MODEL 3215/3216
GP-IB INTERFACE
(OPTION)
SPECIFICATIONS

3215/3216

GPIB INTERFACE INSTRUCTIONS

GENERAL

Standard	Based on IEEE-488 (1978)	
Code Used	ASCII	
Interface Functions Used	AH1	receive handshake
	L4	basic listener function
	MTA	release listen function
	RL1	remote/local switching
	DC1	device clear

GPIB address is set by DIP switches A5 (MSB) through A1 (LSB). All addresses can be used except 31 (A5 through A1 all "1") because at this address the 3215/3216 goes into the UNL/UNT (unlisten/untalk) mode.

DATA FORMAT

1. Messages up to 100 bytes or characters long may be passed to the 3215/3216. A typical message would look like:

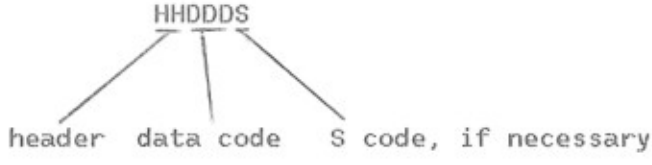
   "FR110SLU6SIN10FM30S" CR LF

   This message would set the carrier frequency to 110 MHz, output level to 6 dB , frequency modulation at 30 kHz, using the 1 kHz internal oscillator. Note that CR LF (carriage return/line feed) must be used as a delimiter following all messages.

2. Input Format

   Each code passed to the interface consists of a header code, data code and S code (if necessary).

   Example

   Alphabet characters must be in capital letters. Spaces within the message are not allowed.

1. GENERAL

When connected to the GP-IB interface (option), the frequency, output level and modulation factor can be set on Model 3215 or 3216 by using program codes.

2. SPECIFICATIONS

Conform to ... IEEE standard 488-1978
LSI ... TMS9914
Code ... ASCII
Interface function ... See Table 2-1.

Table 2-1 Interface functions

Code	Function and availability
SH0	Transmission hand-shake function ... Not available
AH1	Reception hand-shake function ... Available
T O	Talker function ..... Not available
L 4	Basic listener function ..... Available
	Listen-only mode ... Not available
	Listener release with MTA ... Available
LE0	Extended listener function ... Not available
RL1	Remote/local switch function ... Available
DC1	Device clear function ..... Available
DT1	Device trigger function ... Not available
C O	Control function ..... Not available
PR0	Parallel polling function ... Not available
SR0	Service request function ... Not available

3. SETTING ADDRESSES

The listener address for the GP-IB system is set on the DIP switch (see Fig. 3-1) located on the GP-IB unit panel. The DIP switch have five bits (A1 to A5). "1" is set when the address switch is turned up (ON) or "0" is set when the switch is turned down (OFF). Set the address before supplying power to the equipment. Address 31 is not listed in Table 3-1 because this address has a specific meening (UNL,UNT) when bits A1 to A5 are all set to "1".
Therefore, do not set address 31 for normal operation.

Table 3-1 Address settings

Address	A 5	A 4	A 3	A 2	A 1
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
29	1	1	1	0	1
30	1	1	1	1	0

(Example 1) Fig. 3-1 shows the address 5 setting.

Fig. 3-1

4. PROGRAMMING FORMATS

4.1 Program message format

To set various types of data using the GP-IB interface, program codes must be sent to the Model 3215/3216 from the controller.

Model 3215/3216 can receive up to 100 program code bytes through one program message in ASCII code.

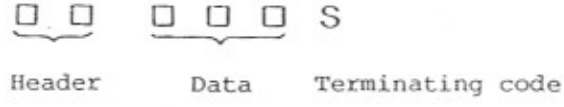
The delimiter for one program code is CR LF. To set the frequency and output level from the front panel in the LOCAL mode, enter "S" at the end of the code.

(Example 2)

To set a frequency of 110 MHz, output level of 60 dBμ, internal modulation of 1 kHz, modulation to MAIN, and FM modulation factor of 75 kHz, enter:

4.2 Input format

The program code contains a header code (two capital alphabetic characters) and a data code.



*Terminating code "S" is required to recall and store frequencies, output levels, and modulations.

The program codes that can be remotely controllable by using the GP-IB are explained as follows.
Table 4-1 lists these codes.

(Notes)

1. The input format is ignored when the input data exceeds the standard frequency range or the "S" code is omitted.
2. When fractional part data is entered, it is assumed to be "0".

Table 4-1

Item	Header	Data Code	Description	S Code	Remarks
RF frequency	FR	0.1~140.000MHz	Sets the RF frequency	Available	O
Output level	LU	-19~126dBμ	Sets the output level	Available	O
FM modulation	FM	0~99.9kHz	Sets the FM modulation factor	Available	O
AM modulation factor	AM	0~60.0%	Sets the AM modulation factor	Available	O
Pilot modulation factor	PM	0~10.0kHz	Sets the pilot modulation factor	Available	Δ
Preset	ST	0~99	Stores data at the memory address	Available	O
	RC	0~99	Recalls data from the memory address	Available	O
AF modulation ON/OFF	MD	0, 1	0=OFF, 1=ON	Not available	Δ
Pilot modulation ON/OFF	PT	0, 1	0=OFF, 1=ON	Not available	Δ
Internal modulation frequency	IN	04, 10	04=400Hz, 10=1kHz	Not available	O
External modulation	EX	1, 2	1=EXT AF, 2=EXT L, R	Not available	X
Stereo mode	SM	0, 1, 2, 3	0=MAIN, 1=L 2=R, 3=SUB	Not available	Δ

(Note)

Marks O, Δ and X in the remarks denotes:

O: Common to Models 3215 and 3216.

Δ: For Model 3126 only.

X: EX2 cannot be used with Model 3215.

(1) Setting the RF frequency ... "FR" header

Programmable frequencies are from 0.1 MHz to 140 MHz. Each frequency can be set in MHz units, and the

fractional part may be emitted. The resolution is 100 Hz for a frequency range of 0.1 MHz to 29 MHz; 1 kHz for a range of 30 MHz to 140 MHz.

(Example 3)

To set 120.56 MHz, enter:

"FR120.56S"

(Example 4)

To set 1 MHz, enter:

"FR1S"

(2) Setting the output level ... "LU" header

The programmable output levels range from -19 dBμ to 126 dBμ in 0.1 dB steps. The data may include symbol "-", 0-9, and ".".

(Example 5)

To set 120.5 dBμ, enter:

"LU120.5S"

(Example 6)

To set -10 dBμ, enter:

"LU-10S"

(3) Setting the modulation factor ... "FM" or "AM" header

The "FM" header is used to set the FM modulation, and "AM" is used to set the AM modulation. The data may include 0-9 and ".".

The maximum FM frequency deviation is 99.9 kHz.

The maximum AM modulation factor is 60.0%. Each can be set in 0.1 kHz (0.1%) steps.

(Example 7)

To set FM 75 kHz, enter:

"FM75S"

(Example 8)

To set AM 30%, enter:

"AM30S"

(4) Setting the pilot modulation factor ... "PM" header (for Model 3216).

The pilot modulation factor can be set from 0 to 10.0%.

(Example 9)

To set 5%, enter:

"PM5S" or "PM5.0S"

(5) Presetting ... "ST" and "RC" headers

Models 3215/3216 can be assigned addresses of 0 to 99. The "store" operation is when the data set on the front panel is written to memory; the "recall" operation is when this data is read from memory. The "ST" header is used from the "store" operation and "RC" is used for the "recall" operation. Numeric characters (0-9) must be used to specify an address.

(Example 10)

To recall address 15, enter:

"RC15S"

(Example 11)

To store data at address 5, enter:

"ST5S"

(6) Setting AM modulation ON/OFF ... "MD" header

"1" or "0" is used to set the AM modulation; "1" for ON and "0" for OFF.

(Example 12)

To set the AF modulation ON, enter:

"MD1"

(Example 13)

To set the AF modulation OFF, enter:

"MD0"

(7) Setting pilot modulation ON/OFF ... "PT" header (for Model 3216).

"1" or "0" is used to set the pilot modulation; "1" for ON and "0" for OFF.

(Example 14)

To set the pilot modulation ON, enter:

"PT1"

(8) Setting the internal modulation frequency ... "IN" header.

An internal modulation frequency of 400 Hz or 1 kHz can be set. "04" or "10" is used to set the internal modulation frequency; "04" for 400 Hz and "10" for 1 kHz. Once either is set, the modulation mode is set to INTERNAL MODULATION.

(Example 15)

To set an internal modulation of 1 kHz, enter:

"1N10"

(9) Setting the external modulation ... "EX" header

(EX2 cannot be used for Model 3215.)

The modulation mode is set to EXTERNAL MODULATION. "1" or "2" is used to set the external modulation; "1" for EXT AF and "2" for EXT L, R.

(Example 16)

To set the external modulation to EXT AF, enter:

"EX1"

(10) Setting the stereo mode ... "SM" header (for Model 3216).

Four types of stereo modes are available: MAIN, SUB, L and R. The four modes and their respective data are shown below. They are valid in the INTERNAL or EXT AF modulation mode.

Mode	Data
MAIN	0
SUB	1
L	2
R	3

(Example 17)

To set the stereo mode to MAIN, enter:

"SM0"