INSTRUCTION MANUAL

GP-IB INTERFACE

MODEL IF01-AVM

KIKUSUI ELECTRONICS CORPORATION

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1. GENERAL

Model IF01-AVM GP-IB Interface is used to hook up a Kikusui Model AVM23R
or AVM25R AC Voltmeter, or a Kikusui Model ORC21 Programmable Oscillator
or etc. to a GP-IB Bus (IEEE-488-1975).

The Interface has remote control connectors for four addresses (A1 - A4)
and is capable of controlling the range select operations of the two
channels of the AC Voltmeter from the controller and controlling the
frequency address selection and L/R output ON/OFF switching of the Pro-
grammable Oscillator. .

The Interface also has analog input signal connectors for four addresses
(A5 - A8) and is capable of converting the analog DC input voltage signal
into a digital signal with its A/D converter, thereby reading out the DC
output data which is proportional to the deflection of the AC voltmeter
into the GP-IB interface bus.

Note: Before using the Interface, refer to the instruction manual of the
       instrument to be controlled to make yourself familiar with the
       instrument.

2. SPECIFICATIONS

2.1   Equipment name: GP-IB Interface

2.2   Model No.:   IF01-AVM

2.3   GP-IB Section

  2.3.1   Electrical Interface Specifications

Complies with IEEE Standards 488-1975 and IEC Standards 625.
Employs an open collector output driver.

  2.3.2   Mechanical Interface Specifications

Employs a 24P connector as per IEEE Standards 488-1975.
(For connection to a 25P connector as per IEC Standards
625, use a connector adaptor.)

  2.3.3   Data codes: 8 bits/word (ASCII Codes)

  2.3.4   Interface Functions

Code	Description
SH1	Send handshake function
AH1	Accept handshake function
T8	Basic talker function Talker release function by listener designation. No serial poll function No talk only function
L4	Basic listener function Listener release function by talker designation No listen only function
SR0	No service request function
RL0	No remote/local select function
PP0	No parallel/poll function

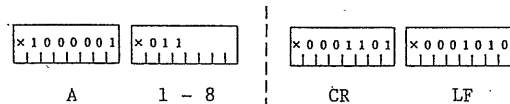| Code	Description
DC1	Device clear function (SDC [selected device clear] and DCL [device clear] commands can be used.)
DT0	No device trigger function
C0	No controller function

2.3.5 Talk/Listen Address Designation

Each device is assigned with an identification code (address number). It is set with the 5-bit DIP switches located on the left-hand side of the interface connector.

Each address is set with a binary number within a range of 0 to 30 (excluding 31). Address numbers should be set avoiding double designations.

2.3.6 Interface Signal Format

Address Data Signal

| ×1 0 0 0 0 0 1 | ×0 1 1 | | ×0 0 0 1 1 0 1 | ×0 0 0 1 0 1 0 |

A   1 - 8   CR   LF

Adress   Connector   The 3rd and further
data iden-   address   characters are ignored.
tification   data   CR and LF are allowable.
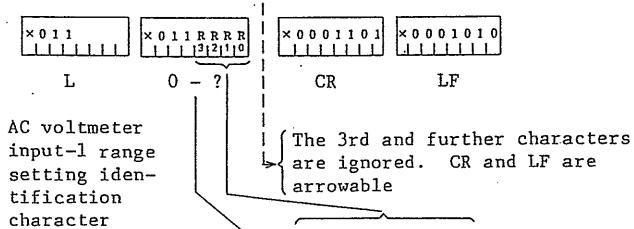character

1 - 4 [Remote section]

o Address for 2-channel range setting
   for AC voltmeter (AVM23R, AVM25R)

o Address for programmable oscillator
   (ORC21) frequency address or output
   mode setting

5 - 8 [Input section]

o Address for applied voltage analysis
   of analog signal input section
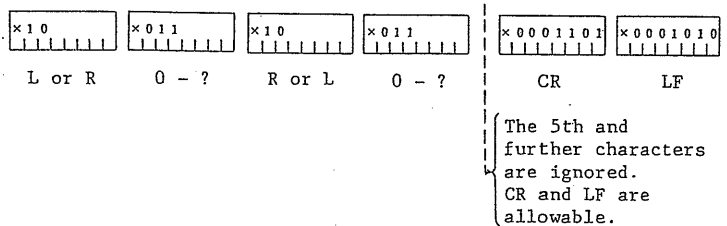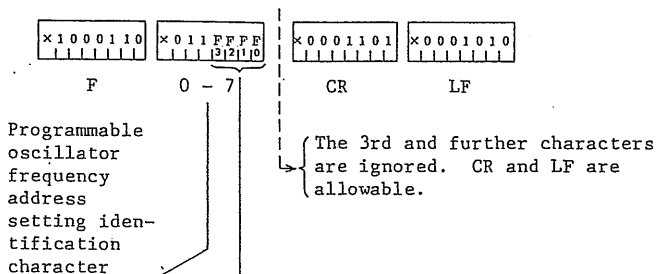
AC Voltmeter Range Setting Signal

```
×011        ×011RRRR    ×0001101    ×0001010
            |3|2|1|0|
   L          0 - ?        CR          LF
```

AC voltmeter
input-1 range
setting iden-
tification
character

The 3rd and further characters
are ignored. CR and LF are
arrowable

R

AC voltmeter
input-2 range
setting iden-
tification
character

ACSII	R3	R2	R1	R0	Range	
0	0	0	0	0	0.3 mV	0.5 mV
1	0	0	0	1	1 mV	1.5 mV
2	0	0	1	0	3 mV	5 mV
3	0	0	1	1	10 mV	15 mV
4	0	1	0	0	30 mV	50 mV
5	0	1	0	1	100 mV	150 mV
6	0	1	1	0	300 mV	500 mV
7	0	1	1	1	1 V	1.5 V
8	1	0	0	0	3 V	5 V
9	1	0	0	1	10 V	15 V
:	1	0	1	0	30 V	50 V
;	1	0	1	1	100 V	150 V
<	1	1	0	0	100 V	150 V
=	1	1	0	1	100 V	150 V
>	1	1	1	0	100 V	150 V
?	1	1	1	1	100 V	150 V

Simultaneous setting of R and L also is possible.

```
×10       ×011       ×10       ×011      ×0001101   ×0001010

L or R    0 - ?      R or L    0 - ?       CR         LF
```

The 5th and
further characters
are ignored.
CR and LF are
allowable.

Programmable Oscillator Frequency Address and Output Mode
Setting Signal

```
┌──────────┐ ┌──────────┐ ┊ ┌──────────┐ ┌──────────┐
│×1000110 │ │×011FFFF │ ┊ │×0001101 │ │×0001010 │
└┴┴┴┴┴┴┴┴┘ └┴┴┴┴┴3┊2┊1┊0┘ ┊ └┴┴┴┴┴┴┴┘ └┴┴┴┴┴┴┴┘
     F        0 - 7    ┊     CR           LF
```

Programmable   ┊ ⎧ The 3rd and further characters
oscillator   ┊ ⟍⎨ are ignored. CR and LF are
frequency   └──⎩ allowable.
address
setting iden-
tification
character

ASCII	F3	F2	F1	F0	Frequency address
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	2
3	0	0	1	1	3
4	0	1	0	0	4
5	0	1	0	1	5
6	0	1	1	0	6
7	0	1	1	1	7
8 ⋮ ?					—

Eight types
(F0 - F8) of
signals are
preset.

Refer to the
instruction manual
of the Programmable
Oscillator.

×1010011	×0118888		×0001101	×0001010
	ᴵ³ᴵ²ᴵ¹ᴵ⁰			
S	0 − 7		CR	LF

Programmable
oscillator
output mode
setting iden-
tification
character

The 3rd and further characters
are ignored. CR and LF are
allowable.
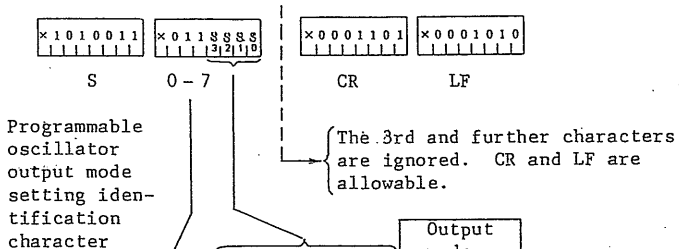
ASCII	S3	S2	S1	S0	Output mode	
					L	R
0	0	0	0	0	OFF	OFF
1	0	0	0	1	ON	OFF
2	0	0	1	0	OFF	ON
3	0	0	1	1	ON	ON
4	0	1	0	0	OFF	OFF
5	0	1	0	1	ON	OFF
6	0	1	1	0	OFF	ON
7	0	1	1	1	ON	ON
8 ⋮ ?					— —	

Refer to the
instruction manual
of the Programmable
Oscillator.

Simultaneous setting of F and S also is possible.

×10	×011	×10	×011		×0001101	×0001010
F or S	0 − 7	S or F	0 − 7		CR	LF
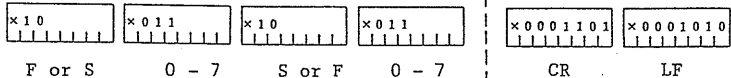
The 5th and further
characters are
ignored. CR and LF
are allowable.

<u>Read Data Signal</u>

After designating A5 – A8 with the address data signal,
the DC voltage data signals applied to the terminals are
fed to the GP-IB interface.
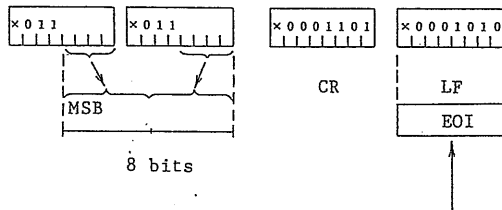
* Data is hexadecimal   Send LF and EO1
   ASCII codes, 3 – X   simultaneously at the
   row characters.   end.

<u>Interface Clear Signal</u>

When there are two or more interface circuits.

    IFC: Initialize all interface circuits.

    DCL: Initialize all interface circuits.

    SDC: Initialize the specified interface circuits only.

2.3.7   Remote/Local Select

Selectable with the slide switch on the front panel.
(Operates irrespective of GP-IB function)

2.3.8   Interface Status Display

Display of TALK or LISTEN status with LED

2.4   Input Section (Analog Signal Input Section)

2.4.1   Number of Input Channels

4 channels (A5, A6, A7, A8)

2.4.2 GND Circuits

        Two GND Circuits (One for A5 and A6, and the other for A7
        and A8. Both GND circuits are isolated from those of
        GP-IB section and REMOTE section.)

2.4.3 Input Impedance: Approx. 100 kΩ

2.4.4 Input Signal Sensitivity: 1 VDC ±7% (FS), adjustable
                                   continuously-variably

2.4.5 Allowable Input Voltage Range: −0.3 to +4.7 VDC

2.5 A/D Converter

2.5.1 Resolution: 8 bits

2.5.2 Conversion Accuracy: ±1% or better (Except the portion of
                            less than 1/10 of FS)

2.5.3 Sample Hold Circuit: No sample hold circuit

2.5.4 Conversion system: Double integration

2.5.5 Conversion Speed: 20 msec or faster

2.6 Connectors

2.6.1 GP-IB Section: Per IEEE Standards 488-1975. Amphenol
                57 Series, 24-contact receptacle

2.6.2 Remote Section: Amphenol 57 Series, 57-40240 receptacles

2.6.3 Input Section: BNC receptacles

2.7 Others

2.7.1 Operating Ambient 5°C to 35°C (41°F to 95°F),
      Temperature and 85% RH or less
      Humidity:

2.7.1 Power Requirements: 100 V, 115 V, 215 V, 230 V ±10%, 50/60 Hz
                            AC, approx. 14 VA.

                            (Voltage is selectable with plug on rear
                            panel.)

2.7.3 Dimensions: 300 W × 70 H × 360 D mm
                                  (11.81 W × 2.76 H × 14.17 D in.)

       (Maximum dimension):   307 W × 85 H × 380 D mm
                                  (12.09 W × 3.35 H × 14.196 D in.)

2.7.4 Weight: Approx. 4 kg (8.8 lbs)

2.7.5 Standard Accessories: Instruction Manual 1

                                  AC Plug Adaptor (3P-2P) 1   ※

                                  Fuse, 0.3 A 1

2.7.6 Optional Accessories: GP-IB Cable

                                  24P Flat Cable

   (Note)

   ※: The AC Plug Adaptor is provided only for model versions for use

       within Japan .

3. PRECAUTIONS BEFORE USE

3.1 Unpacking and Inspection

The instrument is shipped after being fully inspected and tested at the factory. Upon receipt of the instrument, immediately unpack and inspect it for any signs of damage which might have been sustained when in transportation. If any damage is found, immediately notify the transportation company and/or your Kikusui agent.

3.2 Check of AC Line Voltage

The AC line voltage on which the instrument operates is selectable with the voltage selector plug-on the rear panel, as shown in the below table. Before connecting the power cord of the instrument to an AC line outlet, make sure that the voltage selector plug is correctly set in the position corresponding to the AC line voltage. Replace the fuse also as required. Normally, the instrument is shipped being set for line voltage 90 - 110 V and with fuse 0.5 A. Note that the instrument may not operate normally or may be damaged if it is operated on a wrong AC line voltage.

Table 3-1

Selector plug setting	Nominal voltage	Voltage tolerance	Fuse
A	100 V	90 - 110 V	0.5 A
B	115 V	104 - 126 V	
C	215 V	194 - 236 V	0.3 A
D	230 V	207 - 253 V	

3.3 Operating Environments

Do not operate the instrument in direct sunlight or near a source of heat. Avoid operating the instrument in adverse environments such as dusty or corrosive gas atmosphere, chemical stains, mechanical vibration, etc. Note that the longevity of the instrument may be badly shortened if it is exposed to such adverse environments.

3.4 GND Circuits

The chassis of the Interface, the GND circuit of the GP-IB section, the GND circuit of the REMOTE section, and the GND circuit of the analog input signal section (A5 - A8) are mutually isolated. It is ideal that the instrument chassis is kept at the same potential with the ground line of the AC input power. Pay attention so that no impulse noise is applied between the chassis ground and the signal ground.

3.5 Connection/Disconnection of Cables

Be sure to turn off the POWER switch before connecting or disconnecting the cables. Turn on the cable after confirming that the cables are securely connected.

3.6 Note

The specifications mentioned in this publication are subject to change without notice.

4. OPERATION METHOD

4.1 Description of Front Panel Items
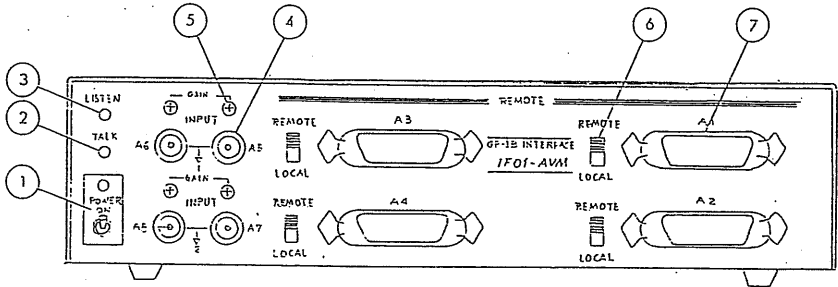
Figure 4-1

① POWER switch: The main power switch of the instrument.
When the power is on, the green POWER indi-
cator light (LED) turns on.

② TALK light: The red TALK indicator light (LED) turns on
when the instrument is operating as a talker.

③ LISTEN light: The red LISTEN indicator light (LED) turns
on when the instrument is operating as a
listener.

④ INPUT analog   The DC voltage data signals (0.93 - 1.07 VDC FS)
signal connectors   applied to these terminals can be read into
A5, A6, A7, A8:   the GP-IB bus. The resolution is 8 bits, the
conversion accuracy is ±1%, and the maximum
conversion speed is 20 msec. The input impedance
is approximately 100 kΩ.

Do not apply to these terminals a voltage lower
than −0.3 VDC or higher than +4.75 VDC.

For the GND circuit, see Section 4.3.1.

⑤	GAIN control potentiometers:	These potentiometers control the gains of the input signals applied to ④ INPUT connectors. (0.93 V – 1.07 VDC FS)

| ⑥ | REMOTE/LOCAL selector switch: | If ⑥ REMOTE/LOCAL switch is set to the REMOTE state and ⑦ REMOTE control connector is connected to the REMOTE control connector of the Programmable Oscillator or AC Voltmeter to be controlled, the REMOTE indicator light of the controlled instrument turns on and the instrument can be remote-controlled with GP-IB. |
| ⑦ | REMOTE control connectors A1, A2, A3, A4: | |

If ⑥ REMOTE/LOCAL switch is set to the LOCAL state, the REMOTE indicator light of the controlled instrument turns off and the instrument can be locally controlled with its panel controls.

The layout of the pins of ⑦ REMOTE control connectors is as shown in Figure 4-2. The pins indicated with the symbols enclosed in the parentheses in Figure 4-2 are not used for the Interface.
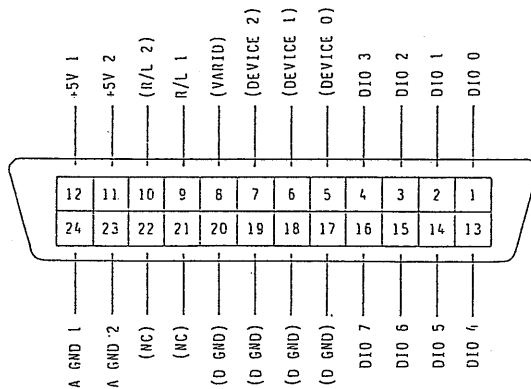

Figure 4-2

As shown in Figure 4-2, two channels of power supply circuits and GND circuits are provided in order to cope with the feature of such instrument as Kikusui Model AVM23 AC Voltmeter which has two mutually independent input circuits.

The DIO 0, DIO 1, DIO 2, DIO 3 and R/L 1 pins are for the +5V 1 and A GND 1 channel; the DIO 4, DIO 5, DIO 6 and DIO 7 pins are for the +5V 2 and A GND 2 channel. (See Section 4.3.1.)

When the power is turned on or the IFC, DCL or SDC command is given, all of the DIO 0 - DIO 7 pins are set to the HI state.

The state is maintained even after one of the A1 - A4 addresses is selected, a remote control signal is set, and control is transferred to another address.
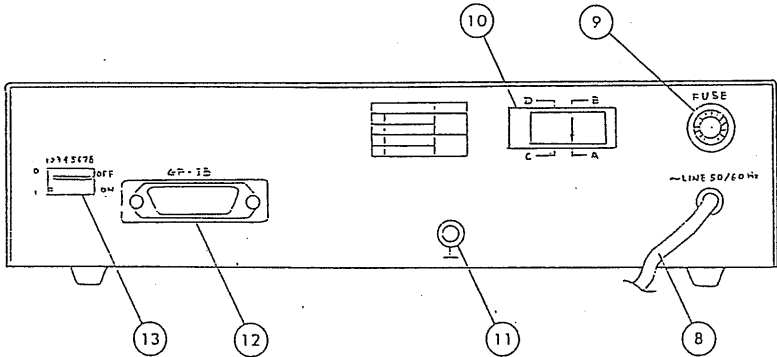
4.2 Description of Rear Panel Items

Figure 4-3

⑧	AC power cord:	The Interface operates on an AC line voltage
⑨	Fuse	of 100 V, 115 V, 215 V, or 230 V, ±10%, AC.
⑩	AC line voltage selector recep- tacle:	Voltage selection can be done with ⑩ AC line voltage selector receptacle. The fuse corresponding to the AC line voltage should be used as shown in Table 4-1.

Table 4-1

Line voltage		Fuse
A	90 V - 110 V	0.5 A
B	104 V - 126 V	
C	194 V - 236 V	0.3 A
D	207 V - 253 V	

⑪ GND terminal: This terminal is for chassis ground. For grounding, see Section 4.3.1.

⑫ GP-IB connector: This connector is for connection between the Interface and the GP-IB. It is a 24-contact Amphenol 57 Series connector. To connect to an IEC Standard connector, use an IEC → IEEE conversion connector.

⑬ ADDRESS switches: This 8-column DIP switch is for address setting of the instrument. Switches [1] – [5] are for address setting. Address 0 – 30 can be set with a binary number.
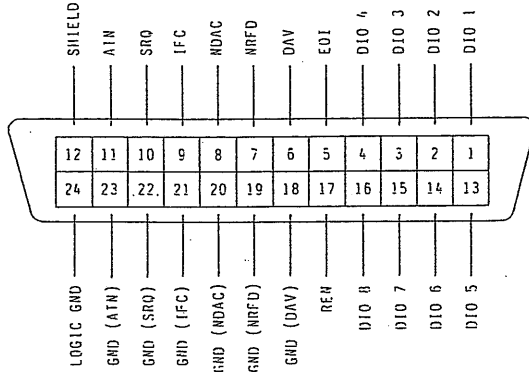

Figure 4-4

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4.3 General Notes for Use

4.3.1 GND Circuits

The Interface has mutually-isolated ground circuits (indicated with
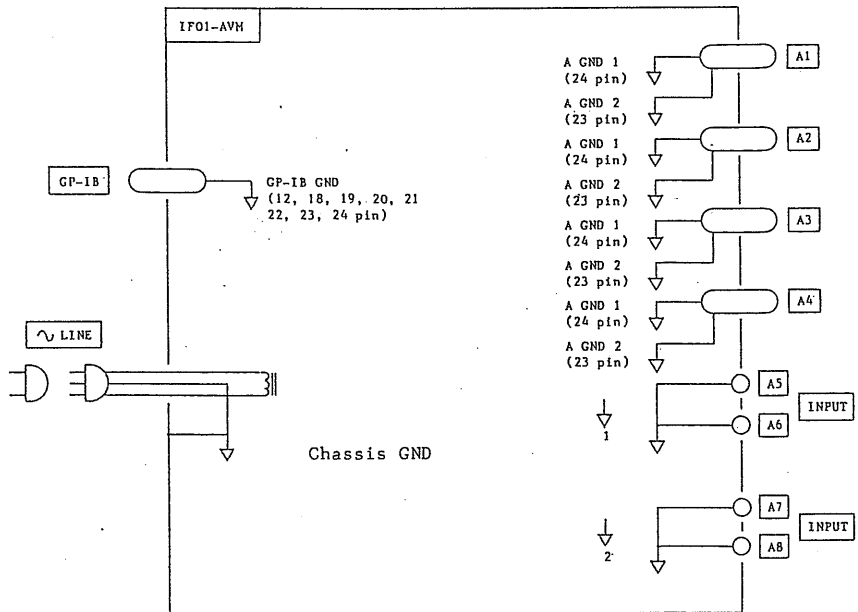the arrowhead symbols) as shown in Figure 4-5.

Figure 4-5

4.3.2 Notes for Connection to AC Voltmeter (AVM23R, AVM25R)

When connecting the two DC OUTPUT terminals of the AC Voltmeter to
connectors A5 – A8 of the Interface to read data, mutually isolate
the GND circuits.

The lower the frequency of the input signal applied to the AC volt-
meter, the larger are the ripples of the DC output signal of the
DC OUTPUT terminal. Although no substantial ripples are generated

down to a frequency of approximately 30 Hz, ripples of approximately
±1.5% are generated at a frequency of 10 Hz. In the latter case,
an average value of several of sampled values may be calculated to
determine the center value of the ripples. (When the signal is at
a level close to the full scale, pay attention to overflow of data.)

4.3.3 R/L Selector Switch

This switch is used to select either the remote mode that the objective
instrument connected to terminals A1 – A4 of the Interface is controlled
remotely by means of the GP-IB or the local mode that the objective
instrument is controlled locally with its panel controls. The inter-
face is not power dependent. If this switch is set to the REMOTE
state, even when the power of the IF01-AVM is off, the REMOTE lamp of
the controlled instrument turns on and the instrument cannot be locally
controlled with its panel controls.

4.3.4 Address Designation of Input Section (Analog Signal Input Section)

If data is read without specifying any address of A5 – A8 when the
power is turned on or after an IFC, DCL or SDC command is given by
the controller, the DC voltage which is applied to A7 is read onto
the GP-IB interface bus.

When the DC voltage applied to A5 – A8 is read, the read address does
not change even if an address other than A5 – A8 is specified.

4.3.5 Service Request Signal and Serial Poll

The Interface has no SR function. Even when the function is selected
by the controller, the Interface does not respond although its power
is automatically turned on and it is initialized to the state of power
on.

4.4 Optional Cables

See Table 4-2 for the optional cables which are used to connect the REMOTE connectors and GP-IB connectors to objective instruments.

Table 4-2

		Cable	Kikusui Code No.	Length
For REMOTE connection		57F-30240-20S K-KESSEN	89-04-0170	2 m (6.6 ft)
		57 CABLE 24P(O)-1M-24P(O)	89-04-0130	1 m (3.3 ft)
		57 CABLE 24P(o)-2M-24P(O)	89-04-0160	2 m (6.6 ft)
For GP-IB connection		408J-1P5 IEEE-488 50 CM	89-04-1000	50 cm (1.6 ft)
		408J-101 IEEE-488 1 M	89-04-1010	1 m (3.3 ft)
		408J-101 IEEE-488 2 M	89-04-1020	2 m (6.6 ft)

4.5 Example of Data Transfer Program

4.5.1 For Programmable Oscillator ORC21

After confirming that the powers of the instruments are off, connect the GP-IB connector of the Interface to the computer. Connect one of connectors Al - A4 to the REMOTE connector of the Programmable Oscillator using an optional 24P cable. (Assume here that connector A2 is used.)
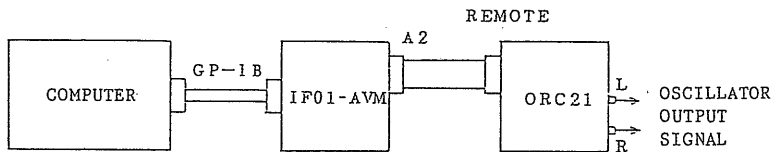

Figure 4-6

Set an address for the Interface with the DIP switches on the rear panel of the instrument. To set the address at 1 for example, throw ADDRESS "1" switch to the ON state (bottom position) and all other

switches to the OFF state (top positions). Turn on the powers of
the instruments and generate programs with the computer.

An example of programming for delivering through both L and R
connectors the signal which is set at frequency address F3 of the
Programmable Oscillator is shown in the following (refer to Section
2.3 for the formats).

(1)   HP 9845/HP 9835/HP 85

     OUTPUT 701 ; "A2F3S3"

(2)   NEC PC-8001

     10   DEFUSR 0=&H6000 : A=USR0(1)   o   To initialize the
     ·20   PRINT @1 ; "A2F3S3"   computer
     30   END

4.5.2 For AC Voltmeter AVM23R (AVM25R)

After confirming that the powers of the instruments are off, connect
the GP-IB connector of the Interface to the computer. Connect one
of connectors A1 - A4 to the REMOTE connector of the AC Voltmeter
using an optional 24P cable. (Assume here that connector A4 is
used.)

Apply an AC input voltage of approximately 0.5 mV rms to the INPUT 1
connector of the AC Voltmeter and connect the DC OUTPUT 1 connector
of the rear panel to one of INPUT connectors A5 - A8 of the Interface
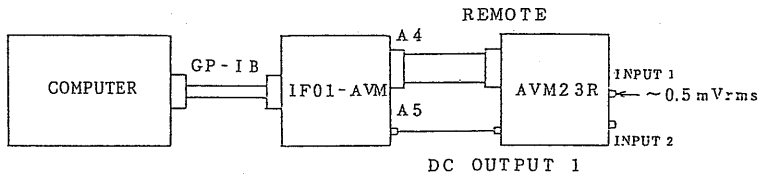using the BNC cable. (Assume here that connector A5 is used.)

Figure 4-7

Set an address for the Interface with the DIP switches on the rear
panel of the instrument. To set the address at 1 for example, throw
ADDRESS "1" switch to the ON state (bottom position) and all other
switches to the OFF state (top positions). Turn on the powers of
the instruments and generate programs with the computer.

An example of programming for setting in "INPUT 1" channel of the
AC Voltmeter at the "1mV" range and the "INPUT 2" channel at the
"100V" range and reading out the DC output voltage of the "DC OUTPUT 1"
terminal is shown in the following:

(1) HP 9845/HP 85

```
10  OUTPUT 701 ; "A4L1R;"
20  WAIT 1500                          o  Wait until the DC
30  OUTPUT 701 ; "A5"                      output is stabilized.
40  ENTER 701 USING "2(B)"; X, Y
50  PRINT ((X-48)×16+(Y-48))/255
60  END
```

(2) NEC PC-8001

```
10  DEFUSR0=&H6000 : A=USR0(1)
20  PRINT @1 ; "A4L1R;"               o  To initialize the
30  FOR W=1 TO 700 : NEXT W              computer
40  PRINT @1 ; "A8"
50  INPUT @1 ; D$                     o  Wait until the DC
60  X=ASC(MID$(D$, 1, 1))                output is stabilized.
70  Y=ASC(MID$(DS, 2, 1))
80  PRINT ((X-48)×16+(Y-48))/255
90  END
```

4.5.3 Example of Program Application

For example, Model ORC21 Programmable Oscillator and Model AVM23R
AC Voltmeter are controlled, automatical judgement is done on whether
the frequency characteristics of a bandpass filter is within the
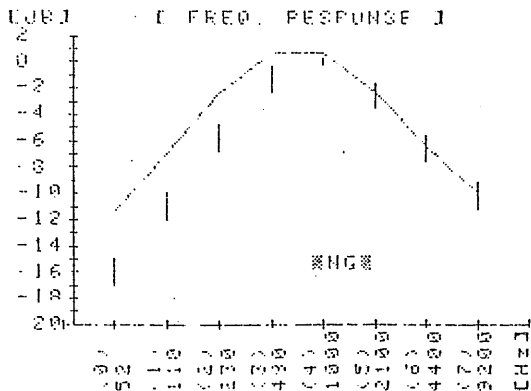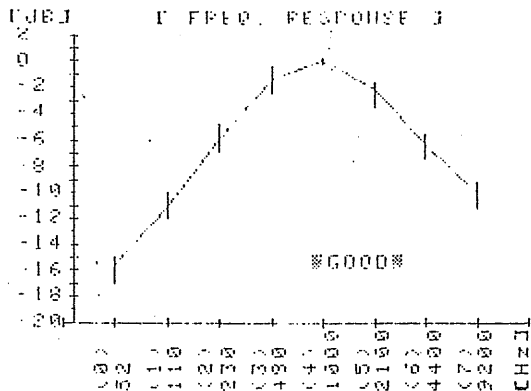specified tolerance, and the result is printed out.

Figure 4-8

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4.5.4 Exerpt of ASCII Codes

Table 4-3

BITS (B4 B3 B2 B1)				C\R	B7=0 B6=0 B5=0 → 0	MSG	B7=0 B6=0 B5=1 → 1	MSG	B7=0 B6=1 B5=0 → 2	MSG	B7=0 B6=1 B5=1 → 3	MSG	B7=1 B6=0 B5=0 → 4	MSG	B7=1 B6=0 B5=1 → 5	MSG
B4	B3	B2	B1		0		1		2		3		4		5	
0	0	0	0	0							0		@		P	
0	0	0	1	1							1		A		Q	
0	0	1	0	2	.						2		B		R	
0	0	1		3							3		C		S	
0	1	0	0	4		SDC		DCL			4		D		T	
0	1	0	1	5							5		E		U	
0	1	1	0	6							6		F		V	
0	1	1	1	7							7		G		W	
1	0	0	0	8							8		H		X	
1	0	0	1	9							9		I		Y	
1	0	1	0	10	LF						:		J		Z	
1	0	1	1	11							;		K			
1	1	0	0	12							<		L			
1	1	0	1	13	CR						=		M			
1	1	1	0	14							>		N			
1	1	1	1	15							?	UNL	O			UNT

Addressed command — Universal command — Listen address — Talk address

Primary commands

Legends

C: Column

R: Row