11. GPIB

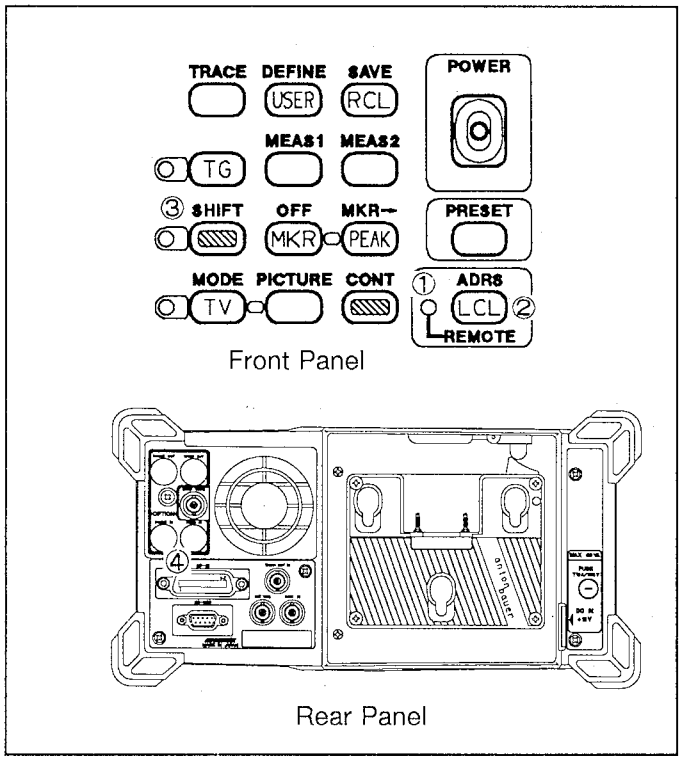
11.1 Overview of the GPIB

You can control the analyzer with any remote controller or computer that uses an IEEE Standard 488-1978 (GPIB) interface. This enables you to run the analyzer remotely, and to use the analyzer to run fully or partially automated tests.

(1) The analyzer's GPIB is fully compatible with any product that meets the IEEE 488-1978 standard. The GPIB bus allows you to connect the analyzer to other GPIB devices more easily than you can using single bus cables, making it easier to construct or modify high-grade measuring systems.

(2) Each device on the GPIB can be assigned the role of controller, talker (sender), or listener (receiver). Devices commonly change roles while the system is operating, although there can only be one controller. Only one device can "talk" at a time, though multiple devices can "listen." The controller specifies the talker and listener addresses and transfers data from the talker to the listener. The controller itself can also play the role of talker, and can specify listener measurement conditions.

(3) GPIB panel switches



Front Panel

Rear Panel

① Remote lamp
This lamp lights when the analyzer is set to External control mode.

② LCL key
This key switches the analyzer between Remote and Local control (allowing you, for example, to interrupt external control and enable input from the front panel).

③ SHIFT key
This key, with the LCL key, specifies the GPIB address.

④ GPIB connector
This terminal connects the analyzer to the external controller or to a plotter.

(4) You can use the GPIB controller to do the following:

① Set measurement conditions (enter the measurement conditions as you would from the front panel)

② Read (or query) existing settings and data

③ Send and receive measurement data (including screen trace, data write, and read out)

④ Send service requests to the controller (this interrupts the controller's current task and reads the status byte)

11.2 GPIB Specifications

(1) GPIB Bus configuration

The following figure shows the configuration of a typical GPIB system, in this case with four devices.

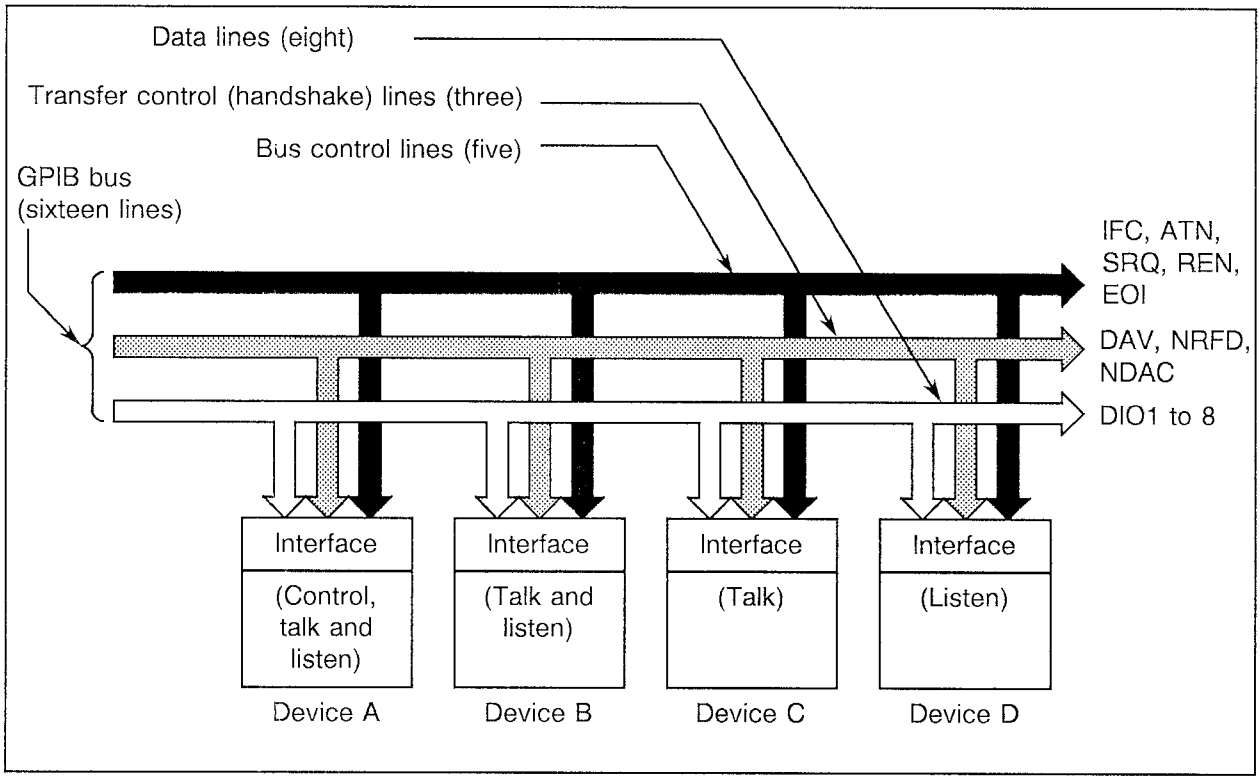


Figure 11-1 GPIB bus configuration

The GPIB bus cables include eight data lines, three transfer control lines (handshake lines), and five bus control lines. These lines function as follows:

- Data lines: these bit-parallel, byte-serial data lines provide asynchronous, bi-directional data transfer between devices. This allows the GPIB system to use high-speed and low-speed at the same time. Data is transferred as ASCII code.
- Transfer control lines (handshake lines) : these control the asynchronous data transfer between devices, and use the following signals:

  DAV (Data valid) : indicates the data valid state (low state)

  NRFD (Not ready for data) : indicates that data can (high state) or cannot (low state) be received

  NDAC (Not data accepted) : indicates that data has (high state) or has not (low state) been received

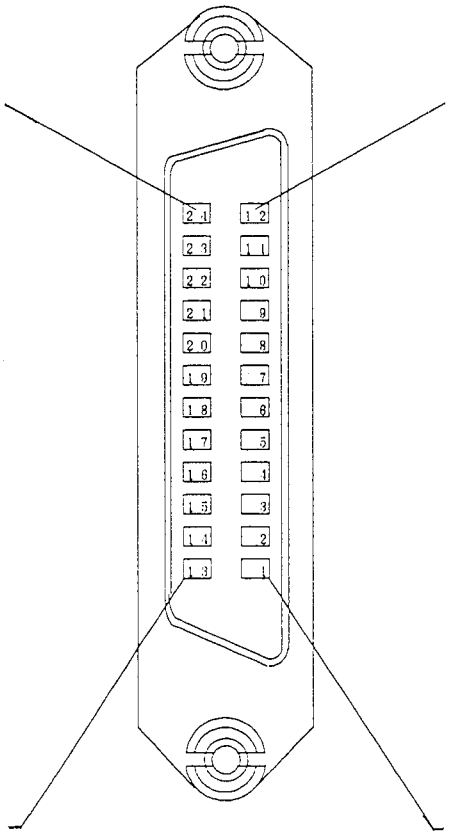
- Bus control lines: these control the flow of information through the bus, and use the following signals:

  ATN (Attention): determines whether the signal on the data line is a command or other information
  IFC (Interface clear): clears the interface
  EOI (End of identify): signals the completion of information transfer
  SRQ (Service request): makes a service request to the controller
  REN (Remote enable): enables remote control of a device

(2) GPIB connector assignment

The analyzer has a 24-pin GPIB connector, Amphenor product number 57-20240-D35A or its equivalent.
The following figure shows the connector and its pin assignments.

Signal	Pin No.
GND LOGIC	24
GND (ATN)	23
GND (SRQ)	22
GND (IFC)	21
GND (NDAC)	20
GND (NRFD)	19
GND (DAV)	18
REN	17
DIO 8	16
DIO 7	15
DIO 6	14
DIO 5	13



Pin No.	Signal
12	SHIELD
11	ATN
10	SRQ
9	IFC
8	NDAC
7	NRFD
6	DAV
5	EOI
4	DIO 4
3	DIO 3
2	DIO 2
1	DIO 1

Figure 11-2 GPIB connector pin assignment

(3) GPIB specifications

Code	:	ASCII, except for packed formatting (which uses binary code)
Logic level	:	Logical 0 High state +2.4 V or above Logical 1 Low state +0.4 V or below
Signal line termination	:	all sixteen bus lines are terminated as shown below.

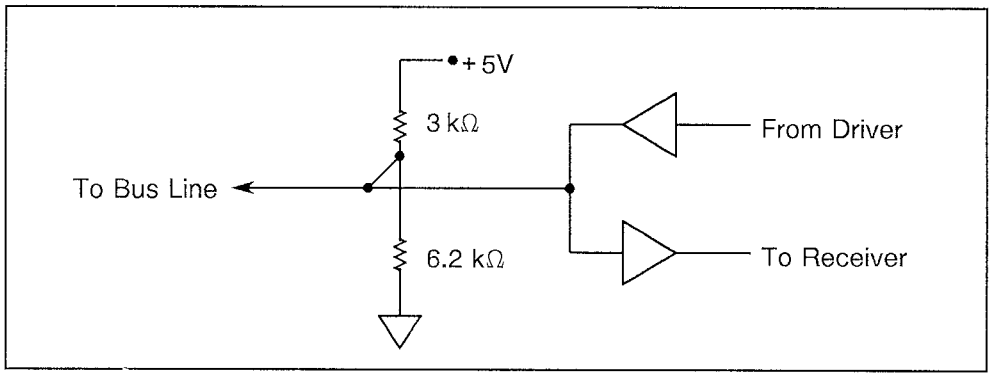


Figure 11-3 Signal line termination

Driver	:	Open collector type Output voltage at Low ... +0.4 V or below, 48 mA at High.... +2.4 V or above, - 6.2 mA
Receiver	:	+0.6 V or below ..."Low" state +2.0 V or above ..."High" state
Bus cable length	:	Connect one device for every four meters of cable you use. The total length of cable connected to the bus must be less than 20 meters.
Addresses	:	Assign a unique talk/listen address (0 through 30) to each device on the bus using the front panel keys. Each device on the bus must have a unique address.

(4) GPIB interface Function: Table 11-1 describes the GPIB codes used by the analyzer.

Table 11-1 Analyzer GPIB interface codes

Code	Description
SH1	Source handshake function
AH1	Acceptor handshake function
T6	Basic talker function, Serial pole function, Talker cancel function by listener specification
L4	Basic listener function, Listener cancel function by talker specification
SR1	Service request function
RL1	Remote function
PP0	No parallel function
DC1	Device clear function provided
DT1	Device trigger function provided
C0	No controller function
E1	Used open collector bus driver; however, EOI and DAV is used a three state bus driver.

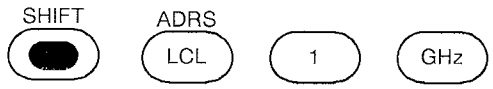
11.3 Initializing the Analyzer

Before you use the analyzer with a GPIB system, you must initialize it as described below.

11.3.1 Setting the Analyzer's GPIB Address

Set the analyzer's GPIB address (0 through 30) using front panel keys.

Example: To set the analyzer's GPIB address to 1:



11.3.2 Defining the Delimiter

When sending data from a controller to the analyzer, use one of the delimiter codes described below to define the symbol that will be used as a message terminator: carriage return (CR), line feed (LF), or end or identify (EOI). When the analyzer sends data to the controller, one of the delimiters given below is selected.

Table 11-2 Delimiter specification codes

Code	Description
DL0	Outputs CR and LF, also outputs EOI signal together with LF
DL1	Outputs LF
DL2	Outputs EOI signal together with the data end byte
DL3	Outputs CR and LF (initial value)
DL4	Outputs LF and also EOI signal together with LF

11.4 Remote setup (Listener)

The key operation on the panel is used for setup of the measurement conditions and or parameters.

For example, to set the analyzer's center frequency to 300 MHz, you would send the following:

HP200, 300 series

```
OUTPUT 7 01 ; "CF 300MZ"
  ↑     ↑  ↑  ↑  ↑
  *1    *2 *3 *4 *5
```

*1 Specifies the controller as the talker
*2 GPIB interface selector
*3 Specifies the analyzer (GPIB address 01) as the listener
*4 Sets the center frequency active
*5 Sets the center frequency to 300 MHz

PC9801 series

```
PRINT @ 01 ; "CF 300MZ"
  ↑   ↑  ↑  ↑  ↑
  *1  *2 *3 *4 *5
```

*1 Specifies the controller as the talker
*2 GPIB interface selector
*3 Specifies the analyzer (GPIB address 01) as the listener
*4 Sets the center frequency active
*5 Sets the center frequency to 300 MHz

"CP", "3", "0" and "MZ" are GPIB code for remote control of the analyzer.
Refer to [11.9 List of GPIB code].

Following is the limitations of the input data.

- It is necessary to delimit for the command with single spaces or commas (,).
  When the numeric data is input, there are not necessary.
  "CF SP" (Correct)
  "CFSP" (Incorrect)
  "CF 300 MZ" (Correct)
  "CF300MZ" (Correct)
  "DL 1DB" (Set 1dB for the display line.)
  "DL1DB" (Set "LF" for the delimiter.)
- Numeric data of the binary cannot be input. (except trace binary input). Carriage return (CR) and line feed (LF) is recognized only for the data delimiter.
- It cannot be input except defined GPIB code.
- If not-yet-defined GPIB code is input then it becomes Syntax error.

HP200 and 300 series programming examples (GPIB address = 1)

Example HP-1: Master-reset the analyzer and set the center frequency to 25 MHz.

```
10 OUTPUT 701;"IP"
20 OUTPUT 701;"CF25MZ"
30 END
```

Example HP-2: Set the start and stop frequencies to 300 kHz and 800 kHz, respectively, and add 50 kHz to the frequency offset.

```
10 OUTPUT 701;"FA300KZ"
20 OUTPUT 701;"FB800KZ"
30 OUTPUT 701;"FON50KZ"
40 END
```

Example HP-3: Set the reference level to -20 dBm (5 dB/div), resolution bandwidth to 100 kHz, and detector mode to positive.

```
10 OUTPUT 701;"RE-20DB"
20 OUTPUT 701;"DD5DB"
30 OUTPUT 701;"RB100KZ"
40 OUTPUT 701;"DTP"
50 END
```

Example HP-4: Set the trigger mode to single and the sweep time to 2 seconds, and match the marker with the maximum level at each sweep.

```
10 OUTPUT 701;"SI"
20 OUTPUT 701;"SW2SC"
30 OUTPUT 701;"SR"          ! Starts the sweep.
40 WAIT 2.5                 ! Pauses the analyzer until the sweep ends (or a
                              service request is received).
50 OUTPUT 701;"PS"          ! Peak search of the marker frequency
60 GOTO 30
70 STOP
80 END
```

PC9801 series programming examples (GPIB address = 8)

Example PC-1: Mster-reset the analyzer and set the center frequency to 25 MHz.

```
10 ISET IFC:ISET REN                    ' Executes the interface clear and the remote enable.
20 PRINT @8;"IP"                        ' Executes the master reset.
30 PRINT @8;"CF25MZ"                    ' Sets the center frequency to 25MHz.
40 END
```

Example PC-2: Set the start and stop frequencies to 300 kHz and 800 kHz, respectively, and add 50 kHz to the frequency offset.

```
10 ISET IFC:ISET REN
20 PRINT @8;"FA300KZ"                   ' Sets the start frequency to 300kHz.
30 PRINT @8;"FB800KZ"                   ' Sets the stop frequency to 800kMHz.
40 PRINT @8;"FON50KZ"                   ' Sets the frequency offset to 50kHz.
50 END
```

Example PC-3: Set the reference level to 87 dBμV (5 dB/div), resolution bandwidth to 100 kHz.

```
10 ISET IFC:ISET REN
20 PRINT @8;"UU RE87DB"                 ' Sets the reference level to 87 dBμV.
30 PRINT @8;"DD5DB"                     ' Sets 5dB/.
40 PRINT @8;"RB100KZ"                   ' Sets the resolution bandwidth to 100 kHz.
50 END
```

Example PC-4: Set the value by a variable.

```
10 ISET IFC:ISET REN
20 SPA = 8:A = 10:B = 2:C = 20          ' Assigns the set value to each variable.
30 PRINT @SPA;"CF",A,"MZ"               ' Sets the center frequency to 10 MHz.
40 PRINT @SPA;"SP",B,"MZ"               ' Sets the frequency span to 2 MHz.
50 PRINT @SPA;"AT",C,"DB"               ' Sets the attenuator 20 dB.
60 END
```

Example PC-5: Save the set value in memory card of drive A with the file name "SAVEDATA" and execute the recalling.

```
10 ISET IFC:ISET REN
20 PRINT @8;"SV /A:SAVEDATA/"          ' Executes the saving
30 PRINT @8;"IP"                       ' Executes the master reset.
40 PRINT @8;"RC /A:SAVEDATA/"          ' Executes the recalling.
50 END
```

Example PC-6: Set the softkey menu display OFF.

```
10 ISET IFC:ISET REN
20 PRINT @8;"MND OFF"                  ' Sets the softkey menu display to OFF.
30 PRINT @8;"CF30MZ SP20MZ"
40 PRINT @8;"PS"
50 END
```

Example PC-7: Input the limit line 1 table and set it ON.

```
10      ISET IFC:ISET REN
20      PRINT @8;"IP"
30      PRINT @8;"LMTADEL"             ' Deletes the limit line 1 table.
40      PRINT @8;"UU LMTAIN"           ' Specifies the unit to dBμV and the data input to the
50 '                                     table.
60      PRINT @8;"25MZ 49.5DB"         ' Inputs the data of the limit line 1.
70      PRINT @8;"27MZ 50.5DB"
80      PRINT @8;"29MZ 51.5DB"
90      PRINT @8;"31MZ 52.5DB"
100     PRINT @8;"36MZ 54.3DB"
110     PRINT @8;"40MZ 55.9DB"
120     PRINT @8;"43MZ 57.0DB"
130     PRINT @8;"46MZ 58.0DB"
140     PRINT @8;"52MZ 60.5DB"
150     PRINT @8;"63MZ 63.0DB"
160     PRINT @8;"67MZ 64.0DB"
```

(cont'd)

```
170   PRINT @8;"69MZ 64.6DB"
180   PRINT @8;"75MZ 64.7DB"
190'
200   PRINT @8;"FA0MZ FB100MZ"        ' Sets the start frequency and stop frequency.
210   PRINT @8;"LMTA ON"              ' Sets the limit line 1 to ON.
220   END
```

Example PC-8: Measurement example of DELAY SWEEP

```
10    ISET IFC:ISET REN               ' Executes interface clear and remote enabling.
20    PRINT @8;"VIDEO DLY 30HZ"       ' Makes a trigger with the VIDEO signal and the
                                        trigger level to 30%.
30    PRINT @8;"TRIGSLP DLY +"        ' Makes a trigger at the leading edge of the VIDEO
                                        signal.
40    PRINT @8;"DLYPOS 10US"          ' Sets the DELAY time to 10 μs.
50    PRINT @8;"DLYSWPTIM 4.5MS"      ' Sets the DELAY sweep time to 4.5 ms.
60    PRINT @8;"DLYSWP ON"            ' Sets DELAY SWEEP to ON.
70    END
```

11.5 Data output (Talker)

For the output of internal data such as the measurement data or the status conditions, pre-assignment to the data to be output is necessary with "xx?" command.

When the analyzer entered talker mode, the assigned data is read out. The following table shows rough classification of the output format.

The type of the output data is shown by the header that is put at the first of the character string and five type delimiters can be used for the terminating output data.

Refer to [11.9 list of GPIB code]. Assigned command of "xx?" is effective until it is changed.

	Response Format
Frequency	HHH△ ±DDDDDDDDDDDE±D CR LF ↑ ↑ ↑ ↑ ↑ ↑ 1 2 3 4 5 6 Maximum data size (including 1 through 5) is 21 bytes; the unit is Hz.
	Example: Assign "CF?" and 3.456 MHz is output for the center frequency. (Header ON). CF 00000123.456E+6
Level	HHH△ ±DDDDDDDDE±D CR LF ↑ ↑ ↑ ↑ ↑ ↑ 1 2 3 4 5 6 Maximum data size (from 1 through 5) is 16 bytes; the units specified by UNIT are used.
	Example: Assign "ML?" and -56.23 dB of the marker level is output. (Header ON). MLB -00056.23E+0
Time	HH△ ±DDDDE±D CR LF ↑ ↑ ↑ ↑ ↑ ↑ 1 2 3 4 5 6 Maximum data size (from 1 through 5) is 11 bytes; the unit is seconds.
	Example: Assign "SW?" and 500msec sweep time is output. (Header ON). SW 0500E-3
Constant	DDDD CR LF or DDDD.D ↑ ↑ 4 6
	Example: Output the ON/OFF state. 1/0 Output the number of averagings. 128

Notes:
1 = Header character (2 or 3 characters if ON, and no characters if OFF)
2 = Separator (a space)
3 = Sign (a space if positive, a minus sign if negative)
4 = Delimiter mantissa
5 = Delimiter exponent
6 = Delimiter (at initial setting)

HP200 and 300 series programming examples (GPIB address = 1).

Example 5: Output the marker frequency.

```
10 OUTPUT 701;"MF?"
20 ENTER 701;A
30 END                                  Result:  A = 1.8E + 9
```

Example 6: Output the center frequency.

```
10 DIM A$ [ 30 ]
20 OUTPUT 701;"HD1"
30 OUTPUT 701;"CF?"
40 ENTER 701;A$
50 END                                  Result:  A$ = CF  00001.234567E + 9
```

Example 7: Output the unit state.

```
10 OUTPUT 701;"UN?"
20 ENTER 701;A
30 END                                  Result: A = 2 (dBμV)
```

Example 8: Output the marker frequency and level.

```
10 OUTPUT 701;"MFL?"
20 ENTER 701;Mf,M1
30 END                                  Result: Mf = 1.8E + 9   M1 = - 65.15
```

Example 9: Output the frequency offset.

```
10 OUTPUT 701;"FO?"
20 ENTER 701;On,Frq
30 END                                  Result: On = 1  Frq = 1.23E + 6
```

Example 10: Using NEXT PEAK, read the first 10 signal peak levels, starting at the second peak.

```
10 DIM M1(9)
20 OUTPUT 701;"PS"
30 FOR I = 0 TO 9
40 OUTPUT 701;"NXP"
50 OUTPUT 701;"ML?"
60 ENTER 701;M1(I)
70 NEXT I
80 END          Result:  M1(0) = - 55.01     M1(1) = - 58.22 ...  M1(9) = - 70.26
```

PC9801 series programming examples (GPIB address = 8).

Example PC-9: Output the maker level (Numerical variable)

```
10 ISET IFC:ISET REN
20 PRINT @8;"HD0"                    ' Sets the header OFF.
30 PRINT @8;"ML?"                    ' Marker level ?
40 PRINT @8;ML                       ' Reads the marker level.
50 PRINT "MARKER LEVEL = ",ML        ' Outputs results on the display.
60 END
```

Result: MARKER LEVEL = -16.22

Example PC-10: Output the center frequency. (Character variable)

```
10 ISET IFC:ISET REN
20 PRINT @8;"HD1"                    ' Sets the header ON.
30 PRINT @8;"CF?"
40 INPUT @8;CF$                      ' Reads the center frequency.
50 PRINT CF$                         ' Outputs results on the display.
60 END
```

Result: CF 000025.000000E + 6

Example PC-11: Output the unit of the level and the level.

```
10      ISET IFC:ISET REN
20      PRINT @8;"HD1"               ' Sets the header ON.
30      PRINT @8;"RE?"
40      INPUT @8;RE$                 ' Reads the reference level.
50      PRINT @8;"UN?"
60      INPUT @8;UN                  ' Reads the unit of the level.
70      PRINT RE$,":",UN             ' Outputs results on the display.
80      END
```

Result: REB 000000.0E + 0 : 0

Example PC-12: Execute 6 dB down then output the frequency and level (more than one).

```
10 ISET IFC:ISET REN
20 PRINT @8;"HD0"                          ' Sets the header OFF.
30 PRINT @8;"CF30MZ SP20MZ"                ' Sets the center frequency and the frequency span.
40 PRINT @8;"TS PS MKBW6DB XDB"            ' After one sweep, executes peak search and 6 dB down.
50 PRINT @8;"MFL?"                         ' Reads the marker frequency and level at a time.
60 INPUT @8;MF,ML
70 PRINT "MARKER FREQ" =";MF;" : MARKER LEVEL =";ML
80 END
```

Result: MARKER FREQ = 400000 : MARKER LEVEL = 1.16

Example PC-13: Execute OBW and output the operation results.

```
10 ISET IFC:ISET REN
20 PRINT @8;"HD0"                          ' Sets the header OFF.
30 PRINT @8;"OBW"                          ' Executes OBW.
40 PRINT @8;"OBW?"                         ' Percentage, occupied band width, carrier frequency
50 INPUT@8;PER,OBW,FC
60 PRINT "OBW (";PER;"%) =";OBW;" : Fc =";FC
70 END
```

Result: OBW (99%) = 171000 : Fc = 2.503E+07

Example PC-14: Output the level of the maximum peak, the second and third peaks of the signal.

```
10    ISET IFC:ISET REN
20    PRINT @8;"HD0 ML?"                   ' Sets the header OFF.
30    PRINT @8;"PS"
40    INPUT @8;A                           ' Reads the peak level.
50    PRINT @8;"NXP"
60    INPUT @8;B                           ' Reads the second peak level.
70    PRINT @8;"NXP"
80    INPUT @8;C                           ' Reads the third peak level.
90    PRINT "1st PK = ";A;" : 2nd PK = ";B;" : 3rd PK = ";C
100   END
```

Result: 1st PK = -9.44 : 2nd PK = -10.06 : 3rd PK = -11.84

11.6 Inputting and Outputting Trace Data

The trace data on the screen is consisted with 701 points data on the frequency axis.
For the purpose of input and output of the data, 701 points data transmitted in order from the left (start frequency).
The level value of the each point is expressed in the integer of 0 to 340 or 0 to 2720.
(However, 400 or the value exceeding 3648 are expressed for the over scaled data.)

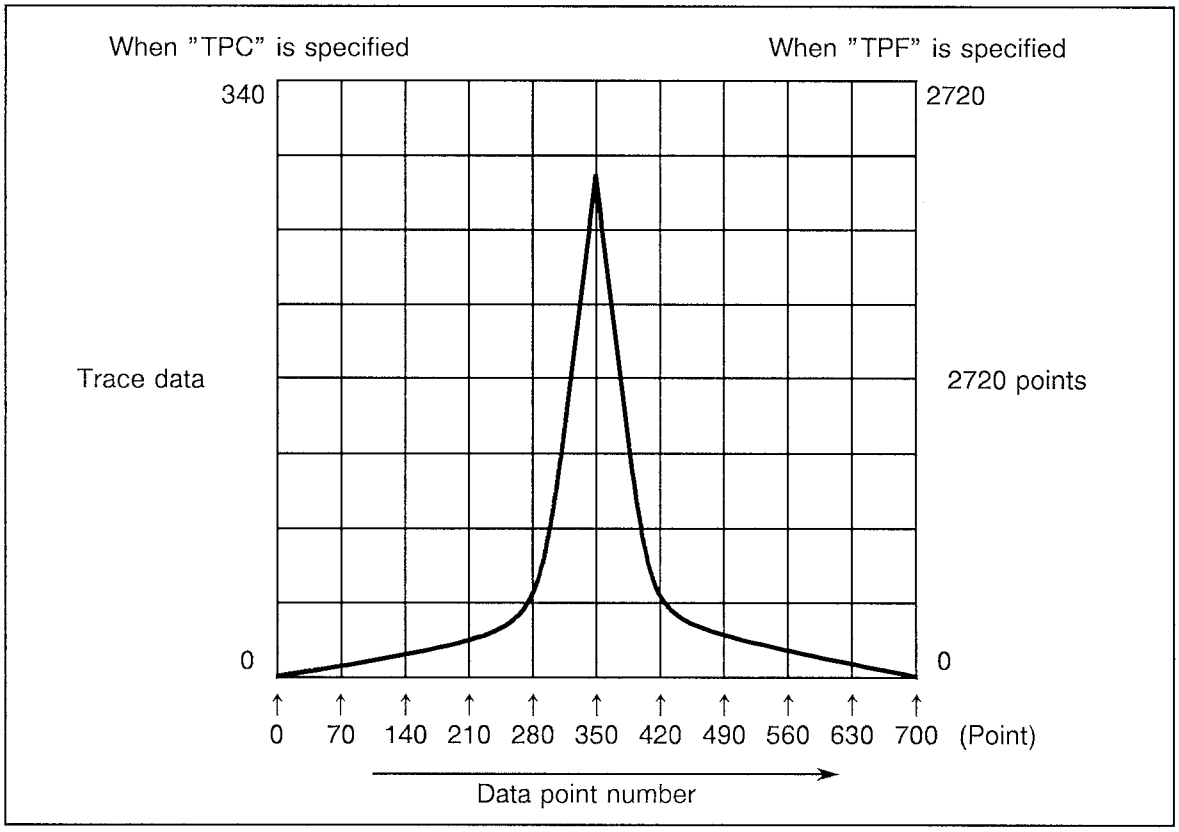


Figure 11-4 Relation between screen grid and data points

Table 11-3 shows the GPIB commands used to select TPC or TPF format.

Table 11-3 Trace accuracy codes

GPIB Code	Description
TPC	The trace data is input or output in the accuracy of 0 to 340.
TPF	The trace data is input or output in the accuracy of 0 to 2720.

The trace data as shown in table 11-4 can be input or output by the ASCII data or binary data format.

Table 11-4 Inputting and Outputting Trace Data

<table>
<tr><th>I/O Format</th><th>Syntax and Command Codes</th></tr>
<tr><td>ASCII</td><td>
DDDD CR LF
↑ Data of one point ↑ Delimiter

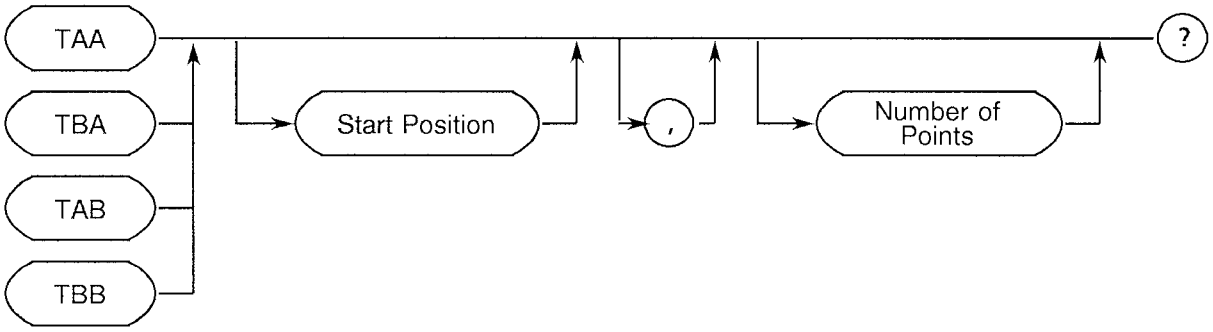
4-byte Data Without Header
<table>
<tr><th></th><th>GPIB Code (Input)</th><th>GPIB Code (Output)</th></tr>
<tr><td>Memory A</td><td>TAA</td><td>TAA?</td></tr>
<tr><td>Memory B</td><td>TAB</td><td>TAB?</td></tr>
</table>
</td></tr>
<tr><td>Binary</td><td>
DD DD ..... DD DD + EOI
↑ Delimiter
↑ Point 1 lower byte ↑ Point 701 lower byte
Point 1 upper byte Point 701 upper byte

Each data is divided into two of the upper and lower byte and is put EOI delimiter for the terminating of the data.
<table>
<tr><th></th><th>GPIB Code (Input)</th><th>GPIB Code (Output)</th></tr>
<tr><td>Memory A</td><td>TBA</td><td>TBA?</td></tr>
<tr><td>Memory B</td><td>TBB</td><td>TBB?</td></tr>
</table>
</td></tr>
</table>

The trace output range assignment.

TAA?
TBA?
TAB?
TBB?

The output range of trace data can be assigned.
The start point and the number of output data is assigned to the command.



- The start position : is assigned by 0 to 700. Default value is zero.
- The number of output data : start position + number of output data ≤ 701. This number must be 701 or less. Default value is 701.

HP200 and 300 series programming examples (GPIB address = 1)

Example HP-11: Output ASCII data from memory A.

```
10 DIM Tr(700)                          ! Fetches 701 variables.
20 OUTPUT 701;"DL3"                     ! Specifies CR LF as the delimiter.
30 OUTPUT 701;"TAA?"                    ! Specifies that data will be read from memory A in
                                          ASCII format.
40 FOR I = 0 TO 700                     ! Fetches data 701 times.
50 ENTER 701;Tr(I)
60 NEXT I
70 END          Result: Tr(0) = 208 Tr(1) = 210...Tr(699) = 311 Tr(700) = 298.
```

Example HP-12: Output binary data from memory B.

```
10 DIM Tr(700)                          ! Fetches 701 variables.
20 OUTPUT 701;"DL2"                     ! Specifies EOI as the delimiter.
30 OUTPUT 701;"TBB?"                    ! Specifies that data will be read from memory B in
                                          ASCII format.
40 ENTER 701 USING "%,W";Tr(*)          ! Fetches data through word conversion until the EOI
                                          is received.
50 END          Result: Tr(0) = 312 Tr(1) = 319...Tr(699) = 208 Tr(700) = 211.
```

Example HP-13: Input ASCII data to memory A.

```
10 INTEGER Tr(700)
20 OUTPUT 701;"TAA"                     ! Specifies that data will be read from memory A in
                                          ASCII format.
30 FOR I = 0 TO 700                     ! Inputs 701 variables.
40 OUTPUT 701;Tr(I)
50 NEXT I
60 END
```

Note: Specify VIEW mode before executing the program. After execution is complete, press the VIEW key again to confirm the input result.

HP200 and 300 series programming examples (GPIB address = 1).

Example HP-14: Input binary data to memory B.

```
10 INTEGER Tr(700)
20 OUTPUT 701;"TBB"                    ! Specifies binary data to be input to memory B.
30 OUTPUT 701 USING "#,W";Tr(*),END    ! Inputs 701 data in word size and adds EOI at the
                                         end.
40 END
```

Note: Specify VIEW mode before executing the program. After execution is complete, press the VIEW key again to confirm the input result.

Note: If the data is in ASCII format, specify 701 as the the number of I/O processings.
If the data is in binary format, fetch 701 data items and specify EOI as the delimiter.

PC9801 series programming examples (GPIB address = 8).

Example PC-15: Output the A memory data in ASCII (0 to 340)

```
10 ISET IFC:ISET REN                   ' Executes interface clear and remote enabling.
20 DIM TR(701)
30 PRINT @8;"DL0 TPC DTG"              ' Sets the negative detector and the trace accuracy for 0
                                         to 340.
40 PRINT @8;"TAA?"                     ' Specifies the memory A for the ASCII output.
50 FOR I = 0 TO 700
60  INPUT @8;TR(I)                     ' Reads data for 701 points.
70  PRINT I;" = ";TR(I)
80 NEXT I
90 END
```

Result: Tr (0) = 208 Tr (1) = 210.... Tr (699) = 311 Tr (700) = 298

Example PC-16: Output the A memory data in BINARY (0 to 340)

```
10 ISET IFC:ISET REN                    ' Executes interface clear and remote enabling.
20 DIM TR(701)
30 PRINT @8;"DL2 TPC DTG"               ' Sets the negative detector and the trace accuracy for 0
                                          to 340.
40 PRINT @8;"TBA?"                      ' Specifies the memory A for the binary output.
50 WBYTE &H3F,&H5F,&H3E,&H48;           ' Releases the listener and addresses PC9801 to listener
                                          30 and this analyzer to talker 8.
60
70 FOR I=0 TO 700
80     RBYTE ;UP,LO                     ' Repeats data reading for every upper byte and lower
                                          byte corresponding to 701 points.
90     TR(I)=UP*256+LO
100    PRINT I;" = ";TR(I)
110 NEXT I
120 WBYTE &H3F,&H5F;                    ' Releases the listener and talker.
130 END
```

Result: Tr (0) = 312 Tr (1) = 319.... Tr (699) = 208 Tr (700) = 211

Example PC-17: Input data to the memory A in ASCII (0 to 340)

```
10 ISET IFC:ISET REN                    ' Executes interface clear and remote enabling.
20 A=0:ST=3.14/100
30 PRINT @8;"TPC AB TAA"                ' Specifies the memory A for the ASCII input. (Accuracy
                                          of 0 to 340)
40 FOR I=0 TO 700
50     N=INT(SIN(A)*170)+170
60     A=A+ST
70     PRINT @8;N
80 NEXT I
90 PRINT @8;N"AV"                       ' A VIEW
100 END
```

Example PC-18: Input data to the memory A in BINARY (0 to 340)

```
10 ISET IFC:ISET REN                    ' Executes interface clear and remote enabling.
20 DIM DT(701)
30 A = 0:ST = 3.14/100
40 FOR I = 0 TO 700
50     DT(I) = INT(COS(A)*170) + 170    ' Creates the transferring data.
60     A = A + ST
70 NEXT I
80 PRINT @8;"TPC AB CWA TBA"            ' Specifies the memory A for the binary input.  (0 to 340)
90 FOR I = 0 TO 699
100   WBYTE ; INT(DT(I)/256), DT(I) MOD 256
                                        ' Transfers data for every upper byte and lower byte.
110 NEXT I
120 WBYTE ; INT(DT(700)/256), DT(700) MOD 256@
                                        ' Outputs the EOI signal together with the net data.
130 PRINT @8;"AV"                       ' A VIEW
140 END
```

11.7 Service Request (SRQ)

When GPIB function of the service request is used, each status of the analyzer can be detected from outside. When the service request is occurred in single following descriptions, the corresponding status bit is set to 1, and the controller can determine the analyzer status by reading the status byte in the serial polling.

Table 11-5 Service request ON/OFF codes

GPIB code	Description
S0	Enables the SRQ function.
S1	Disables the SRQ function. (This is the default setting.)
S2	Clears the status register.

Table 11-6 Status register bit assignments

Bit	Decimal	Description
0	1	Turns ON when UNCAL occurs.
1	2	Turns ON when calibration is complete.
2	4	Turns ON when a sweep is complete.
3	8	Turns ON when the specified number of averagings is complete.
4	16	Turns ON when plot output is complete.
5	32	Turns ON when an error is found in the GPIB code or a mode error occurs (SYNTAX ERR).
6	64	Turns ON when bits 0 through 5 or 7 when a service request is transmitted (S0).
7	128	

HP200 and 300 series programming examples (GPIB address = 1).

Example HP-15: Read the average end. (SRQ is not enabled.)

```
10 OUTPUT 701;"S2"                  ! Clears the status register.
20 OUTPUT 701;"AG 30GZ"             ! Starts averaging.
30 S = SPOLL(701)                   ! Reads the status register into S.
40 IF BIT(S,3) < > 1 THEN 30        ! Loops until bit 3 turns ON.
50 DISP "AVG.END"
60 END
```

Example HP-16: Continuously read out the single sweep end. (SRQ is not enabled.)

```
10 OUTPUT 701;"SI"                  ! Sets the mode to single.
20 OUTPUT 701;"S2"                  ! Clears the status register.
30 OUTPUT 701;"SR"                  ! Starts the sweep.
40 S = SPOLL(701)                   ! Reads the status register into S.
50 IF BIT(S,2) < > 1 THEN 40        ! Waits until bit 2 turns ON.
60 PRINT "SWEEP END"
70 GOTO 20                          ! Starts the next sweep.
80 END
```

Example HP-17: Read out the average end. (SRQ is enabled.)

```
10 OUTPUT 701;"S0"                  ! Enables SRQ.
20 OUTPUT 701;"S2"                  ! Clears the status register.
30 OUTPUT 701;"AG"                  ! Starts averaging.
40 ON INTR 7 GOTO 70                ! Jumps to line 70 when an interrupt occurs.
50 ENABLE INTR 7;2                  ! Sets the analyzer to receive an interrupt.
60 GOTO 50                          ! Loops until an interrupt occurs.
70 S = SPOLL(701)                   ! Reads the status register into S.
80 IF BIT(S,3) = 1 THEN 110         ! Jumps to line 110 if bit 3 is ON.
90 OUTPUT 701;"S2"                  ! Clears the status register.
100 GOTO 40                         ! Repeats.
110 DISP "AVG.END"
120 END
```

PC9801 series programming examples (GPIB address = 8).

Example PC-19: Read the average end. (SRQ is not enabled.)

```
10 ISET IFC:ISET REN
20 PRINT @8;"S2"                          ' Clears the status byte.
30 PRINT @8;"AG 30GZ"                     ' Starts averaging A.
40 *LOOP
50 POLL 8,S                               ' Reads the status byte into variable S.
60 IF (S AND 8) = 0 THEN GOTO *LOOP       ' Executes the loop until 1 stands at the third bit.
70 END
```

Example PC-20: Read out the end of the sweep and execute a single sweep. (The SRQ interrupt is not output.)

```
10  ISET IFC:ISET REN
20  PRINT @8;"SI"                         ' Sets the single sweep.
30 *LOOP
40  PRINT @8;"S2"                         ' Clears the status byte.
50  PRINT @8;"SR"                         ' Starts the sweep.
60 *SPOLL
70  POLL 8,S                              ' Reads the status byte into variable S.
80  IF (S AND 4) = 0 THEN GOTO *SPOLL     ' Executes the loop until 1 stands at the second bit.
90  BEEP:GOTO *LOOP                       ' Beeps out the end of the sweep.
100 END
```

Example PC-21: Read out the peak frequency and level at every end of the single sweep. (The SRQ interrupt is not output.)

```
10  ISET IFC:ISET REN
20  PRINT @8;"HD0 SI MFL?"                ' Sets the header OFF and the single sweep.
30  ON SRQ GOSUB *SPOLL                   ' Specifies the jump destination when the SRQ
                                            interrupt is received.
40  PRINT @8;"S0"                         ' Sets the analyzer so as to output the SRQ interrupt.
50  SRQ ON                                ' Sets PC9801 for enabling the SRQ interrupt.
60  POLL 8,S                              ' Clears the status byte.
70 *LOOP
80  SWP = 0
90  PRINT @8;"SR"                         ' Starts the sweep.
```

(cont'd)

```
100 *INTWAIT
110   IF SWP = 0 THEN GOTO *INTWAIT          ' Waits for an interrupt.
120 '
130   PRINT @8;"PS"                          ' Executes the peak search.
140   INPUT @8;"MF,ML"                       ' Reads the marker frequency and level.
150  PRINT "PEAK FREQ = ";MF;":PEAK LEVEL = ";ML
160   GOTO *LOOP                             ' Reads the status byte into variable S.
170 '
180 *SPOLL
190   POLL 8,S                               ' Reads the status byte into variable S.
200   IF (S AND 4) < > 0 THEN BEEP: SWP = 1  ' Ends the sweep if 1 stands at the second bits.
210   RETURN
```

Example PC-22: Read out the peak and the second peak of the measurement waveform with the marker counter.

```
10        ISET IFC:ISET REN
20        PRINT @8;"HD0 MND OFF"          ' Sets the header OFF.
30        PRINT @8;"MFL?"
40        PRINT @8;"CF30MZ SP10MZ"        ' Sets various data.
50       PRINT @8;"SI"                    ' Sets the single sweep.
60        GOSUB *SWEEP                    ' Executes one sweep.
70        PRINT @8;"CN1"                  ' Executes the counter and the peak search.
80       PRINT @8;"PS"
90       GOSUB *SWEEP                     ' Executes one sweep.
100      INPUT @8;MF1,ML1                 ' Reads the marker frequency and level.
110      PRINT @8;"NXP"                   ' Executes the next peak search.
120      GOSUB *SWEEP                     'Executes one sweep.
130      INPUT @8;MF2,ML2                 ' Reads the second peak frequency and level.
140     PRINT "1st PEAK = ";MF1;" : ";ML1,"2nd PEAK = ";MF2;" : ";ML2
150      END
160 *SWEEP
```

(cont'd)

```
170     PRINT @8;"S2"                          ' Clears the status byte.
180     PRINT @8;"SI"                          ' Starts the sweep.
190 *SPOLL
200     POLL 8,S
210     IF (S AND 4) =0 THEN GOTO *SPOLL       ' Waits for the end of the sweep.
220     BEEP:RETURN
```

Example PC-23: After executing the sweep twice, read out the peak frequency and level. (Use the TS command instead of SRQ.)

```
10  ISET IFC:ISET REN
20  PRINT @8;"IP HD0"
30  PRINT @8;"SP10MZ MFL?"
40  FOR I=0 TO 30
50 PRINT @8;"CF",I,"MZ"
60 PRINT @8;"TS TS PS"
70  INPUT @8;MF,ML
80 PRINT "CF=";I;MZ","FREQ=";MF,"LEVEL=";ML
90  BEEP
100 NEXT I
110 END
```

Sample program of the PC-24. Read the peak list.

```
10  ISET IFC:ISET REN                      '
20  PRINT @8;"MND OFF HD0"                 ' Header OFF.
30  PRINT @8;"PKLSTON"                     ' Peak list ON.
40  PRINT @8;"PKLVL10ENT"                  ' Sorting the data in decreasing order of the level.
                                           The number of peak is 10.
50 PRINT @8;"S2"                           ' Clear status byte.
60 PRINT @8;"SI PKL"                       ' Single sweep.
70 *SPOLL
80 POLL 8, S
90  IF (S AND 4)=0 THEN GOTO *SPOLL        ' Wait sweep end.
100 PRINT@8;"PKN?"                         ' Read the number of peak.
110 INPUT @8;N
120 PRINT@8;"PEAKLIST?"                    ' Read the peak list.
130 FOR I=1 TO N
```

(cont'd)

```
140 INPUT @8;FREQ, LEVEL
150 NEXT I
160 END
```

11.8 Setup Example of TV Channel Function (OPT-72)

GPIB code setup example of TV channel function is shown as follows. The sample program uses "N88-BASIC" produced by NEC Corporation.

Example 1: Channel setup Ⅰ

```
10  ISET IFC:ISET REN
20  PRINT @8;"TVMD ON"          !  Set up channel input mode.
30  PRINT @8;"TVVHF"            !  Set up VHF mode.
40  PRINT @8;"CHAUTO"           !  Set up channel auto.
50  PRINT @8;"CF TVCH 1ENT"     !  Set up picture frequency 1CH.
60  END
```

(Note) If center frequency/start frequency/stop frequency is set up during channel input mode, it becomes frequency input mode.

Example 2: Channel setup Ⅱ

```
10  ISET IFC:ISET REN
20  PRINT @8;"TVMD ON"          !  Set up channel input mode.
30  PRINT @8;"TVVHF"            !  Set up VHF mode.
40  PRINT @8;"FA TVCH 1ENT"     !  Set up the lower limit of frequency bandwidth 1CH.
50  PRINT @8;"FB TVCH 3ENT"     !  Set up the upper limit of frequency bandwidth 3CH.
60  END
```

Example 3: User table setup

```
10  ISET IFC:ISET REN
20  PRINT @8;"TVMD ON"                  !  Set up channel input mode.
30  PRINT @8;"TVUSR"                    !  Set up USER mode.
40  PRINT @8;"TVTIT/USER TABLE,USR/"    !  Set up table title.
50  PRINT @8;"TVEDDEL TVEDIN"           !  Delete user table and set input status.
60  PRINT @8;"#1 91.25MZ 90.0MZ 96.0MZ" !  Set up picture frequency and frequency range
                                            in 1CH.
70  PRINT @8;"#2 97.25MZ 96.0MZ 102.0MZ" !  Set up picture frequency and frequency range
                                            in 2CH.
80  END
```

Example 4: User table setup available for channel number input

```
10  ISET IFC:ISET REN
20  PRINT @8;"TVMD ON"                  !  Set up channel input mode.
30  PRINT @8;"TVUSR 2"                  !  Set up USER2 mode.
40  PRINT @8;"TVTIT/USER 2 TABLE,US2"   !  Set up table title.
50  PRINT @8;"TVEDDEL TVED IN"          !  Delete user table and set input state.
60  PRINT @8;"#120 55MZ 50MZ 60MZ"      !  Set up channel number, picture frequency and
                                            frequency range.
70  PRINT @8;"#2000 85MZ 800MZ 90MZ"    !  Set up channel number, picture frequency and
                                            frequency range.
80  END
```

11.9 GPIB Command Codes

Note on Table

- An asterisk (*) in the Listener Codes column indicates that you can send numeric data following that code by using a knob, numeric key or step key.
- A plus sign (+) in the Output Formats column indicates that multiple data items are output.
- AUTO/MANUAL or ON/OFF in the Output Formats column indicates that the code outputs 1 or 0, respectively.
- ON/OFF in the Output Formats column indicates that they output 1 or 0, respectively.
- A star (☆) in the Remarks column indicates the initial value when power is turned on.
- All frequencies are in Hertz (Hz), and all times are in seconds or fractions of a second.

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Frequency	Center frequency	CENTER *	CENTER?	Frequency	CF	
		CF *	CF?	Frequency	CF	
	CF Step size	CFSTEP *	CFSTEP?	Frequency	CS	
		CS *	CS?	Frequency	CS	
	CF Step AUTO	CSAUTO	CSAUTO?	AUTO/MANUAL	-	
		CA	CA?	AUTO/MANUAL	-	
	Frequency offset size	FROFS *	FROFS?	ON/OFF + Frequency	FO	
		FO *	FO?	ON/OFF + Frequency	FO	
	Frequency offset ON	FROFS ON *	-	-	-	
		FO ON *	-	-	-	
		FON *	-	-	-	
	Frequency offset OFF	FROFS OFF	-	-	-	
		FO OFF	-	-	-	
		FOF	-	-	-	
	Frequency span	SPAN *	SPAN?	Frequency	SP	
		SP *	SP?	Frequency	SP	
	Full span	FLSP	-	-	-	
		FS	-	-	-	
	Zero span	ZROSP	-	-	-	
		ZS	-	-	-	
	Last span	LTSP	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Frequency	Start frequency	START *	START?	Frequency	FA	
		SRT *	SRT?	Frequency	FA	
		FA *	FA?	Frequency	FA	
		FT *	FT?	Frequency	FA	
	Stop frequency	STOP *	STOP?	Frequency	FB	
		STP *	STP?	Frequency	FB	
		FB *	FB?	Frequency	FB	
		FP *	FP?	Frequency	FB	
Measure 1	HI-SENCE ON	HS ON	-	-	-	
		HS	-	-	-	
	HI-SENCE OFF	HS OFF	-	-	-	
		SHHS	-	-	-	
	Counter	-	COUNT?	OFF/ON	-	
		-	CT?	OFF/ON	-	
		-	CN?	OFF/ON	-	
	Counter ON	COUNT ON	-	-	-	
		CT ON	-	-	-	
		CN ON	-	-	-	
	Resolution : 1kHz	CN0	-	-	-	
	: 100Hz	CN1	-	-	-	
	: 10Hz	CN2	-	-	-	
	: 1Hz	CN3	-	-	-	
	Counter OFF	COUNT OFF	-	-	-	
		CT OFF	-	-	-	
		CN OFF	-	-	-	
		CNF	-	-	-	
	DELAY SWEEP					
	Trigger signal source :					
	:VIDEO	VIDEO DLY *	-	-	-	
	:EXT	EXT DLY *	-	-	-	
	:TV-V	TVV DLY	-	-	-	
	:TV-H	TVH DLY	-	-	-	
	TV signal					
	:NTSC system	TVHNT DLY	-	-	-	
	:PAL & SECAM system	TVHPS DLY	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Measure 1	Picture signal modulation polarity					
	: +	TVPLO DLY +	-	-	-	
	:-	TVPLO DLY -	-	-	-	
	Trigger slope					
	: +	TRIGSLP DLY +	-	-	-	
	:-	TRIGSLP DLY -	-	-	-	
	Delay time	DLYPOS *	DLYPOS?	time	DSP	
	Delay sweep time	DLYSWPTIM *	DLYSWPTIM?	time	DST	
	DELAY SWEEP	-	SLYSWP?	OFF/ON		
	:ON	DLYSWP ON	-	-	-	
	:OFF	DLYSWP OFF	-	-	-	
	Sweep time	SWP DLY *	-	-	-	
	Delay mode OFF	DLY OFF	-	-	-	
	Gated sweep					
	Gate signal		GTSG?	1 : External 0 : Internal	-	
	External	GTSGE	-	-	-	
	Internal	GTSGI	-	-	-	
	Gate position	GTPOS	GTPOS?	Real value	GSP	
	Gate width	GTWID	GTWID?	Real value	GSW	
	Time axis sweep time	SWP GT	-	-	-	
	Gated SWP		GTSWP?	1/0	-	
	ON	GTSWO ON	-	-	-	
	OFF	GTSWP OFF	-	-	-	
	Gated mode OFF	GTOFF	-	-	-	
	Peak list		PKLST?	OFF/ON		
	ON	PKLSTON	-	-	-	
	OFF	PKLSTOFF	-	-	-	
	Single sweep	SI PKL	-	-	-	
	Peak ΔY div	DY PKL *	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Measure 1	Peak range					
	Normal	PSN PKL	-	-	-	
	Upper	PSU PKL	-	-	-	
	Lower	PSL PKL	-	-	-	
	Peak mode	-	PKMD?	0 : Frequency 1 : Level	-	
	In order of frequency	PKFREQ				
	In order of level	PKLVL *	PKLVL?	Integer (Number of peaks set)	PKL	
	Number of peaks detected		PKL?	Integer	PKL	
	Data output		PEAKLIST?	Frequency + Level	Same as MF, ML	
Measure 2	OBW	OBW *	OBW?	Percentage + operation value	OBW, MF	See Note.
	ACP	ADJ	ADJ?	Operation value	Same as ML	See Note.
	ACP GRAPH	ADG	-	-	-	
	ACP GRAPH OFF	ADG OFF	-	-	-	
	ACP Ch Space	ADCH *	ADCH ?	Frequency	ADC	
	ACP Specified BW	ADBS *	ADBS ?	Frequency	ADB	
	dB down					
	X dB down width	MKBW *	MKBW?	Level	XDB	
	X dB down	DBDOWN	-	-	-	
		XDB	-	-	-	
	X dB down left	DBLEFT	-	-	-	
		XDL	-	-	-	
	X dB down right	DBRIGHT	-	-	-	
		XDR	-	-	-	
	X dB relative	DBREL	-	-	-	
		DC0	-	-	-	
	X dB abs. left	DBABSL	-	-	-	
		DC1	-	-	-	
	X dB abs. right	DBABSR	-	-	-	
		DC2	-	-	-	
	X dB execution state	-	DC?	0: Relative 1: Absolute (Left) 2: Absolute (Right)	-	

Note : Two calculated results are output continuously.
IF OBW: Frequency + Frequency
IF ACP : Level + Level

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Measure 2	Continuously dB down?	-	CDB?	OFF/ON	-	
	Continuously dB down ON	CDB ON	-	-	-	
	Continuously dB down OFF	CDB OFF	-	-	-	
	3rd Order Meas	PKTHIRD	-	-	-	
	AM modulation ratio (%AM)	AMMOD	AMMOD?	Operation value	-	
	Power measurement					
	Average count	PWTM *	PWTM?	Integer (1 to 999)	-	
	Average power ON	PWAVG ON	-	-		
	Average power OFF	PWAVG OFF	-	-	Unit : Header	
	Average power?		PWAVG?	Level	dBm : PWB	
	Total power ON	PWTOTAL ON	-	-	dBmV : PWM	
	Total power OFF	PWTOTAL OFF	-	-	dBuV : PWU	
	Total power?		PWTOTAL?	Level	dBuVemf : PWE	
	Channel power ON	PWCH ON	-	-	dBpW : PWP	
	Channel poer OFF	PWCH OFF	-	-	V : PWV	
	Channel power?		PWCH?	Level	W : PWW	
	Carrier power ON	PWCARR	-	-	-	
	Position of displaying measurement result					
	Upper	PDU	-	-	-	
	Lower	PDL	-	-	-	
Reference Level	Reference level	REF *	REF?	Level	Unit : Header	
		RE *	RE?	Level	dBm : REB	
		RL *	RL?	Level	dBmV : REM	
					dBμV : REU	
					dBμVemf : REE	
					dBpW : REP	
					V : REV	
					W : REW	
	X dB/div	DIV *	DIV?	0 : 10 (20) dB/	-	
		DD *	DD?	1 : 5 (10) dB/	-	
				2 : 2 (4)dB/		
				3 : 1 (2) dB/ When the peak list is ON, the number inside the parentheses is valid.		
	LINEAR	LIN	-	-	-	
		LN	-	-	-	
		LL	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Reference Level	Reference level display unit	-	UNIT?	0: dBm	-	
		-	UN?	1: dBmV	-	
		-	AUNITS?	2: dBμV	-	
				3: dBμVemf		
				4: dBpW		
				6: V		
				7: W		
	dBm	UDBM	-	-	-	
		AUNITS DBM	-	-	-	
		KSA	-	-	-	
		UB	-	-	-	
	dBmV	UDBMV	-	-	-	
		AUNITS DBMV	-	-	-	
		KSB	-	-	-	
		UM	-	-	-	
	dBμV	UDBUV	-	-	-	
		AUNITS DBUV	-	-	-	
		KSC	-	-	-	
		UU	-	-	-	
	dBμVemf	UEMF	-	-	-	
		UE	-	-	-	
	dBpW	UDBPW	-	-	-	
		UW	-	-	-	
	volts	UVLT	-	-	-	
		AUNITS V	-	-	-	
		KSD	-	-	-	
	watts	UWAT	-	-	-	
		AUNITS W	-	-	-	
	Level offset	REFOFS *	REFOFS?	OFF/ON + Level	RO	
		RO *	RO?	OFF/ON + Level	RO	
	Level offset ON	REFOFS ON*	-	-	-	
		RO ON *	-	-	-	
		RON *	-	-	-	
	Level offset OFF	REFOFS OFF	-	-	-	
		RO OFF	-	-	-	
		ROF	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Coupled Function	Coupled function					
	RBW	RBW *	RBW?	Frequency	RB	
		RB *	RB?	Frequency	RB	
	RBW AUTO	RBAUTO	RBAUTO?	AUTO/MANUAL	-	
		BA	BA?	AUTO/MANUAL	-	
	VBW	VBW *	VBW?	Frequency	VB	
		VB *	VB?	Frequency	VB	
	VBW AUTO	VBAUTO	VBAUTO?	AUTO/MANUAL	-	
		VA	VA?	AUTO/MANUAL	-	
	SWP	SWP *	SWP?	Time	SW	
		SW *	SW?	Time	SW	
		ST *	ST?	Time	SW	
	SWP AUTO	SWAUTO	SWAUTO?	AUTO/MANUAL	-	
		AS	AS?	AUTO/MANUAL	-	
	WIDE RBW	-	WRBW?	OFF/ON	-	
	ON	WRBW ON	-	-	-	
	OFF	WRBW OFF	-	-	-	
	ATT	ATT *	ATT?	Level	AT	
		AT *	AT?	Level	AT	
	ATT AUTO	ATAUTO	ATAUTO?	AUTO/MANUAL	-	
		AA	AA?	AUTO/MANUAL	-	
	Couple All AUTO	COALL	COALL?	AUTO/MANUAL	-	
		AL	AL?	AUTO/MANUAL	-	
Menu	Menu					
	Trigger mode	-	TRMD?	0 : FREE RUN	-	
		-	TM?	2 : VIDEO	-	
				3 : TV_V		
				4 : TV_H		
				5 : External		
	FREE RUN	FREE	-	-	-	
		TM FREE	-	-	-	
		FR	-	-	-	
	VIDEO	VIDEO *	VIDEO?	Integer	VID	
		VI *	VI?	Integer	VID	
	TV_V	TVV	-	-	-	
		TV	-	-	-	
	TV_H	TVH *	TVH?	Integer	TVH	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Menu	TV Signal					
	NTSC method	TVHNT	-	-	-	
	PAL & SECAM method	TVHPS	-	-	-	
	Video signal modulation polarity +	TVPOL +	-	-	-	
	–	TVPOL –	-	-	-	
	External	EXT *	EXT?	Real value (0 to 5.0)	EXT	
		TM EXT *	-	-	-	
		EX *	EX?	Real value (0 to 5.0)	EXT	
	Trigger slope +	TRIGSLP +	-	-	-	
	–	TRIGSLP –	-	-	-	
	Trigger possition	TRPOSI	TRPOSI?	Integer	TRP	
	Detector mode	-	DTMD?	0 : Normal	-	
		-	DM?	1 : Positive	-	
		-	DET?	2 : Negative	-	
				3 : Sample		
	Normal	DTN	-	-	-	
		DET NRM	-	-	-	
		KSa	-	-	-	
	Positive	DTP	-	-	-	
		DET POS	-	-	-	
		KSb	-	-	-	
	Negative	DTG	-	-	-	
		DET NEG	-	-	-	
		KSd	-	-	-	
	Sample	DTS	-	-	-	
		DET SMP	-	-	-	
		KSe	-	-	-	
	Sweep mode	-	SWMD?	0 : Continuous & full	-	
		-	SWM?	1 : Continuous & window	-	
				10 : Manual & full		
				11 : Manual & window		
				20 : Single & full		
				21 : Single & window		
	Continuous	CONTS	-	-	-	
		SN	-	-	-	
	Manual	MANSWP	-	-	-	
		SM	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Menu	Single	SNGLS	-	-	-	
		SI	-	-	-	
	Window ON	WDOSWP ON	-	-	-	
		SDW	-	-	-	
	Window OFF	WDOSWP OFF	-	-	-	
	Reset & Start	SR	-	-	-	
	Take sweep	TS	-	-	-	
	Pause time	PAUSE *	PAUSE?	OFF /ON + Time	PU	
		PU *	PU?	OFF /ON + Time	PU	
	Marker pause ON	PAUSE ON *	-	-	-	
		PU ON *	-	-	-	
		PUN *	-	-	-	
	Marker pause OFF	PAUSE OFF	-	-	-	
		PU OFF	-	-	-	
		PUF	-	-	-	
	Sound mode	-	SDMD?	0: OFF		
		-	SD?	1: ON (AM)		
				2: ON (FM)		
	Sound ON (AM or FM)	SON	-	-	-	
	Sound ON (AM)	SD AM	-	-	-	
		SAM	-	-	-	
	Sound ON (FM)	SD FM	-	-	-	
		SFM	-	-	-	
	Sound OFF	SD OFF	-	-	-	
		SOF	-	-	-	
	Display line	DL *	DL ?	OFF/ON + Level	Unit : Header dBm : DLB dBmV : DLM dBμV : DLU dBμVemf : DLE dBpW : DLP V : DLV W : DLW	
	Display line ON	DL ON *	-	-	-	
		DLN *	-	-	-	
	Display line OFF	DL OFF	-	-	-	
		DLF	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Trace	Trace A	-	TA?	(Lower byte) 0 : write 1 : view 2 : blank 3 : normalize 4 : A-DL→A 5 : A-B→A 6 : B-A→A (Upper byte) 1 : + max hold 2 : + averaging	-	
	A write	AWRITE	-	-	-	
		AW	-	-	-	
	A view	AVIEW	-	-	-	
		AV	-	-	-	
	A blank	ABLANK	-	-	-	
		AB	-	-	-	
	A max hold	AMAX	-	-	-	
		AM	-	-	-	
	A min hold	AMIN	-	-	-	
	A averaging	AAVG *	AAVG?	Integer	AG	
		AG *	AG?	Integer	AG	
	start	AGR	-	-	-	
	stop	AGS	-	-	-	
	pause	AGP	-	-	-	
	continue	AGC	-	-	-	
	1 time	AG1	-	-	-	
	continue	AG0	-	-	-	
	Detector mode					
	Sample	AGSMP	-	-	-	
	Positive	AGPOS	-	-	-	
	A Normalize					
	A Normalize ON	ANORM	-	-	-	
		AN	-	-	-	
		ANORM ON	-	-	-	
		AN ON	-	-	-	
		ANN	-	-	-	
	A Normalize OFF	ANORM OFF	-	-	-	
		AN OFF	-	-	-	
		ANF	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Trace	Correction data save	AR	-	-	-	
	A Instant normalize	AI	-	-	-	
		SHTA	-	-	-	
	Correction data selection					
	BKUP	ANBK	-	-	-	
	MEM	ANM	-	-	-	
	A XCH B	ACHB	-	-	-	
		CH	-	-	-	
	A-B→A	ABA	-	-	-	
		TR0	-	-	-	
	B-A→A	BAA	-	-	-	
		TR1	-	-	-	
	A-DL→A	ADLA	-	-	-	
		TR2	-	-	-	
	Trace A clear	CWA	-	-	-	
	Trace B	-	TB?	(Lower byte) 0 : write 1 : view 2 : blank	-	
	B store	BSTORE	-	-	-	
	B write	BWRITE	-	-	-	
		BW	-	-	-	
	B view	BVIEW	-	-	-	
		BV	-	-	-	
	B blank	BBLANK	-	-	-	
		BB	-	-	-	
GPIB	Local	LOCAL	-	-	-	
		LC	-	-	-	
	GPIB Address	-	AD?	Integer	AD	
		-	SHLC?	Integer	AD	
User Definition	User definition					
	1	UR1	-	-	-	
	2	UR2	-	-	-	
	3	UR3	-	-	-	
	4	UR4	-	-	-	
	5	UR5	-	-	-	
	6	UR6	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Recall	Recall	RECALL *	-	-	-	See Note.
		RC *	-	-	-	
		RCNORM *	-	-	-	
		RN *	-	-	-	
Save	Save	SAVE *	-	-	-	See Note.
		SV *	-	-	-	
		SHRC *	-	-	-	
	Current drive A	CDRA	-	-	-	
	Current drive B	CDRB	-	-	-	
Preset	Instrument preset	IP	-	-	-	
Marker	Marker ON	MKR ON *	MKR?	0 : Marker off	-	
		MN *	MN?	1 : Normal marker	-	
		MKN *	-	2 : ΔMarker	-	
	Marker frequency	-	MF?	-	MF	
	Marker level	-	ML?	-	Unit : Header dB : MLD dBm : MLB dBmV : MLM dBμV : MLU dBμVemf : MLE dBpW : MLP V : $\overline{\text{MLV}}$ W : MLW dBm/Hz : MLH dBμV/√Hz : MLL dBc/Hz : MLC	
	Frequency + Level	-	MFL?	Frequency + Level	Same as MF, ML	
	Normal marker	MKNORM *	MKNORM?	Frequency	MF	
		MKN *	-	-	-	
		MK *	MK?	Frequency	MF	

Note : When recalling or saving data, input the characters using a slash(/) immediately before and after the listener code. Up to 8 characters are available.
For example, input "RECALL /A:FILE0001/" when recalling the data.

(cont'd)

	Function		Listener code	Talker request			Remarks
				Code	Output format	Header	
Marker	ΔMarker		MKDLT *	MKDLT?	Frequency	MF	
			MKD *	-	-	-	
			MT *	MT?	Frequency	MF	
	Fixed Marker		-	FIX?	OFF/ON	-	
				FX?	OFF/ON	-	
	Fixed Marker ON		FIX ON	-	-	-	
			FX ON	-	-	-	
			FXN	-	-	-	
	Fixed Marker OFF		FIX OFF	-	-	-	
			FX OFF	-	-	-	
			FXF	-	-	-	
	1/ΔMarker			REDLT?	OFF/ON + Operation value	MF	See Note.
	1/ΔMarker ON		REDLT ON	-	-	-	
	1/ΔMarker OFF		REDLT OFF	-	-	-	
	ΔMarker %display	ON	MKDPR ON	-	-	-	
		OFF	MKDPR OFF	-	-	-	
	Multi-Marker						
	Multi-marker ON		MLT	MLT?	OFF/ON	-	
	Multi-Marker OFF		MO				
	Active marker move		MN *	-	-	-	*Frequency
			MK *	-	-	-	
	Multi-Marker No. 1	ON	MLN1 *	-	-	-	
		OFF	MLF1	-	-	-	
	Multi-Marker No. 2	ON	MLN2 *	-	-	-	
		OFF	MLF2	-	-	-	
	Multi-Marker No. 3	ON	MLN3 *	-	-	-	
		OFF	MLF3	-	-	-	
	Multi-Marker No. 4	ON	MLN4 *	-	-	-	
		OFF	MLF4	-	-	-	
	Multi-Marker No. 5	ON	MLN5 *	-	-	-	
		OFF	MLF5	-	-	-	
	Multi-Marker No. 6	ON	MLN6 *	-	-	-	
		OFF	MLF6	-	-	-	

Note : Calculated value is used as time or frequency data.

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Marker	Active marker Frequency		MF?	Frequency	MF	
	Active marker Level		ML?	Level	Same as the marker level	
	Active marker Frequency + Level		MFL?	Frequency + level	Same as MF and ML	
	Multi-Marker All frequencies		MLSF?	Frequency	MF	6 markers +△MKR
	Multi-Marker All levels		MLSL?	Level	Same as ML	6 markers +△MKR
	Multi-Marker Peak list					
	In frequency order	PLS FREQ	-	-	-	
	In level order	PLS LVL	-	-	-	
	No. of peaks	-	MPKN?	Integer	MPN	
	Signal track	-	SIG?	OFF/ON	-	
		-	SG?	OFF/ON	-	
	Signal track ON	SIG ON	-	-	-	
		SG ON	-	-	-	
		SGN	-	-	-	
	Signal track OFF	SIG OFF	-	-	-	
		SG OFF	-	-	-	
		SGF	-	-	-	
	Noise/Hz	NOISE *	NOISE?	0 : OFF +Frequency	NI	
		NI *	NI?	1 : dBm +Frequency	NI	
				2 : dBμV +Frequency		
				3 : dBc +Frequency		
	dBm/Hz ON	NIDBM	-	-	-	
		NIM	-	-	-	
	dBμV /√Hz ON	NIDBU	-	-	-	
		NIU	-	-	-	
	dBc/Hz ON	NIDBC	-	-	-	
		NIC	-	-	-	
	Noise/Hz OFF	NOISE OFF	-	-	-	
		NI OFF	-	-	-	
		NIF	-	-	-	

Note : Calculated value is used as time or frequency data.

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Marker	Marker display					
	Relative value display	HDR	-	-	-	
	Absolute value display	HDA	-	-	-	
	Active marker movement					
	Trace A	MKTRACE TRA	MKTRACE?	0: Blank	-	
	Trace B	MKTRACE TRB	-	1: Trace A	-	
				2: Trace B		
	Marker OFF	MKR OFF	-	-	-	
		MKOFF	-	-	-	
		MO	-	-	-	
		MF	-	-	-	
Peak Search	Peak Search	PEAK	-	-	-	
		MKPK	-	-	-	
		MKPK HI	-	-	-	
		PS	-	-	-	
	NEXT peak	NXPEAK	-	-	-	
		MKPK NH	-	-	-	
		NXP	-	-	-	
	NEXT peak left	NXLEFT	-	-	-	
		MKPK NL	-	-	-	
		NXL	-	-	-	
	NEXT peak right	NXRIGHT	-	-	-	
		MKPK NR	-	-	-	
		NXR	-	-	-	
	MIN search	MIN	-	-	-	
		MIS	-	-	-	
	NEXT MIN	NXMIN	-	-	-	
		NXM	-	-	-	
	Continuously peak					
	Continuously peak ?	-	CP?	ON/OFF	-	
	Continuously peak ON	CP ON	-	-	-	
		CPN	-	-	-	
	Continuously peak OFF	CP OFF	-	-	-	
		CPF	-	-	-	
	Peak range					
	Normal	PSN	-	-	-	
	Upper side	PSU	-	-	-	
	Lower side	PSL	-	-	-	
	Peak ΔY div	DY*	DY?	Real value (0.1 to 10)	DY	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
MKR→	MKR→					
	MKR→CF	MKCF	-	-	-	
		MC	-	-	-	
	MKR→REF	MKRL	-	-	-	
		MR	-	-	-	
	MKR Δ→SPAN	MTSP	-	-	-	
		DS	-	-	-	
	MKR→CF step	MKCS	-	-	-	
		M0	-	-	-	
	MKR Δ→CF step	MTCS	-	-	-	
		M1	-	-	-	
	MKR Δ→CF	MTCF	-	-	-	
	MKR →MKR step	MKMKS	-	-	-	
		M2	-	-	-	
	MKR Δ→MKR step	MTMKS	-	-	-	
		M3	-	-	-	
	MKR step size	MKS *	MKS?	Frequency	MKS	
		MPM *	MPM?	Frequency	MKS	
	MKR step AUTO	MKSAUTO	MKSAUTO?	AUTO/MANUAL	-	
		MPA	MPA?	AUTO/MANUAL	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Measurement Window	Measurement window	-	WDO?	OFF/ON	-	
		-	SHO?	OFF/ON	-	
		-	WN?	OFF/ON	-	
	Window ON	WDO ON	-	-	-	
		WN	-	-	-	
	Window OFF	WDO OFF	-	-	-	
		WF	-	-	-	
	Center position : X	WDOLX *	WDOLX?	Frequency	WLX	
		WLX *	WLX?	Frequency	WLX	
	Center position : Y	WDOLY *	WDOLY?	Level	WLY	See Note.
		WLY *	WLY?	Level	WLY	
	Window width	WDODX *	WDODX?	Frequency	WDX	
		WDX *	WDX?	Frequency	WDX	
	Window hight	WDODY *	WDODY?	Level	WDY	See Note.
		WDY *	WDY?	Level	WDY	
	Start frequency	WDOSRT *	WDOSRT?	Frequency	WTF	
		WTF *	WTF?	Frequency	WTF	
	End frequency	WDOSTP *	WDOSTP?	Frequency	WPF	
		WPF *	WPF?	Frequency	WPF	
	Upper level	WDOUP *	WDOUP?	Level	WUL	
		WUL *	WUL?	Level	WUL	
	Lower level	WDOLOW *	WDOLOW?	Level	WLL	
		WLL *	WLL?	Level	WLL	
	GO/NG Judgment	-	CM?	NG : 0 OK : 1	-	

Note : The center frequency position = Y and the measurement window hight can be input using the step keys and the data knob only.

(cont'd)

	Function		Listener code	Talker request			Remarks
				Code	Output format	Header	
Calibration	Calibration						
	CALL ALL		CLALL	-	-	-	
			CLA	-	-	-	
	Total gain cal.		CLTOTAL	-	-	-	
			CLG	-	-	-	
	Input ATT cal.		CLATT	-	-	-	
			IT0	-	-	-	
	IF step AMP cal.		CLSTEP	-	-	-	
			IT1	-	-	-	
	RBW switch cal.		CLRBW	-	-	-	
			IT2	-	-	-	
	Log linearity cal		CLLOG	-	-	-	
			IT3	-	-	-	
	AMPTD MAG cal.		CLMAG	-	-	-	
			IT4	-	-	-	
	PBW cal.		CLPBW	-	-	-	
			IT6	-	-	-	
	Calibration signal	ON	CLN*	CL?	Level	Unit : Header dBm : CLB dBmV : CLM dBμV : CLU dBμVemf : CLE dBpW : CLP V : CLV w : CLW	
		OFF	CLF	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Calibration	f compensation	-	FRCORR?	OFF/ON	-	
		-	FC?	OFF/ON	-	
	f compensation ON	FRCORR ON	-	-	-	
		FC ON	-	-	-	
		FCN	-	-	-	
	f compensation OFF	FRCORR OFF	-	-	-	
		FC OFF	-	-	-	
		FCF	-	-	-	
	CAL compensation	-	CLCORR?	OFF/ON	-	
		-	CC?	OFF/ON	-	
	CAL compensation ON	CLCORR ON	-	-	-	
		CC ON	-	-	-	
		CCN	-	-	-	
	CAL compensation OFF	CLCORR OFF	-	-	-	
		CC OFF	-	-	-	
		CCF	-	-	-	
Copy	Printer output					
	High resolution	PRNT HIGH	-	-	-	
	Low resolution	PRNT LOW	-	-	-	
	Large size (Low resolution)	PSIZE LRG	-	-	-	
	Small size (High resolution)	PSIZE SML	-	-	-	
	PCL printer	PCMND PCL	-	-	-	
	ESC/P printer	PCMND ESC	-	-	-	
	Plotter output execution	PLOT	-	-	-	
		PLT	-	-	-	
	Printer output execution	PRINT	-	-	-	
		PRT	-	-	-	
	Memory card output execution					
	Drive A	MCPA	-	-	-	
	Drive B	MCPB	-	-	-	
Configure	Plotter type					
	R9833	PLTYPEA	-	-	-	Note
	HP7470	PLTYPEB	-	-	-	
	HP7475	PLTYPEC	-	-	-	
	HP7440	PLTYPED	-	-	-	
	HP7550	PLTYPEE	-	-	-	

Note: The 682-XA provided by Hitachi Electronics Ltd is the same code as R9833's code.

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Configure	Plotter data					
	All data	PLALL	-	-	-	
	Waveform only	PLTRACE	-	-	-	
	Character only	PLCHAR	-	-	-	
	Graphic only	PLGRAT	-	-	-	
	Marker, DL, WDO	PLMKR	-	-	-	
	Antenna table	PLANT	-	-	-	
	Limit 1 table	PLLMTA	-	-	-	
	Limit 2 table	PLLMTB	-	-	-	
	Plotter paper					
	A4	PLA4	-	-	-	
	A3	PLA3	-	-	-	
	Plotter division size					
	1 division	PLPIC1	-	-	-	
	2 division	PLPIC2	-	-	-	
	4 division	PLPIC4	-	-	-	
	Plotter printing position					
	Center	PLMID	-	-	-	
	Left	PLLEFT	-	-	-	
	Right	PLRIGHT	-	-	-	
	Upper left	PLUPLEFT	-	-	-	
	Upper Right	PLUPRIGHT	-	-	-	
	Lower left	PLLOWLEFT	-	-	-	
	Lower right	PLLOWRIGHT	-	-	-	
	Number of plotter pen					
	Pen 1	PLPEN1	-	-	-	
	Pen 2	PLPEN2	-	-	-	
	Pen 4	PLPEN4	-	-	-	
	Pen 6	PLPEN6	-	-	-	
	Pen 8	PLPEN8	-	-	-	
	Plotter printing position movement					
	Auto	PLAUTO	-	-	-	
	Manual	PLMAN	-	-	-	
	Memory card output					
	File number	MCPN *	-	-	-	
	Automatic file update					
	ON	MCPINC ON	-	-	-	
	OFF	MCPINC OFF	-	-	-	
	Bitmap data					
	Monochrome bitmap data	MCPNORM	-	-	-	
	Invert monochrome bitmap data	MCPINV	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Configure	10MHz reference signal source					
	Internal	RFI	-	-	-	
	External	RFE	-	-	-	
	Internal high-stable reference oscillator	RFOP	-	-	-	
	OVEN COLD check	-	RFOPOC?	1 : OVEN COLD executing	-	
				2 : End of OVEN COLD	-	
	RS-232					
	Xon/Xoff Output ON	PRTCL RMT	-	-	-	
	(or Output is valid.).	PRTCL CPY	-	-	-	
	Output OFF					
	(or Output is not valid.).					
Utility	Utility					
	Antenna type	-	ANT?	0 : OFF	-	
				1 : Dipole		
				2 : Log Periodic		
	Antenna selection					
	Die poll	ANT0	-	-	-	
		AN0	-	-	-	
	Log Peri	ANT1	-	-	-	
		AN1	-	-	-	
	Antenna OFF	AF	-	-	-	
		ANT OFF	-	-	-	
	Correction table	-	CR?	OFF/ON	-	
	Correction table ON	CR ON	-	-	-	
		CRN	-	-	-	
	Correction table OFF	CR OFF	-	-	-	
		CRF	-	-	-	
	Correction table input	CRIN *	-	-	-	
	Correction table deletion	CRDEL	-	-	-	
	Correction	-	CORR?	OFF/ON		
	Correction ON	CORR ON	-	-	-	
	Correction OFF	CORR OFF	-	-	-	
	Correction mode Antenna	CR ANT	-	-	-	
	Level	CR LVL	-	-	-	
	PASS/FAIL judgment					
	Trace A	PFJ A	PFJ?	0 : FAIL	-	
				1 : PASS	-	
	Continuous PASS/FAIL ON	PFC ON	PFC?	0 : OFF	-	
	Continuous PASS/FAIL OFF	PFC OFF		1 : ON	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Utility	Judgment result	-	OPF?	0 : PASS	-	
				1 : UPPER FAIL		
				2 : LOWER FAIL		
				3 : UPPER &		
				LOWER FAIL		
	Upper FAIL point	-	FPU?	2 bytes + 2 bytes × pic.	-	
	Lower FAIL point	-	FPL?	2 bytes + 2 bytes × pic.	-	
	Limit line type selection	-	LIMTYPE?	0 : FREQ	-	
				1 : TIME	-	
	Limit line type selection					
	Frequency domain	LIMTYP FREQ	-	-	-	
	Time domain	LIMTYP TIME	-	-	-	
	Limit line					
	Frequency or time					
	ABS/REL?		LIMPOS?	0 : ABS	-	
				1 : REL	-	
	ABS	LIMPOS ABS	-	-	-	
	REL	LIMPOS REL	-	-	-	
	Limit line level					
	ABS/REL?	-	LIMAPOS?	0 : ABS	-	
				1 : REL		
	ABS	LIMAPOS ABS	-	-	-	
	REL	LIMAPOS REL	-	-	-	
	Limit line 1	-	LMTA?	OFF/ON	-	
	Limit line 1 ON	LMTA ON	-	-	-	
		LAN	-	-	-	
	Limit line 1 OFF	LMTA OFF	-	-	-	
		LAF	-	-	-	
	Limit line 1 table input	LMTAIN *	-	-	-	
	Limit line 1 table deletion	LMTADEL	-	-	-	
	Limit line 2	-	LMTB?	OFF/ON	-	
	Limit line 2 ON	LMTB ON	-	-	-	
		LBN	-	-	-	
	Limit line 2 OFF	LMTB OFF	-	-	-	
		LBF	-	-	-	
	Limit line 2 table input	LMTBIN *	-	-	-	
	Limit line 2 table deletion	LMTBDEL	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Memory Card	Memory card					
	Memory card initialization	MCINIT *	-	-	-	
		MMI *	-	-	-	
	Copy	COPY *	-	-	-	
	ALL copy	ALLCOPY *	-	-	-	
Label	Label	-	LB?	Character string	-	Max.25
		-	SH9?	Character string	-	characters
	Label input	LB ON/***/	-	-	-	Enclose a
		LON/***/	-	-	-	character
	Label deletion	LB OFF	-	-	-	with a slash
		LOF	-	-	-	(/).
	Label display					
	ON	LBDSP ON	-	-	-	
	OFF	LBDSP OFF	-	-	-	
Softkey	Softkey					
	Softkey No.1	SF1	-	-	-	
	Softkey No.2	SF2	-	-	-	
	Softkey No.3	SF3	-	-	-	
	Softkey No.4	SF4	-	-	-	
	Softkey No.5	SF5	-	-	-	
	Softkey No.6	SF6	-	-	-	
	Data input correspondence		-	-	-	
	0 to 9	0 to 9	-	-	-	
	. (decimal point)	.	-	-	-	
	BK SP	BS	-	-	-	
	↓ (step down)	UP	-	-	-	
	↑ (step up)	DN	-	-	-	
	Knob up (coarse)	CU	-	-	-	
	(fine)	FU	-	-	-	
	Knob down (coarse)	CD	-	-	-	
	(fine)	FD	-	-	-	
	-	-	-	-	-	
	GHz	GZ	-	-	-	
	MHz	MZ	-	-	-	
	kHz	KZ	-	-	-	
	mV	MV	-	-	-	
	mW	MW	-	-	-	
	dB correspondence	DB	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Softkey	mA	MA	-	-	-	
	Second	SC	-	-	-	
	Milli second	MS	-	-	-	
	Micro second	US	-	-	-	
	ENTER	ENT	-	-	-	
Trace Data	Trace data I/O	-	TP?	0: 0 to 340 mode 1: 0 to 2720 mode	-	
	Accuracy					
	341 points	TPC	-	-	-	
	2721 points	TPF	-	-	-	
	Memory A output (ASCII)	-	TAA?	4 bytes + delimiter	-	1 point
	(BINARY)	-	TBA?	2 bytes×700 points	-	EOI signal
	Memory B output (ASCII)	-	TAB?	4 bytes + delimiter	-	1 point
	(BINARY)	-	TBB?	2 bytes×700 points	-	EOI signal
	Memory A input (ASCII)	TAA	-	-	-	1 point
	(BINARY)	TBA	-	-	-	EOI signal
	Memory B input (ASCII)	TAB	-	-	-	1 point
	(BINARY)	TBB	-	-	-	EOI sig
TV Channel	TV MODE		TVMD?	ON/OFF	-	
	ON	TVMD ON				
	OFF	TVMD OFF				
	TV BAND		TVBND?	0:VHF	-	
				1:UHF	-	
				2:CATV	-	
				3:BS	-	
				4:CS	-	
				5:USER	-	
				6:USER 2	-	
		TVVHF	-	-	-	
		TVUHF	-	-	-	
		TVCATV	-	-	-	
		TVBS	-	-	-	
		TVCS	-	-	-	
		TVUSR	-	-	-	
		TVUSR2	-	-	-	

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
TV Channel	Channel input					
	Center channel	CF TVCH	-	-	-	
	Start channel	FA TVCH	-	-	-	
	Stop channel	FB TVCH	-	-	-	
	Channel auto		CHAUTO?	AUTO/MANUAL	-	
	AUTO	CHAUTO	-	-	-	
	MANUAL	CHMNL	-	-	-	
	Marker channel		MCH?	Integer	VHF UHF CTV BS CS USR	According to bands
	Table input	TVEDIN	-	-	-	
	Table delete	TVEDDEL	-	-	-	
	Title input	TVTIT	-	-	-	
	Memory card					
	STORE	TVMST	-	-	-	
	LOAD	TVMLD	-	-	-	
TV Monitor	PICTURE					
	ON	TVPIC ON	-	-	-	
	OFF	TVPIC OFF	-	-	-	
	VIDEO RF AM/FM					
	AM	TVRFAM	-	-	-	
	FM	TVRFFM	-	-	-	
	COLOR NTSC/PAL					
	NTSC	TVNTSC	-	-	-	
	PAL	TVPAL	-	-	-	
	TVSTD					
	B/G	TVSBG	-	-	-	
	I	TVSI	-	-	-	
	D/K/K1	TVSDKK	-	-	-	
	L/L1	TVSLL	-	-	-	
	M	TVSM	-	-	-	
	CARRIER					
	NORM	TVCNORM				
	INV	TVCINV				
	VIDEO INPUT					
	INT VID	TVVIV	-	-	-	
	EXT VID	TVVEV	-	-	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
TV Monitor	BRIGHT	BRIGHT*	-	-	-	
	CONTRAST	CONTRAST*	-	-	-	
	TINT	TINT*	-	-	-	
	HUE NTSC	HUENTSC*	-	-	-	
	READ OUT	READOUT*	-	-	-	
	Tuning level display					
	Preamplifier display					
	ON	TVTUNE ON	-	-	-	
	OFF	TVTUNE OFF	-	-	-	
Tracking Generator	Tracking generator					
	ON	TG	TG?	ON/OFF	-	
	OFF	TGF	-	-	-	
	Tracking generator output level	TGL*	TGL?	Level	Unit :Header	
					dBm :TGB	
					dBmV :TGM	
					dBμV :TGU	
					dBμVemf :TGE	
					dBpW :TGP	
					V :TGV	
					W :TGW	
	Tracking Generator ADJ	-	TGADJ?	AUTO/MANUAL	-	
	:AUTO	TGADJA	-	-	-	
	:MANUAL	TGADJM*	-	-	-	
Misc	Misc					
	Header OFF	HD0	-	-	-	
	ON	HD1	-	-	-	☆
	Delimiter					
	CR LF <EOI>	DL0	-	-	-	
	LF	DL1	-	-	-	
	<EOI>	DL2	-	-	-	
	CR LF	DL3	-	-	-	☆
	LF <EOI>	DL4	-	-	-	
	Service request					
	Interruption ON	S0	-	-	-	
	Interruption OFF	S1	-	-	-	☆
	Status clear	S2	-	-	-	
	Service request mask	RQS *	RQS?	Decimal corresponding to SRQ bit	-	

(cont'd)

	Function	Listener code	Talker request			Remarks
			Code	Output format	Header	
Misc	Soft menu display	-	MND?	OFF/ON	-	
	Soft menu display ON	MND ON	-	-	-	
	Soft menu display OFF	MND OFF	-	-	-	
	Product type	-	VER?	6 : U3641	-	
				7 : U3641N	-	
				10 : U3641PHS	-	
	Product type (character strings)	-	TYPE?	character strings + delimiter	-	
		-	TYP?	character strings + delimiter	-	
	Revision output	-	REV?	character strings + delimiter	-	
	Screen data output	-	GPL?	35 characters × 2 lines + LABEL; (1 line)	-	
	Back light					
	ON	BKLGT ON	-	-	-	
	OFF	BKLGT OFF	-	-	-	

Table 11-7 Examples or data entry (GPIB codes with asterisk)

Command example	Description
CF100MZ	Sets center frequency to 100MHz.
CS100KZ	Sets frequency step size to 100kHz.
FON10MZ	Turns frequency offset ON and set it to 10MHz.
SP500MZ	Sets frequency span to 500MHz.
FA100KZ or FT100KZ	Sets start frequency to 100kHz.
FB400KZ or FP400KZ	Sets stop frequencies to 400kHz.
RE – 25DB or RL – 25DB	Sets reference level to – 25dBm (if units are set to dBm).
DD5DB	Sets 5dB/div.
RON30DB	Turns level offset ON and sets it to 30dB.
RB300KZ	Sets RBW to 300kHz.
VB100KZ	Sets VBW to 100kHz.
SW200MS	Sets Sweep time to 200msec.
AT20DB	Sets Attenuator to 20dB.
PUN100MS	Turns Marker pause ON and sets the time to 100msec.
DLN87DB	Turns the display line ON and sets to 87dBμV (if units are set to μdB V).
MK1.8GZ	Turns normal marker ON and sets it to 1.8GHz.
MT2MZ	Turns delta marker ON and sets normal marker 2MHz from it.
MN100KZ	Sets the active marker(s) at 100kHz.
NOISE50Hz	Sets noise power noise width to 50Hz.
XDB6DB	Sets XdB down width to 6dB. (This can be also set by the XDL and XDR commands.)
MPM100KZ	Sets marker step size to 100kHz.
AG200GZ	Sets average A to 200 times and executes. (GZ is entry.)
AD8GZ	Sets the analyzer GPIB address to 8. (GZ is entry.)
WTF1MZ	Sets window start frequency 1MHz.
WPF2MZ	Sets window stop frequency to 2MHz.
WUL – 20DB	Sets window upper level to – 20dBm (if units are set to dBm).
WLL – 40DB	Sets window lower level to – 40dBm (if units are set to dBm).
CLN – 25DB	Sets CAL level to – 25dBm (if units are set to dBm).
SV /A:FILE0001/	Executes save of file name "FILE0001".
RC /A:FILE0001/	Executes recall of file name "FILE0001".