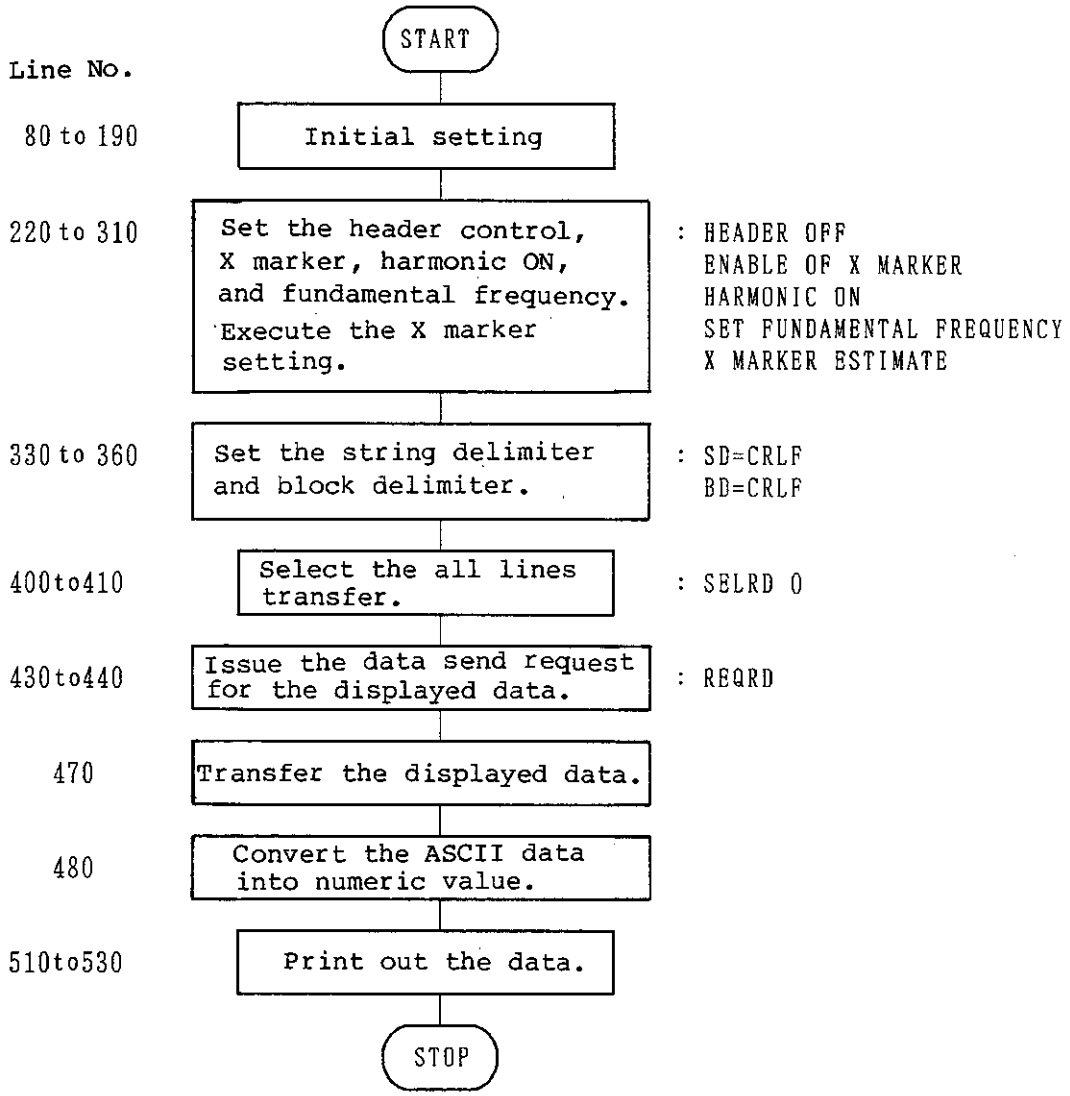
```
10 REM ************************************************************
20 REM **      R9211 DATA OUTPUT MODE :                            **
30 REM **            64 Bit FLOATING MODE EXAMPLE PROGRAM          **
40 REM ************************************************************
50 REM
60 REM                    DATE : '89/02/08
70 REM
80      CLEAR    ,59000!
90      IBINIT1 = 59000!
100     IBINIT2 = IBINIT1 + 3
110     BLOAD "c:Ygpib-pcYbib.m",IBINIT1
120     CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130     CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDNS="GPIB0"
150 D1S="DEV1"
160 CALL IBFIND(D1S,DV1%)
170 CALL IBFIND(BDNS,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 REM
210 REM
220 WRTS="HOLD"+CHRS(&HA)                    'HOLD
230 CALL IBWRT(DV1%,WRTS)
240 WRTS="FMT2"+CHRS(&HA)                    'DATA OUTOUT MODE "64Bit FLOATING
250 CALL IBWRT(DV1%,WRTS)
260 REM
270 WRTS="REQDTN"+CHRS(&HA)                  'DATA NUMBER REQUEST
280 CALL IBWRT(DV1%,WRTS)
290 REM
300 RDS=SPACES(10)                           'DATA NUMBER INPUT
310 CALL IBRD(DV1%,RDS):NO=VAL(RDS)
320 REM
330 CNT%=NO*8                                'DIMENSION CHANGE
340 DIM RD%(NO*8),FL(8)
350 DIM DX(NO),DY(NO)
360 REM
370 EOSV%=&HA                                'DISABLE END-OF-STRING "0A"
380 V%=EOSV%+&H0
390 CALL IBEOS(DV1%,V%)
400 REM
410 FOR J=1 TO 2
420   WRTS="SELXY"+STRS(J-1)+CHRS(&HA)       'X or Y axis DATA SELECT
430   CALL IBWRT(DV1%,WRTS)
440   WRTS="REQDT"+CHRS(&HA)                 'DATA REQUEST
450   CALL IBWRT(DV1%,WRTS)
460   CALL IBRDI(DV1%,RD%(1),CNT%)           'READ DATA TO INTEGER ARRAY
470   REM
480   FOR I=1 TO NO
490     REM
500     FOR M=1 TO 4                         'ORDER INTEGER ARRAY TO
510       A=RD%(I*4+M-4)                     '                FLOATING MODE
520       IF A<0 THEN A=65536!+A
530       FL(M*2)=INT(A/256)
540       FL(M*2-1)=A-FL(M*2)*256
550     NEXT M
560     REM
570     B=INT(FL(2)/16)                      'DEVIDE SECOND BYTE TO
580     C=FL(2)-B*16                         '  EXPONENTIAL PART AND REAL PART
```

```
590     REM
600     VL=16+C                                    'CALCULATE REAL PART
610     FOR M=3 TO 8
620       VL=VL*256+FL(M)
630     NEXT M
640     REM
650     IF FL(1)<128 THEN GOTO 680                 'SELECT POSITIVE OR NEGATIVE
660     VL=-VL:FL(1)=FL(1)-128
670     REM
680     EX=FL(1)*16+B                              'CALCULATE EXPONENTIAL PART
690     REM
700     IF EX<900 THEN LET VL=0:GOTO 750           'COMBINE EXPONENTIAL PART AND
710     IF EX>975 THEN GOTO 730                    '                      REAL PART
720     VL=VL*2^(-100):EX=EX+100
730     VL=VL*2^(EX-1075)
740     REM
750     IF J=1 THEN DY(I)=VL                       'Y-axis DATA INPUT
760     IF J=2 THEN DX(I)=VL                       'X-axis DATA INPUT
770   NEXT I
780 NEXT J
790 REM
800 FOR I=1 TO NO                                  'PRINT DATA
810   PRINT DX(I),DY(I)
820 NEXT I
830 REM
840 V%=0                                           'CLEAR REMOTE ENABLE LINE
850 CALL IBSRE(BO%,V%)
860 END
```

Example 4. Harmonic marker data transfer

When displayed harmonics with marker indication, transfer the data from the R9211 display to the personal computer provided by IBM.
In this program example, the fundamental frequency is set as 2kHz.

[Flowchart]

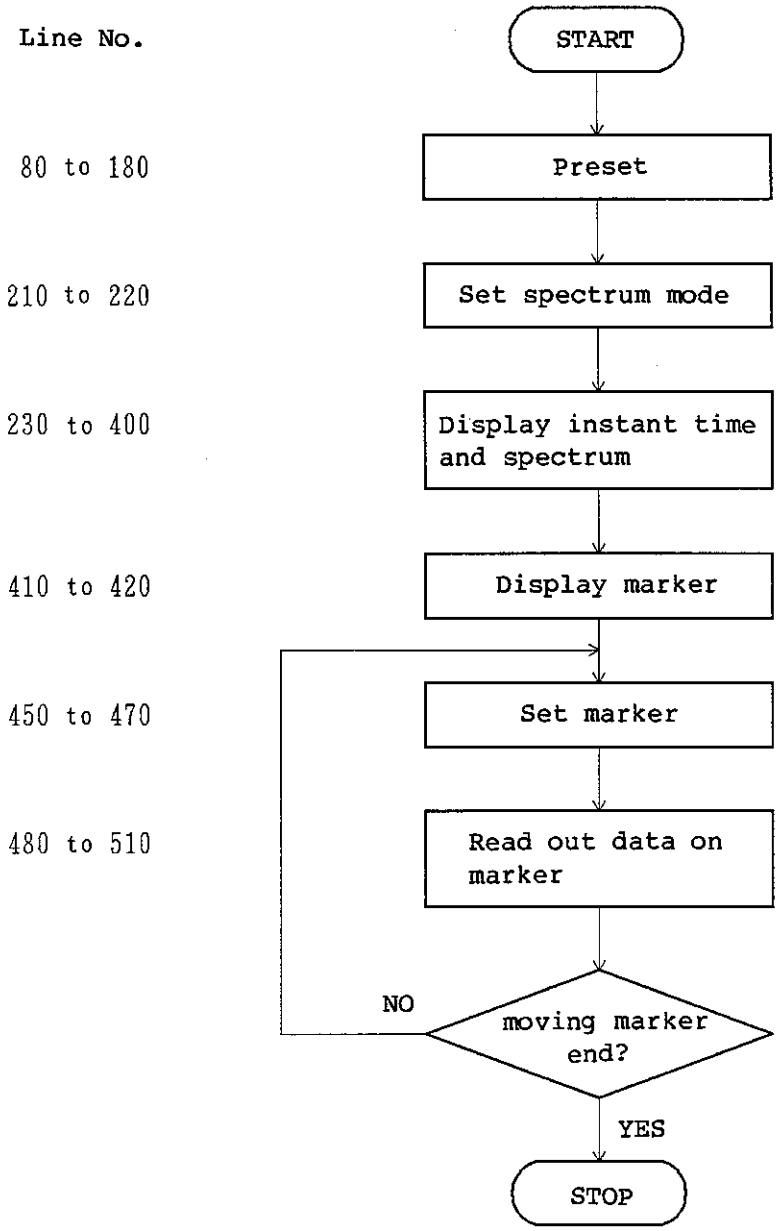


```
10 REM ************************************************
20 REM **      R9211 DATA OUTPUT MODE :                **
30 REM **                  HARMONIC MARKER             **
40 REM ************************************************
50 REM
60 REM                  DATE : '89/04/03
70 REM
80      CLEAR    ,59000!
90      IBINIT1 = 59000!
100     IBINIT2 = IBINIT1 + 3
110     BLOAD "c:\gpib-pc\ib.m",IBINIT1
120     CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130     CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDNS="GPIB0"
150 DIS="DEV1"
160 CALL IBFIND(DIS,DV1%)
170 CALL IBFIND(BDNS,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 REM
210 REM
220 WRTS="HED0"+CHR$(&HA)                    'HEADER OFF
230 CALL IBWRT(DV1%,WRTS)
240 WRTS="XXXMKR"+CHR$(&HA)                  'ENABLE OF X MARKER
250 CALL IBWRT(DV1%,WRTS)
260 WRTS="HARMMKR1"+CHR$(&HA)                'HARMONIC ON
270 CALL IBWRT(DV1%,WRTS)
280 WRTS="FDMTFKHZ2.0"+CHR$(&HA)             'SET FUNDAMENTAL FREQUENCY
290 CALL IBWRT(DV1%,WRTS)
300 WRTS="XMARKER"+CHR$(&HA)                 'X MARKER ESTIMATE
310 CALL IBWRT(DV1%,WRTS)
320 REM
330 WRTS="SDL2"+CHR$(&HA)                    'STRING DELIMITER CRLF
340 CALL IBWRT(DV1%,WRTS)
350 WRTS="DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CRLF
360 CALL IBWRT(DV1%,WRTS)
370 REM
380 DIM D(7)
390 REM
400 WRTS="SELRD0"+CHR$(&HA)                  'REQUEST ALL LINE'S DATA
410 CALL IBWRT(DV1%,WRTS)
420 REM
430 WRTS="REQRD"+CHR$(&HA)                   'DATA REQUEST
440 CALL IBWRT(DV1%,WRTS)
450 A$=SPACE$(13)                            'DATA INPUT
460 FOR N=1 TO 7
470   CALL IBRD(DV1%,A$)
480   D(N)=VAL(A$)
490 NEXT N
500 REM
510 FOR N=1 TO 7
520   PRINT N,D(N)
530 NEXT N
540 REM
550 V%=0                                     'CLEAR REMOTE ENABLE LINE
560 CALL IBSRE(B0%,V%)
570 REM
580 END
```

Example 5. Move marker and read out data

This program displays two graph.Lower graph displays instant time of channel A, and upper graph displays spectrum of this time wave.
Also this program moves marker by 10kHz step from 10kHz to 100kHz, and reads out data on marker.

[Flowchart]



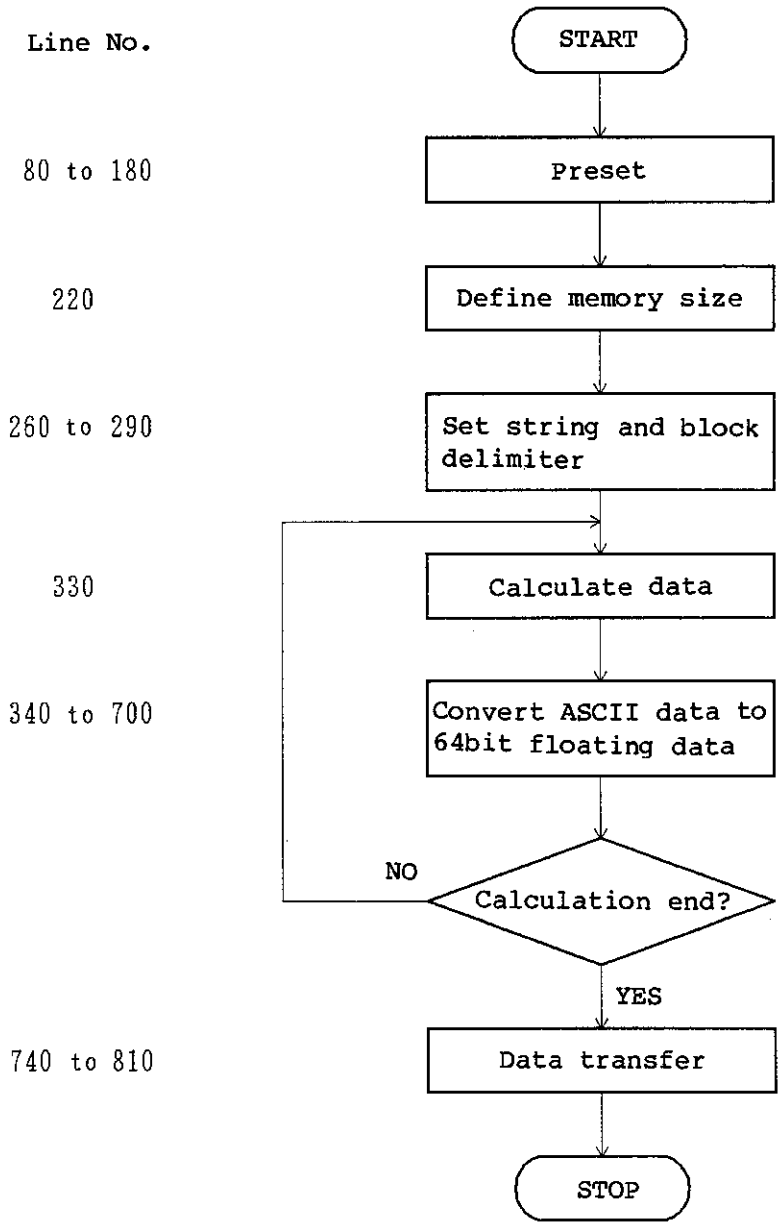
```
10 REM ************************************************************
20 REM **            MOVE CURSOR AND READ OUT DATA                **
30 REM ************************************************************
40 REM
50 REM                      DATE : '90/02/13
60 REM
70       CLEAR     ,59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 WRT$ = "MSPECTRM"+CHR$(&HA)                    'SET SPECTRUM MODE
220 CALL IBWRT(DV1%,WRT$)
230 WRT$ = "POWERSPC"+CHR$(&HA)                    'MEASUREMENT OF POWER SPECTRUM
240 CALL IBWRT(DV1%,WRT$)
250 WRT$ = "SENSA!"+CHR$(&HA)                      'SET SENS OF CH-A AUTO
260 CALL IBWRT(DV1%,WRT$)
270 WRT$ = "AUTORNGA1"+CHR$(&HA)
280 CALL IBWRT(DV1%,WRT$)
290 WRT$ = "DUALT"+CHR$(&HA)                       'DISPLAY DUAL
300 CALL IBWRT(DV1%,WRT$)
310 WRT$ = "SEL1"+CHR$(&HA)                        'SELECT FIRST DISPLAY
320 CALL IBWRT(DV1%,WRT$)
330 WRT$ = "CHATIMEI"+CHR$(&HA)                    'DISPLAY INST TIME OF CH-A
340 CALL IBWRT(DV1%,WRT$)
350 WRT$ = "SINGLEX"+CHR$(&HA)                     'DISPLAY MARKER
360 CALL IBWRT(DV1%,WRT$)
370 WRT$ = "SEL2"+CHR$(&HA)                        'SELECT SECOND DISPLAY
380 CALL IBWRT(DV1%,WRT$)
390 WRT$ = "CHASPCTI"+CHR$(&HA)                    'DISPLAY SPECTRUM OF CH-A
400 CALL IBWRT(DV1%,WRT$)
410 WRT$ = "SINGLEX"+CHR$(&HA)                     'DISPLAY MARKER
420 CALL IBWRT(DV1%,WRT$)
430 '
440 FOR I=10 TO 100 STEP 10
450   FR = I*1000
460   WRT$ = "XCSAHZ"+STR$(FR)+CHR$(&HA)           'SET MARKER
470   CALL IBWRT(DV1%,WRT$)
480   F$ = SPACE$(13)
490   D$ = SPACE$(13)
500   GOSUB 590                                    'DATA INPUT
510   PRINT F$,"KHZ",D$,"dBMg"
520 NEXT I
530 '
540 V%=0                                           'CLEAR REMOTE ENABLE LINE
550 CALL IBSRE(B0%,V%)
560 END
```

```
570 '
580 '
590 WRT$ = "FMT0"+CHR$(&HA)
600 CALL IBWRT(DV1%,WRT$)
610 WRT$ = "SDL1"+CHR$(&HA)                    'STRING DELIMITER
620 CALL IBWRT(DV1%,WRT$)
630 WRT$ = "HED0"+CHR$(&HA)                    'HEADER OFF
640 CALL IBWRT(DV1%,WRT$)
650 '
660 WRT$ = "SELRD0"+CHR$(&HA)                  'SELECT DATA
670 CALL IBWRT(DV1%,WRT$)
680 WRT$ = "REQRD"+CHR$(&HA)                   'DATA REQUEST
690 CALL IBWRT(DV1%,WRT$)
700 CALL IBRD(DV1%,F$)
710 CALL IBRD(DV1%,D$)
720 RETURN
```

Example 6. Write data into R9211's internal data save buffer

This program calculates sinewave and writes into R9211's internal data save buffer using 64bit floating mode.

[Flowchart]



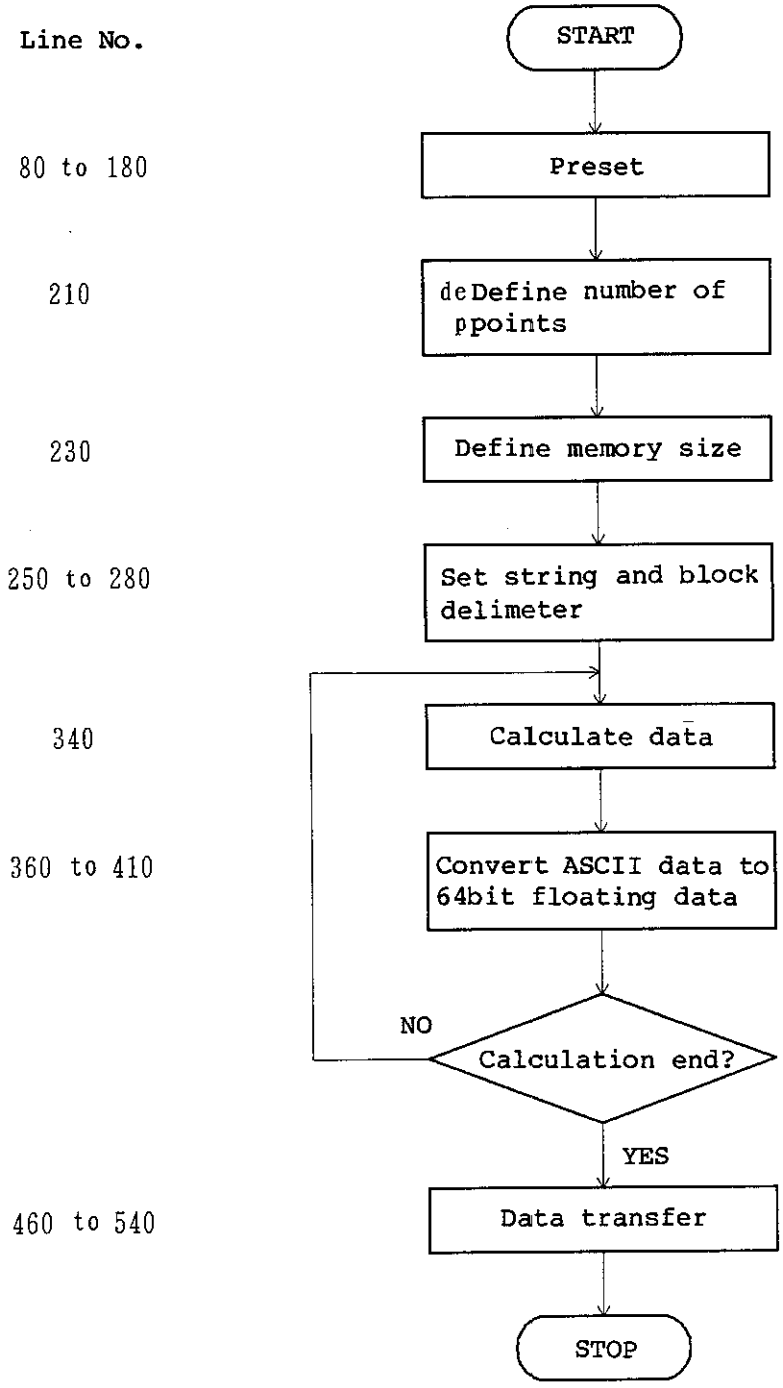
```
10 REM ************************************************************
20 REM **            IEEE floating format                        **
30 REM **                  SVWRITE                               **
40 REM ************************************************************
50 REM
60 REM                  DATE : '90/02/13
70 REM
80      CLEAR    ,59000!
90      IBINIT1 = 59000!
100     IBINIT2 = IBINIT1 + 3
110     BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
120     CALL IBINIT1(IBFIND,IBTRG,IBCLR,ISPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
130     CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
140 BDN$="GPIB0"
150 D1$="DEV1"
160 CALL IBFIND(D1$,DV1%)
170 CALL IBFIND(BDN$,B0%)
180 CALL IBSIC(B0%)
190 V%=1:CALL IBSRE(B0%,V%)
200 '
210 '
220 DIM DA%(4096)
230 '
240 W = 2*3.14*500*.004/1024
250 '
260 WRT$ = "SDL2"+CHR$(&HA)                    'STRING DELIMITER CR,LF
270 CALL IBWRT(DV1%,WRT$)
280 WRT$ = "DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CR,LF
290 CALL IBWRT(DV1%,WRT$)
300 '
310 '
320 FOR I=1 TO 1024
330   A = SIN(W*I)
340   IF A>0 THEN S=0 ELSE S=1
350   A = ABS(A)
360   E = INT(LOG(A)/LOG(2))+1023
370   B = LOG(A)/LOG(2)-(E-1023)
380   F = 2^B-1
390   '
400   INE = INT(E/2^4)
410   N1 = (S*2^7) OR INE
420   '
430   F = F*2^4
440   IN = INT(F)
450   N2 = ((E/2^4-INE)*2^8) OR IN
460   F = (F-IN)*2^8
470   N3 = INT(F)
480   F = (F-N3)*2^8
490   N4 = INT(F)
500   F = (F-N4)*2^8
510   N5 = INT(F)
520   F = (F-N5)*2^8
530   N6 = INT(F)
540   F = (F-N6)*2^8
550   N7 = INT(F)
560   F = (F-N7)*2^8
570   N8 = INT(F)
```

```
580   '
590   N1 = N1+N2*256
600   IF N1>=32768! THEN N1=N1-65536!
610   DA%(I*4-3) = N1
620   N3 = N3+N4*256
630   IF N3>=32768! THEN N3=N3-65536!
640   DA%(I*4-2) = N3
650   N5 = N5+N6*256
660   IF N5>=32768! THEN N5=N5-65536!
670   DA%(I*4-1) = N5
680   N7 = N7+N8*256
690   IF N7>=32768! THEN N7=N7-65536!
700   DA%(I*4) = N7
710   PRINT I,DA%(I*4-3),DA%(I*4-2),DA%(I*4-1),DA%(I*4)
720 NEXT I
730 '
740 EOSV% = &HA                                 'DISABLE END OF STRING "OA"
750 V% = EOSV%+&H0
760 CALL IBEOS(DV1%,V%)
770 '
780 WRT$ = "SVWRITE 0 3 0"                      'DATA TRANSFER
790 CALL IBWRT(DV1%,WRT$)
800 CNT% = 8192
810 CALL IBWRTI(DV1%,DA%(1),CNT%)
820 '
830 V%=0                                        'CLEAR REMOTE ENABLE LINE
840 CALL IBSRE(B0%,V%)
850 END
```

Example 7. Write data into R9211's arbitrary signal buffer

This program calculates sinewave and writes into R9211's arbitrary signal buffer to generate sinewave.

[Flowchart]

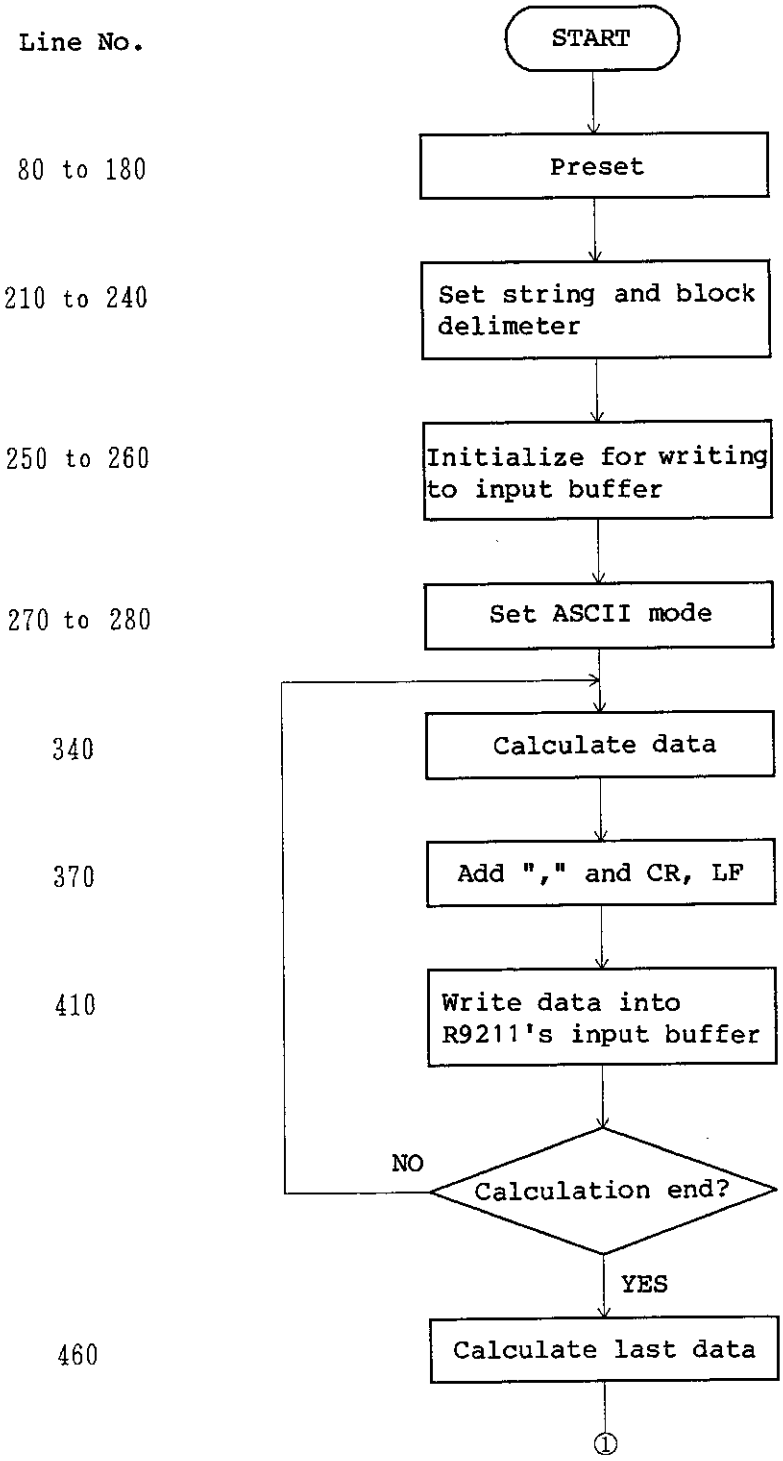


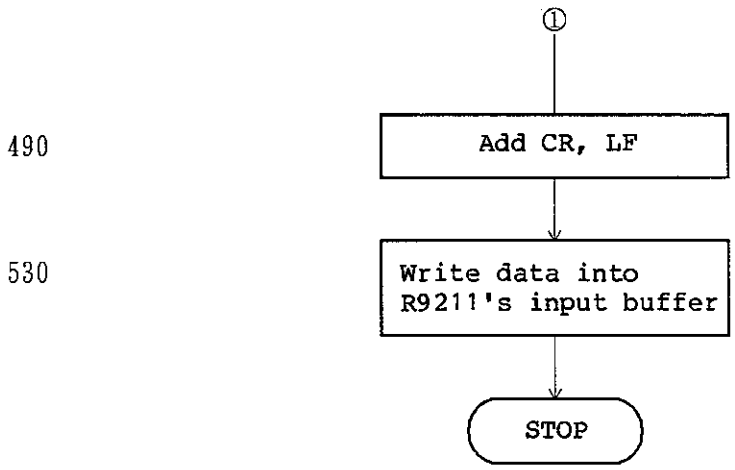
```
10 REM ************************************************************
20 REM **          16 BIT FIXED POINT DATA TO ARBIT                **
30 REM ************************************************************
40 REM
50 REM                    DATE : '90/02/16
60 REM
70       CLEAR    .59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 SAMPLE = 1024                              'SET NUMBER OF POINTS
220 '
230 DIM DA%(SAMPLE)
240 '
250 WRT$ = "SDL 2"+CHR$(&HA)                   'STRING DELIMITER CR,LF
260 CALL IBWRT(DV1%,WRT$)
270 WRT$ = "DEL 0"+CHR$(&HA)                   'BLOCK DELIMITER CR,LF
280 CALL IBWRT(DV1%,WRT$)
290 '
300 W = 8*3.14/SAMPLE
310 '
320 FOR T=1 TO SAMPLE
330   '
340   A = INT(16384*SIN(W*T))
350   '
360   B = INT(A/256)
370   C = A-256*B
380   IF B<0 THEN B=B+256
390   D = B+C*256
400   IF D>=32768! THEN D=D-65536!
410   DA%(T) = D
420   '
430   PRINT DA%(T)
440 NEXT T
450 '
460 EOSV% = &HA                                'DISABLE END-OF-STRING "0A"
470 V% = EOSV%+&H0
480 CALL IBEOS(DV1%,V%)
490 '
500 WRT$ = "TOARBIT"+STR$(SAMPLE)
510 CALL IBWRT(DV1%,WRT$)
520 '
530 CNT% = SAMPLE*2
540 CALL IBWRTI(DV1%,DA%(1),CNT%)
550 '
560 V%=0                                       'CLEAR REMOTE ENABLE LINE
570 CALL IBSRE(B0%,V%)
580 END
```

Example 8. Write data into R9211's input buffer using ASCII mode

This program calculates sinewave and writes into R9211's input buffer using ASCII mode.

[Flowchart]



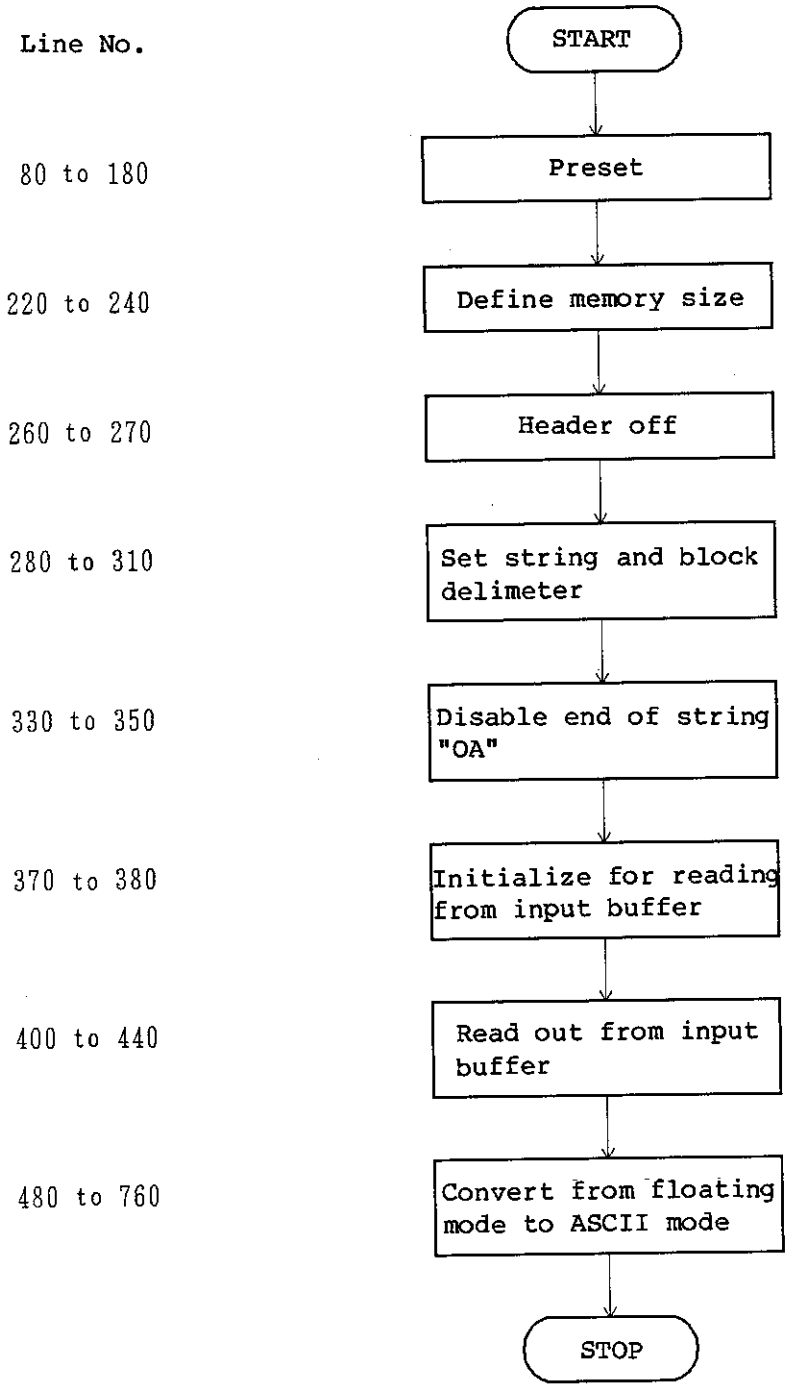

①
490
Add CR, LF
530
Write data into
R9211's input buffer
STOP

```
10 REM ************************************************************
20 REM **              IBWRITE   ASCII DATA                      **
30 REM ************************************************************
40 REM
50 REM                    DATE : '90/02/19
60 REM
70       CLEAR    ,59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 WRT$ = "SDL2"+CHR$(&HA)                    'STRING DELIMITER CR,LF
220 CALL IBWRT(DV1%,WRT$)
230 WRT$ = "DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CR,LF
240 CALL IBWRT(DV1%,WRT$)
250 WRT$ = "IBRESET"+CHR$(&HA)                 'INITIALIZE FOR WRITING
260 CALL IBWRT(DV1%,WRT$)
270 WRT$ = "IBWRITE 2 0 1024"
280 CALL IBWRT(DV1%,WRT$)
290 '
300 W = 8*3.14/1024
310 '
320 FOR T=1 TO 1023
330   '
340   A = 5*SIN(W*T)
350   '
360   DA$ = STR$(A)
370   DA$ = DA$+","+CHR$(&HD)+CHR$(&HA)        'ADD "," AND CR.LF
380   '
390   PRINT DA$
400   '
410   CALL IBWRT(DV1%,DA$)
420   '
430 NEXT T
440 '
450 T=1024                                     'LAST DATA
460 A = 5*SIN(W*T)
470 '
480 DA$ = STR$(A)
490 DA$ = DA$+CHR$(&HD)+CHR$(&HA)              'ADD CR,LF
500 '
510 PRINT DA$
520 '
530 CALL IBWRT(DV1%,DA$)
540 '
550 V%=0                                       'CLEAR REMOTE ENABLE LINE
560 CALL IBSRE(B0%,V%)
570 END
```

Example 9. Read out data from R9211's input buffer using floating mode

This program reads out data from R9211's input buffer using 64bit floating mode.

[Flowchart]



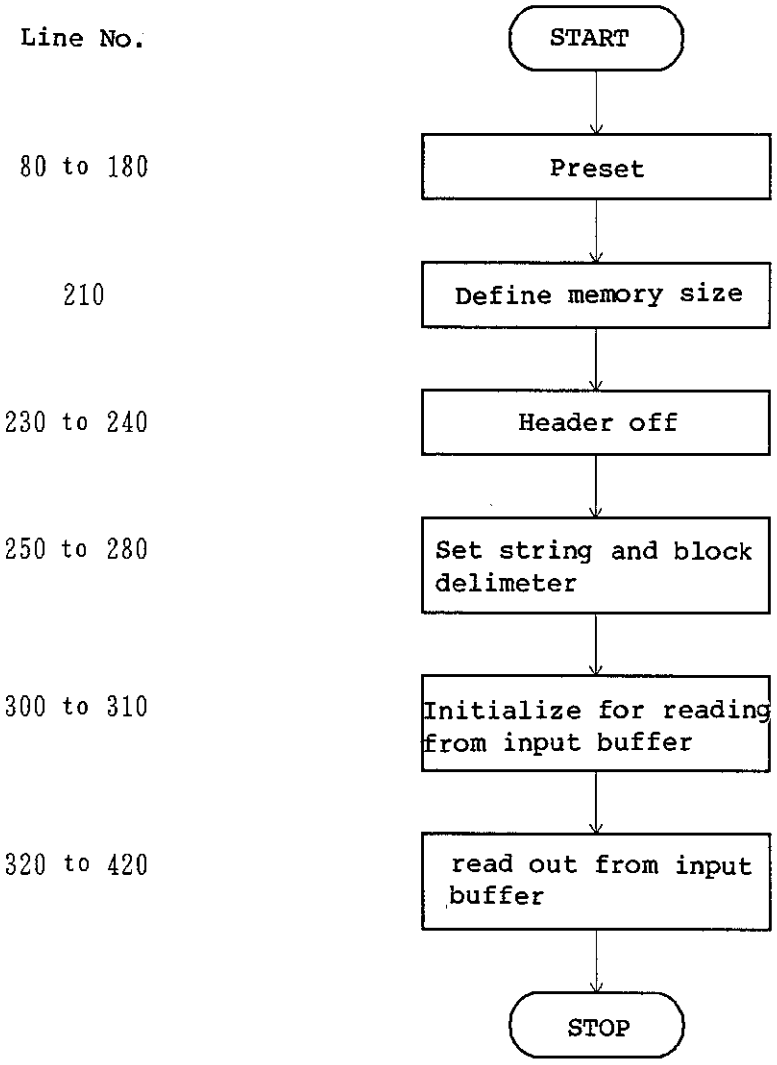
```
10 REM ************************************************************
20 REM **      IB READ     64 BIT FLOATING DATA                    **
30 REM ************************************************************
40 REM
50 REM                    DATE : '90/02/13
60 REM
70       CLEAR    ,59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 NO =1024
220 DIM DA%(NO*4)
230 DIM X(NO)
240 DIM FL(8)
250 '
260 WRT$ = "HED0"+CHR$(&HA)
270 CALL IBWRT(DV1%,WRT$)
280 WRT$ = "SDL2"+CHR$(&HA)                    'STRING DELIMITER CR,LF
290 CALL IBWRT(DV1%,WRT$)
300 WRT$ = "DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CR,LF
310 CALL IBWRT(DV1%,WRT$)
320 '
330 EOSV% = &HA                                'DISABLE END-OF-STRING "0A"
340 V% = EOSV%+&HA
350 CALL IBEOS(DV1%,V%)
360 '
370 WRT$ = "IBRESET"+CHR$(&HA)                 'INITIALIZE FOR READING
380 CALL IBWRT(DV1%,WRT$)
390 '
400 WRT$ = "IBREAD 3 0 1024 0"                 'READ DATA FROM INPUT BUFFER
410 CALL IBWRT(DV1%,WRT$)
420 '
430 CNT% = NO*8
440 CALL IBRDI(DV1%,DA%(1),CNT%)
450 '
460 FOR I=1 TO NO
470   '
480   FOR J=1 TO 4                             'CHANGE INTEGER ARRAY TO FLOATING
490     A = DA%(I*4+J-4)
500     IF A<0 THEN A=A+65536!
510     FL(J*2) = INT(A/256)
520     FL(J*2-1) = A-FL(J*2)*256
530   NEXT J
540   '
550   B = INT(FL(2)/16)                        'DEVICE SECOND BYTE TO
560   C = FL(2)-B*16                           '    ECPONENTIAL PART AND REAL PART
570   '
```

```
580   VL = C+16                                   'CALCULATE REAL PART
590   FOR J=3 TO 8
600     VL = VL*256+FL(J)
610   NEXT J
620   '
630   IF FL(1)<128 THEN GOTO 660                  'POSITIVE OR NEGATIVE ?
640   VL = -VL : FL(1)=FL(1)-128
650   '
660   EX = FL(1)*16+B                             'CALCULATE EXPONENTIAL PART
670   '
680   IF EX<900 THEN LET VL=0 : GOTO 730          'COMBINE EXPONENTIAL PART AND
690   IF EX>975 THEN GOTO 710                     '                      REAL PART
700   VL = VL*2^100 : EX = EX+100
710   VL = VL*2^(EX-1075)
720   '
730   X(I) = VL
740   PRINT I,X(I)
750   '
760 NEXT I
770 '
780 V%=0                                          'CLEAR REMOTE ENABLE LINE
790 CALL IBSRE(B0%,V%)
800 END
```

Example 10. Read out data from R9211's input buffer using ASCII mode

This program reads out data from R9211's input buffer using ASCII mode.

[Flowchart]

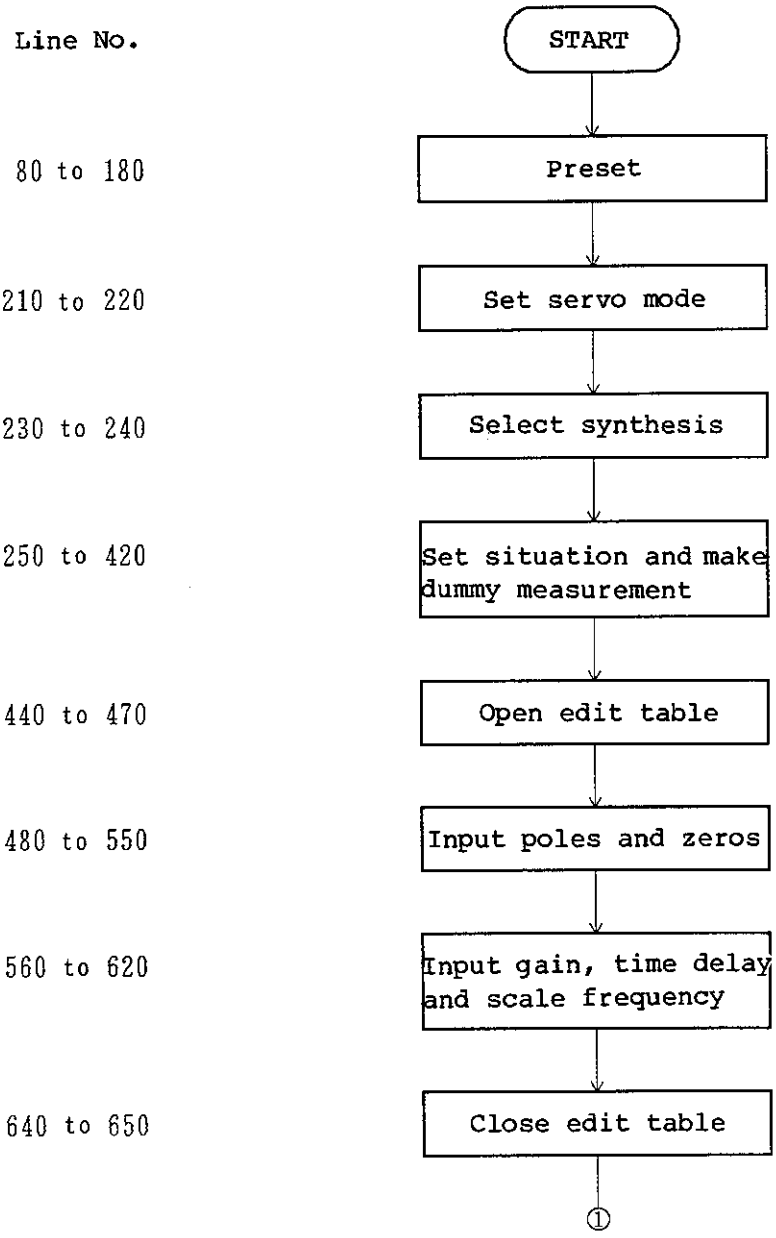


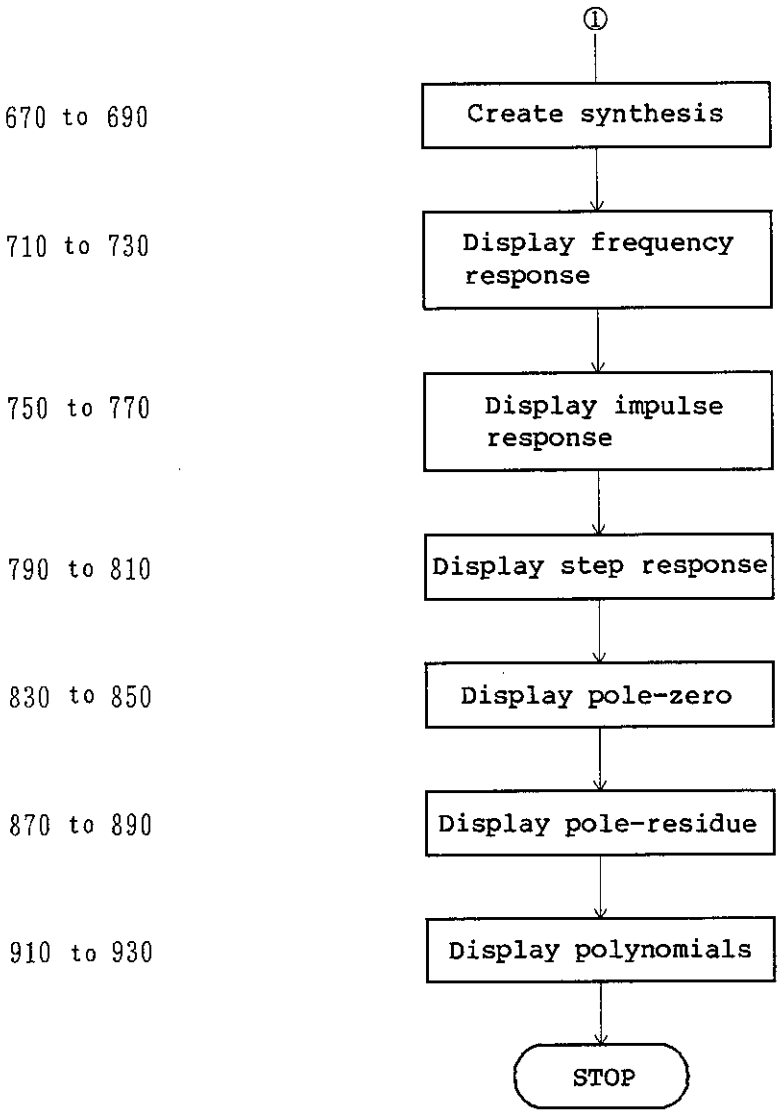
```
10 REM ************************************************************
20 REM **                  IBREAD ASCII DATA                       **
30 REM ************************************************************
40 REM
50 REM                     DATE : '90/02/13
60 REM
70       CLEAR    ,59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 DIM DA(1024)
220 '
230 WRT$ = "HED0"+CHR$(&HA)
240 CALL IBWRT(DV1%,WRT$)
250 WRT$ = "SDL2"+CHR$(&HA)                    'STRING DELIMITER CR,LF
260 CALL IBWRT(DV1%,WRT$)
270 WRT$ = "DEL0"+CHR$(&HA)                    'BLOCK DELIMITER CR,LF
280 CALL IBWRT(DV1%,WRT$)
290 '
300 WRT$ = "IBRESET"+CHR$(&HA)                 'INITIALIZE FOR READING
310 CALL IBWRT(DV1%,WRT$)
320 WRT$ = "IBREAD 2 0 1024 0"                 'READ DATA FROM INPUT BUFFER
330 CALL IBWRT(DV1%,WRT$)
340 '
350 A$=SPACE$(13)
360 FOR I=1 TO 1024
370   '
380   CALL IBRD(DV1%,A$)
390   PRINT A$
400   DA(I)=VAL(A$)
410   '
420 NEXT I
430 '
440 V%=0                                       'CLEAR REMOTE ENABLE LINE
450 CALL IBSRE(B0%,V%)
460 END
```

Example 11. Synthesis

This program inputs poles, zeros, gain, time delay and scale frequency, and then displays frequency response etc..

[Flowchart]




①
670 to 690
Create synthesis
710 to 730
Display frequency response
750 to 770
Display impulse response
790 to 810
Display step response
830 to 850
Display pole-zero
870 to 890
Display pole-residue
910 to 930
Display polynomials
STOP

```
10 REM ************************************************
20 REM **                    SYNTHESIS                 **
30 REM ************************************************
40 REM
50 REM                  DATE : '90/02/13
60 REM
70       CLEAR    ,59000!
80       IBINIT1 = 59000!
90      IBINIT2 = IBINIT1 + 3
100      BLOAD "c:¥gpib-pc¥bib.m",IBINIT1
110      CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,IBONL,IBSC
,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,IBEOT,IBRDF,IBWRTF)
120      CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,IBCMDA,IBRD,IB
RDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBER%,IB
CNT%)
130 BDN$="GPIB0"
140 D1$="DEV1"
150 CALL IBFIND(D1$,DV1%)
160 CALL IBFIND(BDN$,B0%)
170 CALL IBSIC(B0%)
180 V%=1:CALL IBSRE(B0%,V%)
190 '
200 '
210 WRT$ = "MSERVO+CHR$(&HA)                    'SELECT SERVO
220 CALL IBWRT(DV1%,WRT$)
230 WRT$ = "MKSYNTH"+CHR$(&HA)                  'SELECT SYNTHESIS
240 CALL IBWRT(DV1%,WRT$)
250 WRT$ = "LINMSN"+CHR$(&HA)                   'SELECT LIN MULTI SINE
260 CALL IBWRT(DV1%,WRT$)
270 WRT$ = "FRANGKHZ 2"+CHR$(&HA)               'MAXIMUM FREQUENCY 2KHZ
280 CALL IBWRT(DV1%,WRT$)
290 WRT$ = "SLINESPN 200"+CHR$(&HA)             'NUMBER OF LINES 200
300 CALL IBWRT(DV1%,WRT$)
310 WRT$ = "SVAMPV 0.5"+CHR$(&HA)               'SET SG VOLT 0.5V
320 CALL IBWRT(DV1%,WRT$)
330 WRT$ = "GENSTR"+CHR$(&HA)                   'GENERATOR START
340 CALL IBWRT(DV1%,WRT$)
350 WRT$ = "SIGOUT 1"+CHR$(&HA)                 'SIG OUT ON
360 CALL IBWRT(DV1%,WRT$)
370 WRT$ = "START"+CHR$(&HA)                    'MEASUREMENT START
380 CALL IBWRT(DV1%,WRT$)
390 FOR I=1 TO 10000
400 NEXT I
410 WRT$ = "STOP"+CHR$(&HA)                     'MEASUREMENT STOP
420 CALL IBWRT(DV1%,WRT$)
430 '
440 WRT$ = "SINGLET"+CHR$(&HA)                  'DISPLAY SINGLE
450 CALL IBWRT(DV1%,WRT$)
460 WRT$ = "EDPZ 1"+CHR$(&HA)                   'SELECT 1 LINE
470 CALL IBWRT(DV1%,WRT$)
480 WRT$ = "VALPZ -5,-2"+CHR$(&HA)              'INPUT POLE'S DATA
490 CALL IBWRT(DV1%,WRT$)
500 WRT$ = "VALPZ -1,-1,1.0"+CHR$(&HA)
510 CALL IBWRT(DV1%,WRT$)
520 WRT$ = "EDPZ 21"+CHR$(&HA)                  'SELECT 21 LINE
530 CALL IBWRT(DV1%,WRT$)
540 WRT$ = "VALPZ -8,-2"+CHR$(&HA)              'INPUT ZERO'S DATA
550 CALL IBWRT(DV1%,WRT$)
560 WRT$ = "SGIN 6.31,-1"+CHR$(&HA)             'INPUT GAIN 0.631
570 CALL IBWRT(DV1%,WRT$)
```

```
580 WRT$ = "TDLY 0.0"+CHR$(&HA)                 'INPUT TIME DALAY 0
590 CALL IBWRT(DV1%,WRT$)
600 WRT$ = "SCFR 1.0,3"                         'INPUT SCALE FREQUENCY 1KHZ
610 CALL IBWRT(DV1%,WRT$)
620 STOP
630 '
640 WRT$ = "DEDPZ"+CHR$(&HA)                    'CLOSE EDIT TABLE
650 CALL IBWRT(DV1%,WRT$)
660 '
670 WRT$ = "CRSYN 1"+CHR$(&HA)                  'CREATE SYNTHESIS
680 CALL IBWRT(DV1%,WRT$)
690 STOP
700 '
710 WRT$ = "SFRF"+CHR$(&HA)                     'DISPLAY SYNTH FRF
720 CALL IBWRT(DV1%,WRT$)
730 STOP
740 '
750 WRT$ = "SIPSP"+CHR$(&HA)                    'DISPLAY IMPULSE RESPONSE
760 CALL IBWRT(DV1%,WRT$)
770 STOP
780 '
790 WRT$ = "SSTPR"+CHR$(&HA)                    'DISPLAY STEP RESPONSE
800 CALL IBWRT(DV1%,WRT$)
810 STOP
820 '
830 WRT$ = "SPZRO"+CHR$(&HA)                    'DISPLAY POLE-ZERO
840 CALL IBWRT(DV1%,WRT$)
850 STOP
860 '
870 WRT$ = "SPRSD"+CHR$(&HA)                    'DISPLAY POLE-RESIDUE
880 CALL IBWRT(DV1%,WRT$)
890 STOP
900 '
910 WRT$ = "SPOLY"+CHR$(&HA)                    'DISPLAY POLYNOMIALS
920 CALL IBWRT(DV1%,WRT$)
930 STOP
940 '
950 '
960 V%=0                                        'CLEAR REMOTE ENABLE LINE
970 CALL IBSRE(B0%,V%)
980 END
```

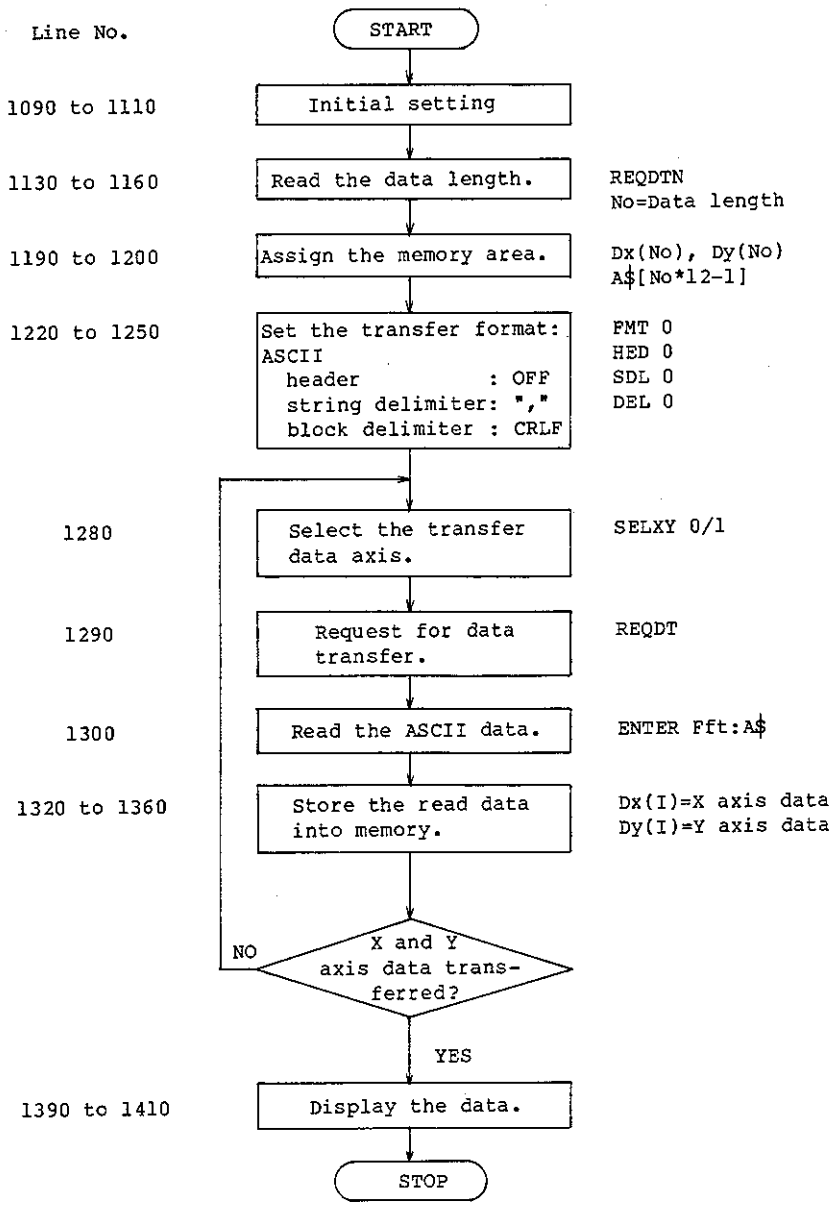
MEMO

5.2 Program Examples for HP 200/300

Example 1. Data transfer in the ASCII block transfer mode

Read data from the R9211 display, assign the required memory area. Read the data in the ASCII block format to allocate it in the memory area. Before executing this program, display the data to be transferred. (If multi-screen mode, select the screen of the data to be transferred with the "SEL" key. In case the screen selected contains momentous data varying, stop the data by issuing the "HOLD" or "ARM".

[Flowchart]

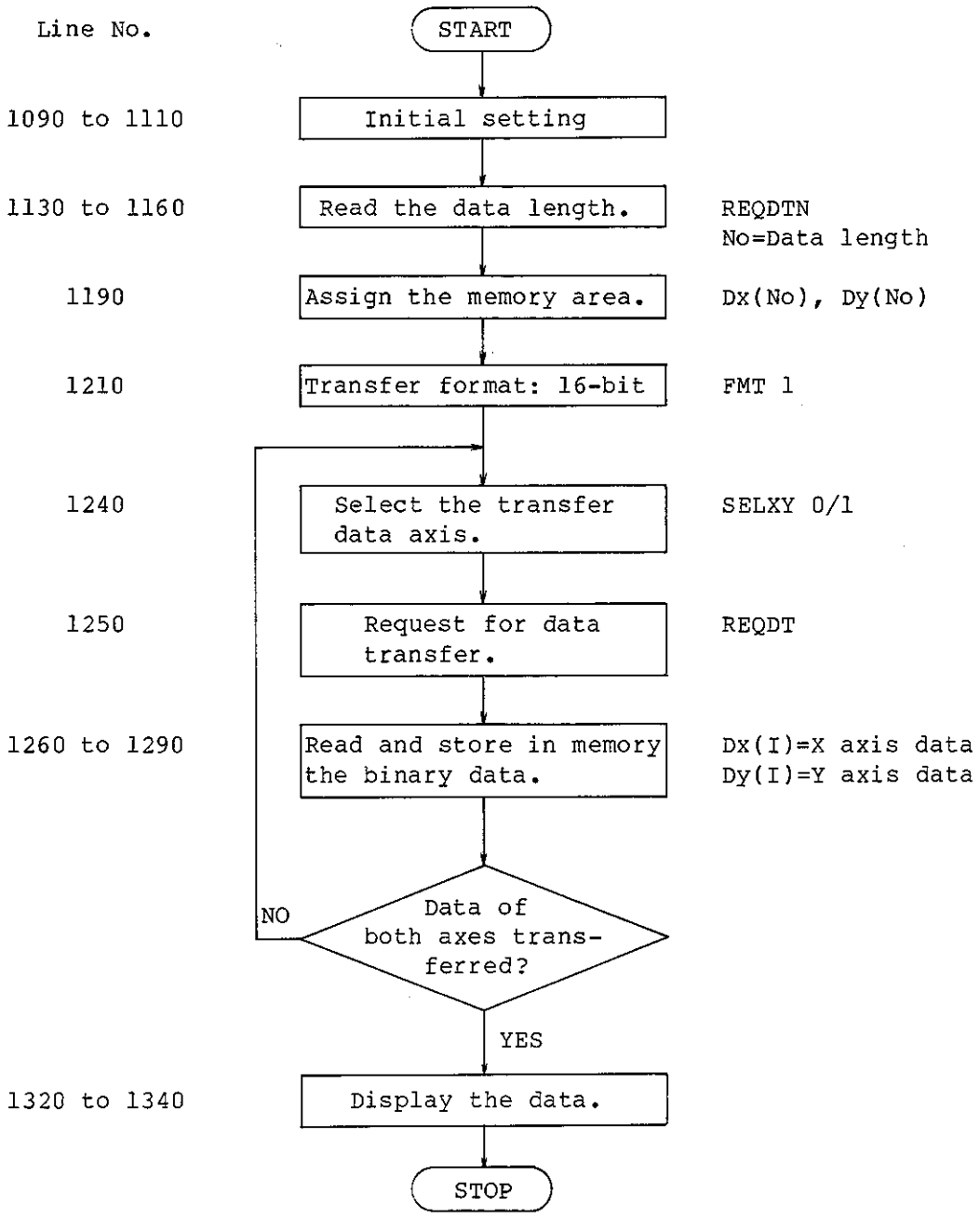


```
1000  ! ************************************************
1010  ! *    R9211 GPIB Example Program                *
1020  ! *    Readout Display Data by Ascii Block Format *
1030  ! *                                              *
1040  ! *      (C) Copyright 1990 ADVANTEST CORPORATION *
1050  ! *       last update NoV.21,1990                *
1060  ! *       BASIC 3.0 , HP9836                     *
1070  ! ************************************************
1080  !
1090  OPTION BASE 1                        ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  Fft=708                              ! DEFINE DEVICE ADDRESS
1120  !
1130  OUTPUT Fft;"HED 0"                   ! HEADER OFF
1140  OUTPUT Fft;"DEL 0"                   ! BLOCK DELIMITER CRLF
1150  OUTPUT Fft;"REQDTN"                  ! REQUEST BLOCK DATA NUMBER
1160  ENTER Fft;No                         ! RECEIVE BLOCK DATA NUMBER
1170  PRINT "BLOCK DATA NUMBER:";No
1180  !
1190  ALLOCATE Dx(No),Dy(No)               ! ALLOCATE DATA BUFFER
1200  ALLOCATE A$[No*12-1]                 ! ALLOCATE STRING BUFFER
1210  !
1220  OUTPUT Fft;"FMT 0"                   ! BLOCK DATA FORMAT ASCII
1230  OUTPUT Fft;"HED 0"                   ! HEADER OFF
1240  OUTPUT Fft;"SDL 0"                   ! STRING DELIMITER ","
1250  OUTPUT Fft;"DEL 0"                   ! BLOCK DELIMITER CRLF
1260  !
1270  FOR J=1 TO 2
1280    OUTPUT Fft;"SELXY"&VAL$(J-1)       ! X or Y-axis DATA SELECT
1290    OUTPUT Fft;"REQDT"                 ! REQUEST BLOCK DATA
1300    ENTER Fft;A$                       ! READ BLOCK DATA
1310    !
1320    FOR I=1 TO No
1330      B$=A$[1+12*(I-1);11]             ! DEVIDE STRING ALLOCATE
1340      IF J=1 THEN Dy(I)=VAL(B$)        ! Y AXIS DATA
1350      IF J=2 THEN Dx(I)=VAL(B$)        ! X AXIS DATA
1360    NEXT I
1370  NEXT J
1380  !
1390  FOR I=1 TO No                        ! PRINT READOUT DATA
1400    PRINT Dx(I),Dy(I)
1410  NEXT I
1420  !
1430  END
```

Example 2. Data transfer in the 16-bit binary transfer mode (FMT1)

Read the data length from the R9211 display, assign the required memory area. Read the data in the 16-bit binary format and allocate it in the memory area.
Before executing this program, display the data to be transferred. (If in multi-screen mode, select the screen of the data to be transferred, with the "SEL" key. If the selected screen contains momentous data varying, stop the data with the "HOLD" or "ARM".)

[Flowchart]

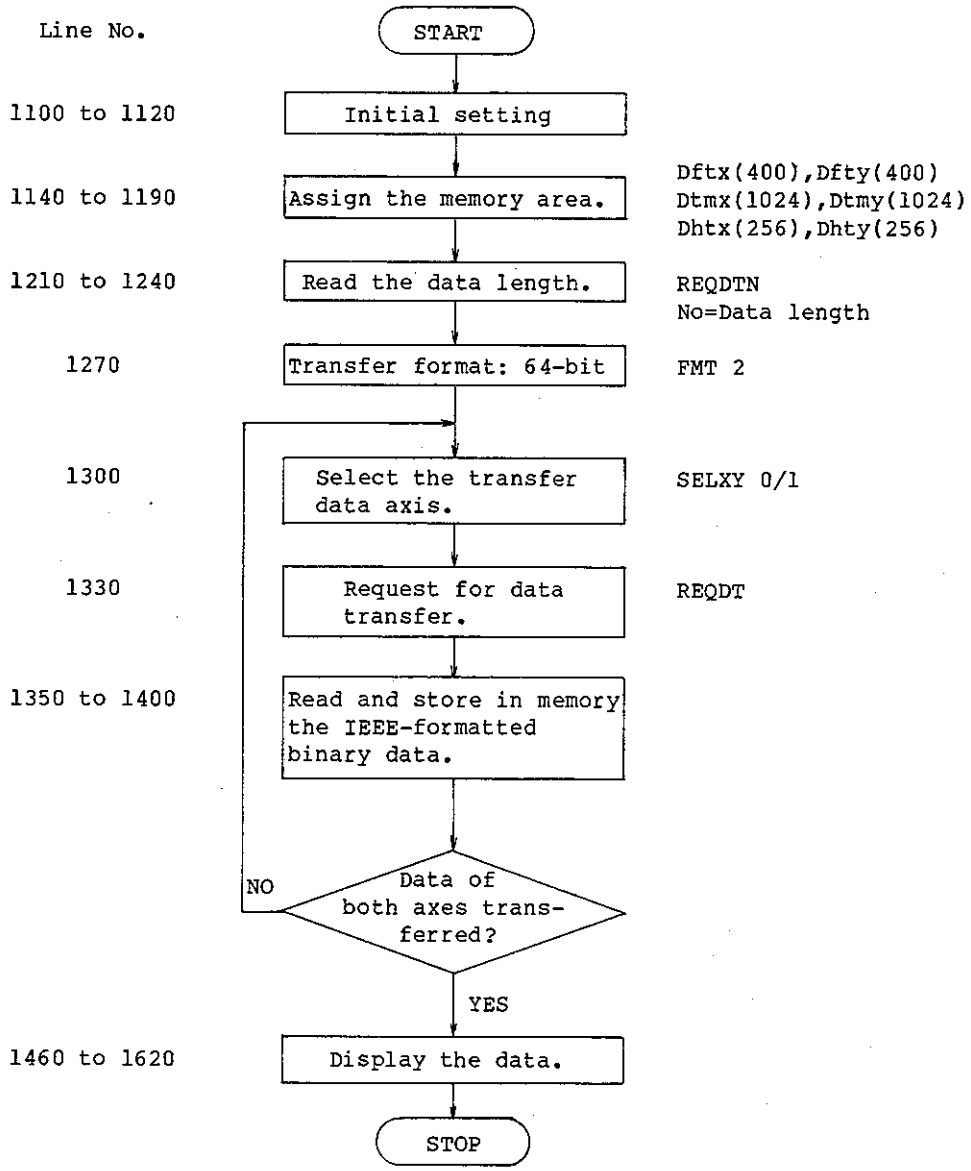


```
1000  ! ********************************************************
1010  ! *    R9211 GPIB Example Program                        *
1020  ! *    Readout Display Data by 16 Bit Fixed-Point Fotmat  *
1030  ! *                                                      *
1040  ! *      (C) Copyright 1990 ADVANTEST CORPORATION        *
1050  ! *      last update Nov.21,1990                         *
1060  ! *      BASIC 3.0 , HP9836                              *
1070  ! ********************************************************
1080  !
1090  OPTION BASE 1                         ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  Fft=708                               ! DEFINE DEVICE ADDRESS
1120  !
1130  OUTPUT Fft;"HED 0"                    ! HEADER OFF
1140  OUTPUT Fft;"DEL 0"                    ! BLOCK DELIMITER CRLF
1150  OUTPUT Fft;"REQDTN"                   ! REQUEST BLOCK DATA NUMBER
1160  ENTER Fft;No                          ! RECEIVE BLOCK DATA NUMBER
1170  PRINT "BLOCK DATA NUMBER:";No
1180  !
1190  ALLOCATE Dx(No),Dy(No)                ! ALLOCATE DATA BUFFER
1200  !
1210  OUTPUT Fft;"FMT 1"                    ! BLOCK DATA FORMAT 16BIT
1220  !
1230  FOR J=1 TO 2
1240    OUTPUT Fft;"SELXY"&VAL$(J-1)        ! X or Y-axis DATA SELECT
1250    OUTPUT Fft;"REQDT"                  ! REQUEST BLOCK DATA
1260    FOR I=1 TO No
1270      IF J=1 THEN ENTER Fft USING "#,W";Dy(I)      ! Y AXIS DATA
1280      IF J=2 THEN ENTER Fft USING "#,W";Dx(I)      ! X AXIS DATA
1290    NEXT I
1300  NEXT J
1310  !
1320  FOR I=1 TO No                         ! PRINT READOUT DATA
1330    PRINT Dx(I),Dy(I)
1340  NEXT I
1350  !
1360  END
```

Example 3. Data transfer in the 64-bit, IEEE floating point data transfer mode (FMT2)

Read the data length on the R9211 display screen and allocate a memory area. Read the data in the 64-bit IEEE dual precision floating point format and allocate it in the memory area.
Before executing this program, display the data to be transferred. (If in multi-screen mode, select the screen of the data to be transferred, with the "SEL" key. If the selected screen contains momentous data varying, stop the data with the "HOLD" or "ARM".)
The data length of the data which can be handled by this program is: 400, 1024 and 256.

[Flowchart]

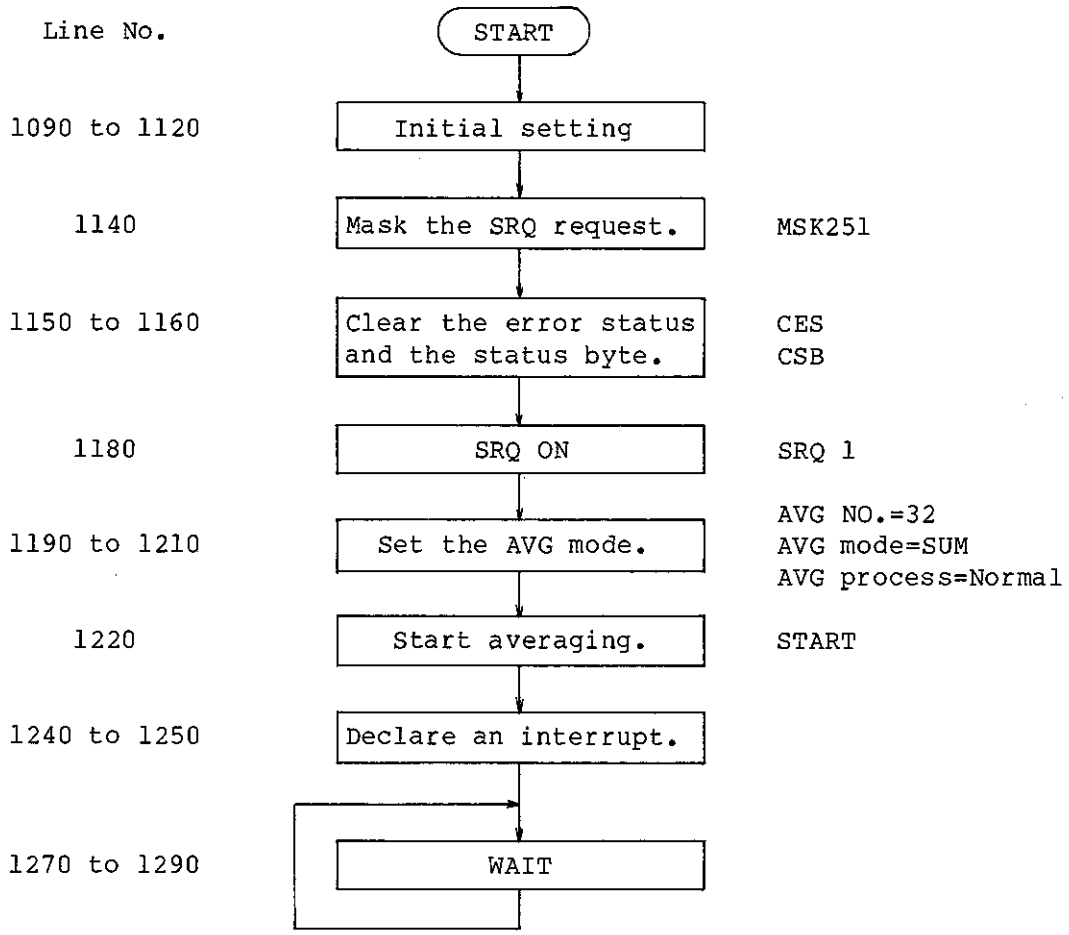


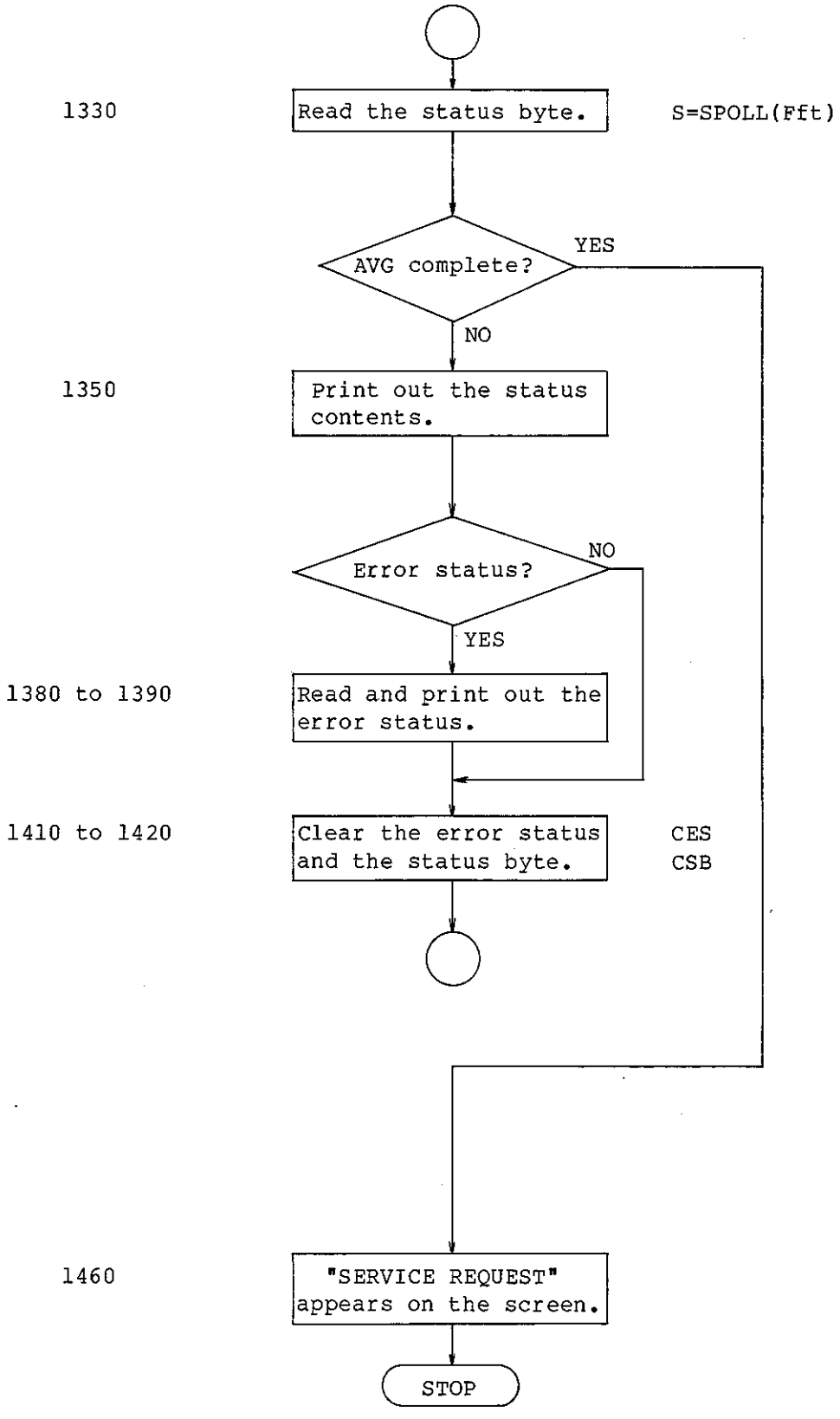
```
1000  !   ********************************************************
1010  !   *  R9211 GPIB Example Program                          *
1020  !   *  Readout Display Data by IEEE Floating-Point         *
1030  !   *                      Double-Precision Format         *
1040  !   *                                                      *
1050  !   *    (C)  Copyright 1990 ADVANTEST CORPORATION         *
1060  !   *    last update Nov.21,1990                           *
1070  !   *    BASIC 3.0 , HP9836                                *
1080  !   ********************************************************
1090  !
1100  OPTION BASE 1                          ! SET MINIMUM NUMBER OF ALLOCATE "1"
1110  !
1120  Fft=708                                ! DEFINE DEVICE ADDRESS
1130  !
1140  REAL Dftx(400) BUFFER                  ! ALLOCATE DATA BUFFER
1150  REAL Dfty(400) BUFFER
1160  REAL Dtmx(1024) BUFFER
1170  REAL Dtmy(1024) BUFFER
1180  REAL Dhtx(256) BUFFER
1190  REAL Dhty(256) BUFFER
1200  !
1210  OUTPUT Fft;"HED 0"                     ! HEADER OFF
1220  OUTPUT Fft;"DEL 0"                     ! BLOCK DELIMITER CRLF
1230  OUTPUT Fft;"REQDTN"                    ! REQUEST DATA NUMBER
1240  ENTER Fft;Dtn                          ! RECEIVE DATA NUMBER
1250  PRINT "BLOCK DATA NUMBER:";Dtn
1260  !
1270  OUTPUT Fft;"FMT 2"                     ! BLOCK DATA FORMAT 64BIT FLOAT
1280  !
1290  FOR L=1 TO 2
1300    OUTPUT Fft;"SELXY"&VAL$(L-1)           ! X or Y-axis DATA SELECT
1310    !
1320    ASSIGN @Fft TO Fft                     ! I/O PASS @Pass OPEN
1330    OUTPUT @Fft;"REQDT"                    ! REAUEST BLOCK DATA
1340    !
1350    IF Dtn=400 AND L=1 THEN ASSIGN @Buf TO BUFFER Dfty(*)   !
1360    IF Dtn=400 AND L=2 THEN ASSIGN @Buf TO BUFFER Dftx(*)   !
1370    IF Dtn=1024 AND L=1 THEN ASSIGN @Buf TO BUFFER Dtmy(*)  !  I/O PASS @Buf
1380    IF Dtn=1024 AND L=2 THEN ASSIGN @Buf TO BUFFER Dtmx(*)  !      OPEN
1390    IF Dtn=256 AND L=1 THEN ASSIGN @Buf TO BUFFER Dhty(*)   !
1400    IF Din=256 AND L=2 THEN ASSIGN @Buf TO BUFFER Dhtx(*)   !
1410    !
1420    TRANSFER @Fft TO @Buf;END,WAIT         ! DATA TRANSFER
1430    ASSIGN @Buf TO *                       ! I/O PASS CLOSE
1440  NEXT L
1450  !
1460  IF Dtn=400 THEN                          ! PRINT READOUT DATA, NUMBER=400
1470    FOR I=1 TO 400
1480      PRINT Dftx(I),Dfty(I)
1490    NEXT I
1500  END IF
1510  !
1520  IF Dtn=1024 THEN                         ! PRINT READOUT DATA, NUMBER=1024
1530    FOR I=1 TO 1024
1540      PRINT Dtmx(I),Dtmy(I)
1550    NEXT I
1560  END IF
1570  !
1580  IF Dtn=256 THEN                          ! PRINT READOUT DATA, NUMBER=256
1590    FOR I=1 TO 256
1600      PRINT Dhtx(I),Dhty(I)
1610    NEXT I
1620  END IF
1630  !
1640  END
```

Example 4. Service request at the end of averaging (SRQ)

Make a setting so that a SRQ is issued upon completion of the averaging. Start the averaging and execute an interrupt upon completion of the averaging.

[Flowchart]



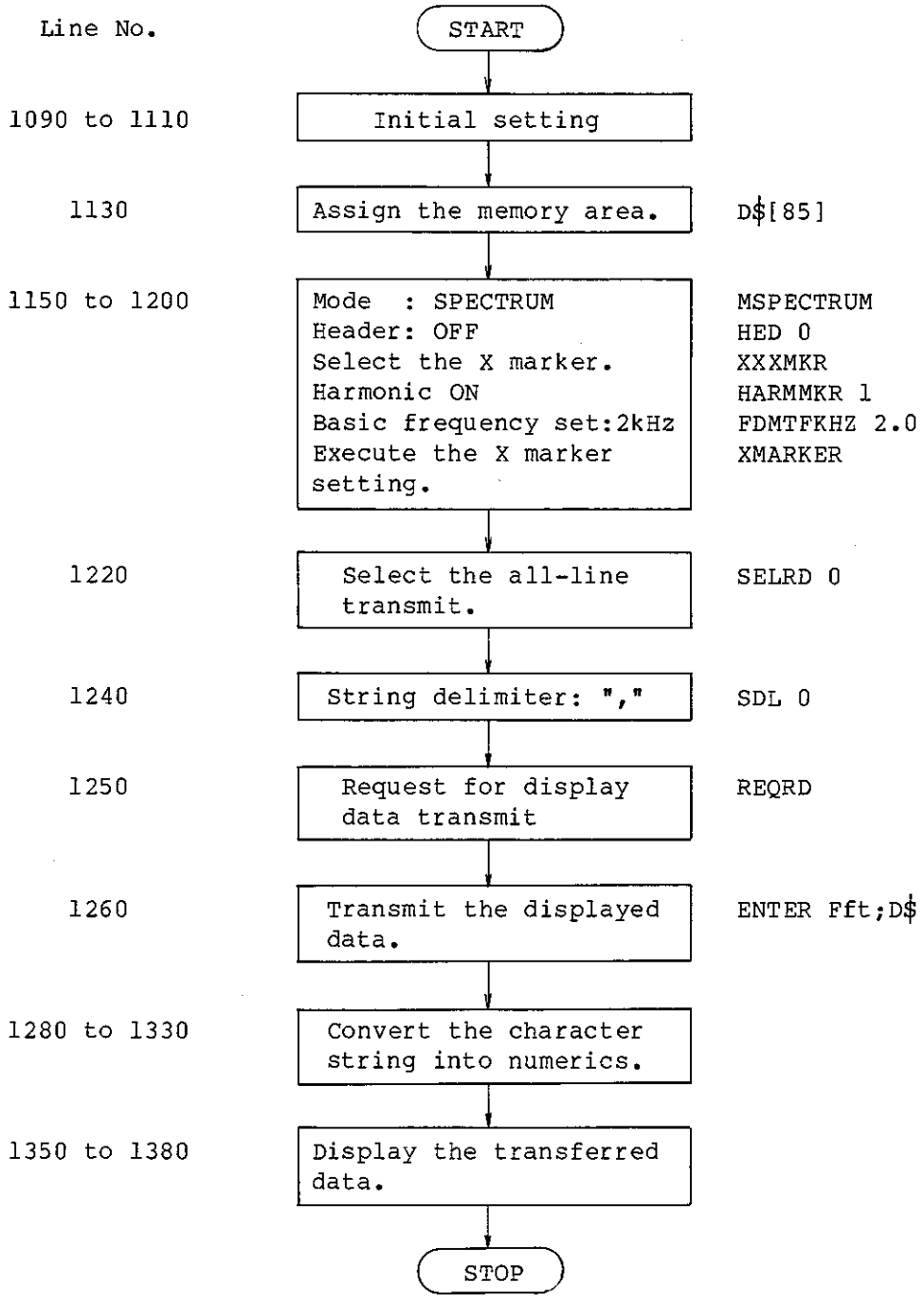

1330
Read the status byte.
S=SPOLL(Fft)
AVG complete?
YES
NO
1350
Print out the status contents.
Error status?
NO
YES
1380 to 1390
Read and print out the error status.
1410 to 1420
Clear the error status and the status byte.
CES
CSB
1460
"SERVICE REQUEST" appears on the screen.
STOP

```
1000            !   ******************************************************
1010            !   *  R9211 GPIB Example Program                        *
1020            !   *  Example of SRQ Command  (AVG END)                 *
1030            !   *                                                    *
1040            !   *    (C)  Copyright 1990 ADVANTEST CORPORATION       *
1050            !   *    last update Nov.21,1990                         *
1060            !   *    BASIC 3.0 , HP9836                              *
1070            !   ******************************************************
1080            !
1090            OPTION BASE 1             ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100            !
1110            Fft=708                   ! DEFINE DEVICE ADDRESS
1120            Wt=0                      ! INITIALIZE "WAIT TIME"
1130            !
1140            OUTPUT Fft;"MSK 251"      ! SRQ MASK (AVG END ONLY)
1150            OUTPUT Fft;"CES"          ! CLEAR ERROR STATUS
1160            OUTPUT Fft;"CSB"          ! CLEAR STATUS BYTE
1170            !
1180            OUTPUT Fft;"SRQ 1"        ! SRQ ON
1190            OUTPUT Fft;"AVGNO 32"     ! SET AVG NO "32"
1200            OUTPUT Fft;"AVGSUM"       ! SET AVG MODE "SUM"
1210            OUTPUT Fft;"AVGNORML"     ! SET AVG PROCESS "NORMAL"
1220            OUTPUT Fft;"START"        ! AVERAGING START
1230            !
1240            ON INTR 7 GOTO Interrupt ! SRQ INTERRUPT
1250            ENABLE INTR 7;2           ! INIERRUPT MODE
1260            !
1270 Re_start:  DISP "WAIT TIME : ";Wt
1280            Wt=Wt+1
1290            GOTO Re_start
1300            !
1310            !
1320 Interrupt: !
1330            S=SPOLL(Fft)                          ! READ STATUS BYTE
1340            IF BINAND(S,4)=0 THEN
1350              PRINT TAB(20);"STATUS = ";S
1360              IF S<128 THEN Jmp
1370              OUTPUT Fft;"REQER"                  ! REQUEST ERROR STATUS
1380              ENTER Fft;Er                        ! READ ERROR STATUS
1390              PRINT TAB(45);"ERROR STATUS = ";Er
1400 Jmp:         ENABLE INTR 7;2
1410              OUTPUT Fft;"CES"
1420              OUTPUT Fft;"CSB"
1430              GOTO Re_start
1440            END IF
1450            !
1460            DISP "SERVICE REQUEST !!!"
1470            OFF INTR
1480            !
1490            END
```

Example 5. Harmonic marker data transfer

This program is used to transfer the data on the higher harmonic displayed with marker on the R9211 CRT, to a HP personal computer. The higher harmonic basic frequency is set to 2kHz.

[Flowchart]

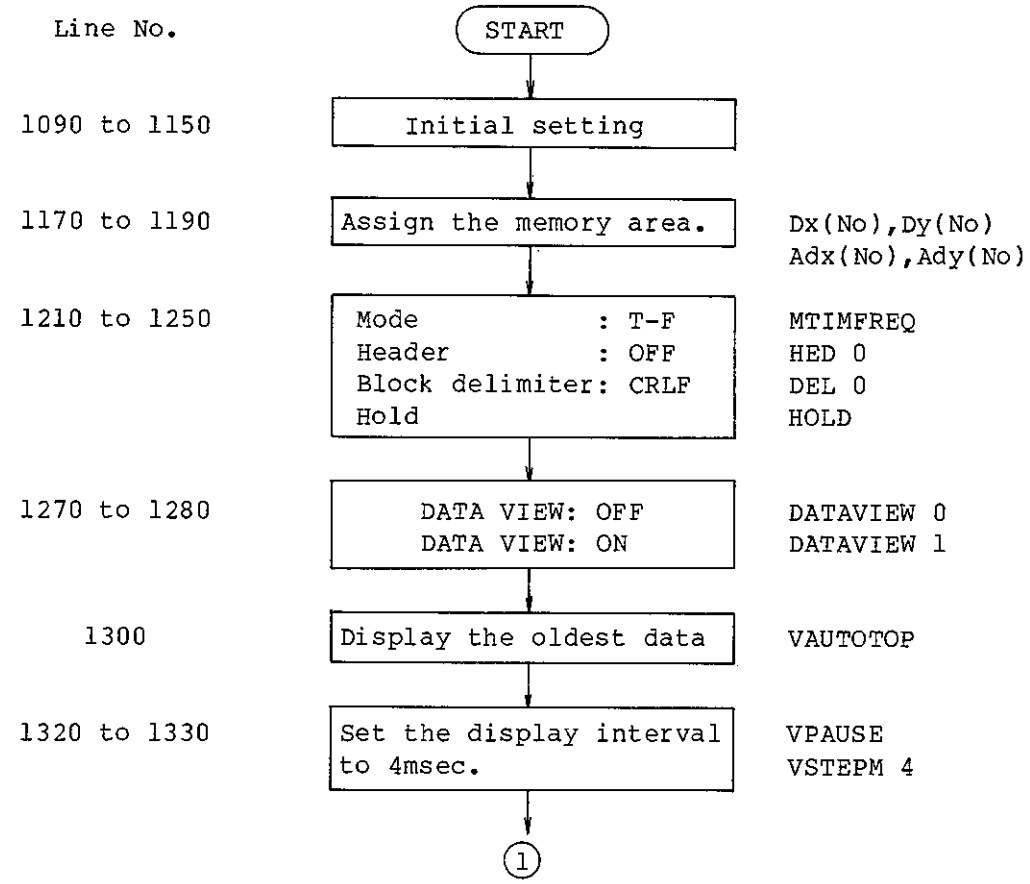


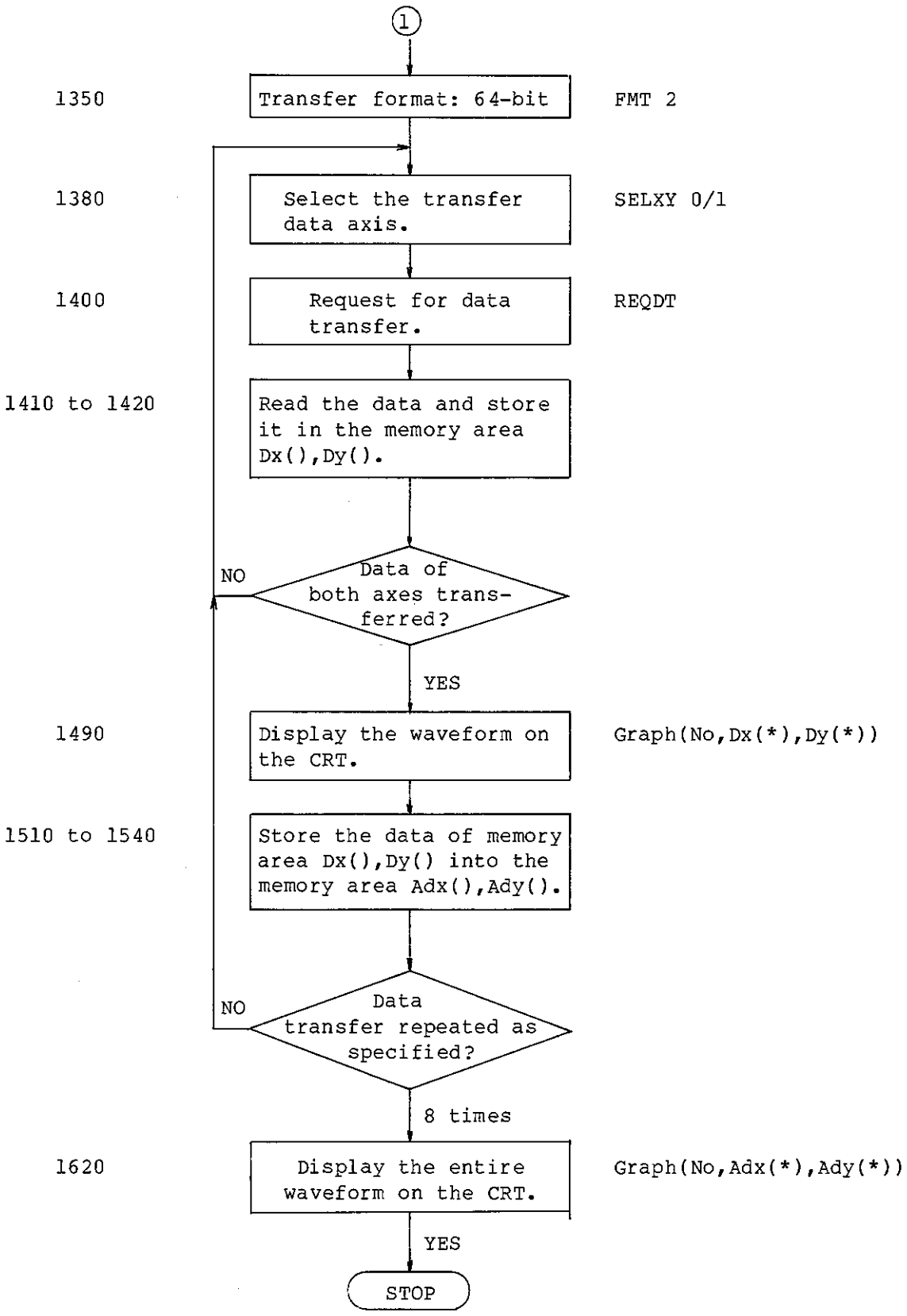
```
1000  !  ************************************************
1010  !  *    R9211 GPIB Example Program                *
1020  !  *    Readout Data of Harminc Marker            *
1030  !  *                                              *
1040  !  *      (C) Copyright 1990 ADVANTEST CORPORATION*
1050  !  *      last update Nov.21,1990                 *
1060  !  *      BASIC 3.0 , HP9836                      *
1070  !  ************************************************
1080  !
1090  OPTION BASE 1                        ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  Fft=708                              ! DEFINE DEVICE ADDRESS
1120  !
1130  ALLOCATE D$[85]                      ! ALLOCATE STRING BUFFER
1140  !
1150  OUTPUT Fft;"MSPECTRM"                ! SELECT SPECTRUM MODE
1160  OUTPUT Fft;"HED 0"                   ! HEADER OFF
1170  OUTPUT Fft;"XXXMKR"                  ! SET X MARKER
1180  OUTPUT Fft;"HARMMKR 1"               ! MARMONIC MARKER ON
1190  OUTPUT Fft;"FDMTFKHZ 2.0"            ! SET FUNDAMENTAL FREQUENCY 2.0kHz
1200  OUTPUT Fft;"XMARKER"                 ! ESTIMATE X MARKER
1210  !
1220  OUTPUT Fft;"SELRD 0"                 ! SELECT ALL LINE'S DATA DISPLAYED
1230  !
1240  OUTPUT Fft;"SDL 0"                   ! STRING DELIMITER ","
1250  OUTPUT Fft;"REQRD"                   ! DATA RQUEST
1260  ENTER Fft;D$                         ! RECEIVE DISPLAYED DATA
1270  !
1280  A1=VAL(D$[1;11])                     ! DEVIDE STRING BUFFER
1290  B1=VAL(D$[13;11])
1300  A2=VAL(D$[25;11])
1310  B2=VAL(D$[37;11])
1320  C=VAL(D$[49;11])
1330  D=VAL(D$[73;11])
1340  !
1350  PRINT A1,B1                          ! PRINT READOUT DATA
1360  PRINT A2,B2
1370  PRINT C
1380  PRINT D
1390  !
1400  END
```

Example 6. Read data of buffer in arm length

Use the DATA VIEW function to read the measurement data memory of R9211 used in T-F mode.
First of all, set the input signal to HOLD state. Then, after turning ON/OFF the "DATA VIEW", issue the GPIB command "VAUTOTOP" to display the oldest data stored in memory and read it by the HP personal computer. Sent the GPIB command "VMANSTP" and read the next data of measurement. Repeat this procedure several times.
In this program example, the waveform data is read eight times to be displayed on the data on the CRT. At the end, the entire waveform will appear on the screen.

[Flowchart]




1
1350
Transfer format: 64-bit
FMT 2
1380
Select the transfer data axis.
SELXY 0/1
1400
Request for data transfer.
REQDT
1410 to 1420
Read the data and store it in the memory area Dx(),Dy().
NO
Data of both axes transferred?
YES
1490
Display the waveform on the CRT.
Graph(No,Dx(*),Dy(*))
1510 to 1540
Store the data of memory area Dx(),Dy() into the memory area Adx(),Ady().
NO
Data transfer repeated as specified?
8 times
1620
Display the entire waveform on the CRT.
Graph(No,Adx(*),Ady(*))
YES
STOP

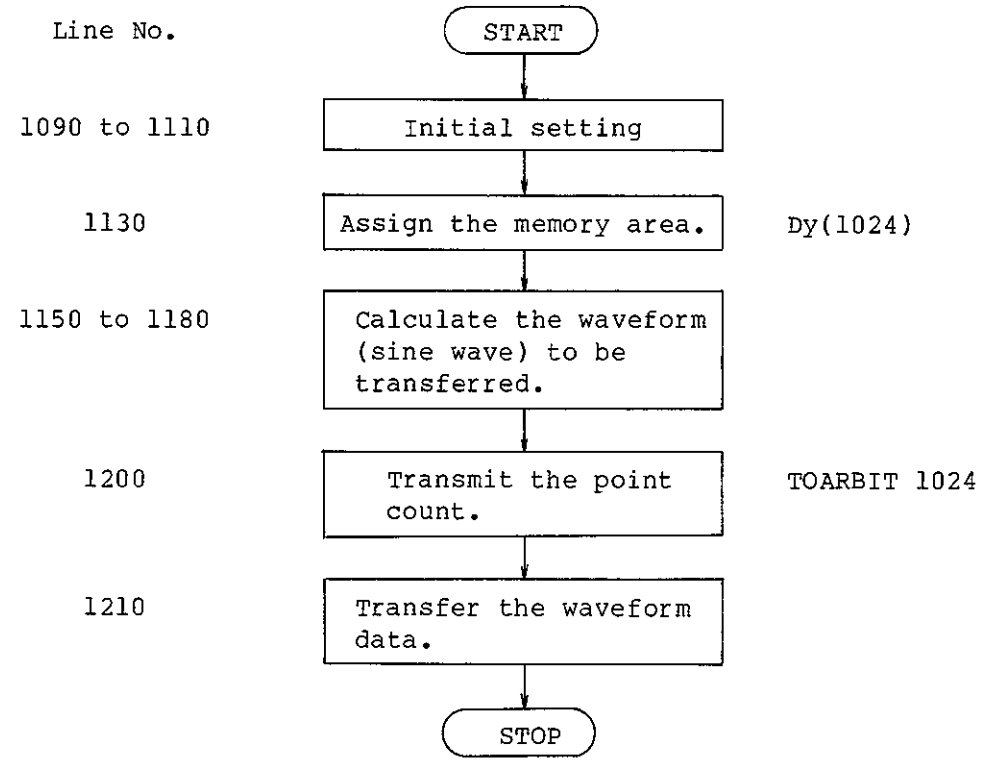
```
1000  !  ************************************************
1010  !  *    R9211 GPIB Example Program                *
1020  !  *    Readout Buffer in Arm Length              *
1030  !  *                                              *
1040  !  *      (C) Copyright 1990 ADVANTEST CORPORATION*
1050  !  *      last update Nov.21,1990                 *
1060  !  *      BASIC 3.0 , HP9836                      *
1070  !  ************************************************
1080  !
1090  OPTION BASE 1                          ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  INTEGER Fft,No,Zoom
1120  !
1130  Fft=708                                ! DEFINE DEVICE ADDRESS
1140  Zoom=8                                 ! DEFINE BUNBER OF READOUT
1150  No=1024
1160  !
1170  REAL Dx(1024) BUFFER                   ! ALLOCATE BLOCK DATA BUFFER
1180  REAL Dy(1024) BUFFER
1190  ALLOCATE Adx(No),Ady(No)               ! ALLOCATE DATA BUFFER TO DISPLAY ALL
1200  !
1210  OUTPUT Fft;"MTIMFREQ"                  ! SELECT T-F MODE
1220  OUTPUT Fft;"CHATIMEI"                  ! DISPLAY WAVEFORM OF CH-A
1230  OUTPUT Fft;"HED 0"                     ! HEADER OFF
1240  OUTPUT Fft;"DEL 0"                     ! DELIMITER CRLF
1250  OUTPUT Fft;"HOLD"                      ! HOLD
1260  !
1270  OUTPUT Fft;"DATAVIEW 0"                ! DATA VIEW OFF
1280  OUTPUT Fft;"DATAVIEW 1"                ! DATA VIEW ON
1290  WAIT 2
1300  OUTPUT Fft;"VAUTOTOP"                  ! AUTO TOP
1310  WAIT 2
1320  OUTPUT Fft;"VPAUSE"                    ! STOP VIEW STEP
1330  OUTPUT Fft;"VSTEPMS4"                  ! STEP TIME 4 msec
1340  !
1350  OUTPUT Fft;"FMT 2"                     ! BLOCK DATA FORMAT 64BIT FLOAT
1360  FOR I=1 TO Zoom
1370    FOR J=1 TO 2
1380      OUTPUT Fft;"SELXY"&VAL$(J-1)              ! X or Y-axis DATA SELECT
1390      ASSIGN @Fft TO Fft                        ! I/O PASS @Pass OPEN
1400      OUTPUT Fft;"REQDT"                        ! REQUEST BLOCK DATA
1410      IF J=1 THEN ASSIGN @Buf TO BUFFER Dy(*)   ! Y AXIS DATA
1420      IF J=2 THEN ASSIGN @Buf TO BUFFER Dx(*)   ! X AXIS DATA
1430      !
1440      TRANSFER @Fft TO @Buf;END,WAIT            ! DATA TRANSFER
1450      ASSIGN @Buf TO *                          ! I/O PASS CLOSE
1460    NEXT J
1470    !
1480    PRINT "NUMBER OF READOUT:";I
1490    Graph(No,Dx(*),Dy(*))                ! TRACE BLOCK DATA
1500    !
1510    FOR J=1 TO No/8                      ! COPY DATA
1520      Adx(No*(I-1)/8+J)=Dx(J*8)
1530      Ady(No*(I-1)/8+J)=Dy(J*8)
1540    NEXT J
1550    !
1560    OUTPUT Fft;"VMANSTP"
1570    WAIT 10
1580    !
1590  NEXT I
```

```
1600  !
1610  PRINT "DISPLAY ALL"
1620  CALL Graph(No*Zoom/10,Adx(*),Ady(*))  ! TRACE ALL DATA
1630  !
1640  END
1650  !
1660  SUB Graph(INTEGER Sample,REAL X(*),Y(*))     ! SUB PROGRAM OF TRACE
1670    !
1680    GINIT                                      ! INITIALIZE GRAPH
1690    GRAPHICS ON                                ! LASTER ON
1700    !
1710    WINDOW X(1),X(Sample),-2,2                 ! SET WINDOW
1720    FRAME
1730    !
1740    MOVE 0,0                                   ! PLOT
1750    FOR I=1 TO Sample
1760      DRAW X(I),Y(I)
1770    NEXT I
1780    !
1790  SUBEND
```

Example 7. Proper waveform generation data transfer (R9211B/C only)

This program is used to transfer an arbitrary waveform generated by the SG built in the R9211B/C. This program calculates the sine signal and transfer the obtained data to the R9211B/C.

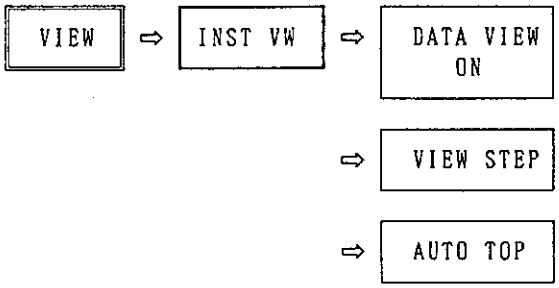
[Flowchart]



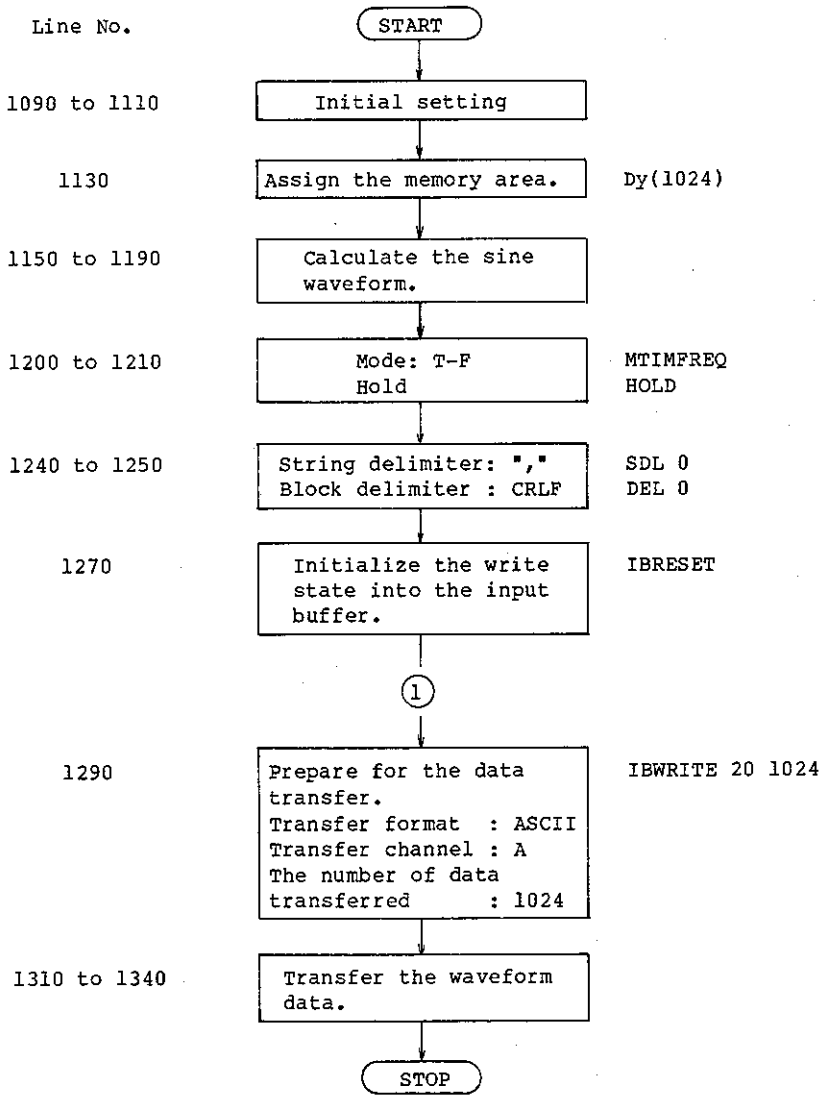
```
1000  !  ************************************************************************
1010  !  *    R9211 GPIB Example Program                                        *
1020  !  *    Write Arbit Waveform to SG Buffer by 16 Bit Fixed-Point Format    *
1030  !  *                                                                      *
1040  !  *      (C) Copyright 1990 ADVANTEST CORPORATION                        *
1050  !  *      last update Nov.21,1990                                         *
1060  !  *      BASIC 3.0 , HP9836                                              *
1070  !  ************************************************************************
1080  !
1090  OPTION BASE 1                          ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  Fft=708                                ! DEFINE DEVICE ADDRESS
1120  !
1130  INTEGER Dy(1024)                       ! ALLOCATE DATA BUFFER
1140  !
1150  W=2*3.14159*10/1024                    ! CALCULATE SINE WAVE
1160  FOR I=1 TO 1024
1170    Dy(I)=SIN(W*I)*16384
1180  NEXT I
1190  !
1200  OUTPUT Fft;"TOARBIT 1024"              ! PREPARE FOR WRITE DATA
1210  OUTPUT Fft USING "#,W";Dy(*)           ! SEND DATA TO SG BUFFER
1220  !
1230  END
```

Example 8. Data write to input buffer

Write the sine waveform directly into the input buffer.
The data written can be checked by setting as follows.



[Flowchart]



```
1000  !  ************************************************************************
1010  !  *    R9211 GPIB Example Program                                        *
1020  !  *    Write Arbit Waveform to Input-Buffer by Ascii Format              *
1030  !  *                                                                      *
1040  !  *      (C) Copyright 1990 ADVANTEST CORPORATION                        *
1050  !  *      last update Nov.21,1990                                         *
1060  !  *      BASIC 3.0 , HP9836                                              *
1070  !  ************************************************************************
1080  !
1090  OPTION BASE 1                          ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  Fft=708                                ! DEFINE DEVICE ADDRESS
1120  !
1130  ALLOCATE Dy(1024)                      ! ALLOCATE DATA BUFFER
1140  !
1150  W=2*3.14159*10/1024                    ! CALCULATE SINE WAVE
1160  FOR I=1 TO 1024
1170    Dy(I)=SIN(W*I)
1180  NEXT I
1190  !
1200  OUTPUT Fft;"MTIMFREQ"                  ! SELECT T-F MODE
1210  OUTPUT Fft;"HOLD"                      ! HOLD
1220  WAIT 2
1230  !
1240  OUTPUT Fft;"SDL 0"                     ! STRING DELIMITER ","
1250  OUTPUT Fft;"DEL 0"                     ! BLOCK DELIMITER CRLF
1260  !
1270  OUTPUT Fft;"IBRESET"                   ! RESET GPIB READ/WRITE POINTER
1280  !
1290  OUTPUT Fft;"IBWRITE 2 0 1024"          ! PREPARE FOR WRITE DATA
1300  !
1310  FOR I=1 TO 1023                        ! WRITE DATA TO INPUT BUFFAR
1320    OUTPUT Fft;VAL$(Dy(I))&","
1330  NEXT I
1340  OUTPUT Fft;VAL$(Dy(1024))
1350  !
1360  END
```

Example 9. Data transfer to save area

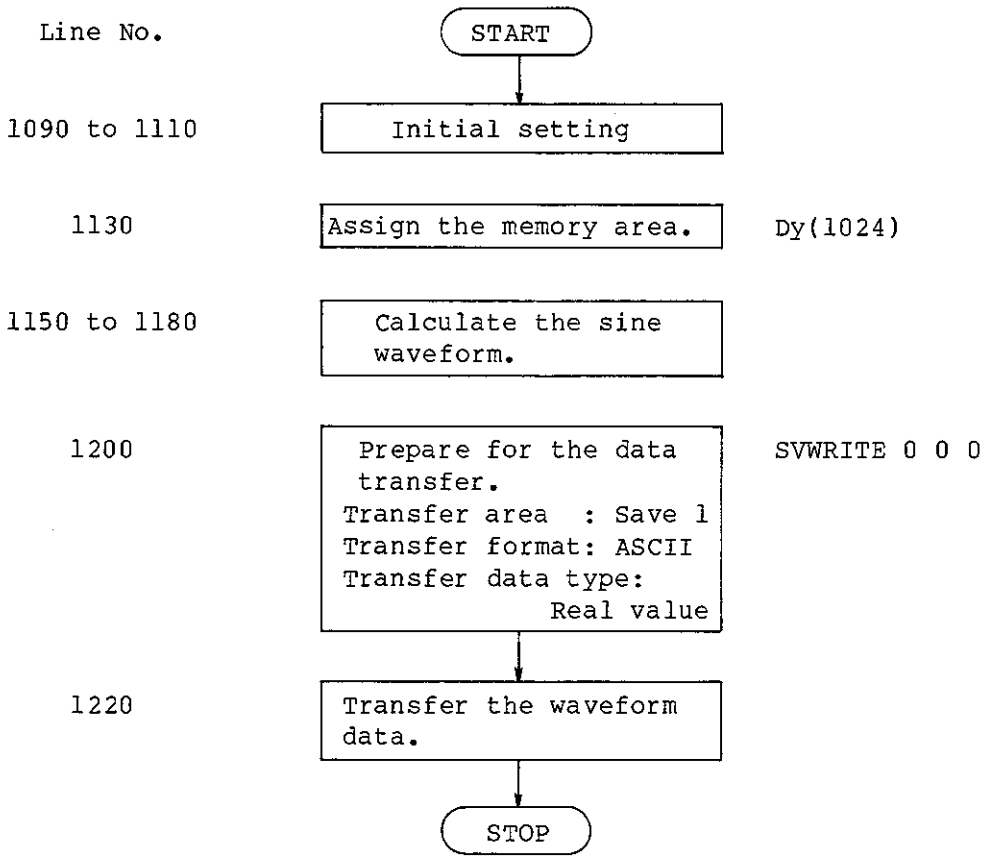
Write the sine waveform (time data) of 1024 points into the data saving area.
Before executing the program, display a time waveform of identical point count 1024 on the R9211 CRT and store the dummy data by setting as follows.

VIEW ⇨ MEM ⇨ DATA SAVE I

After executing the program, the transferred data can be checked by setting as follows.

VIEW ⇨ MEM ⇨ DATA RECALL I

[Flowchart]

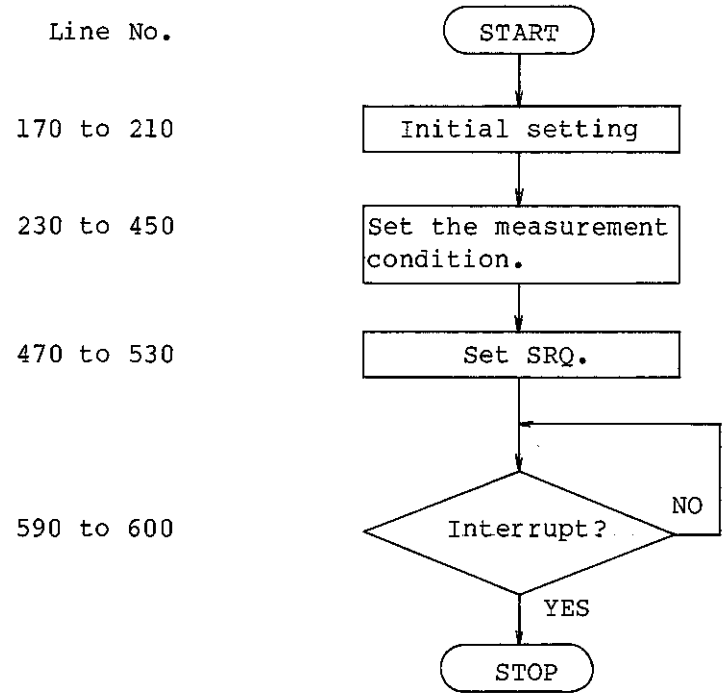


```
1000  !  ************************************************************************
1010  !  *    R9211 GPIB Example Program                                        *
1020  !  *    Write Arbit Waveform to Save Area by 16Bit Fixed-Point Format     *
1030  !  *                                                                      *
1040  !  *      (C) Copyright 1990 ADVANTEST CORPORATION                        *
1050  !  *      last update Nov.21,1990                                         *
1060  !  *      BASIC 3.0 , HP9836                                              *
1070  !  ************************************************************************
1080  !
1090  OPTION BASE 1                          ! SET MINIMUM NUMBER OF ALLOCATE "1"
1100  !
1110  INTEGER Dy(1024) BUFFER                ! ALLOCATE DATA BUFFER
1120  !
1130  Fft=708                                ! DEFINE DEVICE ADDRESS
1140  !
1150  W=2*3.14159*10/1024                    ! CALCULATE SINE WAVE
1160  FOR I=1 TO 1024
1170    Dy(I)=SIN(W*I)*16384
1180  NEXT I
1190  !
1200  OUTPUT Fft;"SVWRITE 0 0 0"             ! PREPARE FOR WRITE DATA
1210  !
1220  OUTPUT Fft USING "#,W";Dy(*);END       ! WRITE DATA TO INPUT BUFFAR
1230  !
1240  END
```

Example 10. Measurement in WAVEFORM mode

Supply signal to Ach and Bch and display the time waveforms of Ach and Bch in dual-screen mode.
Apply trigger with the Ach signal. When the "ARM" is applied, an interrupt is caused by the R9211 to terminate the measurement.

[Flowchart]

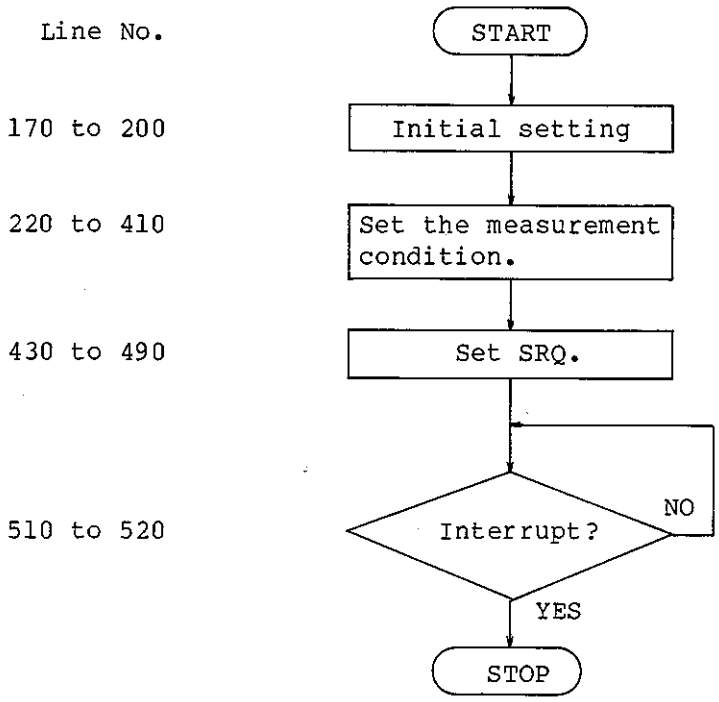


```
100   !  ********************************************
110   !  *   R9211 MEASUREMENT SET EXAMPLE          *
120   !  *                        FOR WAVEFORM MODE  *
130   !  ********************************************
140   !
150   !           1990.6
160   !
170   OPTION BASE 1
180   PRINTER IS 1
190   !
200   Spa=708
210   W_time=10
220   !
230   OUTPUT Spa;"MWAVEFRM"              !SET WAVEFORM MODE
240   OUTPUT Spa;"TIME"                  !MEASURE TIME
250   OUTPUT Spa;"SAMPLCLK1"             !SET SAMPLE CLOCK "INT"
260   OUTPUT Spa;"SAMPLRAT3.91E-6"       !SET SAMPLING RATE 3.91uSec
270   OUTPUT Spa;"ACTIVAB"               !SET CH-A AND CH-B ACTIVE
280   OUTPUT Spa;"CHANNEL1"              !SELECT CH-A
290   OUTPUT Spa;"COUPLE1"               !AC COUPLE
300   OUTPUT Spa;"PINPUT1"               !SET PLUS  TERM. IN
310   OUTPUT Spa;"MINPUT0"               !SET MINUS TERM. GND
320   OUTPUT Spa;"FILTER1"               !SET FILTER ON
330   OUTPUT Spa;"CHANNEL0"              !SELECT CH-B
340   OUTPUT Spa;"COUPLE0"               !DC COUPLE
350   OUTPUT Spa;"PINPUT1"               !SET PLUS  TREM. IN
360   OUTPUT Spa;"MINPUT0"               !SET MINUS TERM. GNDD
370   OUTPUT Spa;"FILTER0"               !SET FILTER OFF
380   OUTPUT Spa;"SENSA0"                !SET SENS. OF CH-A MANUAL
390   OUTPUT Spa;"SENSADV+30"            !SET SENS. OF CH-A +30dBV
400   OUTPUT Spa;"SENSB1"                !SET SENS. OF CH-B AUTO
410   OUTPUT Spa;"AUTORNGB1"             !SET SENS. OF CH-B UP&D
420   OUTPUT Spa;"TRGSORA"               !SET TRIGGER SOURCE TO CH-A
430   OUTPUT Spa;"TRGPSLOP"              !SET TRIGGER WHEN GOING UP
440   OUTPUT Spa;"TRGLEVEL0.5"           !SET TRIGGER LEVEL 0.5V
450   OUTPUT Spa;"DUALT"                 !DUAL DISPLAY
460   !
470   OUTPUT Spa;"CES"                   !ERROR  STATUS CLEAR
480   OUTPUT Spa;"MSK253"                !SRQ MASK
490   !
500   ON INTR 7 GOTO Interrupt           !SRQ INTERRUPT
510   ENABLE INTR 7;2                    !INTERRUPT MODE
520   !
530   OUTPUT Spa;"SRQ1"                  !SRQ ON
540   !
550   WAIT W_time
560   !
570   OUTPUT Spa;"ARM"
580   !
590 Loop:      !
600   GOTO Loop
610   !
620 Interrupt:     !
630   OUTPUT Spa;"SRQ0"                  !SRQ OFF
640   !
650   END
```

Example 11. Measurement in SPECTRUM mode

Supply a signal to the Ach and display the time waveform on the upper screen area and the power spectrum on the lower screen area in dual-screen mode. The Power spectrum has been set as follows: the data is 50% overlapped and averaging is executed 10 times. When the averaging is completed, an interrupt is caused from the R9211.

[Flowchart]

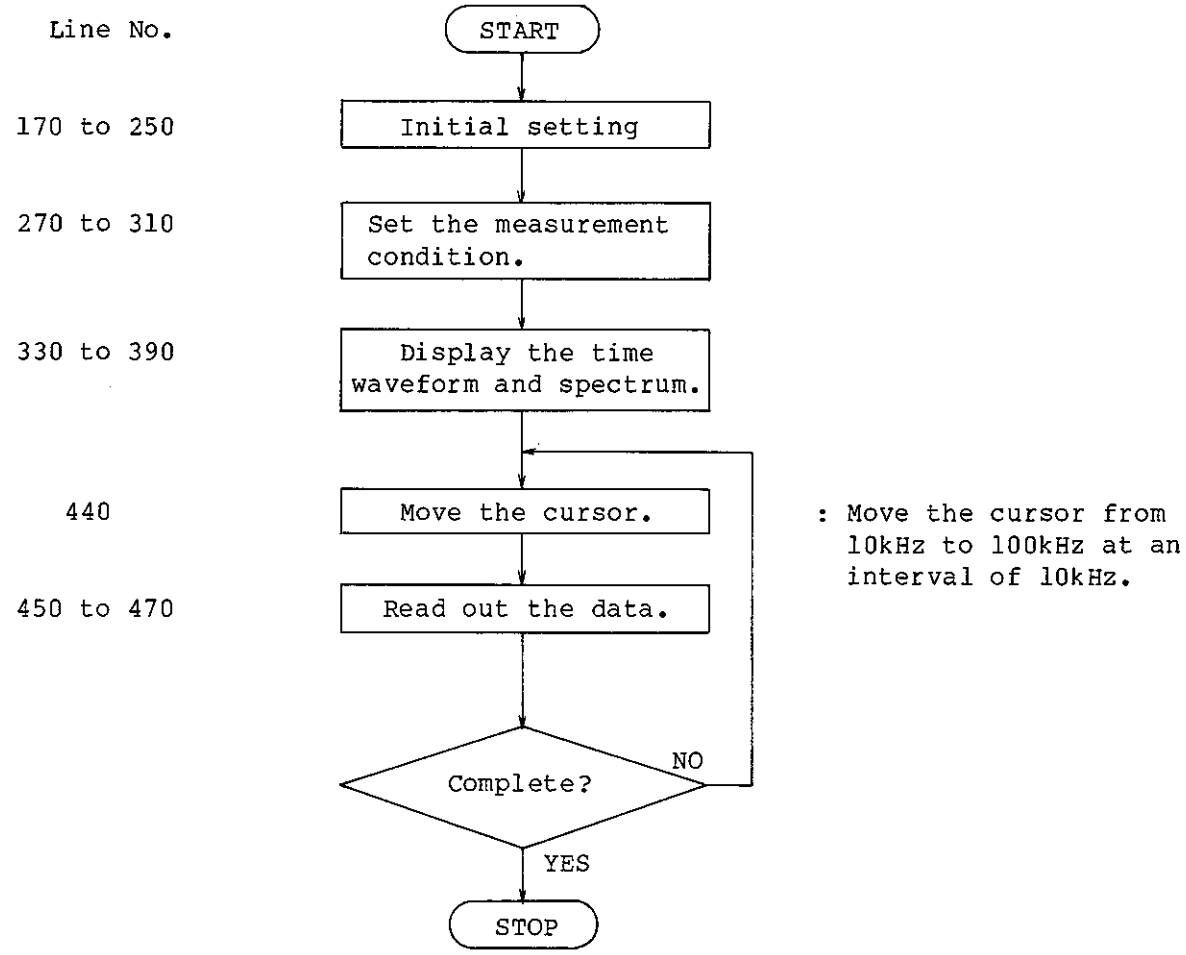


```
100   !  ********************************************
110   !  *   R9211 MEASUREMENT SET EXAMPLE          *
120   !  *                    FOR SPECTRUM MODE     *
130   !  ********************************************
140   !
150   !           1990,6
160   !
170   OPTION BASE 1
180   PRINTER IS 1
190   !
200   Spa=708
210   !
220   OUTPUT Spa;"MSPECTRM"                    !SELECT "SPECTRUM"
230   OUTPUT Spa;"POWERSPC"                    !MEASUREMENT FOR POWER SPECTRUM
240   OUTPUT Spa;"ACTIVA"                      !SET CH-A ACTIVE
250   OUTPUT Spa;"LINESPAN800"                 !LINE/SPAN 800
260   OUTPUT Spa;"FRANGKHZ100"                 !FREQUENCY RANGE 100kHz
270   OUTPUT Spa;"SENSA0"                      !SET CH-A MANUAL RANGE
280   OUTPUT Spa;"SENSADV+30"                  !SET RANGE OF CH-A +30dBV
290   OUTPUT Spa;"HANNING"                     !SELECT "HANNING"
300   OUTPUT Spa;"AVGSUM"                      !SELECT "SUM AVERAGE"
310   OUTPUT Spa;"AVGNO10"                     !SET NUMBER OF AVERAGES 10
320   OUTPUT Spa;"AVGNORML"                    !DISPLAY RESULT OF AVG AT EACH
TIME
330   OUTPUT Spa;"AVGOVLPB"                    !SET OVERLAP 50%
340   !
350   OUTPUT Spa;"START"                       !AVERAGING START
360   !
370   OUTPUT Spa;"DUALT"                       !DUAL DISPLAY
380   OUTPUT Spa;"SEL1"                        !SELECT FIRST DISPLAY
390   OUTPUT Spa;"CHAPWSPA"                    !DISPLAY AVERAGED POWER SPECTRU
M
400   OUTPUT Spa;"SEL2"                        !SELECT SECOND DISPLAY
410   OUTPUT Spa;"CHATIMEI"                    !DISPLAY INSTANTANEOUS WAVEFORM
420   !
430   OUTPUT Spa;"CES"                         !ERROR STATUS CLEAR
440   OUTPUT Spa;"MSK251"                      !SRQ MASK
450   !
460   ON INTR 7 GOTO Interrupt                 !SRQ INTERRUPT
470   ENABLE INTR 7;2
480   !
490   OUTPUT Spa;"SRQ1"                        !SRQ ON
500   !
510 Loop:                !
520   GOTO Loop
530   !
540 Interrupt:           !
550   OUTPUT Spa;"SRQ0"                        !SRQ OFF
560   PRINT "AVERAGING END"
570   !
580   END
```

Example 12. Moving the cursor on the spectrum and executing read-out

Supply a signal to the Ach in dual-screen mode so that a time waveform will appear on the upper screen portion and a spectrum will appear on the lower screen portion. On the spectrum screen, move the cursor from 10kHz up to 100kHz at an interval of 10kHz, reading the cursor value.

[Flowchart]

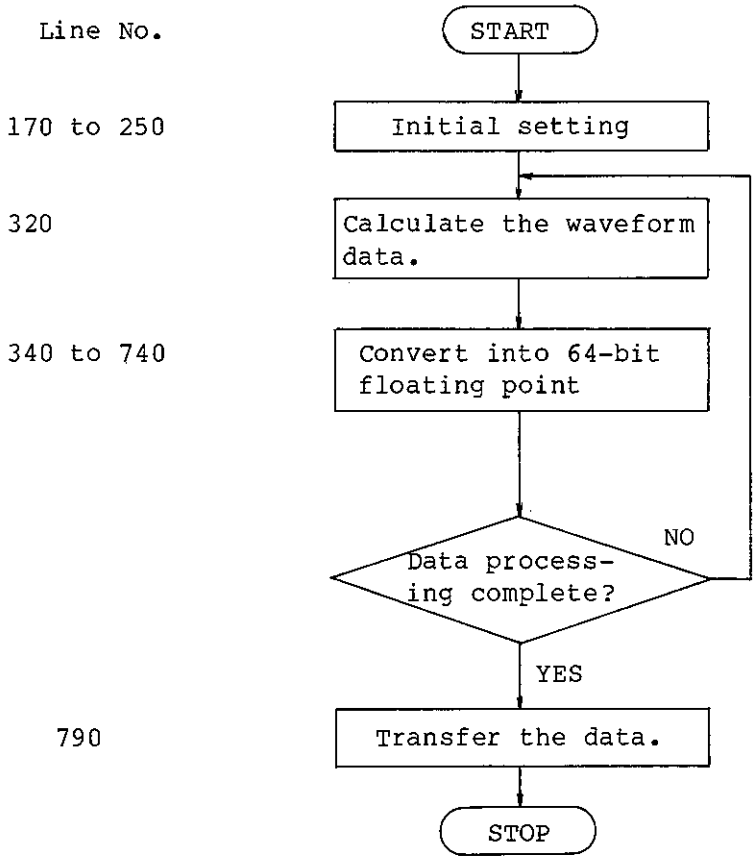


```
100   !  ********************************************
110   !  *   MARKER READ-OUT SAMPLE                 *
120   !  *                    FOR SPECTRUM MODE     *
130   !  ********************************************
140   !
150   !           1990,6
160   !
170   OPTION BASE 1
180   PRINTER IS 1
190   !
200   Spa=708
210   !
220   ALLOCATE A$[24]
230   !
240   OUTPUT Spa;"SDL1"                          !STRING DELIMITER " "
250   OUTPUT Spa;"HED0"                          !HEADER OFF
260   !
270   OUTPUT Spa;"MSPECTRM"                      !SELECT "SPECTRUM"
280   OUTPUT Spa;"POWERSPC"                      !MEASUREMENT FOR POWER SPECTRUM
290   OUTPUT Spa;"FRANGKHZ100"                   !SET FREQUENCY RANGE 100kHz
300   OUTPUT Spa;"SENSA1"                        !SET CH-A AUTO RANGE
310   OUTPUT Spa;"AUTORNGA1"                     !SET CH-A UP & D
320   !
330   OUTPUT Spa;"DUALT"                         !DUAL DISPLAY
340   OUTPUT Spa;"SEL1"                          !SELECT FIRST DISPLAY
350   OUTPUT Spa;"CHATIME1"                      !DISPLAY INSTANTANEOUT WAVEFORM
360   OUTPUT Spa;"SINGLEX"                       !SET SINGLE MARKER
370   OUTPUT Spa;"SEL2"                          !SELECT SECOND DISPLAY
380   OUTPUT Spa;"CHASPCT1"                      !DISPLAY POWER SPECTRUM
390   OUTPUT Spa;"SINGLEX"                       !SET SINGLE MARKER
400   !
410   OUTPUT Spa;"SEL2"                          !SELECT SECOND DISPLAY
420   FOR I=10 TO 100 STEP 10
430     Fr=I*1000
440     OUTPUT Spa;"XCSAHZ"&VAL$(Fr)             !SET CURSOR
450     OUTPUT Spa;"SELRD0"                      !SELECT ALL DATA
460     OUTPUT Spa;"REQRD"                       !DATA REQUEST
470     ENTER Spa;A$                             !READ DATA
480     !
490     F$=A$[1;11]
500     D$=A$[13;11]
510     !
520     PRINT F$,D$
530     !
540   NEXT I
550   !
560   END
```

Example 13. Data transfer to the save area in 64-bit floating point mode

This program converts the data calculated by the personal computer into 64-bit floating point data and transfers it to the R9211 save area.

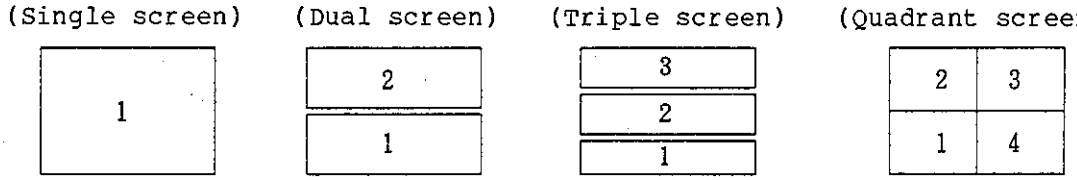
[Flowchart]



```
100     !  ***********************************************
110     !  *          TO IEEE FLOATING FORMAT            *
120     !  *                              SVWRITE        *
130     !  ***********************************************
140     !
150     !           !990,6
160     !
170     OPTION BASE 1
180     PRINTER IS 1
190     !
200     INTEGER Spa,Dy(1:4096) BUFFER
210     Spa=708
220     CLEAR Spa
230     ASSIGN @Spa TO Spa
240     !
250     OUTPUT Spa;"SVWRITE 0,3,0"                !SET WRITE MODE
260     !
270     Rd=1000*2*3.14*.004/1024                  !CALCULATE SINE-WAVE
280     !
290     FOR I=1 TO 1024
300       !
310       N=(I-1)*4
320       A=10*SIN(Rd*I)
330       !
340       IF A>0 THEN
350         S=0
360       ELSE
370         S=1
380       END IF
390       !
400       A=ABS(A)
410       P=LOG(A)/LOG(2)
420       E=INT(P)+1023
430       B=P-INT(P)
440       F=2^B-1
450       !
460       F=F*2^4
470       In=INT(F)
480       C=S*2^15+E*2^4+In
490       IF C<32768 THEN
500         Dy(N+1)=C
510       ELSE
520         Dy(N+1)=C-65536
530       END IF
540       F=(F-In)*2^16
550       C=INT(F)
560       IF C<32768 THEN
570         Dy(N+2)=C
580       ELSE
590         Dy(N+2)=C-65536
600       END IF
610       F=(F-C)*2^16
620       C=INT(F)
630       IF C<32768 THEN
640         Dy(N+3)=C
650       ELSE
660         Dy(N+3)=C-65536
670       END IF
680       F=(F-C)*2^16
690       F=INT(F)
700       IF F<32768 THEN
710         Dy(N+4)=F
720       ELSE
730         Dy(N+4)=F-65536
740       END IF
750       !
760       PRINT I,Dy(N+1),Dy(N+2),Dy(N+3),Dy(N+4)
770     NEXT I
780     !
790     OUTPUT Spa USING "#,W";Dy(*);END           !SEND DATA
800     !
810     END
```

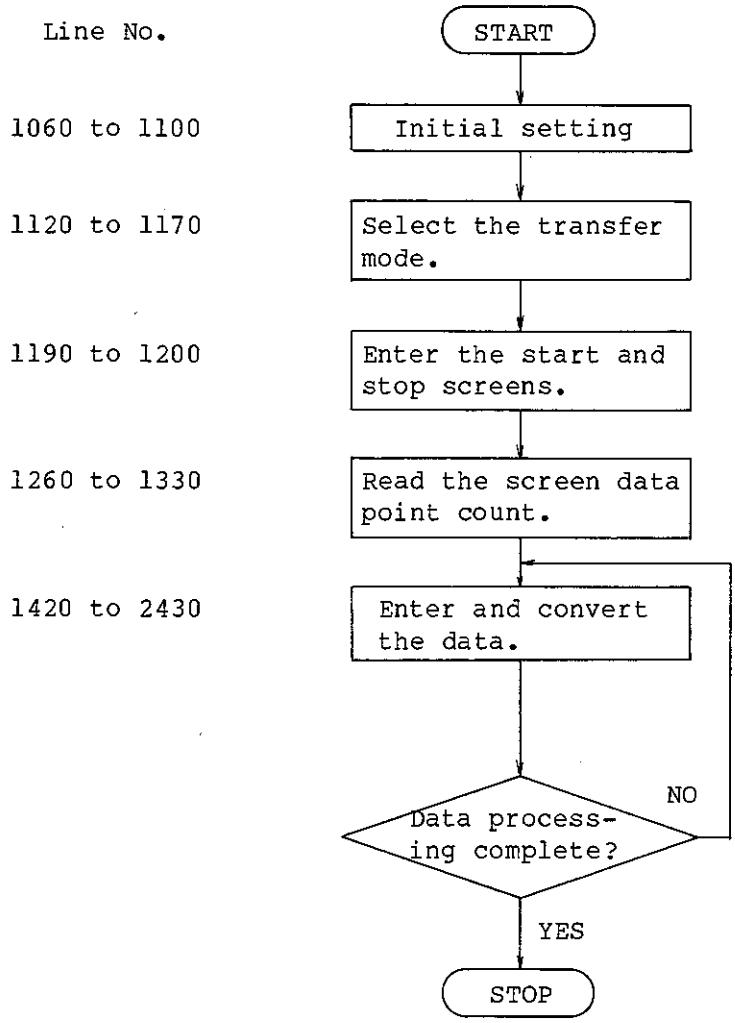
Example 14. Multi-screen transfer

This program transfers the R9211 screen data (in multi-screen mode) to a personal computer.
Enter the start screen and stop screen of the data to be read out by the lines 1190 to 1200. The screen portions are numbered as follows.



ASCII, 64-bit floating point, and 32-bit floating point data can be transferred.

[Flowchart]



```
1000   !  ********************************************
1010   !  *           REQDT SAMPLE PROGRAM           *
1020   !  ********************************************
1030   !
1040   !           1990,6
1050   !
1060   OPTION BASE 1
1070   PRINTER IS 1
1080   !
1090   Spa=708
1100   W_time=.1
1110   !
1120 Select:           !
1130   PRINT "ASCII DATA              :2"
1140   PRINT "64 BIT FLOATING DATA    :3"
1150   PRINT "32 BIT FLOATING DATA    :4"
1160   PRINT ""
1170   INPUT "SELECT NO",Md
1180   !
1190   INPUT "START DISPLAY NO",Strd
1200   INPUT "STOP  DISPLAY NO",Stod
1210   !
1220   OUTPUT Spa;"DEL2"                    !BLOCK DELIMITER EOI
1230   OUTPUT Spa;"HED0"                    !HEADER OFF
1240   OUTPUT Spa;"SDL2"                    !STRING DELIMITER CRLF
1250   !
1260   Tn=0
1270   FOR No=Strd TO Stod
1280     OUTPUT Spa;"SEL"&VAL$(No)          !SELECT DISPLAY
1290     OUTPUT Spa;"REQDTN"                !REQUEST NUMBER OF DATA
1300     ENTER Spa;Dn(No)
1310     PRINT Dn(No)
1320     Tn=Tn+Dn(No)
1330   NEXT No
1340   !
1350   ALLOCATE Dy(Tn)
1360   !
1370     IF Md=2 THEN GOTO Ascii
1380     IF Md=3 THEN GOTO Bit64
1390     IF Md=4 THEN GOTO Bit32
1400   GOTO Select
1410   !
1420 Ascii:            !
1430   !
1440   ! DATA REQUEST
1450   OUTPUT Spa;"REQDT"&VAL$(Md)&","&VAL$(Strd)&","&VAL$(Stod)
1460   !
1470   FOR N=1 TO Tn                        !DATA INPUT
1480     ENTER Spa;Vl
1490     PRINT Vl
1500     Dy(N)=Vl
1510   NEXT N
1520   !
1530   GOTO End
1540   !
1550   !
1560 Bit64:            !
1570   !
1580   ! DATA REQUEST
1590   OUTPUT Spa;"REQDT"&VAL$(Md)&","&VAL$(Strd)&","&VAL$(Stod)
1600   !
1610   Acc=0
```

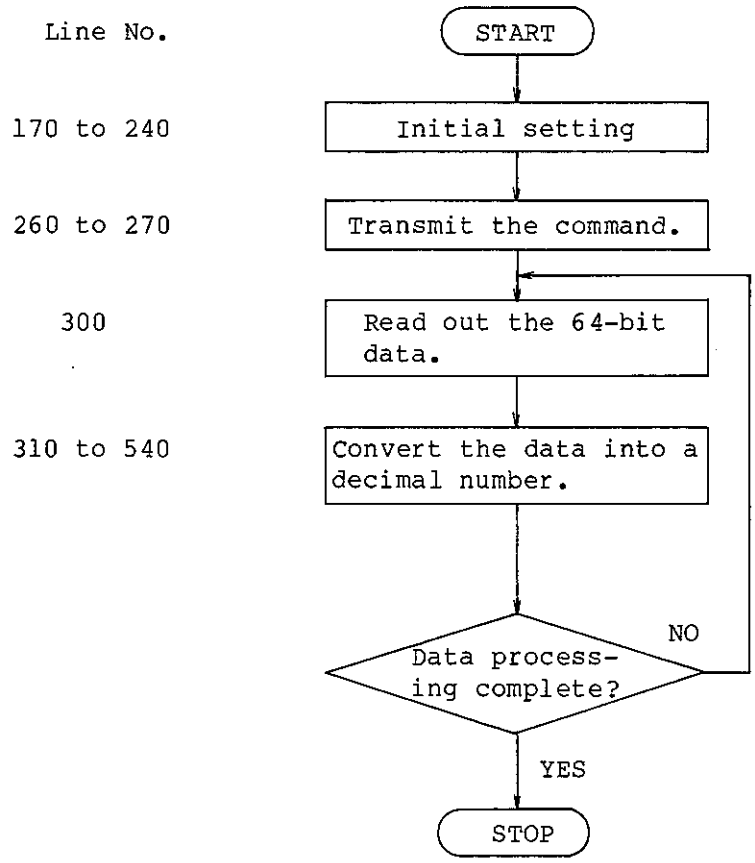
```
1620    FOR N=Strd TO Stod
1630      !
1640      WAIT W_time
1650      !
1660      FOR I=1 TO Dn(N)
1670        ENTER Spa USING "#,W";S1,S2,S3,S4
1680        IF S1<0 THEN S1=65536+S1
1690        IF S2<0 THEN S2=65536+S2
1700        IF S3<0 THEN S3=65536+S3
1710        IF S4<0 THEN S4=65536+S4
1720        !
1730        IF S1>=32768 THEN                       !CALCULATE SIGN
1740          Sign=-1
1750          S1=S1-32768
1760        ELSE
1770          Sign=1
1780        END IF
1790        !
1800        Ex=INT(S1/16)                           !CALCULATE EXPONENTIAL PART
1810        !
1820        V1=1+(S1-Ex*16)/16                      !CAUCLLATE MANTISSA
1830        V1=V1+S2/1048576
1840        V1=V1+S3/6.8719476E+10
1850        V1=V1+S4/4.5035996E+15
1860        !
1870        IF Ex<923 THEN                          !MULTIPLY MANTISSA AND EX. PART
1880          V1=0
1890        ELSE
1900          V1=Sign*V1*2^(Ex-1023)
1910        END IF
1920        !
1930        PRINT V1
1940        Acc=Acc+1
1950        Dy(Acc)=V1
1960        !
1970      NEXT I
1980    NEXT N
1990    !
2000    GOTO End
2010    !
2020 Bit32:           !
2030    !
2040    !
2050    ! DATA REQUEST
2060    OUTPUT Spa;"REQDT"&VAL$(Md)&","&VAL$(Strd)&","&VAL$(Stod)
2070    !
2080    Acc=0
2090    FOR N=Strd TO Stod
2100      !
2110      WAIT W_time
2120      !
2130      FOR I=1 TO Dn(N)
2140        ENTER Spa USING "#,W";S1,S2
2150        IF S1<0 THEN S1=65536+S1
2160        IF S2<0 THEN S2=65536+S2
2170        !
2180        IF S1>=32768 THEN                       !CALCULATE SIGN
2190          Sign=-1
2200          S1=S1-32768
2210        ELSE
2220          Sign=1
2230        END IF
```

```
2240        !
2250        Ex=INT(S1/128)                          !CALCULATE EXPONENTIAL PART
2260        !
2270        V1=1+(S1-Ex*128)/128                    !CALCULATE MANTISSA
2280        V1=V1+S2/(128*65536)
2290        !
2300        IF Ex<27 THEN                           !MULTIPLY MANTISSA AND EX. PART
2310          V1=0
2320        ELSE
2330          V1=Sign*V1*2^(Ex-127)
2340        END IF
2350        !
2360        PRINT V1
2370        Acc=Acc+1
2380        Dy(Acc)=V1
2390        !
2400      NEXT I
2410    NEXT N
2420    !
2430    GOTO End
2440    !
2450    !
2460 End:       .       !
2470    END
```

Example 15. Reading data from the input buffer in 64-bit floating point mode

This program is for reading the contents of the R9211 input buffer in 64-bit floating point mode to a personal computer.

[Flowchart]

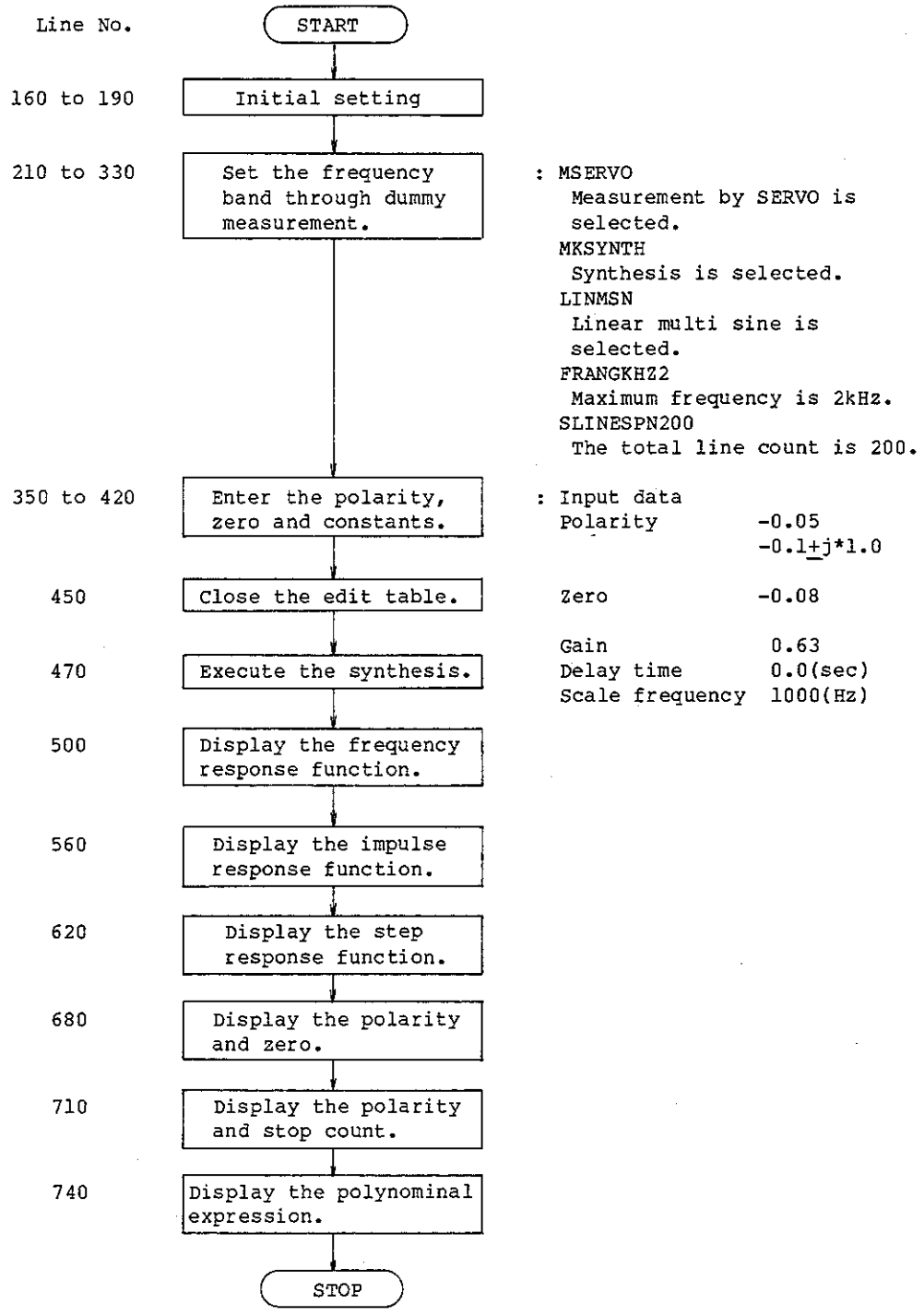


```
100     !  ***********************************************
110     !  *            IBREAD COMMAND                   *
120     !  *                 64 Bit BINARY MODE          *
130     !  ***********************************************
140     !
150     !           1990,6
160     !
170     OPTION BASE 1
180     PRINTER IS 1
190     !
200     Spa=708
210     !
220     ALLOCATE Dy(1024)
230     !
240     OUTPUT Spa;"SDL2"                    !STRING DELIMITER CRLF
250     !
260     OUTPUT Spa;"IBRESET"
270     OUTPUT Spa;"IBREAD 3,0,1024,0"
280     !
290     FOR I=1 TO 1024
300       ENTER Spa USING "#,W";S1,S2,S3,S4
310       IF S1<0 THEN S1=65536+S1
320       IF S2<0 THEN S2=65536+S2
330       IF S3<0 THEN S3=65536+S3
340       IF S4<0 THEN S4=65536+S4
350       !
360       IF S1>=32768 THEN                  !CALCULATE SIGN
370         Sign=-1
380         S1=S1-32768
390       ELSE
400         Sign=1
410       END IF
420       !
430       Ex=INT(S1/16)                      !CALCULATE EXPONENTIAL PART
440       !
450       V1=1+(S1-Ex*16)/16                 !CALCULATE MANTISSA
460       V1=V1+S2/1048576
470       V1=V1+S3/6.8719476E+10
480       V1=V1+S4/4.5035996E+15
490       !
500       IF Ex<923 THEN                     !MULTIPLY MANTISSA AND EX. F
510         V1=0
520       ELSE
530         V1=Sign*V1*2^(Ex-1023)
540       END IF
550       !
560       PRINT V1
570       Dy(I)=V1
580       !
590     NEXT I
600     !
610     END
```

Example 16. Synthesis operation by the GPIB

Using the GPIB, enter the polarity, zero and constants to display the frequency response function, the impulse response function and the step response function.

[Flowchart]



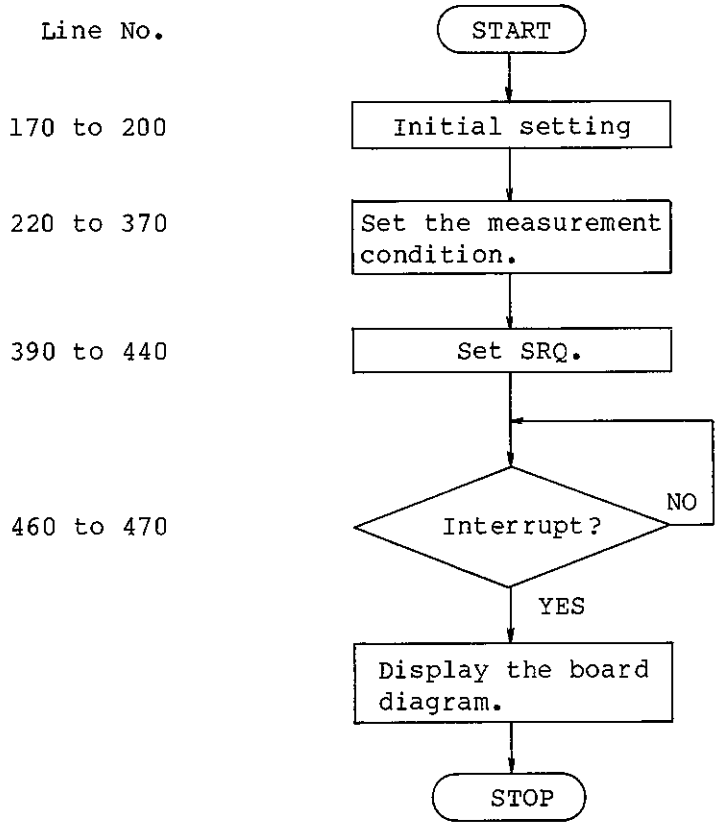
```
100   !  ******************************************
110   !  *                SYNTHESIS                 *
120   !  ******************************************
130   !
140   !           1990.6
150   !
160   OPTION BASE 1
170   PRINTER IS 1
180   !
190   Spa=708
200   !
210   OUTPUT Spa;"MSERVO"                    !SELECT "SERVO"
220   OUTPUT Spa;"MKSYNTH"                   !SELECT "SYNTHESIS"
230   !
240   OUTPUT Spa;"LINMSN"                    !SELECT "LINEAR MULTI-SINE"
250   OUTPUT Spa;"FRANGKHZ2"                 !MAXIMUM FREQUENCY 2kHz
260   OUTPUT Spa;"SLINESPN200"               !NUMBER OF LINES 200
270   OUTPUT Spa;"SVAMPV0.5"                 !SET SG VOLT 0.5V
280   OUTPUT Spa;"GENSTR"                    !GENERATOR START
290   OUTPUT Spa;"SIGOUT1"                   !SG OPERATOR ON
300   OUTPUT Spa;"START"                     !MEASUREMENT START
310   FOR I=1 TO 10000
320   NEXT I
330   OUTPUT Spa;"STOP"                      !MEASUREMENT STOP
340   !
350   OUTPUT Spa;"EDPZ1"                     !SELECT 1 LINE
360   OUTPUT Spa;"VALPZ-5,-2"                !INPUT POLE'S DATA
370   OUTPUT Spa;"VALPZ-1,-1,1,0"
380   OUTPUT Spa;"EDPZ21"                    !SELECT 21 LINE
390   OUTPUT Spa;"VALPZ-8,-2"                !INPUT ZERO'S DATA
400   OUTPUT Spa;"SGING.31,-1"               !INPUT GAIN 0.631
410   OUTPUT Spa;"TDLY0,0"                   !INPUT TIME DELAY 0
420   OUTPUT Spa;"SCFR1.0,3"                 !INPUT SCALE FREQUENCY 1.0
430   PAUSE
440   !
450   OUTPUT Spa;"DEDPZ"                     !CLOSE EDIT TABLE
460   !
470   OUTPUT Spa;"CRSYN1"                    !CREATE SYNTHESIS
480   PAUSE
490   !
500   OUTPUT Spa;"SFRF"                      !DISPLAY SYNTH FRF
510   FOR I=1 TO 5000
520   NEXT I
530   OUTPUT Spa;"YSCAUTO"
540   PAUSE
550   !
560   OUTPUT Spa;"SIPSP"                     !DISPLAY IMPULSE RESPONSE
570   FOR I=1 TO 5000
580   NEXT I
590   OUTPUT Spa;"YSCAUTO"
600   PAUSE
610   !
620   OUTPUT Spa;"SSTPR"                     !DISPALY STEP RESPONSE
630   FOR I=1 TO 5000
640   NEXT I
650   OUTPUT Spa;"YSCAUTO"
660   PAUSE
670   !
680   OUTPUT Spa;"SPZRO"                     !DISPLAY POLE-ZERO
690   PAUSE
700   !
710   OUTPUT Spa;"SPRSD"                     !DISPLAY POLE-RESIDUE
```

```
720   PAUSE
730   !
740   OUTPUT Spa;"SPOLY"                    !DISPLAY POLYNOMIALS
750   PAUSE
760   !
770   OUTPUT Spa;"SDCNV"                    !CLOSE TABLE
780   !
790   END
```

Example 17. Measurement in SERVO mode

Execute measurement on the transfer function in the SERVO mode. Upon completion of the averaging, an interrupt is caused by the R9211 and a board diagram will appear.

[Flowchart]



```
100   !  ********************************************
110   !  *   R9211 MEASUREMENT SET EXAMPLE          *
120   !  *                        FOR SERVO MODE    *
130   !  ********************************************
140   !
150   !           1990,6
160   !
170   OPTION BASE 1
180   PRINTER IS 1
190   !
200   Spa=708
210   !
220   OUTPUT Spa;"MSERVO"                  !SELECT "SERVO"
230   OUTPUT Spa;"LINMSN"                  !SELECT "LINEAR MULTI-SINE"
240   OUTPUT Spa;"MTLONG"                  !MEASUREMENT LONG
250   OUTPUT Spa;"STRFKHZ0"                !START FTRQUENCY 0kHz
260   OUTPUT Spa;"STPFKHZ50"               !STOP  FREQUENCY 50kHz
270   OUTPUT Spa;"SLINESPN800"             !LINE/SPAN 800
280   OUTPUT Spa;"SENSA1"                  !SET CH-A AUTO RANGE
290   OUTPUT Spa;"AUTORNGA1"               !SET CH-A UP & DOWN
300   OUTPUT Spa;"SENSB1"                  !SET CH-B AUTO RANGE
310   OUTPUT Spa;"AUTORNGB1"               !SET CH-B UP & DOWN
320   OUTPUT Spa;"SVAMPV0.8"               !SET SG VOLT 0.8V
330   OUTPUT Spa;"GENSTR"                  !GENERATOR START
340   OUTPUT Spa;"SGAVGNO5"                !SET NUMBER OF AVEARGES 5
350   OUTPUT Spa;"SIGOUT1"                 !SG OPERATOR ON
360   !
370   OUTPUT Spa;"START"                   !MEASUREMENT START
380   !
390   OUTPUT Spa;"CES"                     !ERROR STATUS CLEAR
400   OUTPUT Spa;"MSK251"                  !SRQ MASK
410   ON INTR 7 GOTO Interrupt             !SRQ INTERRUPT
420   ENABLE INTR 7;2
430   !
440   OUTPUT Spa;"SRQ1"                    !SRQ ON
450   !
460 Loop:       !
470   GOTO Loop
480   !
490 Interrupt:  !
500   OUTPUT Spa;"SRQ0"                    !SRQ OFF
510   OUTPUT Spa;"BODE"                    !DISPLAY BODE
520   PRINT "END OF MEASUREMENT"
530   !
540   END
```

6. GPIB PROGRAM CODES

Caution on GPIB Application

(1) When the three-dimensional display, Table display or List display mode is executed by the GPIB, send the command displayed (e.g. three-dimensional MAPDISP), then, send the next command after the screen displayed changes.

(2) In the "setting item" listed in the table below, the key input is prohibited except "effective key" to carry out the smooth setting. To escape from the set menu, send the "End command".

Setting Item		Menu	Effective key	End command
1	SERVO f Table	(SERVO) [SETUP] → [SQ BAND] [AMP&AVG] [f EDIT] (When f Table is displayed)	X menu [SQ BAND] X menu [AMP&AVG] X menu [f EDIT] All Y menu Numeral key, [ENT] [COPY]	FEDDONE
2	GO/NOGO Table	[MATH] [LMT MENU] → [LMT MODE] [LMT VAL] [LMT EDIT] (When f Table is displayed)	X menu [LMT MODE] X menu [LMT VAL] X menu [LMT EDIT] All Y menu Numeral key, [ENT] [COPY]	LMTEDON
3	Displaying curve fit or synthesis table	[MATH] [CFIT] → [sCONV] [SYNTH] → [sCONV] (Displaying operation result)	X menu [sSCALE] X menu [sCONV] All Y menu [COPY]	FDCNV SDCNV
4	Displaying curve fit or synthesis table	[MATH] [CFIT] → [sEDIT] [sSCALE] [SYNTH] → [sEDIT] [sSCALE] (When the table is input)	X menu [sEDIT] X menu [sSCALE] All Y menu Numeral key, [ENT] [COPY]	DEPZ DEDPZ
5	When execution of curve fit	[MATH] [CFIT] → [Fit] [CREATE] [SYNTH] → [SYNTH] [CREATE] (Execution of operation)	Y menu [STOP FIT] Y menu [STOP SYNTH]	CRFT CRSYN

Setting Item		Menu	Effective key	End command
6	Displaying NUMERIC LIST	[VIEW] [FORMAT] → [NUMERIC LIST] (Displaying list)	[SEL] selection X menu [FORMAT] Y menu [GRAPH] [COPY]	GRAPH
7	Displaying CAT	[VIEW] [FORMAT] → [NUMERIC LIST] (Displaying list)	[DEVICE] X menu [ACCESS] All Y menu	CATOFF
8	Displaying 3D	[VIEW] [FORMAT] → [3D DISPLAY] (Displaying 3-dimensional display)	[START] [STOP] [SET UP] [AUTO ARM FREERUN] [DEVICE] All [PLOTTER] All [GPIB] [VIEW] [FORMAT] Y menu [GRAPH] [VIEW] [INSTVW] [DATA VIEW] [STEP method] [COPY]	GRAPH

* Setting item 1 is for R9211B/C only.
* Setting item 2 to 5 are for R9211C only.

6.1 Signal Analysis

Commands for signal analysis						
Type	Command	Parameter	Description	A	B/C	E
Measurement mode	MWAVEFRM	None	Analysis in the time domain	○	○	○
	MSPECTRM	None	Analysis in the frequency domain	○	○	○
	MTIMFREQ	None	Analysis of time - frequency	○	○	○
	MFRF	None	Frequency response function (transfer function)	○	○	○
	MSERVO	None	Sets the servo mode	—	○	—
Calibration	SINGLEDC	None	SINGLE DC CAL	○	○	○

Note: In specifying an analysis mode with GPIB program codes, the specification is described with a program code per line.

6.2 Mode

Commands for mode						
Type	Command	Parameter	Description	A	B/C	E
Calendar	YEAR	Numeral	Setting of the year (e.g., "YEAR89" for 1989)	○	○	○
	MONTH	Numeral	Setting of the month (e.g., "MONTH3" for March)	○	○	○
	DAY	Numeral	Setting of the day	○	○	○
	HOUR	Numeral	Setting of the hour	○	○	○
	MINUTE	Numeral	Setting of the minute	○	○	○
	SECOND	Numeral	Setting of the second	○	○	○
Buzzer	BUZZER	 0 1	Switching of the access completion buzzer of key input OFF ON	○	○	○
	WARNING	 0 1	* Switching of the warning sound for no key-input access NO YES	○	○	○
	TRONST	 0 1	ON: for displaying the internal display format when the START key is pressed OFF ON	○	○	○
	MONITR	 1 0	Selection of time or frequency waveforms when the TYPE of VIEW is set for +MONITOR TIME FREQ	○	○	○

* Valid only when BUZZER is set for ON.

6.3 SETUP

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Function	TIME	None	Measurement of time	○	○	○
	AUTOCORR	None	Measurement of the autocorrelation function	○	○	○
	CROSSCOR	None	Measurement of the crosscorrelation function	○	○	○
	HISTGRAM	None	Measurement of the amplitude probability density function	○	○	○
	POWERSPC	None	Measurement of power spectrum	○	○	○
	CROSSSPC	None	Measurement of cross spectrum	○	○	○
	COMPSPC	None	Measurement of complex spectrum	○	○	○
	FRFSETUP	None	Measurement of frequency reponse function	○	○	○
Channel	DIGITIN	0 1	Input of digital A Analogue input Digital input	○	○	○
	ACTIVAB	None	Activation of channles A and B	○	○	○
	ACTIVAC	None	Activation of channels A and C (optional)	○	○	○
	ACTIVA	None	Activation of channel A only	○	○	○
	ACTIVB	None	Activation of channel B only	○	○	○
	ACTIVC	None	Activation of channel C only (optional))	○	○	○

Option: Can be set if I/O with memory

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Range	SAMPLRAT	Numeral	Sets the sampling time (cannot be used when the sampling clock is set for EXT) Unit: sec (e.g., "SAMPLRAT3.91" for 3.91sec)	○	○	○
	FRAMEP	Numeral	Sets the frame time (e.g., "FRAMEP1024" for 1,024 points)	○	○	○
	HISTP	Numeral	Sets the range of amplitude (histogram) (e.g., "HISTP512" for 512 points)	○	○	○
	SAMPLCLK	1 0	Selection of a sampling clock INTERNAL EXTERNAL	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B	E
Range			(Frequency rang)			
	FRANGKHZ	Numeral	Unit: kHz	○	○	○
	FRANGHZ	Numeral	Unit: Hz	○	○	○
	FRANGMHZ	Numeral	Unit: mHz	○	○	○
			(Start frequency in measuring range)			
	STRFKHZ	Numeral	Unit: kHz	○	C	–
	STRFHZ	Numeral	Unit: Hz	○	C	–
	STRFMHZ	Numeral	Unit: mHz	○	C	–
			(Stop frequency)			
	STPFKHZ	Numeral	Unit: kHz	○	C	–
	STPFHZ	Numeral	Unit: Hz	○	C	–
	STPFMHZ	Numeral	Unit: mHz	○	C	–
			(Frequency resolution)			
	LINFRES	None	Linear frequency analysis	○	○	○
	LOGFRES	None	Logarithmic analysis	○	○	○
	THIRDOCT	None	1/3 octave analysis	○	○	○
	OCTFRES	None	1/1 octave analysis	○	○	○
	LINESPAN	Numeral	Number of lines in the spectrum (e.g., "LINESPAN400" for 400 lines)	○	○	○
	DECADES	Numeral	Number of decades (except for linear analysis) (e.g., "DECADES2" for 2 decades)	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Input sensitivity	SENSA	1 0	Selection of a setting method of (CH-A) Auto range Manual	○	○	○
	SENSB	1 0	Selection of a setting method of (CH-B) Auto range Manual	○	○	○
	SENSADV	30 29 28 27 | | | -58 -59 -60	Input sensitibity of (CH-A) +30dBV ("SENSADV30") +29dBV +28dBV +27dBV -58dBV -59dBV -60dBV	○	○	○
	SENSBDV	30 29 28 27 | | | -58 -59 -60	Input sensitibity of (CH-B) +30dBV ("SENSBDV30") +29dBV +28dBV +27dBV -58dBV -59dBV -60dBV	○	○	○
	AUTORNGA	0 1	Up only Up or down	○	○	○
	AUTORNGB	0 1	Up only Up or down	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Input	CHANNEL	1 0	Selection of a channel to be set (CH-A) (CH-B)	○	○	○
	COUPLE	1 0	Selection of an input coupling AC DC	○	○	○
	PINPUT	1 0	Sets the (+) input terminal IN GND	○	○	○
	MINPUT	1 0	Sets the (-) input terminal IN GND	○	○	○
	FILTER	1 0	Switching of the analog filter ON OFF	○	○	○
	ICP	1 0	Switching of the power for the accelerometer ON OFF	○	○	○
	TEST	1 0	Switching of the test signal ON OFF	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Trigger	TRGLEVEL	Numeral	Sets the trigger level (Its unit depends on the input sensitivity range. V: 30 to 20dBV mV: 19 to -60dBV)	○	○	○
	TRGHYSTR	Numeral	Sets the trigger hysteresis width	○	○	○
	ARMLEN	Numeral	Sets the memory length to be stored (8, 16, 32, 64K)	○	○	○
			(Trigger source)			
	TRGSORA	None	CH-A	○	○	○
	TRGSORB	None	CH-B	○	○	○
	TRGSORXT	None	EXT	○	○	○
			(Trigger slope)			
	TRGPSLOP	None	+ slope (triggering at rising)	○	○	○
	TRGMSLOP	None	- slope (triggering at falling)	○	○	○
	BISLOPIN	None	Triggering at a signal entering the trigger range	○	○	○
	BISLOPOT	None	Triggering at an output signal from the trigger range	○	○	○
			Delay time from DELAY (triggered time)			
	TRGDELS	Numeral	Unit: sec (e.g. "TRGDELS10" for 10sec)	○	○	○
	TRGDELMS	Numeral	Unit: msec	○	○	○
	TRGDELUS	Numeral	Unit: μsec	○	○	○
	TRGDELPO	Numeral	Unit: Number of points	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
ARM/HOLD	AUTOARM	None	AUTO ARM	○	○	○
	ARM	None	ARM	○	○	○
	HOLD	None	HOLD	○	○	○
	FREERUN	None	FREE RUN	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Lag window	LAGWHANN	None	HANNING window	○	○	○
	LAGWRECT	None	RECTANGULAR window	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Window function/ Auditory compensation character-istics	MINIMUM	None	Selects the minimum window function	○	○	○
	HANNING	None	Selects the HANNING window function	○	○	○
	FLATPASS	None	Selects the flat pass window function	○	○	○
	RECT	None	Selects the rectangular wave window function	○	○	○
	WTSETCH	 1 0	(Force/response) Channel to be set CH-A CH-B	○	○	○
	SETWND	 1 0	Selects a window function Force window Response window	○	○	○
	FRSTART	Numeral	Start time of the window function Unit: μsec (e.g., "FRSTART1000" for 1msec)	○	○	○
	FRSTOP	Numeral	Ending time of the window function Unit: μsec	○	○	○
	DAMPING	Numeral	Damping time of the response window Unit: μsec	○	○	○
	WEITVIEW	 0 1	Selects a waveform display mode Display of waveforms weighted with the window function (F/R) Display of waveforms without the window function (RECT)	○	○	○
	WGTOFF	None	(Auditory compensation characteristics) No filter	○	○	○
	AWGT	None	With A characteristic	○	○	○
	BWGT	None	With B characteristic	○	○	○
	CWGT	None	With C characteristic	○	○	○
	CMSGWGT	None	With C-Message characteristic	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Averaging	AVGSUM	None	AVG MODE (Averaging method) Summational averaging	○	○	○
	AVGEXP	None	Averaging with exponential function transfer	○	○	○
	AVGPEAK	None	Averaging detecting peak values	○	○	○
	AVGSUB	None	Subtractional averaging	○	○	○
	AVGNO	Numeral	Sets the averaging number of times (e.g., "AVGNO32" for 32 times)	○	○	○
	AVGLIMIT	Numeral	Sets the averaging limit when AVG MODE is set for EXP (e.g., "AVGLIMIT2000" for 2000 times)	○	○	○
	AVGREJEC	0 1	Averaging of rejected data OFF ON	○	○	○
			(Averaging process)			
	AVGNORML	None	NORMAL	○	○	○
	AVGFAST	None	FAST	○	○	○
	AVGPONE	None	+1 AVG	○	○	○
			(Overlap)			
	AVGOVLPA	None	No data overlap	○	○	○
	AVGOVLPB	None	Averaging with 50% overlap	○	○	○
	AVGOVLPC	None	Averaging with 75% overlap	○	○	○
	AVGOVLMX	None	Averaging with the internally possible maximum overlap	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Averaging control	START	None	Starts averaging	○	○	○
	STOP	None	Aborts averaging (during averaging) Continues averaging (when averaging is not in progress)	○	○	○
	STOP	0 1	Continues medsurement Aborts measurement (Cannot be specified for +1 averaging)	○	○	○
	STOPPONE	None	Stops +1 averaging	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Unit	UNITCH	 1 0 4	Selects a channel CH-A CH-B CROSS	○	○	○
	UNITVAL	*1	Coefficient of engineering unit	○	○	○
	UNITLBL	*2	Level of engineering unit	○	○	○
	UNITVRMS	None	Vrms	○	○	○
	UNITVLT	None	Volt	○	○	○
	UNITPSD	 0 1	Displays the power spectrum density OFF ON	○	○	○

*1 UNITVAL ch unit value

ch : Indicates channels.
0 : CH-A
1 : CH-B

unit : Indicates unit.
0 : EU
1 : dBEU

value: Set value

*2 UNITLBL ch ax #character string#

ch : Indicates channels.
0 : CH-A
1 : CH-B

ax : Indicates X-axis unit.
0 : Time axis
1 : Others

Character string: Input label (See Item 4.2 (2))

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
Delay between channels	ICHDELAY	0 1	ICH DELAY OFF ON "DELAYTMS10"	○	○	○
	DELAYTMS	Numeral	If delay time is 10msec, "DELAYTMS10" (Its unit depends on the frequency range.)	○	○	○

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
T-F ※	TFINSTF	0 1	Selects the T-F analysis OFF ON	○	○	○
	TFSTRTS	Numeral	(Time for analysis) Starting time Unit: sec (e.g., "TRSTRTS1" for 1sec)	○	○	○
	TFSTRTMS	Numeral	Unit: msec	○	○	○
	TFSTRTUS	Numeral	Unit: μsec	○	○	○
	TFSTOPS	Numeral	(Ending time) Unit: sec	○	○	○
	TFSTOPMS	Numeral	Unit: msec	○	○	○
	TFSTOPUS	Numeral	Unit: μsec	○	○	○
	TFSTEPS	Numeral	(Stepping time) Unit: sec	○	○	○
	TFSTEPMS	Numeral	Unit: msec	○	○	○
	TFSTEPUS	Numeral	Unit: μsec	○	○	○
T-F control	START	None	Starts T-F analysis	○	○	○

※ Time－Frequency

Commands for SETUP						
Type	Command	Parameter	Description	A	B/C	E
T-F ※	TFID	Numeral	Selects an ID No. (1 to 4) (e.g., "TFID2" for ID No.2)	○	○	○
			(Channel)			
	TFCHA	None	Tracing with Gaa, Sa	○	○	○
	TFCHB	None	Tracing with Gbb, Sb	○	○	○
			(Data)			
	TFDGXX	None	Power spectrum	○	○	○
	TFDSMGXX	None	Sum of power spectra	○	○	○
	TFDREAL	None	Real part of the power spectrum	○	○	○
	TFDIMAG	None	Imaginary part of the power spectrum	○	○	○
	TFDPHASE	None	Phase	○	○	○
	TFDFPK	None	Peak frequency	○	○	○
	TFSPTKHZ	Numeral	(Sets a single frequency) Unit: kHz (e.g., "TFSPTKHZ8" for 8kHz)	○	○	○
	TFSPTHZ	Numeral	Unit: Hz	○	○	○
	TFSPTMHZ	Numeral	Unit: mHz	○	○	○
			(Start frequency with a set range)			
	TFSTRKHZ	Numeral	Unit: kHz	○	○	○
	TFSTRHZ	Numeral	Unit: Hz	○	○	○
	TFSTRMHZ	Numeral	Unit: mHz	○	○	○
			(Ending frequency)			
	TFSTPKHZ	Numeral	Unit: kHz	○	○	○
	TFSTPHZ	Numeral	Unit: Hz	○	○	○
	TFSTPMHZ	Numeral	Unit: mHz	○	○	○

※ Time－Frequency

6.4 Display

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
SEL	SEL1	None	Selects the 1st screen	○	○	○
	SEL2	None	Selects the 2nd screen	○	○	○
	SEL3	None	Selects the 3rd screen	○	○	○
	SEL4	None	Selects the 4th screen	○	○	○
TYPE	SINGLET	None	Displays a single screen	○	○	○
	DUALT	None	Displays two screens	○	○	○
	TRIPLET	None	Displays three screens	○	○	○
	QUADT	None	Displays four screens	○	○	○
	PLUSMONI	1 0	+Monitor DO UNDO	○	○	○
FORMAT	GRAPH	None	2-dimensional display	○	○	○
	NUMELIST	None	Displays the numerical data list	○	○	○
	MAPDISP	None	3-dimensional display	○	○	○
	XAXIS	1 0	X-axis LIN LOG	○	○	○
	OVERLAY	0 1	OVERLAY OFF ON	○	○	○
	GRATICUL	0 1	Displays the grating on the screen OFF ON	○	○	○
3-dimensional	STACKNO	Numeral	Sets the number of waveforms for 3-dimensional display (e.g., "STACKN050" for 50)	○	○	○

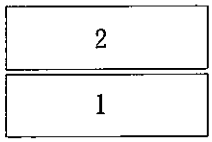
Commands for display						
Type	Command	Parameter	Description	A	B/C	E
3-dimensional	MAPHOLD	None	Displays after each data input	○	○	○
	MAPAVG	None	Displays after averaging	○	○	○
	MAPFREE	None	Displays internal timing	○	○	○
INST VIEW ※	CHATIMEI	None	Displays time-domain waveforms of CH-A	○	○	○
	CHBTIMEI	None	Displays time-domain waveforms of CH-B	○	○	○
	ORBITAL	None	Orbit	○	○	○
	CHAATCRI	None	Autocorrelation function of CH-A	○	○	○
	CHBATCRI	None	Autocorrelation function of CH-B	○	○	○
	CROSSCRI	None	Crosscorrelation function	○	○	○
	CHAHISTI	None	Probability density function of CH-A	○	○	○
	CHBHISTI	None	Probability density function of CH-B	○	○	○
	CHASPCTI	None	Power/complex spectrum of CH-A	○	○	○
	CHBSPCTI	None	Power/complex spectrum of CH-B	○	○	○
	CROSSSPI	None	Cross spectrum	○	○	○

※: Display of instant data

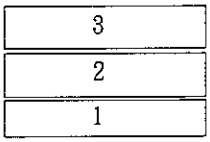
SEL and screen No.

SINGLE display

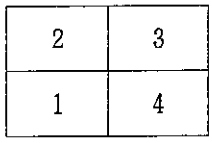
DUAL display



TRIPLE display



QUAD display



Commands for display						
Type	Command	Parameter	Description	A	B/C	E
INST VIEW ※	DATAVIEW			○	○	○
		0	OFF	○	○	○
		1	ON			
			(VIEW STEP)			
	VPAUSE	None	Stops step operation	○	○	○
	VAUTOTOP	None	Moves to the oldest data	○	○	○
	VAUTOR	None	Automatically moves to the new data	○	○	○
	VAUTOL	None	Automatically moves to the old data	○	○	○
	VMANSTP	None	Moves data in manual operation	○	○	○
			(Sets the step width)			
	VSTEPS	Numeral	Unit: sec (e.g., "VSTEPS1" for 1sec)	○	○	○
	VSTEPMS	Numeral	Unit: msec	○	○	○
	VSTEPUS	Numeral	Unit: μsec	○	○	○

※ Display of instant data

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
AVG VIEW※	CHATIMEA	None	Average time-domain waveforms of CH-A	○	○	○
	CHBTIMEA	None	Average time-domain waveforms of CH-B	○	○	○
	CHAATCRA	None	Average autocorrelation function of CH-A	○	○	○
	CHBATCRA	None	Average autocorrelation function of CH-B	○	○	○
	CROSSCRA	None	Average crosscorrelation function	○	○	○
	CHAHISTA	None	Average probability density of CH-A	○	○	○
	CHBHISTA	None	Average probability density of CH-B	○	○	○
			(SPECTRUM・T-F mode)			
	CHAPWSPA	None	Average power spectrum of CH-A	○	○	○
	CHBPWSPA	None	Average power spectrum of CH-B	○	○	○
	CHACPSPA	None	Average complex spectrum of CH-A	○	○	○
	CHBCPSPA	None	Average complex spectrum of CH-B	○	○	○
	CROSSSPA	None	Average cross spectrum	○	○	○
			(FRF・SERVO mode)			
	CHAPWSPF	None	Average power spectrum of CH-A	○	○	○
	CHBPWSPF	None	Average power spectrum of CH-B	○	○	○
	CROSSSPF	None	Average cross spectrum	○	○	○
	FRF	None	Average frequency response function	○	○	○
	COHERENC	None	Average coherence function	○	○	○
	IMPLSRSP	None	Average impulse response	○	○	○

※ : Display of average data
Note: In the SERVO mode, power and cross spectra cannot be displayed.

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
MEM VIEW※1	MEMRECL1	None	Displays the data of memory (1)	○	○	○
	MEMRECL2	None	Displays the data of memory (2)	○	○	○
	MEMRECL3	None	Displays the data of memory (3)	○	—	○
	MEMSAVE1	None	Saves data to memory (1)	○	○	○
	MEMSAVE2	None	Saves data to memory (2)	○	○	○
	MEMSAVE3	None	Saves data to memory (3)	○	—	○
MATH VIEW ※2	RESULTAR	None	Displays the result of calculation	○	○	○
	FFRF	None	Displays curve-fitted frequency response function <Hab>.	—	C	—
	FIPSP	None	Displays impulse response function <IMP> in curve-fitted delay area.	—	C	—
	FSTPR	None	Displays step response function <STP> in curve-fitted delay area.	—	C	—
	SFRF	None	Displays synthesized frequency response function <Hab>.	—	C	—
	SIPSP	None	Displays impulse response function <IMP> in synthesized delay area.	—	C	—
	SSTPR	None	Displays stop frequency function <STP> in synthesized delay area.	—	C	—
T-F VIEW※3	TFTRACE1	None	Displays "ID 1" of T-F analysis	○	○	○
	TFTRACE2	None	Displays "ID 2" of T-F analysis	○	○	○
	TFTRACE3	None	Displays "ID 3" of T-F analysis	○	○	○
	TFTRACE4	None	Displays "ID 4" of T-F analysis	○	○	○

※1 Display of the stored data
※2 Display of the calculated data
※3 Display of the time-frequency analysis data
Note: "MEMRECL3" and "MEMSAVE3" are not available in R9211B/C.

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
COORD ※1	REAL	None	Displays the real part when TIME, HIST, CORR, IMPULSE is selected in VIEW.	○	○	○
	IMAG	None	Displays the imaginary part	○	○	○
	MAG	None	Linear amplitude display on Y-axis	○	○	○
	DBMAG	None	Logarithmic amplitude display on Y-axis	○	○	○
	PHASE	None	Phase display	○	○	○
COORD ※2	SDBMAG	None	Logarithmic amplitude display on Y-axis when SPECTRUM is selected in VIEW	○	○	○
	SMAG	None	Linear amplitude display on Y-axis	○	○	○
	SMAGSQR	None	Linear square-amplitude display on Y-axis	○	○	○
	SPHASE	None	Phase display	○	○	○
	SREAL	None	Displays the real part	○	○	○
	SIMAG	None	Displays the imaginary part	○	○	○
	SNYQUIST	None	Nyquist display	○	○	○

※1 Display format of Y-axis coordinate when TIME, HIST, and IMPULSE are selected with VIEW.
※2 Display format of Y-axis coordinate when SPECTRUM is selected with VIEW.

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
COORD ※3	FDBMAG	None	Logarithmic amplitude display on Y-axis when FRF is selected in VIEW	○	○	○
	FMAG	None	Linear amplitude display on Y-axis	○	○	○
	PHASEP	None	Phase display	○	○	○
	PHASEM	None	Inverse phase display	○	○	○
	GROUPDLY	None	Displays group delay	○	○	○
	FREAL	None	Displays the real part	○	○	○
	FIMAG	None	Displays the imaginary part	○	○	○
COORD ※4	BODE	None	Bode diagram	○	○	○
	COQUAD	None	CO-QUAD	○	○	○
	NYQUIST	None	Nyquist	○	○	○
	COLECOLE	None	Cole-Cole	○	○	○
	NICHOLS	None	Nichols	○	○	○

※3 Display format of Y-axis coordinate when FRF is selected with VIEW.
※4 Display format of frequency response function when FRF is selected with VIEW.

After the display screeen is changed to FRF average data, send the screen coordinate command of frequency response function (for example, command for the Y-axis coordinate selected with FRF CORD by manual operation such as BODE and NYUQUIST).

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
X scale	XSCDEFLT	None	X-axis default	○	○	○
	XSCAUTO	None	X-axis autoscale At ORBITAL display	○	○	○
	XSCLFTS	Numeral	(When DOMAIN = TIME or LAG) Left value Unit: sec (e.g., "XSCLFTS1" for 1sec)	○	○	○
	XSCLFTMS	Numeral	Unit: msec	○	○	○
	XSCLFTUS	Numeral	Unit: μsec	○	○	○
	XSCRITS	Numeral	Right value Unit: sec	○	○	○
	XSCRITMS	Numeral	Unit: msec	○	○	○
	XSCRITUS	Numeral	Unit: μsec	○	○	○
	XSCLFTV	Numeral	(When DOMAIN = HIST) Left value Unit: V (e.g., "XSCLFTV-1" for -1V)	○	○	○
	XSCLFTMV	Numeral	Unit: mV	○	○	○
	XSCLFTUV	Numeral	Unit: μV	○	○	○
	XSCRITV	Numeral	Right value Unit: V	○	○	○
	XSCRITMV	Numeral	Unit: mV	○	○	○
	XSCRITUV	Numeral	Unit: μV	○	○	○

Note: When set left or right values, send right or left values after the left or right values changed.

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
X scale	XSCLFTKH	Numeral	(When DATA = SPECTRUM) Left value Unit: kHz (e.g., "XSCLFTKH10" for 10kHz)	○	○	○
	XSCLFTHZ	Numeral	Unit: Hz	○	○	○
	XSCLFTMZ	Numeral	Unit: mHz	○	○	○
	XSCRITKH	Numeral	Right value Unit: kHz	○	○	○
	XSCRITHZ	Numeral	Unit: Hz	○	○	○
	XSCRITMZ	Numeral	Unit: mHz	○	○	○
	XSCLF	Numeral	(When DATA = NYQUIST for FRF)		○	
	XSCRIT	Numeral			○	

Note: When set left or right values, send right or left values after the left or right values changed.

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
Y scale	YSCDEFLT	None	Y-axis default	○	○	○
	YSCAUTO	None	Y-axis autoscaling	○	○	○
			(When DOMAIN = TIME) Upper value			
	YSCUPV	Numeral	Unit: V (e.g., "YSCUPV10" for 10V)	○	○	○
	YSCUPMV	Numeral	Unit: mV	○	○	○
	YSCUPUV	Numeral	Unit: μV	○	○	○
			Lower value			
	YSCLOWV	Numeral	Unit: V	○	○	○
	YSCLOWMV	Numeral	Unit: mV	○	○	○
	YSCLOWUV	Numeral	Unit: μV	○	○	○
			(When COORD = REAL, IMAG, MAG, NYQUIST for FRF)			
	YSCUP	Numeral	Upper value (e.g., "YSCUP1" for 1)	○	○	○
	YSCLOW	Numeral	Lower value (e.g., "YSCLOW-1" for -1)	○	○	○
			(When COORD = dBMAG)			
	YSCUPDB	Numeral	Upper value (e.g., "YSCUPDB0" for 0dBV)	○	○	○
	YSCLOWDB	Numeral	Lower value	○	○	○
			(When COORD = PHASE)			
	YSCUPDG	Numeral	Upper value (e.g., "YSCUPDG10" for 10deg)	○	○	○
	YSCLOWDG	Numeral	Lower value	○	○	○
			(When DATA = HISTGRAM)			
	YSCUPP	Numeral	Upper value (e.g., "YSCUPP80" for 80%)	○	○	○
	YSCLOWP	Numeral	Lower value	○	○	○

Commands for display						
Type	Command	Parameter	Description	A	B/C	E
Y scale			(When COORD = GROUP DELAY) Upper value			
	YSCUPS	Numeral	Unit: sec	○	○	○
	YSCUPMS	Numeral	Unit: msec	○	○	○
	YSCUPUS	Numeral	Unit: μsec	○	○	○
			Lower value			
	YSCLOWS	Numeral	Unit: sec	○	○	○
	YSCLOWMS	Numeral	Unit: msec	○	○	○
	YSCLOWUS	Numeral	Unit: μsec	○	○	○

6.5 MARKER

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
X cursor			(X-axis single and dual left cursor)			
	XCSASEC	Numeral	Unit: sec (e.g., "XCSASEC10" for 10sec)	○	○	○
	XCSAMSEC	Numeral	Unit: msec	○	○	○
	XCSAUSEC	Numeral	Unit: μsec	○	○	○
	XCSAV	Numeral	Unit: V	○	○	○
	XCSAMV	Numeral	Unit: mV	○	○	○
	XCSAUV	Numeral	Unit: μV	○	○	○
	XCSAHZ	Numeral	Unit: Hz	○	○	○
	XCSAMHZ	Numeral	Unit: mHz	○	○	○
	XCSAUHZ	Numeral	Unit: μHz	○	○	○
			(X-axis dual right cursor)			
	XCSBSEC	Numeral	Unit: sec	○	○	○
	XCSBMSEC	Numeral	Unit: msec	○	○	○
	XCSBUSEC	Numeral	Unit: μsec	○	○	○
	XCSBV	Numeral	Unit: V	○	○	○
	XCSBMV	Numeral	Unit: mV	○	○	○
	XCSBUV	Numeral	Unit: μV	○	○	○
	XCSBHZ	Numeral	Unit: Hz	○	○	○
	XCSBMHZ	Numeral	Unit: mHz	○	○	○
	XCSBUHZ	Numeral	Unit: μHz	○	○	○

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
Y cursor	YCSA	Numeral	(Y-axis lower cursor) Unit: subunit only (e.g., "YCSA-5" for -5dB)	○	○	○
	YCSAM	Numeral	Unit: milli	○	○	○
	YCSAU	Numeral	Unit: micro	○	○	○
	YCSB	Numeral	(Y-axis upper cursor) Unit: subunit only	○	○	○
	YCSBM	Numeral	Unit: milli	○	○	○
	YCSBU	Numeral	Unit: micro	○	○	○
	YCSS	Numeral	(Y-axis single cursor) Unit: subunit only	○	○	○
	YCSSM	Numeral	Unit: milli	○	○	○
	YCSSU	Numeral	Unit: micro	○	○	○

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
MKR VAL	MKROFF	None	MKR OFF	○	○	○
	SINGLEX	None	X1, Y1	○	○	○
	XYXY	None	X1, Y1 and X2, Y2	○	○	○
	XYXDY	None	X1, Y1 and X2, DY	○	○	○
	XXXMKR	None	X MKR	○	○	○
	YY	None	Y1 and Y2	○	○	○
	YDY	None	Y1 and DY	○	○	○

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
X marker	XMARKER	None	Execution of X MKR	○	○	○
	PKMKROF	None	(Peak marker) PK MKR OFF	○	○	○
	SINGLEPK	None	Displays the peak	○	○	○
	MKRPKPK	None	Displays the max. and min. values	○	○	○
	NEXTRPK	None	NEXT RIGHT PK	○	○	○
	NEXTLPK	None	NEXT LEFT PK	○	○	○
	NEXTRMIN	None	NEXT RIGHT MIN	○	○	○
	NEXTLMIN	None	NEXT LEFT MIN	○	○	○
	PPK	None	The first max. amplitude at left and right	○	○	○
	MPK	None	The first min. amplitude at left and right	○	○	○
	FSINGLPK	None	Displays the peak marker	○	○	○
	BNDMKROF	None	(BAND MKR) BAND MKR OFF	○	○	○
	BNDPKPK	None	Max. and min. values in the specified band	○	○	○
	RMS	None	Execution value in the specified band	○	○	○
	PK	None	Max. peak in the specified band	○	○	○
	OVERALL	None	Overall	○	○	○
	MEAN	None	Average	○	○	○
	VARIANCE	None	Variance	○	○	○

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
X marker			(PULSE PARAMETER)			
	PULPAROF	None	Pulse parameter OFF	○	○	○
	RISETIME	None	Rise time	○	○	○
	FALLTIME	None	Fall time	○	○	○
	PULSWIDT	None	Pulse width	○	○	○
	DAMPPWR		(For correlation data) Damping coefficient and damping ratio	○	○	○
		0	OFF			
		1	ON			
	REALTIME		Real time display of a marker	○	○	○
		0	OFF			
		1	ON			
	XDBBWD		(Pass band calcuration) Pass bandwidth marker	○	○	○
		0	OFF			
		1	ON			
	XDBXDB	Numeral	Sets the value of X as XdB	○	○	○
	SHAPE		(Shaping factor calcuration) Shaping factor marker	○	○	○
		0	OFF			
		1	ON			
	SHAPEXDB	Numeral	XdB setting	○	○	○
	SHAPEYDB	Numeral	YdB setting	○	○	○

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
X marker	HARMMKR		(HARMONIC) Harmonic	○	○	○
		0	OFF			
		1	ON			
	FDMTFKHZ	Numeral	(Setting of the fundamental frequency) Unit: kHz (e.g., "FDMTFKHZ2" for 2kHz)	○	○	○
	FDMTFHZ	Numeral	Unit: Hz	○	○	○
	FDMTFMHZ	Numeral	Unit: mHz	○	○	○
	SIDEBAND		(SIDEBAND) Sideband	○	○	○
		0	OFF			
		1	ON			
	CARRFKHZ	Numeral	(Setting of the carrier frequency) Unit: kHz	○	○	○
	CARRFHZ	Numeral	Unit: Hz	○	○	○
	CARRFMHZ	Numeral	Unit: mHz	○	○	○
	MODFKHZ	Numeral	(Setting of the modulation frequency) Unit: kHz	○	○	○
	MODFHZ	Numeral	Unit: Hz	○	○	○
	MODFMHZ	Numeral	Unit: mHz	○	○	○
	FDAMPPWR		(When DAMP PWR data = impulse) Damping power marker	○	○	○
		0	OFF			
		1	ON			
	DAMPFKHZ	Numeral	(Frequency to obtain the damping coefficient) Unit: kHz	○	○	○
	DAMPFHZ	Numeral	Unit: Hz	○	○	○
	DAMPFMHZ	Numeral	Unit: mHz	○	○	○
	RIPPLE	0	OFF (Ripple marker)	○	○	○
		1	ON			

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
	FDFSET	0 1	Select the basic wave frequency ※1 Manual specification Peak Basic wave setting ※2	△	△	△
	HRMMXODR	Numeric	Set the maximum order of the higher harmonic. ("HRMMXODR 20" if the order is 20.) ※1	△	△	△

Note 1 : Available if the option 10 or 11 is mounted.
Note 2 : Valid if the basic wave frequency selection is set to manual specification.

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
CTRL SYS※	CTLSYSM	None	Selects the marker function for evaluating the servo system	○	○	○
	BODEMKR	0 1	Marker function of an open loop OFF ON	○	○	○
	CLOSELOP	0 1	Marker function of a closed loop OFF ON	○	○	○
	DCGAIN	Numeral	Marker key for displaying the DC gain (e.g., "DCGAIN20" for 20dBV)	○	○	○

※ Display of the marker for evaluating the servo system

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
FIX X ※	XFIXCNTR	None	Changes the width between two cursors with their center fixed	○	○	○
	XFIXRIGT	None	Moves the left cursor with the right cursor fixed	○	○	○
	XFIXLEFT	None	Moves the right cursor with the left cursor fixed	○	○	○
	XFIXWIDT	None	Moves the two cursors with their distance fixed	○	○	○

※ Setting of the range on X-axis

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
FIX Y ※	YFIXCNTR	None	Changes the width between two cursors with their center fixed	○	○	○
	YFIXUPER	None	Moves the lower cursor with the upper cursor fixed	○	○	○
	YFIXLOWR	None	Moves the upper cursor with the lower cursor fixed	○	○	○
	YFIXWIDT	None	Moves the two cursors with their distance fixed	○	○	○

※ Setting of the range on Y-axis

Commands for MARKER						
Type	Command	Parameter	Description	A	B/C	E
Reference marker	SETREF	Numeral	Sets the reference marker (1-20) (e.g., "SETREF2" for 2)	○	○	○
	RCLREF	Numeral	Calls the reference marker (1-20)	○	○	○
	DELREF	Numeral	Deletes the reference marker (1-20)	○	○	○
	CURSOR	0 1	Moves the cursor with a knob For all screens For selected screen	○	○	○
	SELTOOTH		Copys cursor values in the selected screen to another screen	○	○	○

6.6 MATH KEY

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
MATH KEY	MKMATH	None	Executes MATH MENU.	*1 –	*1 C	*1 –
	MKLMT	None	Executes GO, NOGO MENU.	–	C	–
	MKCRVF	None	Executes curve fit MENU.	–	C	–
	MKSYNTH	None	Executes FRF synthesis MENU.	–	C	–

Note: To execute MATH, functions of MATH must be allocated in advance. Execute the above commands.

*1 Since A, B, and E are always set, these commands need not be executed.

6.7 MATH

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
MATH SELECT	DOMATH	None	Execution of calculation	○	○	○
	SETMOPRD	None	Sets data to be calculated	○	○	○
	SETMATH01	None	Sets the first operator and data	○	○	○
	SETMATH02	None	Sets the second operator and data	○	○	○
	SETMATH03	None	Sets the third operator and data	○	○	○
	CLRMATH0	None	Initialization of all operators	○	○	○
	REMATH	0 1	Real-time operation OFF ON	○	○	○

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
ALGEBRA	ALGBROFF	None	Cancellation of arithmetic operation among matrices	○	○	○
	ADDALGBR	None	Addition between matrices	○	○	○
	SUBALGBR	None	Subtraction between matrices	○	○	○
	MPYALGBR	None	Multiplication between matrices	○	○	○
	DIVALGBR	None	Division between matrices	○	○	○
CALCULATE	CALCOFF	None	Cancellation of operation between a constant and a matrix	○	○	○
	CNSTADD	None	Addition between a constant and a matrix	○	○	○
	CNSTMPY	None	Multiplication between a constant and a matrix	○	○	○
	NEGATE	None	Sign inversion of a matrix	○	○	○
	RECIP	None	Reciprocal of a matrix	○	○	○
	CMPCONJ	None	Complex conjugate of a matrix	○	○	○
CONST	CONSTV	Numeral	Setting of a constant Unit: V (e.g., "CONSTV0.5" for 0.5V)	○	○	○
	CONSTMV	Numeral	Unit: mV	○	○	○
	CONSTUV	Numeral	Unit: μV	○	○	○

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
DOMAIN※	TOCXTIME	None	HILBERT transform	○	○	○
	TOTIME	None	IFFT	○	○	○
	TOFREQ	None	FFT	○	○	○

※ Execution of area changing

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
TR MATH ※	SMOOTH	0 1	Smoothing OFF ON	○	○	○
	SMTERMS	Numeral	Standard points for smoothing (3, 5, 7, 9, 11, 13)	○	○	○
	CUMULATE	0 1	Cumulative display OFF ON	○	○	○
	DIFERENT	0 1	Differentiation of a time-domain waveform OFF ON	○	○	○
	INTEGRAL	0 1	Integration of a time-domain waveform OFF ON	○	○	○
	INTGZERO	0 1	Integration of a time-domain waveform (starting at 0) OFF ON	○	○	○
	TRENDRMV	0 1	Trend removal OFF ON	○	○	○

※ Calculation function of display trace

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
Jω※	JWTHRESH	Numeral	Threshold value Unit: dBV (e.g., "JWTHRESH-100" for -100dBV)	○	○	○
			(Lower frequency limit)			
	JWLFKHZ	Numeral	Unit: kHz	○	○	○
	JWLFHZ	Numeral	Unit: Hz	○	○	○
	JWLFMHZ	Numeral	Unit: mHz	○	○	○
			(Upper frequency limit)			
	JWUFKHZ	Numeral	Unit: kHz	○	○	○
	JWUFHZ	Numeral	Unit: Hz	○	○	○
	JWUFMHZ	Numeral	Unit: mHz	○	○	○
	JW	None	Cancellation of quasi differentiation and integration	○	○	○
	MPYJW	None	Quasi differentiation	○	○	○
	MPYJWJW	None	Quasi differentiation of the 2nd order	○	○	○
	DIVJW	None	Quasi integration	○	○	○
	DIVJWJW	None	Quasi double integration	○	○	○

※ Function of quasi differentiation/integration

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
Jω※	ROTDELY		Compensation of delay time			
		0	OFF	○	○	○
		1	ON			
			(Delay time)			
	TCSTSEC	Numeral	Unit: sec	○	○	○
	TCSTMSEC	Numeral	Unit: msec	○	○	○
	TCSTUSEC	Numeral	Unit: μsec	○	○	○
	DOSHIFT		Frequency shift from the source range to the intended range	○	○	○
		0	OFF			
		1	ON			
			(Lower frequency limit of the source range)			
	SSFTLKHZ	Numeral	Unit: kHz	○	○	○
	SSFTLHZ	Numeral	Unit: Hz	○	○	○
	SSFTLMHZ	Numeral	Unit: mHz	○	○	○
			(Upper frequency limit of the source range)			
	SSFTUKHZ	Numeral	Unit: kHz	○	○	○
	SSFTUHZ	Numeral	Unit: Hz	○	○	○
	SSFTUMHZ	Numeral	Unit: mHz	○	○	○
			(Lower frequency limit of the intended range)			
	DSFTLKHZ	Numeral	Unit: kHz	○	○	○
	DSFTLHZ	Numeral	Unit: Hz	○	○	○
	DSFTLMHZ	Numeral	Unit: mHz	○	○	○
			(Upper frequency limit of the intended range)			
	DSFTUKHZ	Numeral	Unit: kHz	○	○	○
	DSFTUHZ	Numeral	Unit: Hz	○	○	○
	DSFTUMHZ	Numeral	Unit: mHz	○	○	○

※ Function of quasi differentiation/integration

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
Cepstrum	CEPSTRUM	None 0 1	Cepstrum OFF ON	○	○	○
	CPSTTHRE	Numeral	Threshold value Unit: dBV	○	○	○
	CPSTLKHZ	Numeral	(Lower frequency limit) Unit: kHz	○	○	○
	CPSTLHZ	Numeral	Unit: Hz	○	○	○
	CPSTLMHZ	Numeral	Unit: mHz	○	○	○
	CPSTUKHZ	Numeral	(Upper frequency limit) Unit: kHz	○	○	○
	CPSTUHZ	Numeral	Unit: Hz	○	○	○
	CPSTUMHZ	Numeral	Unit: mHz	○	○	○
	LIFTER	0 1	Liftering OFF ON	○	○	○
	LIFLSEC	Numeral	(Lower time limt) Unit: sec	○	○	○
	LIFLMSEC	Numeral	Unit: msec	○	○	○
	LIFLUSEC	Numeral	Unit: μsec	○	○	○
	LIFUSEC	Numeral	(Upper time limt) Unit: sec	○	○	○
	LIFUMSEC	Numeral	Unit: msec	○	○	○
	LIFUUSEC	Numeral	Unit: μsec	○	○	○

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
FRF MTH ※	EQUALIZE	0 1	Equalizing function OFF ON	○	○	○
	OPCLOFF	None	(Open loop → closed loop) Cancels the transform function	○	○	○
	OPNCLS	None	H/(1+H)	○	○	○
	OPCLFDB	None	H/(1+G*H)	○	○	○
	CLOPOFF	None	(Closed loop → open loop) Cancels the transform function	○	○	○
	CLSOPN	None	H/(1-H)	○	○	○
	CLOPFDB	None	H/(1-G*H)	○	○	○
	SNROFF	0 1	(SNR) Cancels the coherence function OFF ON	○	○	○
	SNR	None	Signal-to-noise ratio SNR	○	○	○
	SNRCOP	None	Power spectrum of signal components	○	○	○
	SNRINCOP	None	Power spectrum of noise components	○	○	○

※ Calculation of frequency response function

Commands for MATH						
Type	Command	Parameter	Description	A	B/C	E
Band-pass	PASFILTR	0 1	Band-pass filter OFF ON	○	○	○
	LPFKHZ	Numeral	(Lower frequency limit) Unit: kHz (e.g., "LPFKHZ1" for 1kHz)	○	○	○
	LPFHZ	Numeral	Unit: Hz	○	○	○
	LPFMHZ	Numeral	Unit: mHz	○	○	○
	UPFKHZ	Numeral	(Upper frequency limit) Unit: kHz	○	○	○
	UPFHZ	Numeral	Unit: Hz	○	○	○
	UPFMHZ	Numeral	Unit: mHz	○	○	○
	STPFILTR	0 1	Band-stop filter OFF ON	○	○	○
	LSFKHZ	Numeral	(Lower frequency limit) Unit: kHz	○	○	○
	LSFHZ	Numeral	Unit: Hz	○	○	○
	LSFMHZ	Numeral	Unit: mHz	○	○	○
	USFKHZ	Numeral	(Upper frequency limit) Unit: kHz	○	○	○
	USFHZ	Numeral	Unit: Hz	○	○	○
	USFMHZ	Numeral	Unit: mHz	○	○	○

6.8 DEVICE

Commands for DEVICE						
Type	Command	Parameter	Description	A	B/C	E
Access※	EXESAVE	None File name	No file name is specified. A character string consisting of up to 7 characters (without a file type) Enclose the file name with special characters for label entry.	○	○	△
	EXERECAL*1	File name	A character string describing the file name (with a file type attached) Enclose the file name with special characters for label entry.	○	○	△
	EXECOPY *1	File name1 File name2	The file specified by the file name 1 is copied to the file name 2. The new file created is of the same file type as the original file. File name 1: Original file name A character string describing a file name (file type specified) Enclose the file name with special characters for label entry. File name 2: File name of the copy destination A character string consisting of up to 7 characters (no file type specified) Enclose the file name with special characters for label entry.	○	○	△
	EXEDELET*1	File name	A character string describing a file name (file type specified) Enclose the file name with special characters for label entry.	○	○	△
	EXEINIT *1	None	Initialize the floppy disk.	○	○	△
	RECDTOFF	None	Return from the analysis screen after reproduction to the measurement screen.	○	○	△
	CATOFF	None	Return to the measurement screen.	○	○	△

※ Disk recording/reproduction function
For the R9211E, the option 06 should be mounted.

*1 These commands cannot be executed when the multi-sueem display is set.

Commands for DEVICE						
Type	Command	Parameter	Description	A	B/C	E
FILETYPE	MEASFILE	0 1	Filetype to be stored to a floppy disk. Data File View File	○	○	○
	TBLFILE	0			C	
	PNLFILE	None		○	○	○

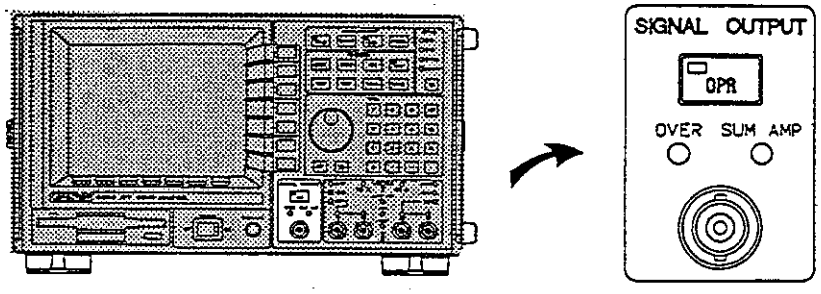
Commands for DEVICE						
Type	Command	Parameter	Description	A	B/C	E
Plotter	PLTYPE	1 0	Type of the plotter AT HP-GL	○	○	○
			(Items to be plotted)			
	ALLPLOT	None	Waveforms and the scale	○	○	○
	PLTFRAME	None	Scale only	○	○	○
	PLTSIGNL	None	Waveforms only	○	○	○
	PLTLABEL	None	Writes a label at the current pen position	○	○	○
			(Pen switching)			
	AUTOPEN	None	Automatic pen switching	○	○	○
	CURNTPEN	None	Uses the current pen	○	○	○
			(Selection of a pen)			
	GRIDPEN	Numeral	Pen for the frame line	○	○	○
	ANNOTPEN	Numeral	Pen for notes	○	○	○
	TRACEPEN	Numeral	Pen for tracing	○	○	○
	READOPEN	Numeral	Pen for read values	○	○	○
			(Selection of a tracing line)			
	SOLDLINE	None	Tracing with continuous line (————)	○	○	○
	DASHLINE	None	Tracing with dashed line (------)	○	○	○
	DOTSLINE	None	Tracing with dotted line (……)	○	○	○

Commands for DEVICE						
Type	Command	Parameter	Description	A	B/C	E
Plotter	PAPEROFF	None	(Paper size) No size is specified. (Same as A4 setting)	○	○	○
	PAPERAC	None	A3	○	○	○
	PAPERAD	None	A4	○	○	○
	PAPERUSR	None	Any size	○	○	○
	MACRPLOF	None	(Divided plotting) Not perform automatic divided plotting	○	○	○
	MACRPLT	Numeral	Performs automatic divided plotting	○	○	○
	PXMIN	Numeric	(Any paper size) X-axis start point (mm)	○	○	○
	PYMIN	Numeric	Y-axis start point (mm)	○	○	○
	PXMAX	Numeric	X-axis end point (mm)	○	○	○
	PYMAX	Numeric	Y-axis end point (mm)	○	○	○
	PRATE	Numeric	Multiplication coefficient (%)	○	○	○
	PROT	 1 0	Select Vartical or Horizontal writing ON : Vertical OFF: Horizontal	○	○	○

6.9 Servo SETUP

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Sweep	LINMSN	None	Measurement with linear multiple sine waves	—	○	—
	LOGMSN	None	Measurement with logarithmic multiple sine waves	—	○	—
	LINSIN	None	Linear frequency measurement with sine waves	—	○	—
	LOGSIN	None	Logarithmic frequency measurement with sine wave	—	○	—
	FTABLE	None	Measurement using the frequency table	—	○	—
			(Measurement time with linear multiple sine waves or linear sine waves)			
	MTSHORT	None	Measurement in the shortest time	—	○	—
	MTMIDDLE	None	Measurement in a medium length of time	—	○	—
	MTLONG	None	Measurement in the longest time	—	○	—
Standby/ Operate	SIGOUT	0 1	Sets to standby (See Figure below) Sets to operate	—	○	—

Control command of [OPR] key in the signal generator section.



Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Range	FRANGKHZ	Numeral	(Frequency range) Unit: kHz (e.g., "FRANGKHZ50" for 50kHz)	—	○	—
	FRANGHZ	Numeral	Unit: Hz	—	○	—
	FRANGMHZ	Numeral	Unit: mHz	—	○	—
	STRFKHZ	Numeral	(Starting frequency of the measurement range) Unit: kHz	○	○	—
	STRFHZ	Numeral	Unit: Hz	○	○	—
	STRFMHZ	Numeral	Unit: mHz	○	○	—
	STPFKHZ	Numeral	(Ending frequency of the measurement range) Unit: kHz	○	○	—
	STPFHZ	Numeral	Unit: Hz	○	○	—
	STPFMHZ	Numeral	Unit: mHz	○	○	—
	SLINESPN	Numeral	Number of analyzed lines e.g., "SLINESPN400" for 400 lines	—	○	—
	SLINEDEC	Numeral	(When f RESOLN = LOG f) Number of lines per decade	—	○	—
	SDECADE	Numeral	Number of decades	—	○	—
	SWEEPUP	None	Measurement from low to high frequencies	—	○	—
	SWEEPDWN	None	Measurement from high to low frequencies	—	○	—

※ The starting and the ending frequencies are used with the zooming function.

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
SG VOLT ※			(Setting of the amplitude of generated signals)			
	SVAMPV	Numeral	Unit: V (e.g., "SVAMPV2" for 2V)	—	○	—
	SVAMPMV	Numeral	Unit: mV	—	○	—
	SVAMPUV	Numeral	Unit: μV	—	○	—
			(Setting of the offset voltage for signal generation)			
	SVOFSTV	Numeral	Unit: V	—	○	—
	SVOFSTMV	Numeral	Unit: mV	—	○	—
	SVOFSTUV	Numeral	Unit: μV	—	○	—
			(Setting of the upper limit of signal peak values)			
	SVLIMTV	Numeral	Unit: V	—	○	—
	SVLIMTMV	Numeral	Unit: mV	—	○	—
	SVLIMTUV	Numeral	Unit: μV	—	○	—

※ Setting of amplitude and offset voltages for signal generation

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
SG COM※	GENSTR	None	Starts measurement	—	○	—
	GENSTP	None	Stops measurement	—	○	—
	ITVLTIM	0 1	Interval time exists or not OFF ON	—	○	—
	ITVLTS	Numeral	Unit: sec	—	○	—
	ITVLTMS	Numeral	Unit: msec	—	○	—
	GENON	1 0	Starts measurement at [START] Starts measurement at [GENERATOR START/STOP]	—	○	—
	SUMAMP	0 1	Use of the summing amplifier OFF ON	—	○	—

※ Control of generation and termination of signal waveform

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Averaging	SGAVGNO	Numeral	Setting of the averaging number (e.g., "SGAVGN032" for 32)	—	○	—
	SGAVGLMT	Numeral	Setting of the maximum automatic averaging number (e.g., "SGAVGLMT2000" for 2000)	—	○	—
	SGAVGNML	None	(Averaging process) Displays the result everytime	—	○	—
	SGAVGFST	None	Displays the result after averaging	—	○	—
	AVGNSTP	0 1	Measurement after averaging Stops measurement Continues measurement	—	○	—
	ATAVG	0 1	Automatic averaging OFF ON	—	○	—
	COHLIM	None	Threshold value of the coherence function of automatic averaging	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
SQ BAND	SQSIN	None	Generates sine waves	—	○	—
	SQMSN	None	Generates multiple sine waves	—	○	—
	ISTTKHZ	Numeral	(Starting frequency of generated waves) Unit: kHz (e.g., "ISTTKHZ1" for 1kHz)	—	○	—
	ISTTHZ	Numeral	Unit: Hz	—	○	—
	ISTTMHZ	Numeral	Unit: mHz	—	○	—
	ISTPFKHZ	Numeral	(Ending frequency) Unit: kHz	—	○	—
	ISTPFHZ	Numeral	Unit: Hz	—	○	—
	ISTPFMHZ	Numeral	Unit: mHz	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Amp or averaging	SAMPV	Numeral	(Amplitude of generated waves) Unit: V (e.g., "SAMPV1" for 1V)	—	○	—
	SAMPMV	Numeral	Unit: mV	—	○	—
	SAMPUV	Numeral	Unit: μV	—	○	—
	SOFSTV	Numeral	(Offset of generated waves) Unit: V	—	○	—
	SOFSTMV	Numeral	Unit: mV	—	○	—
	SOFSTUV	Numeral	Unit: μV	—	○	—
	SAVGNO	Numeral	Average number of measurement	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
f EDIT	FEDDONE	None	Pressed when the editing of the frequency table is done	—	○	—
	FEDID	Numeral	ID No. of editing (e.g., "FEDID1" for 1)	—	○	—
	FEDINS	0 1	Insertion OFF (Rewriting) ON	—	○	—
	FEDDELID	Numeral	Deletion of the ID No. specified	—	○	—
	FEDDELEN	Numeral	Deletion of the ID No. specified and the following numbers	— —	○ ○	— —
	FEDSTTID	Numeral	ID No. for starting measurement	—	○	—
	FEDSTPID	Numeral	ID No. for ending measurement	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Input	SCHANNEL	1 0	Selection of the channel to be set (CH-A) (CH-B)	—	○	—
	SCOUPL	1 0	Selection of an input coupling AC DC	—	○	—
	SPINPUT	0 1	Setting of the (+) input terminal GND IN	—	○	—
	SMINPUT	0 1	Setting of the (-) input terminal GND IN	—	○	—
	SICP	1 0	Switching of the power for the accelerometer ON OFF	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Hold	SHOLD	None	HOLD	—	○	—
	SFREERUN	None	FREE RUN	—	○	—

Commands for servo SETUP						
Type	Command	Parameter	Description	A	B/C	E
Unit	UNITCH	0 1 4	Selection of a channel CH-B CH-A CROSS	—	○	—
	UNITVAL	*1	Coefficient of the engineering unit When set 0dBV=40dBEU for CH-A) "UNITVAL 0 1 40"	—	○	—
	UNITLBL	*2	Engineering unit	—	○	—
	SUNITEU	None	Engineering unit	—	○	—
	SUNTVRMS	None	Vrms	—	○	—
	SUNITVLT	None	Volt	—	○	—

*1 UNITVAL ch unit value

ch : Indicates channels.
0 : CH-A
1 : CH-B

unit : Indicates unit.
0 : EU
1 : dBEU

The unit depends on the ordinate. Set the unit to EU for linear display or dBEU for dB display.

value: Set value

*2 UNITLBL ch ax #character string#

ch : Indicates channels.
0 : CH-A
1 : CH-B

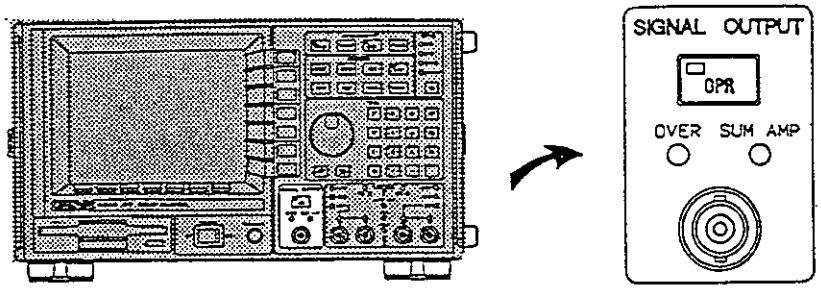
ax : Indicates X-axis unit.
0 : Time axis
1 : Others

Character string: Input label (See Item 4.2 (2))

6.10 SG

Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
SIGNAL	SGSIN	None	Generation of sine waves	—	○	—
	SGSWPT	None	Generation of swept sine waves	—	○	—
	SGMSN	None	Generation of multiple sine waves	—	○	—
	SGIMPLS	None	Generation of impulses	—	○	—
	SGRND	None	Generation of random function waves	—	○	—
	SGARB	None	Generation of arbitrary function waves	—	○	—
	SGXFR	None	(Control of arbitrary function memory) Transfer of an arbitrary function to the waveform memory	—	○	—
	SGTRWV	None	Transfer of displayed data after 8-time interpolation	—	○	—
	SGINPBF	None	Transfer of data in the input buffer without interpolation	—	○	—
Standby/ Operate	SIGOUT	0 1	Sets to standby (See Figure below) Sets to operate	—	○	—

Control command of [OPR] key in the signal generator section.



Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
Frequency	SGSNFKHZ	Numeral	(Setting of the frequency of sine waves) Unit: kHz (e.g., "SGSNFKHZ10" for 10kHz)	—	○	—
	SGSNFHZ	Numeral	Unit: Hz	—	○	—
	SGSNFMHZ	Numeral	Unit: mHz	—	○	—
	RESOLN	0 1	Generation of the set frequency Generation according to the resolution of the frequency for analysis	—	○	—
	SGSTTKHZ	Numeral	(Starting frequency of swept sine waves) Unit: kHz	—	○	—
	SGSTTHZ	Numeral	Unit: Hz	—	○	—
	SGSTTMHZ	Numeral	Unit: mHz	—	○	—
	SGSTPKHZ	Numeral	(Ending frequency of swept sine waves) Unit: kHz	—	○	—
	SGSTPHZ	Numeral	Unit: Hz	—	○	—
	SGSTPMHZ	Numeral	Unit: mHz	—	○	—

Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
SG VOLT	SGAMPV	Numeral	(Setting of the peak value of signals) Unit: V (e.g., "SGAMPV2" for 2V)	—	○	—
	SGAMPMV	Numeral	Unit: mV	—	○	—
	SGAMPUV	Numeral	Unit: μv	—	○	—
	SGOFSTV	Numeral	(Setting of the DC offset) Unit: V	—	○	—
	SGOFSTMV	Numeral	Unit: mV	—	○	—
	SGOFSTUV	Numeral	Unit: μv	—	○	—
	SGLIMTV	Numeral	(Setting of the limit value of signal peaks) Unit: V	—	○	—
	SGLIMTMV	Numeral	Unit: mV	—	○	—
	SGLIMTUV	Numeral	Unit: μv	—	○	—

Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
CONNECT	SGOUT	None	Output of signals from the BNC terminal	—	○	—
	SGSUMAMP	None	Summing amplifier available	—	○	—
	SGTOCHA	None	Monitors signals in CH-A	—	○	—
	SGTOCHB	None	Monitors signals in CH-B	—	○	—
OUT CTRL	SGGENSTT	None	Generation of signals	—	○	—
	SGGENSTP	None	Termination of signals	—	○	—
	SGMTRIG	None	Starts signal generation if the signal output mode is MANUAL	—	○	—
	SGGENON	1 0	Averaging if the signal output mode is CONTINUE Generates signals if averaging starts Stops signals when averaging ends Generates signals regardless of averaging	—	○	—

Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
OUT MODE	SGCONT	None	Continuous signal generation	—	○	—
	SGINT	None	Generation of signals at an internal trigger	—	○	—
	SGEXT	None	Generation of signals at an external trigger	—	○	—
	SGEXTGT	None	Generation of signals at an external gate	—	○	—
	SGMAN	None	Manual signal generation	—	○	—
	SGN	Numeral	Setting of the cycle/frame number (e.g., "SGN100" for 100)	—	○	—
	SGPERIS	Numeral	(OUT MODE=INTERNAL) Setting of the interval of signal generation Unit: sec	—	○	—
	SGPERIMS	Numeral	Unit: msec	—	○	—
	SGPERIUS	Numeral	Unit: μsec	—	○	—
	SGPXTRIG	None	(OUT MODE=EXTERNAL) Starts generation after a rise of signal is detected	—	○	—
	SGMXTRIG	None	Starts generation after a fall of signal is detected	—	○	—

Commands for SG						
Type	Command	Parameter	Description	A	B/C	E
Impedance	SGIMP0	None	Sets to 0 the output impedance of the signal source	—	○	—
	SGIMP50	None	Sets to 50Ω the output impedance	—	○	—
	SGIMP600	None	Sets to 600Ω the output impedance	—	○	—
SYNC OUT	SGSYNC0	Numeral	Setting of the number of synchronization triggers generated from the linear external synchronization output (e.g., "SGSYNC01" for 1 cycle/frame)	—	○	—
TAPER	SGTAPER	0 1	(Tapering function) OFF ON	—	○	—
	SGTPRS	Numeral	(Setting of the tapering time) Unit: sec	—	○	—
	SGTPRMS	Numeral	Unit: msec	—	○	—
	SGTPRUS	Numeral	Unit: μsec	—	○	—

6.11 COMPARATOR (R9211C only)

Commands for COMPARATOR			
Type	Command	Parameter	Description
Comparator control	LMTTEST		Starts and Stops GO/NOGO.
		0	START
		1	STOP
	LMTMODE		Selects data set mode.
		0	Table mode
		1	Reference mode
	LMTLINE		Displays limit line.
		0	Not-display
		1	Display
	LMTTOTL		Outputs result.
		0	ORs all results.
		1	ANDs all results.
	LMTXMAN	None	Executes manual test.

Commands for COMPARATOR			
Type	Command	Parameter	Description
Comparator execution trigger	LMTTFRN	None	Executes with internal timing.
	LMTTAVG	None	Executes when average is terminated.
	LMTTHLD	None	Executes when comparator is held.
	LMTTMAN	None	Executes when key pressed.

Commands for COMPARATOR			
Type	Command	Parameter	Description
Result output method	LMTCONT	 0 1	Execution number Executes every time. Executes specified time.
	LMTCNTN	Numeral	Specify execution number
	LMTOTTL	 0 1	Result from the rear panel Not-output Output
	LMTCTTL	 0 1	Rear panel output value LOW for NOGO LOW for GO

Commands for COMPARATOR			
Type	Command	Parameter	Description
Comparison method	LMTMDHI	None	Compares the upper end only.
	LMTMDLW	None	Compares the lower end only.
	LMTMDHL	None	Compares the upper and lower ends.
	LMTMDLV	None	Compares level.
	LMTMDPK	None	Compares peak.
	LMTMDOA	None	Compares overall.

Commands for COMPARATOR			
Type	Command	Parameter	Description
Comparison value	LMTVALXA	Numeral	Horizontal axis range start point
	LMTVALXB	Numeral	Horizontal axis range width
	LMTVALYA	Numeral	Vertical axis range start point or +offset
	LMTVALYB	Numeral	Vertical axis range width or -offset

Commands for COMPARATOR			
Type	Command	Parameter	Description
Comparison value edition	LMTEDON	None	Ends table mode setting.
	LMTESEG	Numeral	Specifies corrected segment.
	LMTEINS	0 1	Replace mode Insert mode
	LMTEDSG	None	Deletes specified segment.
	LMTEDLE	None	Deletes segment more than specified segment.
	LMTESTS	Numeral	Specifies start segment.
	LMTESPS	Numeral	Specifies end segment.

6.12 CURVE FIT (R9211C only)

Commands for CURVE FIT			
Type	Command	Parameter	Description
Curve fit	CRFT	1 0	Executes curve fit. :Execute :Interrupt
	DLYES	1 0	Evaluation of delay time :ON :OFF
	FITIN	1 0	Selects curve fit execution input. :AVG VIEW data :MATH VIEW data (RESULT Array)
sEDIT	DFPZ	None	Closes table.
sWeight	FITWGT	0 1 2	:Automatically calculates weight function :Determines the value of weight function to 1.0 in the all applicable range. :Determines the value of weight function to 1.0 in the specified range.
	FITSF	a_1E b_1 *	Sets frequency to start weight function.
	FITSPR	a_1E b_1 *	Sets frequency to stop weight function.
sCONV	FDCNV	None	Ends table display.
	FPZRO	None	Selects whether the pole-zero table is displayed.
	FPRSD	None	Selects pole-residue table display.
	FPOLY	None	Selects polynomial ratio table display.
to SYNTH	FTSN	None	Synthesizes frequency response function according to curve fitted data.

* a_1 : Mantissa
b_1 : Exponent

6.13 FUNCTION SYNTHESIS (R9211C only)

Commands for FUNCTION SYNTHESIS			
Type	Command	Parameter	Description
SYNTH	CRSYN	1 0	Executes function synthesis. :Execute :Interrupt
sEDIT	DFDPZ	None	Closes table.
	EDPZ	Integral	Specifies the line number to be edited.
	DLPZ	None	Deletes the line number.
	VALPZ	*1	Unit terminator
sSCALE	SGIN	a_1 E b_1	Sets gain.
	TDLY	a_1 E b_1	Sets time delay.
	SCFR	a_1 E b_1	Sets scale frequency.
sCONV	SDCNV	None	Ends table display.
	SPZRO	None	Selects pole-zero table display.
	SPRSD	None	Selects pole-residue table display.
	SPOLY	None	Selects polynomial ratio table display.

*1 : VALPZ a_1 E b_1, c_1 E d_1

VALPZ has a_1 E b_1 and c_1 E d_1 parameters.
If a_1 E b_1 is 10kHz, input 1.4.

6.14 Built-in Printer (Option 07)

Commands for Built-in Printer			
Type	Command	Parameter	Description
Printer	PRTCOPY	None	The image on the CRT is output to the Printer.
	PRTFEED	None	The paper set on the printer is fed.

When a command for the built-in printer is issued, do not execute any other command before the printer command operation is complete. The printer command end can be detected through the status byte 4th bit (10.END) with the service request. In case the printer setting is incorrect and printing cannot be executed, the error status byte 3rd bit (PRINTER ERROR) turns ON (1).

• Error messages

If an error is caused as shown below, the printer control command will not operate. SRQ is caused and a corresponding error massage will appear on the screen.

```
GP.er = [PRTCOPY] Invalid = Printer Error n° 1
```

Command name — Error code

Error code List

Error cause	Error code
Printer in operation	1
Paperless	2
Head-up state	3
The necessary option not mounted	4

MEMO

APPENDIX 1. GPIB Command Under Condition for Use

Note that the following GPIB commands are restricted by measuring function.

	Type	Command	Set enable state	Set disable state
SETUP	[RANGE]	LINESPAN	When frequency resolution is analyzed by linear frequency	When frequency resolution is analyzed by logarithmic frequency
		DECADES	When frequency resolution is analyzed by logarithmic frequency	When frequency resolution is analyzed by linear frequency
	INPUT SENSI-BILITY [INPUT]	SENSADV	When CH-A input sensibility is set manually (CH-A AUTO/ MAN)	When CH-A input sensibility is set in auto range (CH-A AUTO/ MAN)
		AUTORNGA	When CH-A input sensibility is set in auto range (CH-A AUTO/ MAN)	When CH-A input sensibility is set manually (CH-A AUTO/ MAN)
		SENSBDV	When CH-B input sensibility is set manually (CH-B AUTO/ MAN)	When CH-B input sensibility is set in auto range (CH-B AUTO/ MAN)
		AUTORNGB	When CH-B input sensibility is set in auto range (CH-B AUTO/ MAN)	When CH-B input sensibility is set manually (CH-B AUTO/ MAN)
	[T-F]	TFSPTKHZ TFSPTHZ TFSPTMZ	When Gxx, REAL, IMAG, and PHASE are selected by TF analysis trace data	When Σ Gxx and fPEAK are selected by TF analysis trace data
		TFSTRKHZ TFSTRHZ TFSTRMZ	When Σ Gxx and fPEAK are selected by TF analysis trace data	When Gxx, REAL, IMAG, and PHASE are selected by TF analysis trace data
	[RANGE] (SERVO)	SLINESPN	When LIN MSIN, LIN SIN, and LIN F-Tab are selected by SWEEP	When LOG MSIN, LOG SIN, and LOG F-Tab are selected by SWEEP
		SLINEDEC	When LOG MSIN, LOG SIN, and LOG F-Tab are selected by SWEEP	When LIN MSIN, LIN SIN, and LIN F-Tab are selected by SWEEP

	Type	Command	Set enable state	Set disable state
SG	[FREQ]	SGSNFKHZ SGSNFHZ SGSNFMHZ	When SINE is selected by SIGNAL	When other than SINE is selected by SIGNAL
		SGSTTKHZ SGSTTHZ SGSTTMHZ	When SWEPT is selected by SIGNAL	When other than SWEPT is selected by SIGNAL
	[OUT MODE]	SGPERIS SGPERIMS SGPERIUS	When INTERNAL is selected in OUT MODE	When other than INTERNAL is selected in OUT MODE
		SGPXTRIG SGMXTRIG	When EXTERNAL is selected in OUT MODE	When other than EXTERNAL is selected in OUT MODE
VIEW	[XSCALE]	XSCLFTS XSCLFTMS XSCLFTUS XSCRITS XSCRITMS XSCRITUS XSCLFTV XSCLFTMV XSCLFTUV XSCRITV XSCRITMV XSCRITUV XSCLFTKH XSCLFTHZ XSCLFTMH XSCRITKH XSCRITHZ XSCRITMH	* Command for use depends on display data.	

	Type	Command	Set enable state	Set disable state
VIEW	[YSCALE]	YSCUPV YSCUPMV YSCUPUV YSCLOWV YSCLOWMV YSCLOWUV YSCUP YSCLOW YSCUPDB YSCLOWDB YSCUPDG YSCLOWDG YSCUPP YSCLOWP	* Command for use depends on display data.	

MEMO

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IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

PLEASE READ CAREFULLY: This is an important notice for the software defined herein. Computer programs including any additions, modifications and updates thereof, operation manuals, and related materials provided by Advantest (hereafter referred to as "SOFTWARE"), included in or used with hardware produced by Advantest (hereafter referred to as "PRODUCTS").

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Advantest shall have no liability (1) for any PRODUCT failures, which may arise out of any misuse (misuse is deemed to be use of the SOFTWARE for purposes other than it's intended use) of the SOFTWARE. (2) For any dispute between you and any third party for any reason whatsoever including, but not limited to, infringement of intellectual property rights.

LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.

2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.

3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.

4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:

   (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest 's instructions;

   (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);

   (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

   (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;

   (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);

   (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

   (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or

   (h) any negligent act or omission of the Purchaser or any third party other than Advantest.

5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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