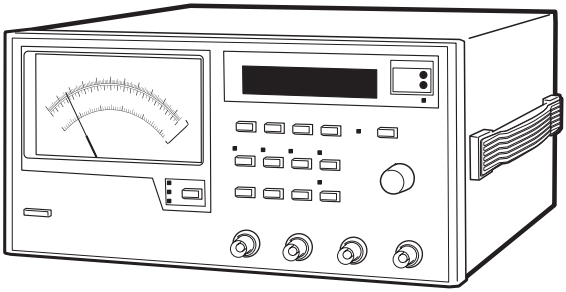
Part No. Z1-002-722, IA002922
Sep. 2004

Operation Manual

Time interval jitter meter

KJM6775



KIKUSUI

About This Manual

Please read through and understand this Operation Manual before operating the product. After reading, always keep the manual nearby so that you may refer to it as needed. When moving the product to another location, be sure to bring the manual as well.

If you find any incorrectly arranged or missing pages in this manual, they will be replaced. If the manual it gets lost or soiled, a new copy can be provided for a fee. In either case, please contact Kikusui distributor/agent, and provide the “Kikusui Part No.” given on cover.

This manual has been prepared with the utmost care; however, if you have any questions, or note any errors or omissions, please contact Kikusui distributor/agent.

Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly. (Revision should be applied to items indicated by a check mark ☑.)

☐ **Input voltage**

The input voltage of this product is _____ VAC, and the voltage range is _____ to _____ VAC. Use the product within this range only.

☐ **Input fuse**

The rating of this product's input fuse is _____ A, _____ VAC, and _____ .

⚠WARNING

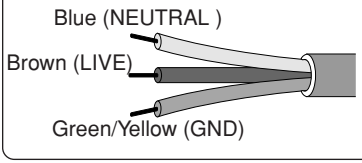
- To avoid electrical shock, always disconnect the AC power cord or turn off the switch on the switchboard before attempting to check or replace the fuse.
- Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.

☐ AC power cord

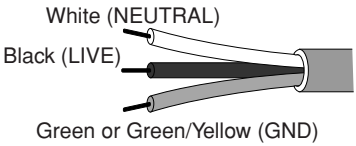
The product is provided with AC power cords described below. If the cord has no power plug, attach a power plug or crimp terminals to the cord in accordance with the wire colors specified in the drawing.

⚠WARNING • The attachment of a power plug or crimp terminals must be carried out by qualified personnel.

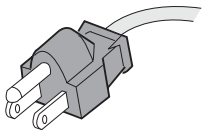
☐ Without a power plug



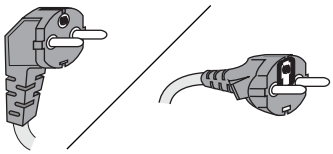
☐ Without a power plug



☐ Plugs for USA



☐ Plugs for Europe

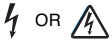


☐ Provided by Kikusui distributor/agent

Kikusui agents can provide you with suitable AC power cord. For further information, contact Kikusui distributor/agent.

⚠ Safety Symbols

For the safe use and safe maintenance of this product, the following symbols are used throughout this manual and on the product. Understand the meanings of the symbols and observe the instructions they indicate (the choice of symbols used depends on the products).

	Indicates that a high voltage (over 1,000 V) is used here. Touching the part causes a possibly fatal electric shock. If physical contact is required by your work, start work only after you make sure that no voltage is output here.
DANGER	Indicates an imminently hazardous situation which, if ignored, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if ignored, may result in damage to the product and other property.
	Shows that the act indicated is prohibited.
	Is placed before the sign "DANGER," "WARNING," or "CAUTION" to emphasize these. When this symbol is marked on the product, see the relevant sections in this manual.
	Indicates a protective conductor terminal.
	Indicates a chassis(frame) terminal.

⚠ Safety Precautions

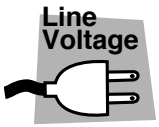
The following safety precautions must be observed to avoid fire hazard, electrical shock, accidents, and other failures. Keep them in mind and make sure that all of them are observed properly.

Users

- This product must be used only by qualified personnel who understand the contents of this operation manual.
- If it is handled by disqualified personnel, personal injury may result. Be sure to handle it under supervision of qualified personnel (those who have electrical knowledge.)
- This product is not designed or produced for home-use or use by general consumers.

Purposes of use

- Do not use the product for purposes other than those described in the operation manual.



Input power

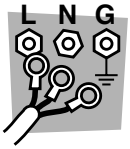
- Use the product with the specified input power voltage.
- For applying power, use the AC power cord provided. Note that the provided power cord is not use with some products that can switch among different input power voltages or use 100 V and 200 V without switching between them. In such a case, use an appropriate power cord. For details, see the relevant page of this operation manual.

Fuse

- With products with a fuse holder on the exterior surface, the fuse can be replaced with a new one. When replacing a fuse, use the one which has appropriate shape, ratings, and specifications.

Cover

- There are parts inside the product which may cause physical hazards. Do not remove the external cover.



Installation

- When installing products be sure to observe "1.2 Precautions for Installation" described in this manual.
- To avoid electrical shock, connect the protective ground terminal to electrical ground (safety ground).
- When applying power to the products from a switchboard, be sure work is performed by a qualified and licensed electrician or is conducted under the direction of such a person.

Relocation

- Turn off the power switch and then disconnect all cables when relocating the product.
- Use two or more persons when relocating the product which weights more than 20 kg. The weight of the products can be found on the rear panel of the product and/or in this operation manual.
- Use extra precautions such as using more people when relocating into or out of present locations including inclines or steps. Also handle carefully when relocating tall products as they can fall over easily.
- Be sure the operation manual be included when the product is relocated.

Operation

- Check that the AC input voltage setting and the fuse rating are satisfied and that there is no abnormality on the surface of the AC power cord. Be sure to unplug the AC power cord or stop applying power before checking.
- If any abnormality or failure is detected in the products, stop using it immediately. Unplug the AC power cord or disconnect the AC power cord from the switchboard. Be careful not to allow the product to be used before it is completely repaired.
- For output wiring or load cables, use connection cables with larger current capacity.
- Do not disassemble or modify the product. If it must be modified, contact Kikusui distributor/agent.

Maintenance and checking

- To avoid electrical shock, be absolutely sure to unplug the AC power cord or stop applying power before performing maintenance or checking.
- Do not remove the cover when performing maintenance or checking.
- To maintain performance and safe operation of the product, it is recommended that periodic maintenance, checking, cleaning, and calibration be performed.

Service

- Internal service is to be done by Kikusui service engineers. If the product must be adjusted or repaired, contact Kikusui distributor/agent.

Overvoltage category

To standardize insulation requirements with respect to the level of transient overvoltage, IEC60664 (Insulation coordination for equipment within low-voltage systems) classifies circuits into four categories according to the frequency of occurrence of voltage transients. For details, see the IEC Standards.

Overvoltage category I

- Equipment of over voltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriately low level.
  Examples are protected electronic circuits.

Overvoltage category II

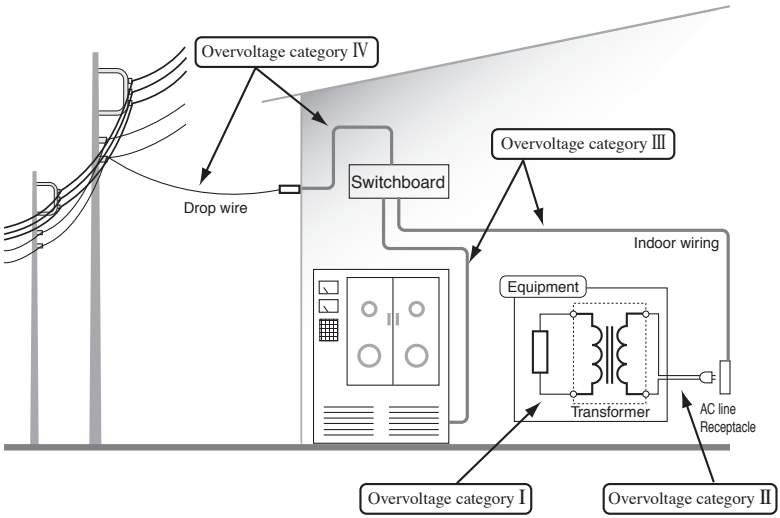
- Equipment of overvoltage category II is energy-consuming equipment to be supplied from the fixed installation.
  Examples of such equipment are appliances, portable tools and other household and similar loads.
  If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies.

Overvoltage category III

- Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements.
  Examples of such equipment are switches in the fixed installation and equipment for industrial use with permanent connection to the fixed installation.

Overvoltage category IV

- Equipment of overvoltage IV is for use at the origin of the installation.
  Example of such equipment are electricity meters and primary overcurrent protection equipment.


Overvoltage category Ⅳ
Drop wire
Switchboard
Overvoltage category Ⅲ
Indoor wiring
Equipment
Transformer
AC line
Receptacle
Overvoltage category Ⅰ
Overvoltage category Ⅱ

Arrangement of this manual

This Operation Manual is made up of the following sections.

Preface

This Operation Manual describes the time interval jitter meter KJM6775.

Chapter1 Setup

This chapter describes the procedures from unpacking to installation to operation checking.

Chapter2 Part Names and Functions

This chapter gives the names of the switches, indicators, connectors, and other parts on the front and rear panels, and describes their functions.

Chapter3 Operation

This chapter describes the basic operations performed from the front panel, such as setting of the test conditions and system settings

Chapter4 GPIB Control

This chapter describes device messages and preparations for remotely controlling the KJM6775 via the GPIB interface.

Chapter5 Control Using EXIT I/O

This chapter describes use of the EXT I/O connector on the rear panels of the KJM6775.

Chapter6 Maintenance

This chapter describes the maintenance and inspection of the KJM6775. To maintain the KJM6775's original performance for as long as possible, conduct periodic inspection and maintenance.

Chapter7 Specifications

This chapter provides the electrical and mechanical specifications for the KJM6775.

Appendix

This Appendix introduces measurement principle of jitter and the block diagram.

Contents

Chapter4 GPIB Control

Chapter5 Control Using EXIT I/O

Chapter6 Maintenance

Chapter7 Specifications

Appendix

Preface

About this Manual

This Operation Manual describes the time interval jitter meter KJM6775.

■ This manual is applicable to the KJM6775 whose ROM version number is:

- ROM version 1.5x.

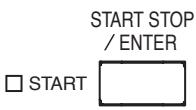
You can check the version number on the opening screen at turning on the power or by using the *IDN? message.

For the *IDN? message, see "Chapter4 GPIB Control".

When you contact us for any information about the KJM6775, please indicate the ROM version number and serial number of the KJM6775. The serial number is shown on the rear panel of the KJM6775.

Fig.P-1 The opening screen (Example of ROM version is 1.50)

■ START STOP/ENTER key



This operation manual refers to the START STOP/ENTER key as START STOP key or ENTER key depending on the intended purpose of the key.

■ SHIFT key

The functions marked in blue characters below the front panel keys are activated by pressing the relevant key while holding down the SHIFT key.

When describing procedures of functions marked in blue characters, this operation manual refers to the relevant key by the function name in blue characters (for example, "Press the INITIAL key with the SHIFT key held down.").

Product Overview

The KJM6775 is an instrument used to measure jitters of optical disks such as CDs and DVDs.

It is capable of measuring three types of jitters: RF to CLOCK jitter, BI-PHASE jitter, and WOBBLE jitter.

The KJM6775 can be used for the development, adjustment, and inspection of optical pickups.

Below are the features of the KJM6775.

■ High-speed processing

Achieves high-speed processing in RF to CLOCK jitter measurements: maximum frequency of 220 MHz and 74 MSPS maximum.

It is suitable for jitter measurements of high-density optical disk drives and next-generation disks.

■ Built-in Specialized Circuit

Equipped with equalizer (DVD × 1), PLL clock regeneration circuit (CD × 1, 2, 4, 8, DVD × 1, 2), symmetry follow-up circuit, and delay circuit as standard.

The circuits are designed according to the specifications (books) of different storage media.

Measurements are convenient and easy.

■ Sectional Calculation and Single-Shot Calculation Capabilities

The KJM6775 employs a system by which input data is accumulated as histograms and collective digital calculations are used to derive the jitter. Combination of arming, arming delay, and inhibit allows calculation of single-shot signals and sections of a disk.

Chapter1 Setup

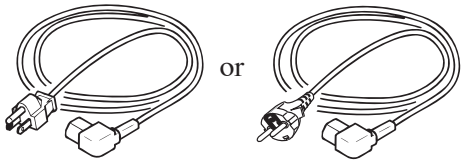
This chapter describes the procedures from unpacking to installation to operation checking.

1.1 Unpacking and Packing

■ Unpacking

Upon receiving the product, confirm that the necessary accessories are included and have not been damaged in transit. Fig.1-1 shows a list of the accessories.

Should any damage or shortage be found, please contact Kikusui distributor/agent.

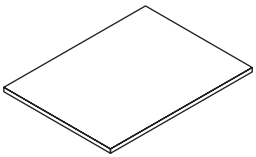


or

The power cord that is provided varies depending on the destination for the product at the factory-shipment.

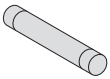
[85-AA-0003] [85-AA-0005]

☐ Power cord, 1 pc.



☐ Operation Manual, 1 copy.
[Z1-002-722]

This is contained in the fuse holder.



☐ Spare fuse, 1 pc.
2.5A (T) 250V
[99-00-0027]

Fig.1-1 Accessories

NOTE • Retain the packing material for future transport.

1.2 Precautions for Installation

Be sure to observe the following precautions when installing the KJM6775.

■ Do not use the meter in a flammable atmosphere.

To prevent explosion or fire, do not use the meter near alcohol, thinner, or other combustible materials, or in an atmosphere containing such vapors.

■ Avoid locations where the meter is exposed to high temperatures or direct sunlight.

Do not locate the meter near a heater or in areas subject to drastic temperature changes.

Operating temperature range :0 °C to 40 °C

Optimum (specification guaranteed) temperature range
:15 °C to 35 °C

Storage temperature range :-20 °C to 60 °C

■ Avoid humid environments.

Do not locate the meter in a high-humidity environment—near a boiler, humidifier, or water supply.

Operating humidity range :20% to 85% R.H
(no dew condensation is allowed)

Storage humidity range :90% R.H or less
(no dew condensation is allowed)

Condensation may occur even within the operating humidity range. In that case, do not start using the meter until the location is completely dry.

■ Do not place the meter in a corrosive atmosphere.

Do not install the meter in a corrosive atmosphere or one containing sulfuric acid mist or the like. This may cause corrosion of various conductors and imperfect contact with connectors, leading to malfunction and failure, or in the worst case, a fire.

■ Do not locate the meter in a dusty environment.

Dirt and dust in the meter may cause electrical shock or fire.

■ Do not use the meter where ventilation is poor.

Provide sufficient space around the meter. Otherwise, heat may accumulate in the meter, resulting in fire.

■ **Do not place any object on the meter.**

Particularly a heavy one, as doing so could result in a malfunction.

■ **Do not place the meter on a tilted surface or in a location subject to vibrations.**

If placed on a non-level surface or in a location subject to vibration, the meter may fall, resulting in damage and injury.

■ **Do not use the meter in locations affected by strong magnetic or electric fields.**

Operation in a location subject to magnetic or electric fields may cause the meter to malfunction, resulting in electrical shock or fire.

Use of the legs

These legs are used to raise the front part of the meter so that the screen on the front panel is easier to see and the keys are easier to operate.

To use the legs, pull them toward the front until you hear a click.

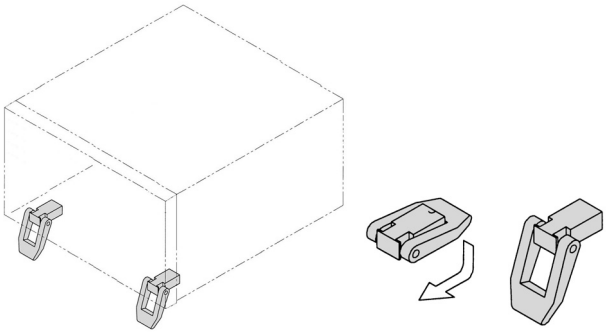


Fig.1-2 Raising the Legs

⚠CAUTION •When the legs are raised and used, do not place any article on the meter or exert force on it.

1.3 Precautions on Moving

When moving or transporting the KJM6775 to an installation site, observe the following precautions.

■ **Turn the POWER switch off.**

Moving the meter with the power on may result in electrical shock or damage.

■ **When moving the meter, Disconnect all wires from it.**

Moving the meter with cables connected may break the cables or cause the meter to fall, resulting in injury.

■ **Retract the legs.**

Moving the meter with the legs raised may result in breakage of the legs.

■ **For transportation, use the special packing material for the meter.**

Transport the meter in its original package to prevent vibration and falls, which may damage the meter. If you require packing material, contact Kikusui distributor/agent.

1.4 Checking the Line Voltage

The power cord that is provided varies depending on the destination for the product at the factory-shipment.

⚠WARNING

- This instrument is designed to operate from the overvoltage category II.
  Do not operate if from the overvoltage category III or IV.
  For the overvoltage categories, see See "Overvoltage category" on page VII
- The AC power cord for 100 V system shown in Fig.1-3 has a rated voltage of 125 V AC. If this AC power cord is used at the line voltage of a 200 V system, replace the power cord with that satisfying that line voltage.
  Appropriate power code must be selected by qualified personel (those who have electrical knowledge).
  If such a power cord cannot be obtained, contact your Kikusui distributor/agent.

Do not use the power code attached to this product for the power code of other instruments.

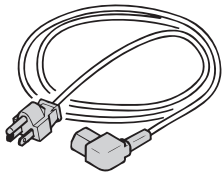
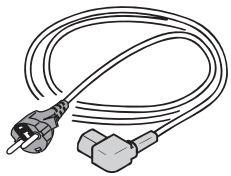
	Power cord for 100 V system [85-AA-0003] Rated voltage: 125 VAC Rated current: 10 A
	Power cord for 200 V system [85-AA-0005] Rated voltage: 250 VAC Rated current: 10 A

Fig.1-3 AC power cord

Connection procedure

1. Confirm that the supply voltage is within the line voltage range of the KJM6775.

   AC power that can be input has an allowable voltage range of 85 V to 250 V AC and a frequency range of 45 Hz to 65 Hz.

2. Connect the AC power cord to the AC LINE connector on the rear panel.

   Use the provided power code or power code that is selected by qualified personnel.

3. Plug in the AC power cord.

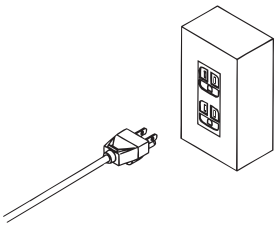
1.5 Grounding

⚠WARNING

- Be sure to connect the KJM6775 to an electrical ground (safety ground).
- The KJM6775 is designed as a Class I equipment (equipment protected against electric shock with protective grounding in addition to basic insulation). Therefore, electric shock may occur without proper grounding.

To ensure safety, be sure to ground the KJM6775.

Connect the AC power cord to a three-contact grounded electrical outlet.

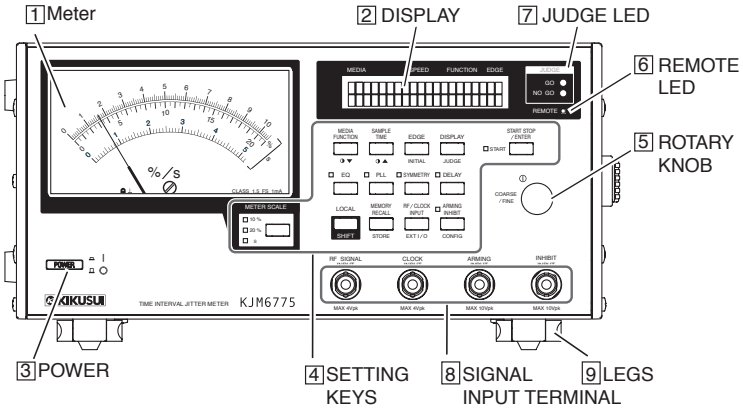


Grounded three-contact electrical outlet

Chapter2 Part Names and Functions

This chapter gives the names of the switches, indicators, connectors, and other parts on the front and rear panels, and describes their functions.

2.1 Front Panel



[1] METER

The KJM6775 indicates a jitter value (standard deviation value).

The % indication shows a jitter value in percentage to one clock cycle when one clock cycle is regarded as 100%.

The ns indication shows a jitter value in the absolute value of time.

At the lower center section of the KJM6775 is a zero adjustment used to adjust the mechanical zero position.

[2] DISPLAY

Displays various information such as settings and measured values.

[3] POWER

Turns instrument power on or off.

Press the switch switches between turn on(|) and off(◯).

[4] SETTING KEYS

Used to set

For details, see "Chapter3 Operation".

MEDIA FUNCTION

◑▼

Used to enter the setup mode for media, speed, and measurement function. The blinking position moves to the right each time the key is pressed. Here, the value can be changed by turning the rotary knob. Pressing this key with the SHIFT key held down lowers the display contrast.

SAMPLE TIME

◑▲

Used to enter the sample time mode. The value can be changed by turning the rotary knob. Pressing this key with the SHIFT key held down highers the display contrast.

EDGE

INITIAL

Used to switch the trigger edge each time the key is pressed.
Pressing this key with the SHIFT key held down causes INITIALIZE EXECUTE? to appear. Pressing the ENTER key in this condition executes initialization.

DISPLAY

JUDGE

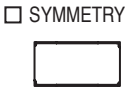
Used to switch the parameter indicated on the display. Pressing this key with the SHIFT key held down enables setting of judge parameters.

☐ EQ

Used to turn on/off the equalizer.
The equalizer can be turned on only when making time interval measurements of DVD, DVD-ROM, DVD-R, DVD-RW, DVD+R, or DVD+RW at ×1.00 speed.

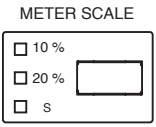
☐ PLL

Used to turn on/off the PLL.
The PLL can be turned on only when making time interval measurements of DVD, DVD-ROM, DVD-R or DVD-RW, at ×1.00 or ×2.00 speed, or CD, CD-ROM, CD-R or CD-RW at ×1.00, ×2.00, ×4.00 or ×8.00 speed.



Used to switch the operation mode of the symmetry follow-up circuit, set the slice level when in manual mode, and fine-adjust when in offset mode.

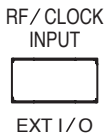
Used to adjust the phase during time interval jitter measurements.



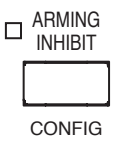
Used to switch the KJM6775 scale.
The possible settings are 10 % and 20 % for % scale and 1 ns, 2 ns to 50 μs for S scale. When the S scale is displayed, the setting can be changed using the rotary knob while displaying the scale.

Pressing this key while the instrument is in the remote state controlled by GPIB causes the instrument to return to control from the front panel (local status).
Pressing a other key with the SHIFT key held down performs as marked in blue characters.

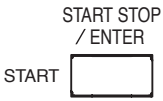
The KJM6775 can store up to 15 sets of panel settings. This key is used to recall the stored settings.
Pressing this key with the SHIFT key held down stores the settings.



Used to set the input section of the RF signal and clock signal.
Pressing this key with the SHIFT key held down enables setting of various EXT I/O port parameters.



To enter the configuration menu where detailed settings can be entered.
Used to set the operation of the arming signal and inhibit signal. Pressing this key with the SHIFT key held down causes the KJM6775.



Starts or stops the measurement operation.
When measurement is in progress, the START LED lights up.
Pressing this key when setting measurement conditions causes the settings to be confirmed, and the display changes from the setup menu back to the display in measurement mode.

[5] Rotary knob

The rotary knob is turned when changing values or various settings.

When entering a value, clicking the rotary knob switches between FINE and COARSE.

[6] Remote LED

Lights up when the KJM6775 is being control via the GPIB.

When lit, all keys except the LOCAL key are not accepted.

[7] Judge LED

LED used for judgment of measured values.

The green LED lights up for GO; the red LED lights up for NO GO.

[8] Signal input terminals (BNC)

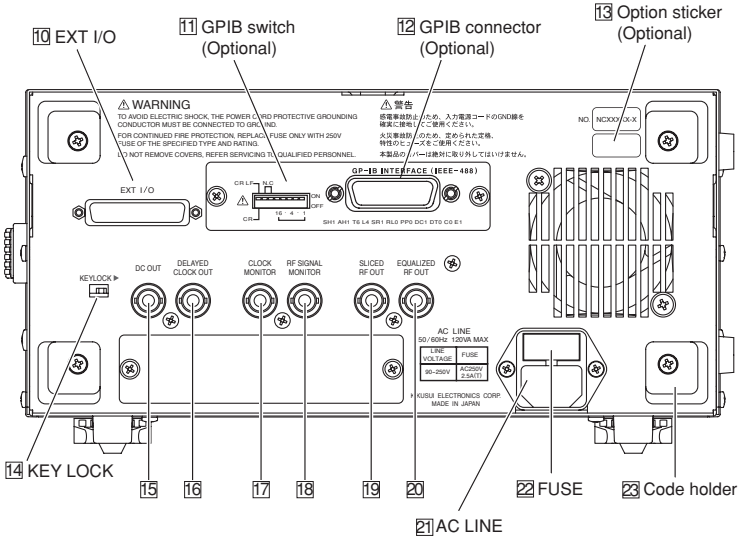
From the left, terminals for RF signal, clock signal, arming signal, and inhibit signal.

[9] LEGS

Used to raise the front panel of the KJM6775 to get a better view of the display or improve the operability of the keys.

Pull the legs forward until you hear them click.

2.2 Rear Panel



[10]EXIT I/O

External control connector (D-sub 25 pins, mounting screw M2.6) .

[11]GPIB switches (optional)

Used to set the GPIB address of the KJM6775.

[12]GPIB connector (optional)

A 24-pin connector complying with the IEEE-488-1978 GPIB Standard, which connects instrument to computer.

[13]Option sticker (optional)

Indicates that optional are installed in the KJM6775.

[14]KEY LOCK

Move this switch in the direction of the right(→) to lock the keys and the rotary knob on the front panel.

[15]DC OUT (BNC)

Outputs a voltage proportional to a measured value (0.2 V/%). Output impedance is approx. 600 Ω.

[16]DELAYED CLOCK OUT (BNC)

Outputs a clock signal that has undergone a phase adjustment with respect to an RF signal in the delay circuit. The output amplitude is 0.2 Vp-p to 0.3 Vp-p (terminated with 50 Ω). The output impedance is approx. 50 Ω.

[17]CLOCK MONITOR (BNC)

Used to monitor a clock signal, this terminal outputs an amplitude approximately 1/4 (terminated with 50 Ω) of input amplitude. Output impedance is approx. 50 Ω.

[18]RF SIGNAL MONITOR (BNC)

Used to monitor an RF signal, this terminal outputs an amplitude approximately 1/4 (terminated with 50 Ω) of input amplitude. Output impedance is approx. 50 Ω.

[19]SLICED RF OUT (BNC)

Outputs an RF signal sliced by the slice circuit. The output amplitude is 0.2 Vp-p to 0.3 Vp-p (terminated with 50 Ω). The output impedance is approx. 50 Ω.

[20]EQUALIZED RF OUT (BNC)

Outputs an RF signal after the signal has passed through the equalizer when the equalizer is on. The output impedance is approx. 50 Ω. When sine wave of specified level frequency 4 MHz to RF input is input, the output level is 0.2 Vp-p to 0.3 Vp-p (terminated with 50 Ω). When an EFM signal is input, the output amplitude changes due to the characteristics of the signal.

[21]AC LINE

Power code connector for supplying line voltage.

⚠WARNING • Improper handling of the AC power cord may cause of electric shock. Always follow the procedure, See "1.4 Checking the Line Voltage".

[22]FUSE

This contains an AC input fuse.

⚠WARNING • Improper handling of the fuse may result in electric shock. Before replacing or checking the fuse, see "6.4 Replacing the Fuse".

[23]Code holders

Wind the AC power cord around these holders when storing the KJM6775.

Chapter3 Operation

This chapter describes the basic operations performed from the front panel, such as setting of the test conditions and system settings

3.1 Power on

1. Confirm that the AC power is within the allowable line voltage range indicated on the rear panel of the KJM6775.
2. Confirm that the AC power cord is properly connected to the AC LINE connector on the rear panel of the KJM6775.
3. Connect the other plug of the AC power cord to an electrical outlet.
4. Check that the KJM6775 pointer is indicating 0.

   If not, adjust the mechanical zero using the zero adjustment screw located at the lower center section of the KJM6775. See figure 3-1.
5. Turn on the POWER switch.

   After the display shows the ROM version, the front panel settings are set to the condition that existed immediately before the power was turned off.

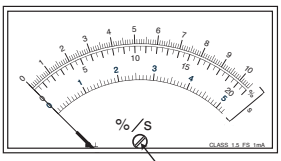


Fig.3-1

3.2 Initialization

Pressing the INITIAL key with the SHIFT key held down causes INITIALIZE EXECUTE? to appear on the display.

Then, pressing the ENTER key executes initialization. The KJM6775 front panel is reset to factory default.

Note that the contents of the setup memory remain the same setting.

The after initialization and the factory-shipped of panel setting are as table 3-1:

Table 3-1 Setting of factory-shipment

MEDIA	DVD
SPEED	×1.00
FUNCTION	RF to CLK
SAMPLE TIME	20.0 ms
BLOCK	1
EDGE(RF)	↑(rising)
EDGE(CLK)	↑(rising)
EQ	OFF
PLL	OFF
SYMMETRY	AUTO
DELAY	OFF
METER SCALE	20 %
INHIBIT INPUT	OFF
ARMING	OFF
JUDGE LEVEL (UPPER)	20 %
JUDGE LEVEL (LOWER)	0 %
JUDGE UNIT	%
MEMORY	OFF
RF IMPEDANCE	1 MΩ
CLK IMPEDANCE	1 MΩ

CLK TRIG LEVEL	0.000 V
RF COUPLING	AC
CLK COUPLING	AC
EXT I/O PO	#H00
METER AVERAGE	1
DC OUT AVERAGE	1
T-REFERENCE	COUNTER MEAS.
INHIBIT SLICE-OUT	THROUGH
INHIBIT DELAY	0 μs
INHIBIT MODE	GATE + SYMMETRY
BACK LIGHT	ON
DC OUT GAIN	0.20 V/%
DC OUT OFFSET	0.00 V
INPUT CHECK	ENABLE
START MODE	REPEAT
LOCK MODE	STANDARD

3.3 Connecting the Signal

Fig.3-2 shows the four signal input terminals used for measurements. Different terminals are used according to the input signal and the measurement method.

Connect the DUT and the KJM6775 by referring to the connection examples of the RF signal and clock signal indicated on the next page.

1. Connect a RF signal, Wobble signal or Bi-phase signal (ATIP modulation signal) to the RF SIGNAL INPUT terminal.

   When a probe is used for signal connection, calibrate the probe according to section "3.9 Calibrating the Probe"

2. To make measurements using two signals in time interval measurement according to the signal type, connect a clock signal to the CLOCK INPUT terminal.

   When a probe is used for signal connection, calibrate the probe according to section "3.9 Calibrating the Probe"

3. To enable the arming function, connect an arming signal to the ARMING INPUT terminal.
4. To enable the inhibit function, connect an inhibit signal to the INHIBIT INPUT terminal.

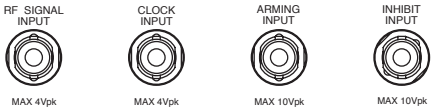


Fig.3-2

After connecting the signals, refer to section "3.4 Basic Setup" to configure the KJM6775 appropriately for the relevant measurement method.

When using the arming function or inhibit function, set the function by referring to section "3.6 Arming and Inhibit Functions"

Connection examples of RF signal and clock signal

- Time interval jitter measurement using sliced RF signal and regenerated clock signal (measurement method compliant with the DVD Book)

Panel setting	
PLL	OFF
SYMMETRY	MANUAL
FUNCTION	RF to CLK

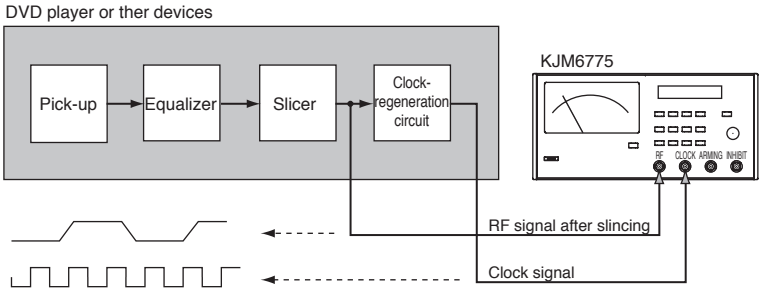


Fig.3-3

- Time interval jitter measurement using equalized RF signal and regenerated clock signal (DVD)

Panel setting	
PLL	OFF
SYMMETRY	AUTO (or AUTO+OFST)
EQ	OFF

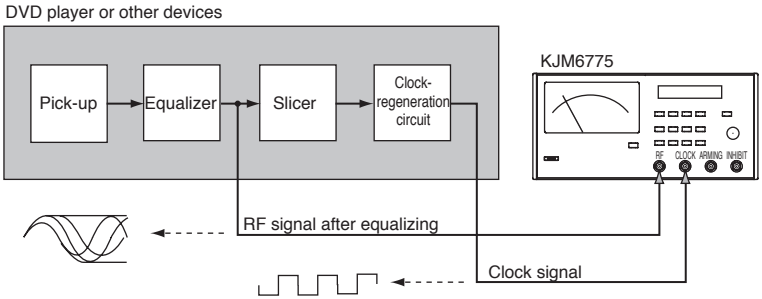


Fig.3-4

• Time interval jitter measurement using pick-up output signal and regenerated clock signal (DVD×1 or CD)

Panel setting	
PLL	OFF
SYMMETRY	AUTO (or AUTO+OFST)
EQ	DVD:ON CD:OFF

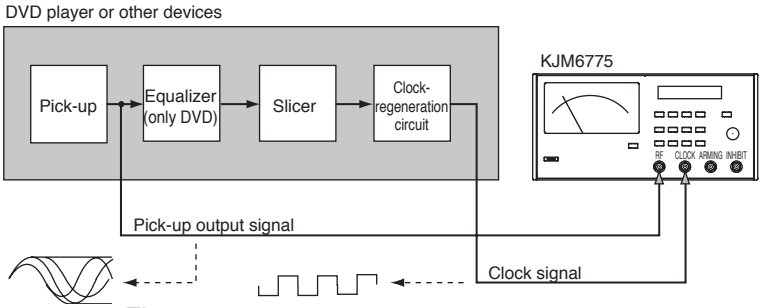


Fig.3-5

• Time interval jitter measurement using sliced RF signal only

Panel setting	
PLL	ON
SYMMETRY	MANUAL
EQ	OFF

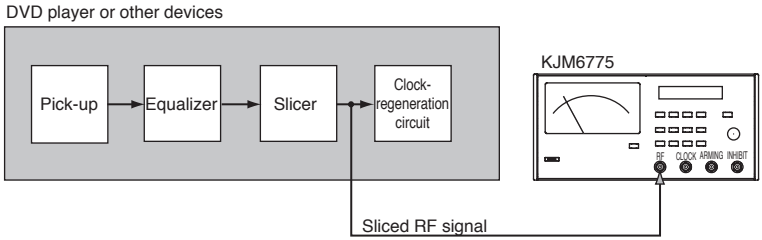


Fig.3-6

• Time interval jitter measurement using equalized RF signal only(CD, DVD)

Panel setting	
PLL	ON
SYMMETRY	AUTO (or AUTO+OFST)
EQ	OFF

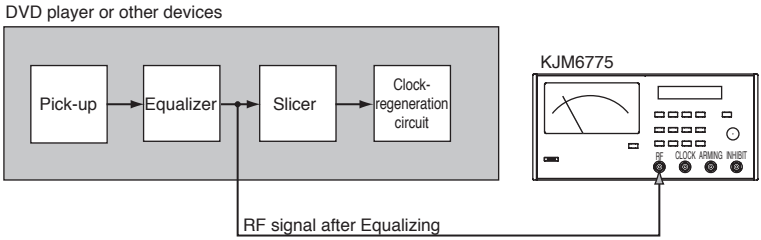


Fig.3-7

• Time interval jitter measurement using pick-up output signal only (DVD1×1 or CD)

Panel setting	
PLL	ON
SYMMETRY	AUTO (or AUTO+OFST)
EQ	ON

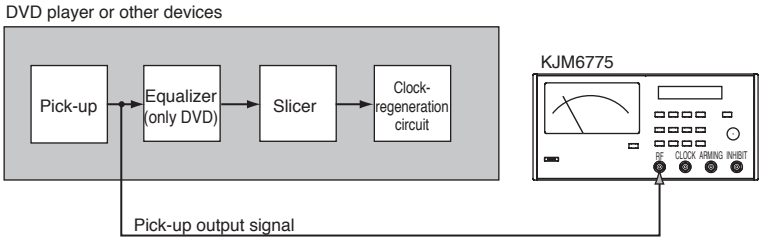


Fig.3-8

3.4 Basic Setup

3.4.1 Starting and Stopping Measurements

Use the START STOP key to start or stop measurements.

When measurement is in progress, the START LED lights up.

Perform the actual measurements after setting the KJM6775.

3.4.2 Setting the Media and Measurement Function

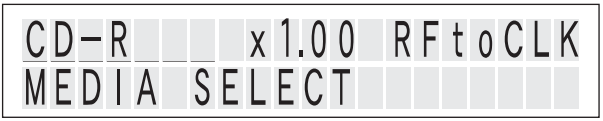
Select the media to be measured, the media speed, and the measurement function.

NOTE • Depending on the media selection, you may not be able to turn on the PLL clock regeneration circuit. In addition, the circuit may be forcibly turned off if the media is switched while the circuit is turned on.

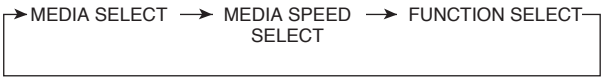
1. Press the MEDIA/FUNCTION key.

   The following screen appears.

   Measurement is suspended when the KJM6775 enters the media setup menu.



2. Each time the MEDIA/FUNCTION key is pressed the cursor (blink indication) changes allowing you to select the parameter.



NOTE • The only available function may be RF to CLK depending on the media. In such case, the function parameter cannot be selected.

3. Use the rotary knob to set the item at the cursor position.

- At the MEDIA SELECT Position

  The media can be selected.

  CD ↔ CD-ROM ↔ CD-R↔ CD-RW ↔ DVD ↔ DVD-ROM ↔ DVD-R ↔ DVD-RW ↔ DVDRAM1 ↔ DVDRAM2 ↔ DVD+RW ↔ DVD+R

- At the MEDIA SPEED Position

  The speed can be changed.

  The preset range varies depending on the selected media.

  CD (×1.0 to ×50.0), DVD (×1.0 to ×8.0), etc.

  ×1.00 ↔ ×2.0 ↔ ×4.0 ← • • • → ×48.0 ↔ ×50.0 (in case of CD)

- Pressing the rotary knob

  Switches to FINE input mode for adjusting the setting in minute amounts. (Pressing the key again resets to the original mode.)

Setting step when FINE input be selected	
to ×1.00	0.02 step
to ×2.0	0.05 step
to ×4.0	0.1 step
to ×10.0	0.2 step
to ×50.0	0.5 step

- At the FUNCTION SELECT position

  The measuring function can be changed.

  RFtoCLK ↔ BiPhase ↔ Wobble

4. Press the START STOP or DISPLAY key.

The KJM6775 returns to measurement display.

3.4.3 Setting the Sample Time

Set the measuring time and the number of block samples.

If the number of block samples is 1, the jitter value is calculated every sample time. If the number of block samples is greater than 1, the jitter value is calculated after repeating the sampling the specified number of times.

By combining the block sample function and the arming function, a certain section such as the ID can be acquired numerous times to calculate the jitter.

1. Press the SAMPLE TIME key.

   The following screen appears.

2. Each time the SAMPLE TIME key is pressed the cursor (blink indication) changes allowing you to select the parameter.

   SAMPLE TIME ↔ BLOCK

3. Use the rotary knob to set the item at the cursor position.

   • At the SAMPLE TIME Position

   The sample time can be changed.

   0.6us ↔ 1.0us ↔ 2.0us ↔ 5.0us ← • • • → 999ms ↔ 1s

   • Pressing the rotary knob

   Switches to FINE input mode for adjusting the setting in minute amounts. (Pressing the key again resets to the original mode.)

Setting step when FINE input be selected (setting range:0.6 μs to 1 s)	
to 100 μs	0.2 μs step
to 1 ms	1 μs step
to 10 ms	10 μs step
to 100 ms	100 μs step
to 1.00 s	1 ms step

- At the BLOCK position

  The number of block samples can be changed.

  1 ↔ 2 ↔ 3 ← ••• → 100

4. Press the START STOP or DISPLAY key.

   The KJM6775 returns to measurement display.

3.4.4 Setting the Edge

Select the measuring edge of RF signal and clock signal.

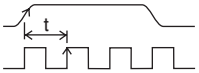
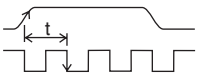
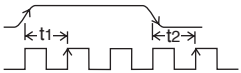
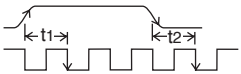
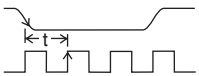
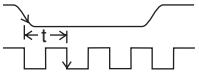
1. Press the EDGE key.

   The following screen appears.

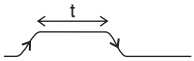
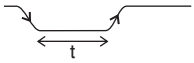
2. The edge switches each time the EDGE key is pressed.

   The edge types that can be selected varies depending on the function.

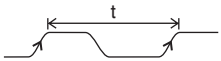
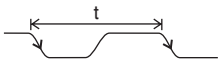
   - For time interval jitter measurement (R to C)

↑↑		Measures from the rising edge of the RF signal to the rising edge of the next clock signal.
↑↓		Measures from the rising edge of the RF signal to the falling edge of the next clock signal.
⇕↑		Alternately measures from the rising edge or falling edge of the RF signal to the rising edge of the next clock signal ↑(RF) ↑ (CLK) and ↓(RF) ↑ (CLK)).
⇕↓		Alternately measures from the rising edge or falling edge of the RF signal to the falling edge of the next clock signal ↑(RF) ↓(CLK) and ↓ (RF) ↓ (CLK)).
↓↑		Measures from the falling edge of the RF signal to the rising edge of the next clock signal.
↓↓		Measures from the falling edge of the RF signal to the falling edge of the next clock signal.

• For Bi-Phase jitter measurement

↑↓		Measures the positive side (from the rising edge to the next falling edge).
↓↑		Measures the negative side (from the falling edge to the next rising edge).

• For Wobble jitter measurement

↑↑		Measures from the rising edge of the measurement input signal to the rising edge of the next signal.
↓↓		Measures from the falling edge of the measurement input signal to the falling edge of the next signal.

3. Press the START STOP or DISPLAY key.
The KJM6775 returns to measurement display.

Recommended Settings

In the DVD Book, it is necessary to measure the RF signal at its rising edge and falling edge. Thus, when selecting a trigger edge for the RF signal, it is recommended that both edges be set. Regarding the edges of the clock signal, select an edge that coincides with the timing for latching the RF signal sliced in the DVD player or drive.

In case of the signal after edge detection

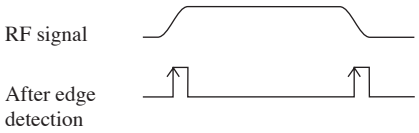


Fig.3-9

In this case, be sure to select the rising edge as the trigger edge of the RF signal of the KJM6775.

In addition, make the measurement with the symmetry follow-up circuit set to manual.

NOTE • When measuring an RF signal that has had single edge converted by edge detection, set the trigger edge of the RF signal in the KJM6775 to either the rising edge or the falling edge, thus bringing the trigger edge into line with the RF signal to be measured. Note that measurement fails if both edges are selected at the same time.

3.4.5 Setting the Judge level

Set the GO/NOGO judgment level. The judgment level can be set individually for two system of units, % and s (seconds). The GO/NOGO judgment is performed using the judgment level of the selected system of units.

The judgment is performed every jitter calculation. When the judgment level is changed, NOGO is indicated until the next data is acquired.

Judgment indicates GO when the measured value is greater than or equal to the LOWER preset value and less than or equal to the UPPER preset value. Otherwise, NOGO is indicated.

NOTE • If the LOWER preset value is greater than or equal to the UPPER preset value, the LOWER preset value is void, and the lower judgment is not performed. In this case, the judgment indicates GO when the measured value is less than or equal to the UPPER preset value and NOGO otherwise.

1. While holding down the SHIFT key, press the JUDGE key.
   The following screen appears.

2. Each time the JUDGE key while holding down the SHIFT key is pressed the cursor (blink indication) changes allowing you to select the parameter.

3. Use the rotary knob to set the item at the cursor position.
   - At the UNIT Position
     The unit cab be selected as s(seconds) or %.
   - At the UPPER or LOWER Position
     When UNIT is set to %
     0.0% ↔ 6.0% ↔ 8.0% ← • • • → 18.0% ↔ 20.0%
     When UNIT is set to s (seconds)
     0.00ns ↔ 1.00ns ↔ 2.00ns ↔ 5.00ns ↔ 10.0ns ← • • • → 50.0us

- Pressing the rotary knob

  Switches to FINE input mode allowing the value to be set in steps of the smallest digit.

  (Pressing the key again resets to the original mode.)

Setting step when FINE input be selected			
When UNIT is set to % (setting range:0.00 % to 20.0 %)		When UNIT is set to s (seconds) (setting range:0.00 ns to 50.0 μs)	
to 10.0 %	0.01 % step	to 10.0 ns	0.01 ns step
to 20.0 %	0.1% step	to 100 ns	0.1 ns step
		to 1.00 μs	1 ns step
		to 10.0 μs	0.01 μs step
		to 50.0 μs	0.1 μs step

4. Press the START STOP or DISPLAY key.

   The KJM6775 returns to measurement display.

3.4.6 Setting the Equalizer

The built-in equalizer turn on/off each time the EQ key is pressed. When turned on, the LED above the EQ key lights up.

The built-in equalizer can be turned on only when the speed of the media, DVD, DVD-ROM, DVD-R, DVD-RW, DVD+R, or DVD+RW, is set to ×1.00 and the function is set to RF to CLOCK measurement. If the EQ key is pressed in any other setting, a warming message appears.

When the built-in equalizer is turned on or off, ON or OFF is displayed for approximately 3 s before returning to the measurement display.

NOTE • The characteristics of the equalizer circuit of the KJM6775 conform to the DVD Book (Ver. 1.0). Therefore, if there is a difference between the characteristics of the equalizer circuit in the DVD player (ROM) and the characteristics of the KJM6775, errors are produced between the values measured when the equalizer is turn on and the values measured when the equalizer of the DVD player is used.

3.4.7 Setting the PLL clock-regeneration

The built-in PLL turn on/off each time the PLL key is pressed. When turned on, the LED above the PLL key lights up.

The built-in PLL clock-regeneration circuit can be turned on only when the speed of the media, CD, CD-ROM, CD-R or CD-RW is set to ×1.00, ×2.00, ×4.00 or ×8.00, or DVD, DVD-ROM, DVD-R or DVD-RW is set to ×1.00 or ×2.00 and the function is set to RF to CLOCK measurement. If the PLL key is pressed in any other setting, a warming message appears.

When the built-in PLL is turned on or off, ON or OFF is displayed for approximately 3 s before returning to the measurement display.

3.4.8 Setting the symmetry and slice level

The DVD (8-16 Modulation) or CD (EFM) modulation systems provide a time ratio of 50:50 between "1" and "0" when bit strings are averaged. In other words, DSV (Digital Sum Variation) is "0," indicating that the signal does not contain a DC value. However, when signals are recorded to disk, the pit length on the disk changes, due to various conditions such as optical power at mastering, the developing time of the original disk, and other factors. When a pickup reads the disk, the RF signal will have a DC value. This phenomenon is called "asymmetry." Slicing the RF signal at the center of the full amplitude of the RF signal when binary-coding the signal gives a DC value to the signal obtained after slicing. In slicing the RF signal, a certain slice level will prevent the signal from taking a DC value after slicing. This level is known as the symmetry level of the RF signal.

Operations When SYMMETRY mode is set to AUTO

The KJM6775 has a feature that allows the slice level to follow up the symmetry level of an RF signal automatically to correct the asymmetry of the RF signal. This is done by feeding back the slice level so that the DC value of a signal obtained after slicing the RF signal becomes 0.

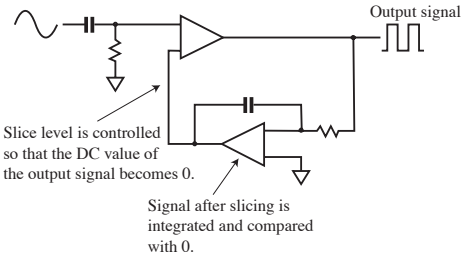


Fig.3-10

Fig.3-10 shows a typical automatic symmetry level follow-up circuit. Changing the slice level of an input signal in this way varies the DC value of the signal obtained after the slicer. This allows for feedback control.

Operation When SYMMETRY mode is set to OFFSET

The OFFSET mode lets you offset the slice level that automatically follows up the symmetry level in AUTO action.

An offset should be selected AUTO+OFST of SYMMETRY mode menu.

Operation When SYMMETRY mode is set to MANUAL.

The automatic symmetry-level follow-up circuit is intended for an RF signal before slicing. Input of a signal with brief rise and fall times, such as square waves, limits the control range. For signals whose duty ratio is not 50%, control is entirely disabled. Thus, when a sliced signal is input, the automatic symmetry level follow-up circuit must be disabled.

To disable automatic symmetry level follow-up, set SYMMETRY to MANUAL.

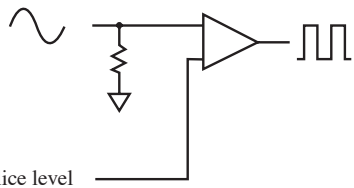


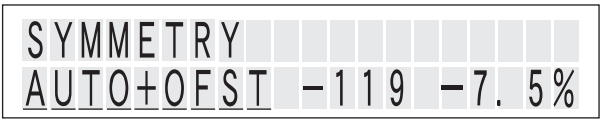
Fig.3-11

Fig.3-11 shows the circuit with SYMMETRY mode set to MANUAL. When the symmetry mode is set to MANUAL, feedback control is disconnected and the slice level is given directly from DAC.

Setting the SYMMETRY mode

1. Press the SYMMETRY key.

   The following screen appears.



   When the symmetry operation mode is set to auto or offset (AUTO+OFST), the actual slice level is displayed in percentage at the lower right corner of the screen. The peak levels of the input amplitude correspond to +50 % and -50 %.

2. Turn the rotary knob to switch the mode.

   SYMMETRY ↔ SYMMETRY ↔ SYMMETRY
   AUTO AUTO+OFST MANUAL
   (OFFSET)

   When set to auto or offset mode, the LED above the SYMMETRY key lights up; when set to manual, the LED turns off.

3. Each time the SYMMETRY key is pressed when mode is AUTO+OFST(OFFSET) or MANUAL, the cursor (blink indication) changes allowing you to select the parameter.

   • When SYMMETRY AUTO+OFST is selected

   mode(AUTO+OFST) ↔ offset value

   When the cursor is at the offset value position (lower center of the screen), turn the rotary knob to set the offset value.

   Since the preset value and the slice level vary depending on the input signal waveform, set the slice level or jitter value to an appropriate value first.

   Preset range: -200 to +200

   • When SYMMETRY MANUAL is selected

   mode(MANUAL) ↔ slice level value

   When the cursor is at the offset value position (lower center of the screen), turn the rotary knob to set the offset value.

   -1.000V ↔ -0.900V ↔ -0.800V ← • • • → +0.900V ↔ +1.000V

   • Pressing the rotary knob

   Switches to FINE input mode allowing the value to be set in 0.002 V steps. (Pressing the key again resets to the original mode.)

4. Press the START STOP or DISPLAY key.

   The KJM6775 returns to measurement display.

3.4.9 Setting the Delay

To measure by time interval jitter(R to C) the amount of jitter of an RF signal relative to a clock signal, the ideal average phase difference between the edge of the clock signal and that of the RF signal is 180˚.

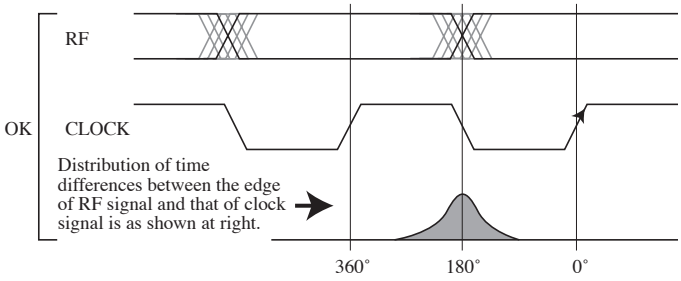


Fig.3-12

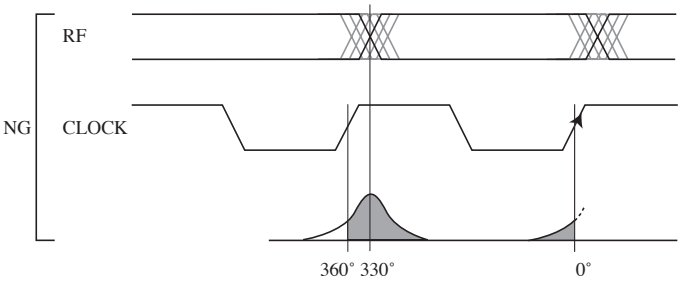


Fig.3-13

Two timings in Fig.3-12 and Fig.3-13 compare the phase difference between the RF and clock signals at 180˚ and the phase difference between them at 330˚.

Essentially, jitter should be distributed in the range 0˚ to 360˚, as shown in Fig.3-12, but is distributed at 0˚ and 360˚ in Fig.3-13.

This results in a higher a standard deviation value, and jitter cannot be measured accurately.

The phase difference must be adjusted so that the average phase difference between the two signals is located at 180˚.

The KJM6775 adjusts the phase of the two signals by delaying the clock signal.

Setting the Delay mode

Set the delay mode when R to C function is set.

1. Press the DELAY key.

   The following screen appears.

2. Each time the DELAY key is pressed the cursor (blink indication) changes allowing you to select the parameter.

   DELAY ON/OFF menu ↔ DELAY PHASE adjustable menu

   • When DELAY ON/OFF menu is selected

   Turn the rotary knob, ON/OFF can be set.

   OFF ↔ ON

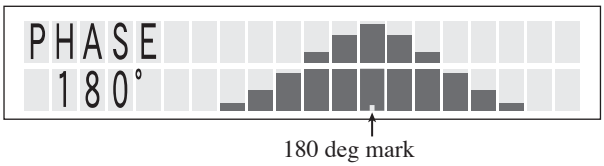
   When DELAY is on, the LED above the DELAY key lights up. When PLL is on, DELAY FIXED is displayed and ON/OFF cannot be switched.

   For functions other than RF to CLK, a warning message appears on the display, and the DELAY setting cannot be changed.

   "CAN'T SEL(FUNC)"

   • When DELAY PHASE adjustable menu is selected

   The following screen appears.



   When DELAY is on, you can set the PHASE using the rotary knob.

   The phase difference between the RF signal and the CLK signal is displayed in the range of 0 deg to 360 deg. Adjust so that the phase difference is 180 deg.

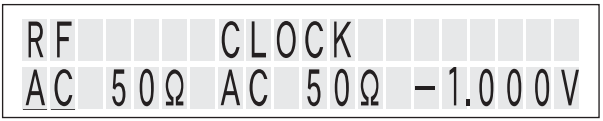
   The 180 deg mark is displayed only when the histogram bin is high. It is not displayed when the bin is low.

3. Press the START STOP or DISPLAY key.
   The KJM6775 returns to measurement display.

3.4.10 Setting the input coupling and input impedance

The coupling and impedance can be switched for the RF input. The coupling and impedance can be switched and the trigger level can be specified for the Clock input.

1. Press the RF/CLOCK INPUT key.
   The following screen appears.



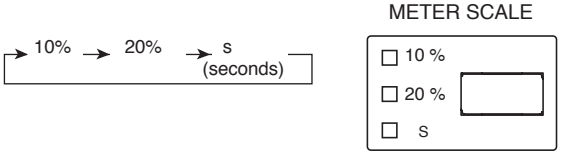
2. Each time the RF/CLOCK INPUT key is pressed the cursor (blink indication) changes allowing you to select the parameter.

3. Use the rotary knob to set the item at the cursor position.
   - At the RF COUPLING or the CLK COUPLING Position
     The unit cab be selected as AC or DC.
   - At the RF IMPEDANCE or the CLK IMPEDANCE Position
     The unit cab be selected as 50 Ω or 1 MΩ.
   - At the CLK TRIG LEVEL Position
     Turn the rotary knob, trigger level value can be set.
     -1.000V ↔ -0.900V ↔ -0.800V ← • • • → +0.800V ↔ +0.900V ↔ +1.000V
   - Pressing the rotary knob
     Switches to FINE input mode allowing the value to be set in 0.002 V steps.
     (Pressing the key again resets to the original mode.)
4. Press the START STOP or DISPLAY key.
   The KJM6775 returns to measurement display.

3.5 Switching the display of measuring value

3.5.1 Meter scale

Each time the KJM6775 SCALE key is pressed the LED lights up, the display of measuring value can be selected.



- When s (seconds) is selected

  As shown below, the display shows a seconds scale. Turn the rotary knob to set the scale.

1ns ↔ 2ns ↔ 5ns ← • • • → 20us ↔ 50us

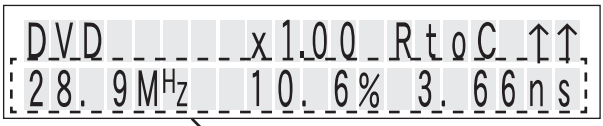
3.5.2 Display Parameters

The parameter shown on the display can be selected each time the DISPLAY key is pressed.

The following parameters can be selected.

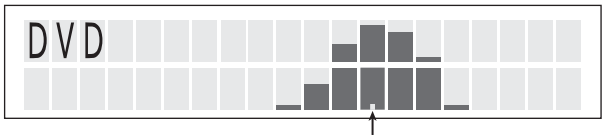
- Memory number
- Amount of jitter (%)
- Amount of jitter (s)
- Meter scale (when meter scale is set to s)
- Clock frequency*1 (when measuring RF to Clock time interval jitter only)
- User setup screen (Configuration setting is required. See "3.8 Configuration Menu")
- Histogram

With the exception of the histogram display, the section shown at the bottom line on the display can be changed for each parameter.



Here can be changed.

The histogram display



180 deg mark
(Shown only when the bin is high)

NOTE • The memory number is shown as "MEM---" before a recall operation or when the settings are changed after a recall.

*1. Clock frequency is measured by the built-in counter circuit.

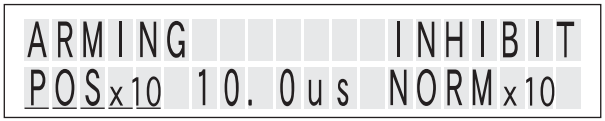
3.6 Arming and Inhibit Functions

Measurements can be started externally by applying an arming signal.

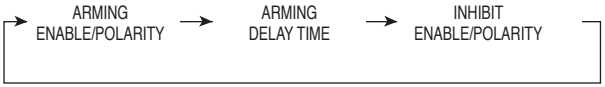
The KJM6775 also provides an arming delay function that starts measurements a certain time after the arming signal is applied.

Inhibit is a function that stops measurements while the signal is enabled.

1. Press the ARMING INHIBIT key.
   The following screen appears.



2. Each time the ARMING INHIBIT key is pressed the cursor (blink indication) changes allowing you to select the parameter.



   When the arming function or the inhibit function is enabled, the LED above the ARMING INHIBIT key lights up.

3. Use the rotary knob to set the item at the cursor position.
   - At the ARMING ENABLE/POLARITY Position
     Turn the rotary knob, function mode can be set.
     OFF ↔ POS×1 ↔ POS×10 ↔ NEG×1 ↔ NEG×10

OFF	The arming function is disabled.	
POS(POSITIVE)	Starts measurements on a (↑)rising arming signal.	
NEG(NEGATIVE)	Starts measurements on a (↓) falling arming signal.	
×1	Logic level 5 V	H level: 2.5 V to 5.0 V L level: 0 V to 1.0 V
×10	Logic level 0.5 V	H level: 0.25 V to 0.5 V L level: 0 V to 0.1 V

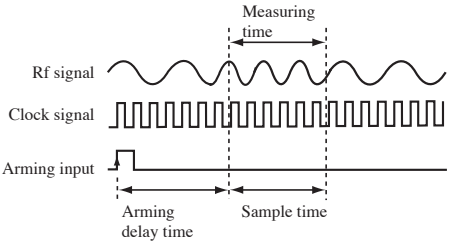


Fig.3-14

- At the ARMING DELAY TIME Position

  Turn the rotary knob, delay time can be set.

- Pressing the rotary knob

  Switches to FINE input mode allowing the value to be set in steps of the smallest digit.

  (Pressing the key again resets to the original mode.)

Setting step when FINE input be selected (setting range:0.0 μs to 1 s)	
to 100 μs	0.2 μs step
to 1 ms	1 μs step
to 10 ms	10 μs step
to 100 ms	100 μs step
to 1.00 s	1 ms step

- At the INHIBIT ENABLE/POLARITY Position

  Turn the rotary knob, trigger level value can be set.

  OFF ↔ NORM×1 ↔ NORM×10 ↔ INVS×1 ↔ INVS×10

OFF	The inhibit function is disabled.
NORM(NORMAL)	Inhibit function when H level input (Stop measurement)
INVS(INVERS)	Inhibit function when L level input (Stop measurement)
×1	Logic level 5 V H level: 2.5 V to 5.0 V L level: 0 V to 1.0 V
×10	Logic level 0.5 V H level: 0.25 V to 0.5 V L level: 0 V to 0.1 V

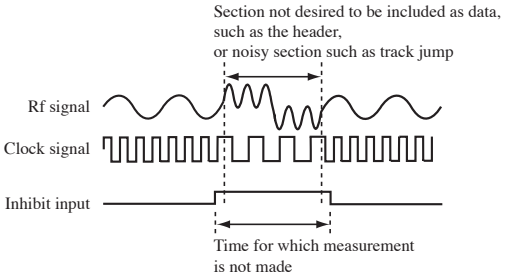


Fig.3-15

4. Press the START STOP or DISPLAY key.
   The KJM6775 returns to measurement display.

3.7 Store and Recall the Contents of the Setup Memory

Up to 15 sets of KJM6775 panel settings can be stored to the setup memory and recalled when necessary.

Store the setup memory

1. While holding down the SHIFT key, press the STORE key.
   Go to the memory store menu.

2. Use the rotary knob to select the stored number.
   _(no number) ↔ 1 ↔ 2 ↔ 3 ← • • • → 14 ↔ 15
3. Press the ENTER key.
   The panel settings are stored to the setup memory, and the display returns to the measurement display.
   If you press the ENTER key while the display shows _ (no number), the settings are not stored and the display returns to the measurement display.
   If you press another key before pressing the ENTER key, the settings are not stored and the menu corresponding to the pressed key is entered.

Recall from the setup memory

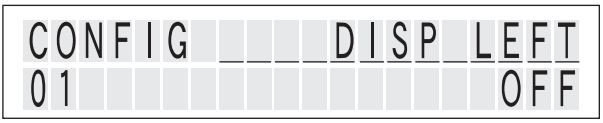
1. Press the MEMORY RECALL key.
   Go to the memory recall menu.

2. Use the rotary knob to select the recalled number.
   1 ↔ 2 ↔ 3 ← • • • → 14 ↔ 15
3. Press the ENTER key.
   The panel settings are recalled from the setup memory, and the display returns to the measurement display.
   If a measurement setting of the selected memory bank is inappropriate, a warning message is shown on the display.
   "No Data"

3.8 Configuration Menu

The configuration menu is used to enter detailed settings of the KJM6775 such as specifying the parameters to be shown on the display during measurement.

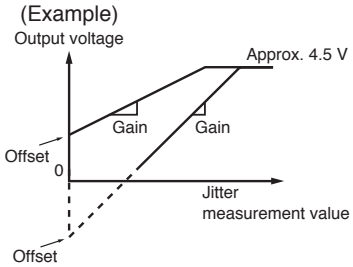
1. While holding down the SHIFT key, press the CONFIG key.
   Go to the configuration menu.



2. Each time the CONFIG key while holding down the SHIFT key is pressed the cursor (blink indication) changes parameters and setting.
   - At the function Position
     Turn the rotary knob, parameter can be selected.
   - At the CLK TRIG LEVEL Position
     Turn the rotary knob, setting value as function can be selected.

Table 3-2 Configuration menu

Parameter	Setting value	Description
01: DISP LEFT 02: DISP CENTER 03: DISP RIGHT	OFF, RECALL NO, CLK-FREQ, σ(S), σ(%), METER SCALE, SAMPLE(N), MEAN, 1/MEAN	Selects the three parameters that are shown at the bottom section of the display during measurement. (User setup screen) The contents of each parameter are as follows: RECALL NO Recall number CLK-FREQ Measured value of the frequency counter σ(S) Sigma value in units of seconds σ(%) Sigma value in percentage METER SCALE Meter scale display SAMPLE(N) Number of samples MEAN Mean value 1/MEAN Inverse of the mean
04: BACK LIGHT	ON, OFF	Turns on/off the panel backlight.
11: AVERAGE METER 12: AVERAGE DCOUT	1, 2, 4, 8, 16, 32, 64, 128, 256	Sets the average count of the measured value output to the KJM6775 and DC-OUT.
21: INHIBIT MODE	GATE ONLY, GATE+SYMMETRY, GATE+SYM+PLL	Select a combination of circuit blocks which the inhibit function is applied .
22: INHIBIT DELAY	0μs, 8μs, 128μs, 2ms	Sets the wait time for starting the calculation after inhibit is cleared by the inhibit signal.
23: INH.SLICE OUT	THROUGH, INHIBIT	Sets whether to inhibit or continue the output level of the SLICED RF OUT and DELAYED CLOCK OUT signals when the inhibit function is enabled.
31: T REFERENCE	PANEL SPEED, COUNTER MEAS.	Sets the reference period (T) for percentage calculations. (Valid only when measuring time interval jitter.) PANEL SPEED is derived from the media and speed settings. For COUNTER MEAS, the time of 1024 cycles of the clock signal is measured by built-in counter circuit, and the period is derived from their average.

Parameter	Setting value	Description
41: DC OUT GAIN	0 V/% to 4 V/%	Function used to modify the DC OUT output voltage. Set the gain and offset. (20 mV resolution)  The standard setting is 0.2 V/% gain and 0 V offset.
42: DC OUT OFFSET	-4 V to 4 V	
51: INPUT CHECK	ENABLE, DISABLE	Sets whether to monitor the amplitude of the RF input signal. When enable this function, measurement is stopped, and an error is displayed if no signal is being applied or if the amplitude is small. Disable this function when a signal with low average amplitude such as a burst signal is applied.
61: START MODE	SINGLE, REPEAT	Sets the operation mode of the START key. Each time the START/STOP key is pressed when SINGLE is selected, data is acquired, calculation is performed, and measurement is stopped. When REPEAT is selected, measurement is performed repeatedly.
71:LOCK MODE	STANDARD, LONG	Sets the lock mode of the PLL re-generation circuit. When LONG is selected, the probability that signal locks increases, even signal that has jitter of 17 % or more and that is hard to lock. It takes longer before signal is locked.
99: EXIT		Exits from the configuration menu.

3.9 Calibrating the Probe

In addition to a 50 Ω coaxial cable, you may also use a 10:1 probe with a 100 MHz bandwidth for connection.

If you use the probe, calibrate the probe (phase correction) as follows first:

NOTE
- If the probe has not been calibrated (phase not corrected), the instrument will not indicate a correct value.
- The frequency range in which the probe can be used is 100 MHz or less. For signals above 100 MHz, make measurements using the 50 Ω input.

Table 3-3 Measuring Instrument and Other Items Required for Calibration

100 MHz bandwidth oscilloscope	1	Kikusui COR5500 or equivalent
50 Ω BNC-BNC cable	1	Kikusui SA550 or equivalent
50 Ω terminator	1	
Adjusting screwdriver	1	

1. As shown in Fig.3-16, connect the KJM6775 and a oscilloscope.

   The BNC-BNC cable and probe run parallel, without forming large loops (which are vulnerable to external noise).

2. Insert the adjusting screwdriver through the phase adjusting hole and correct the phase while monitoring square waves on the oscilloscope.

   For adjusting waveforms, see the description of the oscilloscope probe calibration method.

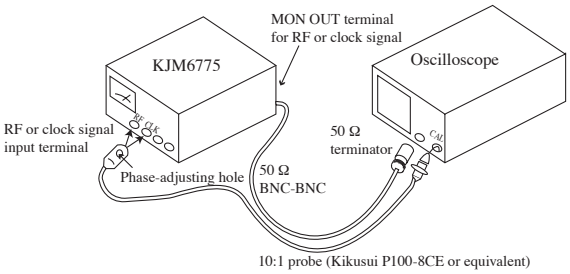


Fig.3-16

Chapter4 GPIB Control

This chapter describes device messages and preparations for remotely controlling the KJM6775 via the GPIB interface.

The GPIB interface is factory option.

4.1 Summary

The GPIB interface supported by the KJM6775 is controlled by IEEE 488 standard interface.

It's electrical and mechanical specifications conform to IEEE std488.1-1987.

Use of the GPIB interface allows you to set the function of each panel other than the POWER and KEYLOCK switches, read the setting condition of a function, or read out the set values.

4.1.1 Before Using the GPIB interface

Preparation

Connecting the GPIB cable

1. Turn off all POWER switches on the KJM6775 and other devices that are part of the GPIB system.
2. Connect a GPIB cable to the 24-pin GPIB connector on the rear panel of the KJM6775.

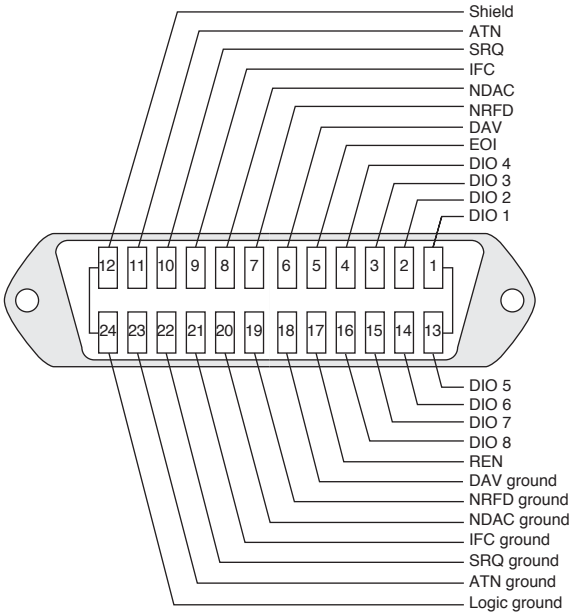


Fig.4-1 GPIB connector

Setting a GPIB Address

The address is set to "2" before delivery.

To change to another address, follow the procedure below.

1. Turn the KJM6775 power off.

2. Set the GPIB address using the dipswitch on the rear panel of the KJM6775.

   The address is assigned by the combination of the dipswitch.

   The address is specified by the sum of values indicated for the DIP switches set to ON (upperside). When all five DIP switches are set to OFF, the address value is 0. For example, to set the address to 6, set the DIP switch indicated as 4 and the DIP switch indicated as • (=2) between 4 and 1 to ON to set 6=4+2.

   See Fig.4-2.

3. Turn the KJM6775 power on.

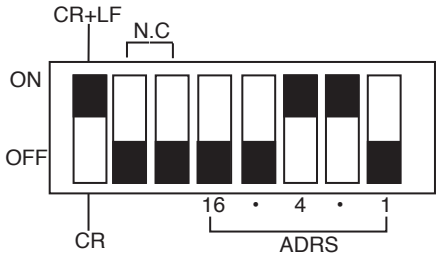


Fig.4-2 Example of setting the address to 6

Interface function

As shown in table 4-1, the list of GPIB interface function.

Table 4-1

Function	Subset	Description
Source handshaking	SH1	All functions provided
Acceptor handshaking	AH1	All functions provided
Talker	T6	All functions provided except for the talk-only function
Listener	L4	All functions provided except for the talk-only function
Service request	SR1	All functions provided
Remote local	RL1	All functions provided
Parallel polling	PP0	No function
Device clear	DC1	All functions provided
Device trigger	DT0	No function
Controller	C0	No function
Device drier	E1	Open collector driver

4.2 Messages and terminators

This section specifies the designations and descriptions used in this manual for communications between a computer (controller) and the KJM6775 (device). See Fig.4-3.

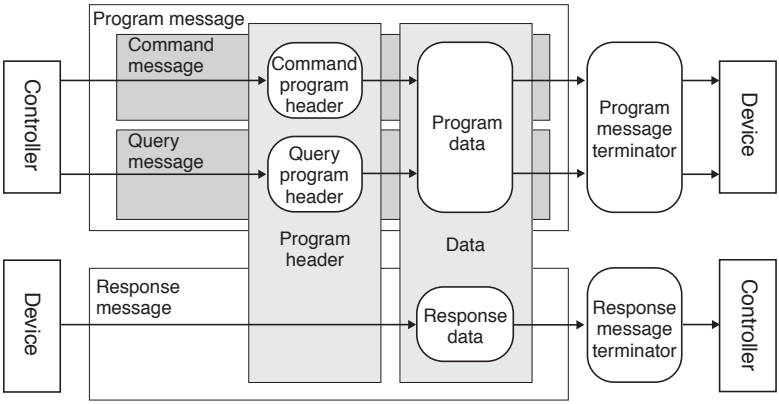


Fig.4-3 Message and terminator

4.2.1 Message

Commands sent from the computer to the KJM6775 are designated as program messages. Responses sent from the KJM6775 to the computer are designated as response messages.

Each message consists of the program header section and data section.

Program message

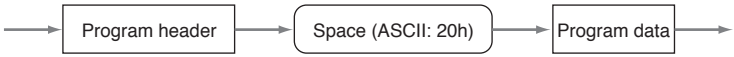
Program messages are further divided into a command message and a query message.

A command message executes a specific function of the KJM6775 or modifies settings.

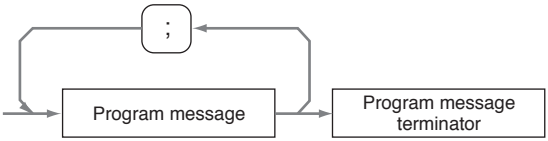
A query message inquires of the setting or status of the KJM6775.

Writing a command message

- A space (ASCII: 20h) is required between the program header section and data section.

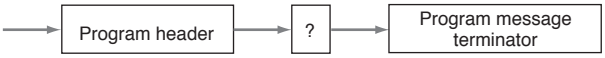


- The concatenation of program messages is performed using a semicolon (;) (ASCII: 3Bh).



When linking program messages for send, the number of characters to be sent at any one time should be 250 characters or less, including message terminators ";", and " " (space).

Writing a query message



Messages cannot be linked using ":" (ASCII: 3Bh).

4.2.2 Terminator

A terminator indicating the end of a program message is designated as a program message terminator. A terminator indicating the end of a response message is designated as a response message terminator.

• Program message terminator

The kinds of program message terminators listed can be used without presetting. (A CR alone, without an EOI, cannot be used.)

LF

LF+EOI

EOI

CR+EOI

• Response message terminator

Fixed to LF + EOI

NOTE • Always set the CR+LF/CR selector switch of the GPIB switches to CR+LF. Note that the message terminators always use LF+EOI, regardless of this setting. They do not switch to CR+LF.

4.3 Device Messages

The program messages and response messages supported by the KJM6775 are designated as device messages.

This section describes each device message.

Program message is case-independence, response message returns uppercase characters.

abbreviation form

Abbreviations are provided for program messages and some character program data.

An item enclosed in parentheses next to a device message indicates the abbreviation of that device message.

NOTE • A response message will be returned in abbreviated form.

Special symbols and characters

The special symbols and characters used in this manual to describe a program message or response message are defined as shown in the table below.

Table 4-2 Definition of Special Symbols and Characters

Symbol and character	Description
< >	These brackets indicate program data. Do not use them in actual programs.
{ }	Characters or numbers enclosed in these brackets and separated by “|” indicate that one in brackets should be selected. In actual programs, do not use the brackets.
_	This character indicates a space.

NOTE • To write data using hexadecimals, add "#H"

(Example) The decimal 10 is expressed as "#H0A" in hexadecimal.

• To write "μ" in the data, use "U" instead.

(Example) To write 8 μs, enter 8US.

• To write "%" in the data, use "PCT" instead.

(Example) To write 10 %, enter 10PCT.

*CLS

Resets the status byte register and the event status register.

For details of each register, see "4.4 Resisters".

Program message

- Syntax

  Comand message: `*CLS`

*ESE

Sets the individual bits of the event status enable register, or inquires about the contents of the register.

For details of each register, see "4.4 Resisters".

Program message

- Syntax

  Comand message: `*ESE_<value>`

  Query message: `*ESE?`

- Program data

  Data format: Hexadecimal

  Set value: #H00 to #HFF

(Example)To set the event status enable register to #H50,

```
*ESE #H50
```

Response message

To *ESE?, the contents of the event status enable register in hexadecimal (#H00 to #HFF) are returned.

(Example)When bits 5 of the event status enable register is set,

`#H20` is returned.

*ESR

Inquires about the contents of the event status register. The individual bits are reset when read.

For details of event status register, see "4.4 Resisters".

Program message

- Syntax

  Query message: `*ESR?`

Response message

To *ESR?, the contents of the event status register in hexadecimal (#H00 to #HFF) are returned.

(Example)When bits 5 of the event status register is set,

`#H20` is returned.

*IDN

Inquires about the model name and ROM version of the KJM6775.

Program message

- Syntax

  Query message: `*IDN?`

Response message

To *IDN?, the model information in the following format are returned.

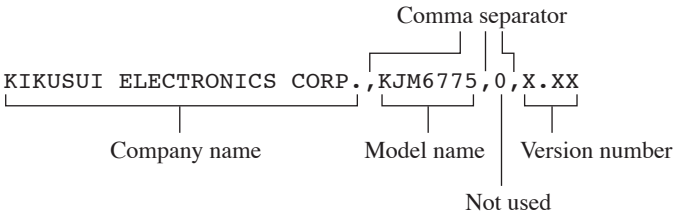


Fig.4-4 *IDN? Response Message

*RST

Brings settings to the same condition as the initial mode set. The status and error registers will not be reset.

Program message

- Syntax

  Comand message: `*RST`

*SRE

Sets the individual bits of the service request enable register, or inquires about the contents of the register.

The service request enable register will not be reset if they are read out.

For details of service request enable register, see "4.4 Resisters".

Program message

- Syntax

  Comand message: `*SRE_<value>`

  Query message: `*SRE?`

- Program data

  Data format: Hexadecimal

  Set value: #H00 to #HFF

(Example)To set ESB bit of the service request enable register to #50.

```
*SRE #H50
```

Response message

To *SRE?, the contents of the service request enable register in hexadecimal (#H00 to #HFF) are returned.

(Example)When bits 5 of the event status register is set,

`#H20` is returned.

*STB?

Inquires about the contents of the status byte register.

For details of service request enable register, see "4.4 Resisters".

Program message

- Syntax

  Query message: `*STB?`

Response message

To *STB?, the contents of the status byte register in hexadecimal (#H00 to #HFF) are returned.

(Example)When bits 5 of the event status register is set,

`#H20` is returned.

ARMING(ARM)

Sets on/off for arming, or inquires about the current setting for arming.

Program message

- Syntax

  Comand message: `ARMING_<{ON|OFF}>`
  `ARM_<{ON|OFF}>`

  Query message: `ARMING?`
  `ARM?`

- Program data

  Data format: Character

  Set value: ON: arming ON
  OFF: arming OFF

(Example)To set arming to on,

```
ARM ON
```

Response message

To ARM?, the current setting in characters (on or off) is returned.

ARMING:POLARITY(ARM:POL)

Sets the polarity and signal level of arming, or inquires about the current setting for polarity and signal level of arming.

Program message

- Syntax

  Comand message: `ARMING:POLARITY_<POSITIVE|NEGATIVE}>`
  `ARM:POL_<{POS|NEG}>`

  Query message: `ARMING:POLARITY?`
  `ARM:POL?`

- Program data

  Data format: Character

  Set value: POS: Starts measurements on a (↑)rising arming signal.
  NEG: Starts measurements on a (↓) falling arming signal.

(Example)To set polarity of arming to POS,

```
ARM:POL POS
```

Response message

To ARM:POL?, the current setting in characters (POS or NEG) is returned.

ARMING:LEVEL(ARM:LEV)

Sets the logic level of arming, or inquires about the current setting for logic level of arming.

Program message

- Syntax

  Comand message: `ARMING:LEVEL_<X1|X10}>`
  `ARM:LEV_<{X1|X10}>`

  Query message: `ARMING:LEVEL?`
  `ARM:LEV?`

- Program data

  Data format: Character

  Set value: X1: Logic level 5 V
  X10: Logic level 0.5 V

(Example)To set logic level of arming to 0.5 V,

```
ARM:LEV X10
```

Response message

To ARM:LEV?, the current setting in characters (X1 or X10) is returned.

ARMING:TIME(ARM:TIM)

Sets the arming delay time, or inquires about the current setting for arming delay time.

Program message

- Syntax

  Comand message: `ARMING:TIME_<value>`
  `ARM:TIM_<value>`

  Query message: `ARMING:TIME?`
  `ARM:TIM?`

- Program data

  Data format: Character

  Set value: 0.0 μs to 1.00 s

  Resolution: to 100 μs: 0.2 μs, to 1.00 ms: 1 μs
  to 10.0 μs: 10 μs, to 100 ms: 100 μs
  to 1.00 s: 1 ms

(Example) To set the arming delay time to 100 μs,

```
ARM:TIM 100US
```

Response message

To ARM:TIM?, the current setting in exponential decimal format is returned.

(Example) When 100 μs of the arming delay time is set,

`100E-6` is returned.

CLOCK:COUPLING(CLOC:COU)

Sets the input coupling of CLOCK INPUT, or inquires about the current setting for input coupling.

Program message

- Syntax

  Comand message: `CLOCK:COUPLING_<{AC|DC}>`
  `CLOC:COU_<{AC|DC}>`

  Query message: `CLOCK:COUPLING?`
  `CLOC:COU?`

- Program data

  Data format: Character

  Set value: AC: AC coupling
  DC: DC coupling

(Example)To set input coupling of CLOCK INPUT to AC,

```
CLOC:COU AC
```

Response message

To CLOC:COU?, the current setting in characters (AC or DC) is returned.

CLOCK:FREQUENCY(CLOC:FREQ)

Inquires about the measured frequency.

Program message

- Syntax

  Query message: `CLOCK:FREQUENCY?`
  `CLOC:FREQ?`

Response message

To CLOC:FREQ?, the current measured frequency is returned.

CLOCK:IMPEDANCE(CLOC:IMP)

Sets the input impedance of CLOCK INPUT, or inquires about the current setting for input impedance.

Program message

- Syntax

  Comand message: `CLOCK:IMPEDANCE_<{50|1M}>`
  `CLOC:IMP_<{50|1M}>`

  Query message: `CLOCK:IMPEDANCE?`
  `CLOC:IMP?`

- Program data

  Data format: Character

  Set value: 50: Input impedance 50 Ω
  1M: Input impedance 1 MΩ

(Example)To set input impedance of CLOCK INPUT to 50 Ω,

```
CLOC:IMP 50
```

Response message

To CLOC:IMP?, the current setting in characters (50 or 1M) is returned.

CLOCK:TRIGGER:EDGE(CLOC:TRIG:EDG)

Sets the polarity of the input trigger edge of CLOCK INPUT, or inquires about the current setting for polarity of input trigger edge.

Program message

- Syntax

  Comand message: `CLOCK:TRIGGER:EDGE_<{POSITIVE|NEGATIVE}>`
  `CLOC:TRIG:EDGE_<{POS|NEG}>`

  Query message: `CLOCK:TRIGGER:EDGE?`
  `CLOC:TRIG:EDG?`

- Program data

  Data format: Character

  Set value: POS: (↑)rising

  NEG: (↓) falling

(Example)To set the polarity of the input trigger edge of CLOCK INPUT to POS,

```
CLOC:TRIG:EDG POS
```

Response message

To CLOC:TRIG:EDG?, the current setting in characters (POS or NEG) is returned.

CLOCK:TRIGGER:LEVEL(CLOC:TRIG:LEV)

Sets the trigger level of clock signal, or inquires about the current setting for trigger level.

Program message

- Syntax

  Comand message: `CLOCK:TRIGGER:LEVEL_<value>`
  `CLOC:TRIG:LEV_<value>`

  Query message: `CLOCK:TRIGGER:LEVEL?`
  `CLOC:TRIG:LEV?`

- Program data

  Data format: Character

  Set value: -1.000 V to +1.000 V

  Resolution: 0.002 V

(Example)To set the trigger level of clock signal to +1.000 V,

```
CLOC:TRIG:LEV 1.000V
```

Response message

To CLOC:TRIG:LEV?, the current setting in real (-1.000 to 1.000) is returned.

DAT

Inquires whether the measured value is available or not.

Program message

- Syntax

  Query message: `DAT?`

Response message

To DAT?, the current setting is returned.

(Example)When measured value is available,

`1` is returned.

(Example)When measured value is not available,

`0` is returned.

DELAY:MODE(DEL:MOD)

Sets the delay mode, or inquires about the current setting for delay mode.

Program message

- Syntax

  Comand message: `DELAY:MODE_<{ON|OFF}>`
  `DEL:MOD_<{ON|OFF}>`

  Query message: `DELAY:MODE?`
  `DEL:MOD?`

- Program data

  Data format: Character

  Set value: ON: Delay ON
  OFF: Delay OFF

(Example)To set the delay mode to on,

```
DEL:MOD ON
```

Response message

To DEL:MOD?, the current setting in characters (on or off) is returned.

DELAY:PHASE(DEL:PHA)

Inquires about phase difference.

Program message

- Syntax

  Query message: `DELAY:PHASE?`
  `DEL:PHA?`

Response message

To DEL:PHA?, the current phase difference is returned.

(Example) When phase difference is 180 deg,

`180` is returned.

DELAY:VALUE(DEL:VAL)

Sets the delay amount, or inquires about the current delay amount.

Program message

- Syntax

  Comand message: `DELAY:VALUE_<value>`
  `DEL:VAL_<value>`

  Query message: `DELAY:VALUE?`
  `DEL:VAL?`

- Program data

  Data format: Integer

  Set value: 0 to 400

  Resolution: 1

(Example) To set the delay amount to 100,

`DEL:VAL 100`

Response message

To DEL:VAL?, the current setting is returned.

(Example) When delay amount is 300,

`300` is returned.

EQ

Sets on/off for the equalizer circuit, or inquires about the current setting for equalizer circuit.

Program message

- Syntax

  Comand message: `EQ_<{ON|OFF}>`

  Query message: `EQ?`

- Program data

  Data format: Character

  Set value: ON: Equalizer circuit ON

  OFF: Equalizer circuit OFF

(Example)To set the equalizer circuit to on,

```
EQ ON
```

Response message

To EQ?, the current setting in characters (on or off) is returned.

IMR

Inquires whether the measured value is 20 % or less.

Program message

- Syntax

  Query message: `IMR?`

Response message

To IMR?, the current status as 0 (when the measured value exceeds 20 %) or 1 (when the measured value is 20 % or less) is returned.

INHIBIT(INH)

Sets on/off for the inhibit circuit, or inquires about the current setting for inhibit circuit.

Program message

- Syntax

  Comand message: `INHIBIT_<{ON|OFF}>`
  `INH_<{ON|OFF}>`

  Query message: `INHIBIT?`
  `INH?`

- Program data

  Data format: Character

  Set value: ON: Inhibit circuit ON
  OFF: Inhibit circuit OFF

(Example)To set the inhibit circuit to on,

```
INH ON
```

Response message

To INH?, the current setting in characters (on or off) is returned.

INHIBIT:SLICEOUT(INH:SLI)

Sets whether to inhibit or continue the output level of the SLICED RF OUT and DELAYED CLOCK OUT signals when the inhibit function is enabled, or inquires about the current setting for output level.

Program message

- Syntax

  Comand message: `INHIBIT:SLICEOUT_<{THROUGH|INHIBIT}>`
  `INH:SLI_<{THR|INH}>`

  Query message: `INHIBIT:SLICEOUT?`
  `INH:SLI?`

- Program data

  Data format: Character

  Set value: THR: Continues the output level
  INH: Inhibits the output level

(Example)To set the output level to inhibit,

```
INH:SLI INH
```

Response message

To INH:SLI?, the current setting in characters (THR or INH) is returned.

INHIBIT:POLARITY(INH:POL)

Sets polarity for the inhibit circuit, or inquires about the current setting for polarity of inhibit circuit.

Program message

- Syntax

  Comand message: `INHIBIT:POLARITY_<{NORMAL|INVERSE}>`
  `INH:POL_<{NORM|INV}>`

  Query message: `INHIBIT:POLARITY?`
  `INH:POL?`

- Program data

  Data format: Character

  Set value: NORM: Polarity of inhibit circuit is normal
  INV: Polarity of inhibit circuit is inverse

(Example)To set polarity of inhibit circuit to normal,

```
INH:POL NORM
```

Response message

To INH:POL?, the current setting in characters (NORM or INV) is returned.

INHIBIT:MODE(INH:MOD)

Sets the item on which the inhibit circuit is applied, or inquires about the current setting for inhibit applying.

Program message

- Syntax

  Comand message: `INHIBIT:MODE_<{GATE|SYMMETRY|PLL}>`
  `INH:MOD_<{GAT|SYM|PLL}>`

  Query message: `INHIBIT:MODE?`
  `INH:MOD?`

- Program data

  Data format: Character

  Set value: GAT: Gate
  SYM: Gate and symmetry
  PLL: Gate, symmetry and PLL

(Example) To set item on which the inhibit circuit is applied to Gate only,

```
INH:MOD GAT
```

Response message

To INH:MOD?, the current setting in characters (GAT, SYM or PLL) is returned.

INHIBIT:LEVEL(INH:LEV)

Sets the logic level for the inhibit signal, or inquires about the current setting for logic level of inhibit signal.

Program message

- Syntax

  Comand message: `INHIBIT:LEVEL_<{X1|X10}>`
  `INH:LEV_<{X1|X10}>`

  Query message: `INHIBIT:LEVEL?`
  `INH:LEV?`

- Program data

  Data format: Character

  Set value: X1: Logic level is 5 V
  X10: Logic level is 0.5 V

(Example)To set logic level of inhibit signal to 0.5 V,

```
INH:LEV X10
```

Response message

To INH:LEV?, the current setting in characters (X1 or X10) is returned.

INHIBIT:DELAY(INH:DEL)

Sets the wait time for starting data acquisition after inhibit is cleared, or inquires about the current setting for wait time.

Program message

- Syntax

  Comand message: `INHIBIT:DELAY_<{0US|8US|128US|2MS}>`
  `INH:DEL_<{0US|8US|128US|2MS}>`

  Query message: `INHIBIT:DELAY?`
  `INH:DEL?`

- Program data

  Data format: Character

  Set value: 0 μs, 8 μs, 128 μs, 2 ms

(Example)To set wait time after inhibit is cleared to 8 μs,

```
INH:DEL 8US
```

Response message

To INH:DEL?, the current setting is returned.

(Example)When wait time is 2 ms,

`2MS` is returned.

HISTOGRAM:WINDOW:ADDRESS(HIS:WIN:ADD)

Sets the start address of the window for extracting the histogram, or inquires about the start address.

Program message

- Syntax

  Comand message: `HISTOGRAM:WIN-`
  `DOW:ADDRESS_<value>`
  `HIS:WIN:ADD_<value>`

  Query message: `HISTOGRAM:WINDOW:ADDRESS?`
  `HIS:WIN:ADD?`

- Program data

  Data format: Hexadecimal

  Set value: #H0000 to #HFFFF

(Example)To set the start address of the window to #H00FF,

```
HIS:WIN:ADD #H00FF
```

Response message

To HIS:WIN:ADD?, the current start address of the window in hexadecimal(#H0000 to #HFFFF) is returned.

HISTOGRAM:WINDOW:LENGTH(HIS:WIN:LEN)

Sets the data length of the window for extracting the histogram, or inquires about the data length.

Program message

- Syntax

  Comand message: `HISTOGRAM:WIN-`
  `DOW:LENGTH_<value>`
  `HIS:WIN:LEN_<value>`

  Query message: `HISTOGRAM:WINDOW:LENGTH?`
  `HIS:WIN:LEN?`

- Program data

  Data format: Hexadecimal

  Set value: #H0001 to #HFFFF

Response message

To HIS:WIN:LEN?, the current data length of the window in hexadecimal (#H0001 to #HFFFF) is returned.

HISTOGRAM:DATA(HIS:DAT)

Inquires about histogram data.

This message can be executed only when the DATA AVAILABLE flag is set to "High" after single start.

In all other cases, an EXE error occurs. (Start using SSTART. The flag can be check using DAT? or *ESR?.)

Program message

- Syntax

  Query message: `HISTOGRAM:DATA?`
  `HIS:DAT?`

Response message

To HIS:DAT?, the histogram data in hexadecimal (#H000000 to #HFFFFFF) of the length specified by HIS:WIN:LEN is returned.

The data delimiter is "," (comma).

(Example) When HIS:WIN:ADD is 3, WIS:WIN:LEN is 4, and the histogram data is 0, 6, 7, 10, 18, 64, 3, 1, 5, ... (decimal) from address 0,

`#H00000A,#H000012,#H000040,#H000003` is returned.

JITTER(JIT)

Inquires about the jitter value in units corresponding to the KJM6775 scale currently set.

Program message

- Syntax

  Query message: `JITTER?`
  `JIT?`

Response message

To JIT?, A value in the range of 0 to 20.00 when the KJM6775 scale is % (percentage) and 0.00E-09 to 50.00E-06 when the KJM6775 scale is s (seconds) is returned.

JUDGE(JUD)

Inquires about judgement result.

Program message

- Syntax

  Query message: `JUDGE?`
  `JUD?`

Response message

To JUD?, A value of 1 when judgement result is GO and 0 when judgement result is NOGO is returned.

JUDGE:UNIT(JUD:UNI)

Sets the unit to be used for the judgment, or inquires about the current setting for unit.

Program message

- Syntax

  Comand message: `JUDGE:UNIT_<{PCT|S}>`
  `JUD:UNI_<{PCT|S}>`

  Query message: `JUDGE:UNIT?`
  `JUD:UNI?`

- Program data

  Data format: Character

  Set value: PCT: % (percentage)
  S: s (seconds)

(Example)To set unit to % (percentage),

```
JUD:UNI PCT
```

Response message

To JUD:UNI?, the current setting in characters (PCT or S) is returned.

JUDGE:LEVEL:UPPER(JUD:LEV:UPP)

Sets the UPPER judgment level for the system of units that was specified by JUDGE:UNIT, or inquires about the current setting for UPPER judgement level.

Program message

- Syntax

  Comand message: `JUDGE:LEVEL:UPPER_<value>`
  `JUDGE:LEV:UPP_<value>`

  Query message: `JUDGE:LEVEL:UPPER?`
  `JUD:LEV:UPP?`

- Program data

  Data format: Character

  When UNIT is set to % (percentage)

  Set value: 0.00 % to 20.0 %

  Resolution: to 10.0 %: 0.01 %
  to 20.0 %: 0.1 %

  When UNIT is set to s (seconds)

  Set value: 0.00 ns to 50.0 μs

  Resolution: to 10.0 ns: 0.01 ns
  to 100 ns: 0.1 ns
  to 1.00 μs: 1 ns
  to 10.0 μs: 0.01 μs
  to 50.0 μs: 0.1 μs

(Example)To set UPPER judgement level to 6.00 %,

```
JUD:LEV:UPP 6.00PCT
```

Response message

To JUD:LEV:UPP?, the current setting is returned.

(Example)When the system of units is set to seconds and the UPPER judgment level is 1.00 ns,

`1.00NS` is returned.

(Example)When the system of units is set to % (percentage) and the UPPER judgment level is 10.0 %,

`10.0PCT` is returned.

JUDGE:LEVEL:LOWER(JUD:LEV:LOW)

Sets the LOWER judgment level for the system of units that was specified by JUDGE:UNIT, or inquires about the current setting for LOWER judgement level.

Program message

- Syntax

  Comand message: `JUDGE:LEVEL:LOWER_<value>`
  `JUDGE:LEV:LOW_<value>`

  Query message: `JUDGE:LEVEL:LOWER?`
  `JUD:LEV:LOW?`

- Program data

  Data format: Character

  When UNIT is set to % (percentage)

  Set value: 0.00 % to 20.0 %

  Resolution: to 10.0 %: 0.01 %
  to 20.0 %: 0.1 %

  When UNIT is set to s (seconds)

  Set value: 0.00 ns to 50.0 μs

  Resolution: to 10.0 ns: 0.01 ns
  to 100 ns: 0.1 ns
  to 1.00 μs: 1 ns
  to 10.0 μs: 0.01 μs
  to 50.0 μs: 0.1 μs

(Example) To set LOWER judgement level to 6.00 %,

```
JUD:LEV:LOW 6.00PCT
```

Response message

To JUD:LEV:LOW?, the current setting is returned.

(Example) When the system of units is set to seconds and the LOWER judgment level is 1.00 ns,

`1.00NS` is returned.

(Example) When the system of units is set to % (percentage) and the LOWER judgment level is 10.0 %,

`10.0PCT` is returned.

JUDGE:RESULT(JUD:RES)

Inquires about judgement result.

Program message

- Syntax

  Query message: `JUDGE:RESULT?`
  `JUD:RES?`

Response message

To JUD:RES?, the judgement result (GO or NOGO) is returned.

MEDIA:TYPE(MED:TYP)

Sets the type of media to be measured, or inquires about the current setting for type of media.

Program message

- Syntax

  Comand message: `MEDIA:TYPE_<{CD|CD-R|CD-RW|DVD|DVD-ROM|DVD-R|DVD-RW|DVDRAM1|DVDRAM2}>`
  `MED:TYP_<{CD|CD-R|CD-RW|DVD|DVD-ROM|DVD-R|DVD-RW|DVDRAM1|DVDRAM2}>`

  Query message: `MEDIA:TYPE?`
  `MED:TYP?`

- Program data

  Data format: Character

  Set value: CD, CD-R, CD-RW, DVD, DVD-ROM, DVD-R, DVD-RW, DVDRA1, DVDRAM2

(Example)To set type of media is CD-R,

```
MED:TYP CD-R
```

Response message

To MED:TYP?, the current setting in character is returned.

(Example)When type of media is DVD-R,

`DVD-R` is returned.

MEDIA:SPEED(MED:SPE)

Sets the speed of media to be measured, or inquires about the current setting for speed of media.

Program message

- Syntax

  Comand message: `MEDIA:SPEED_<value>`
  `MED:SPE_<value>`

  Query message: `MEDIA:SPEED?`
  `MED:SPE?`

- Program data

  Data format: Real

Set value:	CD, CD-ROM, CD-R, CD-RW:	0.90 to 50.0
	DVD, DVD-R, DVD-RW:	0.80 to 8.0
	DVD+R, DVD+RW, DVD-ROM:	0.80 to 8.0
	DVD RAM1:	0.8 to 7.4
	DVD RAM2:	0.8 to 3.7

  Resolution:
  to ×1.00: 0.02
  to ×2.0: 0.05
  to ×4.0: 0.1
  to ×10.0: 0.2
  to ×50.0: 0.5

(Example)To set speed of media is 1.00,

```
MED:SPE 1.00
```

Response message

To MED:SPE?, the current setting in real returned.

(Example)When speed of media is 8.0,

`8.0` is returned.

MEDIA:FUNCTION(MED:FUNC)

Sets the function of media to be measured, or inquires about the current setting for function of media.

Program message

- Syntax

  Comand message: `MEDIA:FUNCTION_<{RFTO-`
  `CLK|BIPHSE|WOBBLE}>`
  `MED:FUNC_<{RFT|BIP|WOB}>`

Query message: `MEDIA:FUNCTION?`
`MED:FUNC?`

- Program data

  Data format: Character

  Set value: RFT: RF to CLOCK
  BIP: BiPhase
  WOB: Wobble

(Example)To set function of media is RF to Clock,

```
MED:FUNC RFT
```

Response message

To MED:FUNC?, the current setting in character is returned.

(Example)When function of media is BiPhase,

`BIP` is returned.

MEMORY:RECALL(MEM:REC)

Recalls the panel settings from the setup memory, or inquires about the memory number being recalled.

Program message

- Syntax

  Comand message: `MEMORY:RECALL_<value>`
  `MEM:REC_<value>`

  Query message: `MEMORY:RECALL?`
  `MEM:REC?`

- Program data

  Data format: Integer

  Set value: 1 to 15

  Resolution: 1

(Example)To recall from setup memory 10,

```
MEM:REC 10
```

Response message

To MEM:REC?, the memory number (1 to 15) being recalled is returned.

NOTE • The value 0 is returned when settings are not being recalled.

MEMORY:STORE(MEM:STO)

Stores the panel settings to the setup memory.

Program message

- Syntax

  Comand message: `MEMORY:STORE_<value>`
  `MEM:STO_<value>`

- Program data

  Data format: Integer

  Set value: 1 to 15

  Resolution: 1

(Example)To store to setup memory 10,

```
MEM:STO 10
```

METER:SCALE(MET:SCAL)

Sets maximum value of meter scale, or inquires about the current setting for the maximum value.

Program message

- Syntax

  Comand message: `METER:SCALE_<{10PCT|20PCT|1NS|2NS|5NS|10NS|20NS|50NS|100NS|200NS|500NS|1US|2US|5US|10US|20US|50US}>`
  `MET:SCAL_<{10PCT|20PCT|1NS|2NS|5NS|10NS|20NS|50NS|100NS|200NS|500NS|1US|2US|5US|10US|20US|50US}>`

  Query message: `METER:SCALE?`
  `MET:SCAL?`

- Program data

  Data format: Character

  Set value: 10 %, 20 %, 1 ns, 2 ns, 5 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs, 2 μs, 5 μs, 10 μs, 20 μs, 50 μs

(Example)To set maximum value of meter is 10 %,

```
MET:SCAL 10PCT
```

Response message

To MET:SCAL?, the current setting in character is returned.

(Example)When maximum value of meter is 100 ns,

`100NS` is returned.

PLL

Sets on/off for the PLL circuit, or inquires about the current setting for PLL circuit.

Program message

- Syntax

  Comand message: `PLL_<{ON|OFF}>`

  Query message: `PLL?`

- Program data

  Data format: Character

  Set value: ON: PLL ON

  OFF: PLL OFF

(Example)To set PLL circuit is on,

```
PLL ON
```

Response message

To PLL?, the current setting in character (on or off) is returned.

PLL:STATUS(PLL:STAT)

Inquires about the current status for PLL clock-regeneration.

Program message

- Syntax

  Query message: `PLL:STATUS?`

  `PLL:STAT?`

Response message

To PLL:STAT?, the current regeneration status in character (LOCK or UNLOCK) is returned.

PORT1

Inquires about the current status for a 4-bit input port of EXT I/O.

Program message

- Syntax

  Query message: `PORT1?`

Response message

To PORT1?, the current port status in hexadecimal (#H00 to #H0F) is returned.

PORT2

Sets the 4-bit EXT I/O output port, or inquires about the current status for the output port.

Program message

- Syntax

  Comand message: `PORT2_<value>`

  Query message: `PORT2?`

- Program data

  Data format: Hexadecimal

  Set value: #H00 to #H0F

(Example)To set 4-bit EXT I/O output port is #H0F,

```
PORT2 #H0F
```

Response message

To PORT2?, the current port status in hexadecimal (#H00 to #H0F) is returned.

RF:COUPLING(RF:COU)

Sets the input coupling of RF INPUT, or inquires about the current setting for input coupling.

Program message

- Syntax

  Comand message: `RF:COUPLING_<{AC|DC}>`
  `RF:COU_<{AC|DC}>`

  Query message: `RF:COUPLING?`
  `RF:COU?`

- Program data

  Data format: Character

  Set value: AC: AC coupling
  DC: DC coupling

(Example)To set input coupling is AC,

```
RF:COU AC
```

Response message

To RF:COU?, the current setting in character (AC or DC) is returned.

RF:IMPEDANCE(RF:IMP)

Sets the input impedance of RF INPUT, or inquires about the current setting for input impedance.

Program message

- Syntax

  Comand message: `RF:IMPEDANCE_<{50|1M}>`
  `RF:IMP_<{50|1M}>`

  Query message: `RF:IMPEDANCE?`
  `RF:IMP?`

- Program data

  Data format: Character

  Set value: 50: Input impedance is 50 Ω
  1M: Input impedance is 1 MΩ

(Example)To set input impedance is 50 Ω,

```
RF:IMP 50
```

Response message

To RF:IMP?, the current setting in character (50 or 1M) is returned.

RF:TRIGGER:EDGE(RF:TRIG:EDG)

Sets the polarity of trigger edge of RF INPUT, or inquires about the current setting for polarity of trigger edge.

Program message

- Syntax

  Comand message: `RF:TRIGGER:EDGE_<{POSITIVE|NEGATIVE|EITHER}>`
  `RF:TRIG:EDG_<{POS|NEG|EIT}>`

  Query message: `RF:TRIGGER:EDGE?`
  `RF:TRIG:EDG?`

- Program data

  Data format: Character

  Set value: POS: (↑)rising
  NEG: (↓) falling
  EIT Rising or falling

(Example)To set polarity of trigger edge is POS,

```
RF:TRIG:EDG POS
```

Response message

To RF:TRIG:EDG?, the current setting in character (POS, NEG or EIT) is returned.

SAMPLE:BLOCK(SAMP:BLO)

Sets the sample block, or inquires about the current setting for sample block.

Program message

- Syntax

  Comand message: `SAMPLE:BLOCK_<value>`
  `SAMP:BLO_<value>`

  Query message: `SAMPLE:BLOCK?`
  `SAMP:BLO?`

- Program data

  Data format: Integer

  Set value: 1 to 100

  Resolution: 1

Response message

To SAMP:BLO?, the current setting in integer (1 to 100) is returned.

SAMPLE:TIME(SAMP:TIM)

Sets the sample time, or inquires about the current setting for sample time.

Program message

- Syntax

  Comand message: `SAMPLE:TIME_<value>`
  `SAMP:TIM_<value>`

  Query message: `SAMPLE:TIME?`
  `SAMP:TIM?`

- Program data

  Data format: Character

  Set value: 0.6 μs to 1.00 s

  Resolution: to 100 μs: 0.2 μs
  to 1.00 ms: 1 μs
  to 10.0 ms: 10 μs
  to 100 ms: 100 μs
  to 1.00 s: 1 ms

(Example)To set sample time is 100 μs,

```
SAMP:TIM 100US
```

Response message

To SAMP:TIM?, the current setting in decimal exponential is returned.

(Example)When sample time is 10 μs,

`100E-6` is returned.

START

Starts the measurement.

Program message

- Syntax

  Comand message: `START`

STOP

Stops the measurement.

Program message

- Syntax

  Comand message: `STOP`

SSTART

Starts the single measurement.

Program message

- Syntax

  Comand message: `SSTART`

SYMMETRY:MODE(SYM:MOD)

Sets the symmetry mode, or inquires about the current setting for symmetry mode.

Program message

- Syntax

  Comand message: `SYMMETRY:MODE_<{AUTO|OFFSET|MANUAL}>`
  `SYM:MOD_<{AUT|OFFS|MAN}>`

  Query message: `SYMMETRY:MODE?`
  `SYM:MOD?`

- Program data

  Data format: Character

  Set value:

AUT:	Setting to AUTO
OFFS:	Setting to OFFSET
MAN	Setting to MANUAL

(Example) To set symmetry mode is AUT,

`SYM:MOD AUT`

Response message

To SYM:MOD?, the current setting in character (AUT, OFFS or MAN) is returned.

(Example) When symmetry mode is MANUAL,

`MAN` is returned.

SYMMETRY:OFFSET:LEVEL(SYM:OFFS:LEV)

Sets the symmetry offset level, or inquires about the current setting for symmetry offset level.

Program message

- Syntax

  Comand message: `SYMMETRY:OFFSET:LEVEL_<value>`
  `SYM:OFFS:LEV_<value>`

  Query message: `SYMMETRY:OFFSET:LEVEL?`
  `SYM:OFFS:LEV?`

- Program data

  Data format: Integer

  Set value: -200 to +200

  Resolution: 1

(Example)To set symmetry offset level is 65,

```
SYM:OFFS:LEV 65
```

Response message

To SYM:OFFS:LEV?, the current setting in integer (-200 to 200) is returned.

SYMMETRY:SLICE:LEVEL(SYM:SLIC:LEV)

Sets the symmetry slice level, or inquires about the current setting for symmetry slice level.

Program message

- Syntax

  Comand message: `SYMMETRY:SLICE:LEVEL_<value>`
  `SYM:SLIC:LEV_<value>`

  Query message: `SYMMETRY:SLICE:LEVEL?`
  `SYM:SLIC:LEV?`

- Program data

  Data format: Character

  Set value: -1.000 V to +1.000 V

  Resolution: 0.002 V

(Example)To set symmetry slice level is +1.000 V,

```
SYM:SLIC:LEV 1.000V
```

Response message

To SYM:SLIC:LEV?, the current setting in real (-1.000 to 1.000) is returned.

UIS

Inquires whether measurement is possible or not.

Program message

- Syntax

  Query message: `UIS?`

Response message

To UIS?, the current status as 0 (when measurement is possible) or 1 (when measurement is impossible) is returned.

4.4 Resisters

The format of status data is shown below.

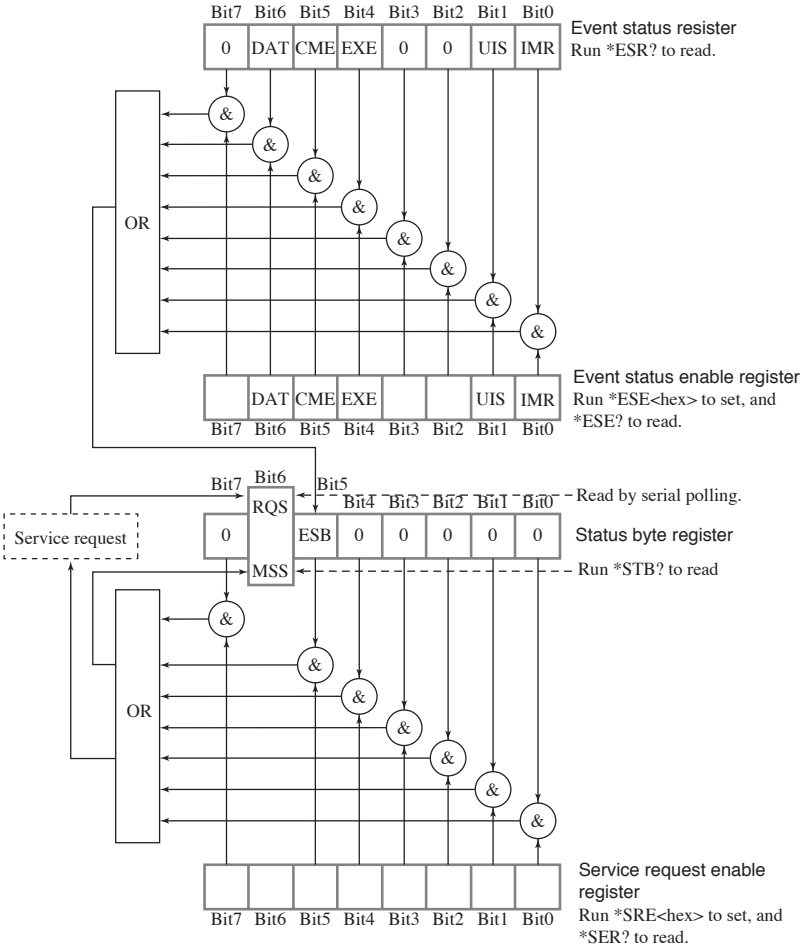


Fig.4-5 Status Data Format

NOTE

- The individual bits of each registers are set when they are 1 and are reset when they are 0.
- *CLS resets the status byte register.

Table 4-3 Event Status Register and Event Status Enable Register

Bit	Register name	Explanation
7		Not used with the KJM6775
6	DAT (Data Available)	The register is set when the measured value become available.
5	CME (Command Error)	Any one of the following events has been encountered while decoding a message: • Syntax error in the message received. • Illegal character data received • Illegal suffix unit received • Illegal data type received.
4	EXE (Execution Error)	Any one of the following events has been encountered while running a message: • Received data out of bounds. • Received message not supported
3		Not used with the KJM6775
2		Not used with the KJM6775
1	UIS (Undesirable Input Signal)	This register is set in case of any one of the following events. • No signal is input • The clock frequency is outside the specified range
0	IMR (In Meas Range)	This register is set when the measured value decreases to 20 % or less.

NOTE • Run *ESR? to read the event status register and *CLS to reset it.

Table 4-4 Status Byte Register and Service Request Enable Register

Bit	Register name	Explanation
7		Not used with the KJM6775
6	RQS (Request)	Signifies the generation of a service request. This bit is reset when read by serial polling.
	MSS (Master Summary Status)	ORed result of the status byte register and service request enable register, which is read by running *STB.
5	ESB (Standard Event Status Bit)	ORed result of the event status register and event status enable register, which is read by serial polling or running *STB?
4		Not used with the KJM6775
3		Not used with the KJM6775
2		Not used with the KJM6775
1		Not used with the KJM6775
0		Not used with the KJM6775

Table 4-5

4.5 Sample Program

The following demonstrates a sample program in which the KJM6775 is GPIB-controlled, using Microsoft Visual Basic via a National Instruments GPIB board meeting NI-488.2 specifications.

The program sets up each item, then displays a jitter value and judgment result once.

```
Dim rd As Integer
Dim strModelInfo As String

Call ibfind("DEV2", rd)                    ' Opens GPIB device.
Call ibconfig(rd, 6, 1)                    ' Sets device configuration .

' Model information acquisition [company name, model, and version number.
' ---------------------------------------------------
Call ibwrt(rd, "*IDN?")                    ' Sends model information
strModelInfo = Space(128)

Call ibrd(rd, strModelInfo)                ' Reads out model information
DispModel.Caption = strModelInfo

' Front panel setup
' ---------------------------------------------------
Call ibwrt(rd, "MEDIA:TYPE DVD")          ' Sets MEDIA to "DVD"
Call ibwrt(rd, "MEDIA:SPEED 1")           ' Sets MEDIA SPEED to "×1.00"
Call ibwrt(rd, "MEDIA:FUNCTION RFTOCLK")' Sets MEDIA FUNCTION to
                                              ' "RF to CLOCK"

Call ibwrt(rd, "SAMPLE:TIME 20E-3")     ' Sets SAMPLE TIME to "20ms"
Call ibwrt(rd, "SAMPLE:BLOCK 1")          ' Sets SAMPLE BLOCK to "1"

Call ibwrt(rd, "RF:TRIGGER:EDGE EIT") ' RF TRIGGER EDGE to "Both
                                          'edge"
Call ibwrt(rd, "CLOCK:TRIGGER:EDGE POSITIVE")' Sets CLOCK TRIGGER
                                               ' EDGE to "Rising"

Call ibwrt(rd, "EQ OFF")                   ' Sets EQ to "OFF"

Call ibwrt(rd, "SYMMETRY:MODE AUTO")   ' Sets SYMMETRY MODE to
                                       ' "AUTO"

Call ibwrt(rd, "DELAY:MODE ON")           ' Sets DELAY MODE to "ON"

Call ibwrt(rd, "RF:COUPLING AC")          ' Sets RF COUPLING to "AC"
```

```
Call ibwrt(rd, "RF:IMPEDANCE 50")      ' Sets RF IMPEDANCE to "50 Ω"

Call ibwrt(rd, "CLOCK:COUPLING AC")    ' Sets CLOCK COUPLING to
                                       ' "AC"
Call ibwrt(rd, "CLOCK:IMPEDANCE 50")   ' Sets CLOCK IMPEDANCE to
                                       ' "50 Ω"
Call ibwrt(rd, "CLOCK:TRIGGER:LEVEL 0V")' Sets CLOCK TRIGGER
                                         ' LEVEL to "0.000V"

Call ibwrt(rd, "ARMING OFF")           ' Sets ARMING to "OFF"
Call ibwrt(rd, "INHIBIT OFF")          ' Sets INHIBIT to "OFF"

Call ibwrt(rd, "METER:SCALE 10PCT")    ' Sets METER SCALE to "10%"

Call ibwrt(rd, "JUDGE:UNIT PCT")       ' Sets JUDGE unit to "%"
Call ibwrt(rd, "JUDGE:LEVEL:LOWER 0") ' Sets JUDGE LEVEL(LOWER)
                                       ' to "0%"
Call ibwrt(rd, "JUDGE:LEVEL:UPPER 8") ' Sets JUDGE LEVEL(UPPER)
                                       ' to "8%"

 Call ibwrt(rd, "START")               ' Starts mesurement.

' Measurement status acquisition
'-----------------------------------------------------
 Dim strImrStatus As String
Do
strImrStatus = Space(16)
Call ibwrt(rd, "IMR?")                 ' Sends a measurement status
                                       ' acquisition message.
Call ibrd(rd, strImrStatus)            ' Measurement status acquisition
DoEvents
Loop Until Left(strImrStatus, 1) = "1"' Waits for the measured value to
                                       ' reach 20 % or less.

' Measured value acquisition
'-----------------------------------------------------
Dim strJitter As String
Dim dJitter As Double
Dim ctrLoop As Integer

Call ibwrt(rd, "JITTER?")              ' Sends jitter value acquisition
                                       ' message.
strJitter = Space(128)
dJitter = 0
Call ibrd(rd, strJitter)               ' Jitter value acquisition
strJitter = Left(strJitter, ibcntl)
```

```
dJitter = Val(strJitter)
DispJitter.Caption = dJitter

' Judgement result acquisition
'-------------------------------------------------
Dim strJudgement As String

Call ibwrt(rd, "JUD:RES?")              ' Sends judgment information
strJudgement = Space(128)
Call ibrd(rd, strJudgement)             ' Judgement result acquisition
strJudgement = Left(strJudgement, ibcntl)
DispJudge.Caption = strJudgement
```

4.6 List of Device Messages

An item in parentheses in the Header column indicates the abbreviation of a device message.

Note 1:A check (✔) is used to indicate available query messages.

Table 4-6 List of Device Messages

HEADER	DATA	Function and response data	Query
*CLS		Clears the status byte register and event status register.	
*ESE	#H00 to #HFF	Sets the event status enable register.	✔
*ESR?		Returns the value of the event status register and clears this register.	Query only
*IDN?		Returns “KIKUSUI ELECTRONICS CORP., KJM6775, 0, x.xx”.	Query only
*RST		Initializes the device (to the factory default settings).	
*SRE	#H00 to #HFF	Sets the service request enable register.	✔
STB?		Returns the value of the status byte register.	Query only
ARMING (ARM)	ON/OFF	Sets on/off for arming.	✔
ARMING:POLARITY (ARM:POL)	POSITIVE/NEGATIVE (POS/NEG)	Sets polarity and signal level for arming.	✔
ARMING:LEVEL (ARM:LEV)	X1/X10	Sets logic level for arming signal.	✔

HEADER	DATA	Function and response data	Query
ARMING:TIME (ARM:TIM)	0.00US to 1.00S	Sets arming delay time. Resolution: to 100 μs: 0.2 μs, to 1 ms: 1 μs, to 10 ms: 10 μs, to 100 ms: 100 μs, to 1.00 s: 1 ms	✔
CLOCK:COUPLING (CLOC:COU)	AC/DC	Sets input coupling for CLOCK INPUT.	✔
CLOCK:FREQUENCY? (CLOK:FREQ?)		Returns measured frequency.	Query only
CLOCK:IMPEDANCE (CLOC:IMP)	50/1M	Sets input impedance for CLOCK INPUT. Unit: Ω	✔
CLOCK:TRIGGER:EDGE (CLOC:TRIG:EDG)	POSITIVE/NEGATIVE (POS/NEG)	Sets trigger edge polarity for CLOCK INPUT.	✔
CLOCK:TRIGGER:LEVEL (CLOC:TRIG:LEV)	-1.000 V to +1.000 V	Sets trigger level for clock signal. Resolution: 0.002 V	✔
DAT?		Returns whether measured data is available or not. Available: 1, Not available: 0	Query only
DELAY:MODE (DEL:MOD)	ON/OFF	Sets on/off for delay mode.	✔
DELAY:PHASE? (DEL:PHA?)		Returns currently phase difference.	Query only
DELAY:VALUE (DEL:VAL)	0 to 400	Sets the delay amount. Resolution: 1	✔
EQ	ON/OFF	Sets on/off for equalizer circuit.	✔
IMR?		Returns whether measured value is 20 % or less. Exceed 20 %: 0, 20 % or less: 1	Query only
INHIBIT (INH)	ON/OFF	Sets on/off for INHIBIT circuit.	✔
INHIBIT:SLICEOUT (INH:SLI)	THROUGH/INHIBIT (THR/INH)	Sets whether to inhibit or continue the output level of the SLICED RF OUT and DELAYED CLOCK OUT signals when the inhibit function is enabled	✔
INHIBIT:POLARITY (INH:POL)	NORMAL/INVERSE (NORM/INV)	Sets polarity for inhibit circuit.	✔

HEADER	DATA	Function and response data	Query
INHIBIT:MODE (INH:MOD)	GATE/ SYMMETRY/PLL (GAT/SYM/PLL)	Sets the item on which the inhibit circuit is applied	✔
INHIBIT:LEVEL (INH:LEV)	X1/X10	Sets logic level for inhibit signal.	✔
INHIBIT:DELAY (INH:DEL)	0US/8US/128US /2MS	Sets the wait time for starting data acquisition after inhibit is cleared	✔
HISTOGRAM:WINDOW:ADDRESS (HIS:WIN:ADD)	#H0000 to #HFFFF	Sets the start address of the window for extracting the histogram.	✔
HISTOGRAM:WINDOW:LENGTH (HIS:WIN:LEN)	#H0001 to #HFFFF	Sets the data length of the window for extracting the histogram.	✔
HISTOGRAM:DATA? (HIS:DAT?)		Returns about histogram data. This message can be executed only when the DATA AVAILABLE flag is set to "High" after single start. In all other cases, an EXE error occurs.	Query only
JITTER? (JIT?)		Returns the jitter value in units corresponding to the KJM6775 scale currently set. A value in the range of 0 to 20.00 when the KJM6775 scale is % (percentage) and 0.00E-09 to 50.00E-06 when the KJM6775 scale is s (seconds) is returned.	Query only
JUDGE? (JUD?)		Return judgement result. GO: 1, NOGO: 0	Query only
JUDGE:UNIT (JUD:UNI)	PCT/S	Sets the unit to be used for the judgment.	✔
JUDGE:LEVEL:UPPER (JUD:LEV:UPP)	0.00PCT to 20.0PCT 0.00NS to 50.0US	Sets the UPPER judgment level for the system of units that was specified by JUDGE:UNIT. Resolution: to 10.0 ns: 0.01ns, to 100 ns: 0.1ns to 1.00 μs: 1 ns, to 10.0 μs: 0.01 μs to 50.0 μs: 0.1 μs	✔
JUDGE:LEVEL:LOWER (JUD:LEV:LOW)	0.00PCT to 20.0PCT 0.00NS to 50.0US	Sets the LOWER judgment level for the system of units that was specified by JUDGE:UNIT. Resolution: to 10.0 ns: 0.01ns, to 100 ns: 0.1ns to 1.00 μs: 1 ns, to 10.0 μs: 0.01 μs to 50.0 μs: 0.1 μs	✔

HEADER	DATA	Function and response data	Query
JUDGE:RESULT? (JUD:RES?)		Return judgement result.	Query only
MEDIA:TYPE (MED:TYP)	CD/CD-R/CD-RW/ DVD/DVD-ROM/ DVD-R/DVD-RW/ DVDRAM1/ DVDRAM2	Sets the type of media to be measured	✔
MEDIA:SPEED (MED:SPE)	CD, CD-ROM. CD-R, CD-RW: 0.90 to 50.0 DVD, DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-ROM: 0.80 to 8.0 DVD RAM1: 0.80 to 7.4 DVD RAM2: 0.80 to 3.7	Sets the speed of media to be measured Resolution: to ×1.00: 0.02, to ×2.0: 0.05 to ×4.0: 0.1, to ×10.0: 0.2 to ×50.0: 0.5	✔
MEDIA:FUNCTION (MED:FUNC)	RFTOCL/BIPHSE/ WOBBLE (RFT/ BIP/WOB)	Sets the function of media to be measured	✔
MEMORY:RECALL (MEM:REC)	1 to 15	Recalls the panel settings from the setup memory. Resolution: 1	✔
MEMORY:STORE (MEM:STO)	1 to 15	Stores the panel settings to the setup memory. Resolution: 1	
METER:SCALE (MET:SCAL)	10PCT/20PCT/1NS/ 2NS/5NS/10NS/ 20NS/50NS/100NS/ 200NS/500NS/1US/ 2US/5US/10US/ 20US/50US	Sets maximum value of meter scale.	✔
PLL		Sets on/off for PLL circuit.	✔
PLL:STATUS? (PLL:STAT?)		Returns current status (LOCK or UNLOCK) for PLL clock-regeneration.	Query only
PORT1?		Returns the current status for a 4-bit input port of EXT I/O.	Query only
PORT2		Sets the 4-bit EXT I/O output port.	✔

HEADER	DATA	Function and response data	Query
RF:COUPLING (RF:COU)	AC/DC	Sets input coupling for RF INPUT circuit.	✔
RF:IMPEDANCE (RF:IMP)	50/1M	Sets input impedance for RF IMPUT impedance. Unit: Ω	✔
RF:TRIGGER:EDGE (RF:TRIG:EDG)	POSITIVE/NEGATIVE/EITHER (POS/NEG/EIT)	Sets trigger edge polarity for RF IMPUT circuit.	✔
SAMPLE:BLOCK (SAMP:BLO)	1 to 100	Sets sample block. Resolution: 1	✔
SAMPLE:TIME (SAMP:TIM)	0.6US to 1.00S	Sets sample time. Resolution: to 100 μs: 0.2 μs: to 1 ms: 1 μs to 10 ms: 10 μs: to 100 ms: 100 μs to 1.00 s: 1 ms	✔
START		Starts measurement	
STOP		Stops measurement	
SSTART		Starts single measurement	
SYMMETRY:MODE (SYM:MOD)	AUTO/OFFSET/MANUAL (AUT/OFFS/MAN)	Sets symmetry mode.	✔
SYMMETRY:OFFSET:LEVEL (SYM:OFFS:LEV)	-200 to +200	Sets symmetry offset level. Resolution: 1	✔
SYMMETRY:SLICE:LEVEL (SYM:SLIC:LEV)	-1.000 V to +1.000 V	Sets symmetry slice level. Resolution: 0.002 V	✔
UIS?		Returns whether measurement is available. Measurement is available: 0, Measurement is not available: 1	Query only

Chapter5 Control Using EXIT I/O

This chapter describes use of the EXT I/O connector on the rear panels of the KJM6775.

5.1 Outline

The KJM6775 allows you to control the following six functions using the EXT I/O connector on its rear.

Recalling the contents of the setup memory

The panel settings stored in the setup memory can be recalled by external control.

Four-bit input ports

Four-bit data input to PI0 to PI3 of the EXT I/O connector can be read via GPIB. This allows you to check the condition of a jig and other devices.

Four-bit output ports

Four-bit data can be output to PO0 to PO3 of the EXT I/O connector via GPIB. This allows you to control a jig and other devices.

Judgement output

Outputs an indication of whether the measured value is larger or smaller than the JUDGE level set on the front panel to GO OUT or NOGO OUT of the EXT I/O connector.

Memory address output

Outputs the address of the recalled setup memory contents to MEM0 to MEM3 of the EXT I/O connector.

Within-measuring-range output

Outputs an indication of whether the measured value is within the measuring range of the instrument to IN MEAS RANGE of the EXT I/O connector.

5.2 Description of the EXT I/O Connector Terminal

The EXT I/O connector is a 25-pin D-sub connector (female). The signal level is TTL level.

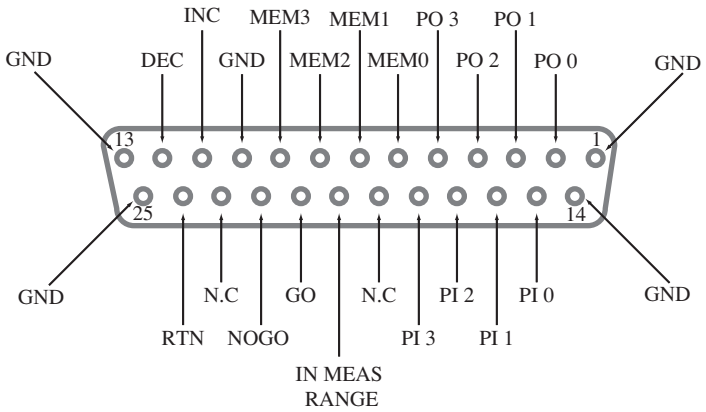


Fig.5-1 Connections of EXT I/O Connector Pins

NOTE

- Use the shielded type of 25-pin D-sub connector and cable to avoid malfunction caused by noise and other problems. The shields should be connected to any of the GND terminals of the EXT I/O connector.
- The input ports are pulled up at 10 kΩ.
- The output impedance of the output ports is 240 Ω to 290Ω.

Table 5-1 Pin Configuration of the EXT I/O Connector

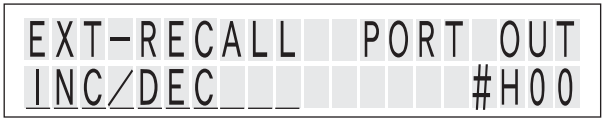
Pin number	Name	In/Out	Function	When the direct recall is executed
1	GND	-	Ground	←
2 to 5	PO0 to PO3	OUT	4-bit output ports	←
6 to 9	MEM0 to MEM3	OUT	Output of setup memory address	←
10	GND	-	Ground	←
11	INC	IN	Increment of setup memory address	Enter the recall execute signal
12	DEC	IN	Decrement of setup memory address	
13	GND	-	Ground	←
14	GND	-	Ground	←
15 to 18	PI0 to PI3	IN	4-bit input ports	Enter the address of the recall number
19	N.C	-	Spare terminal (Leave this pin unconnected)	←
20	IN MEAS RANGE	OUT	Output indicating whether jitter is within the measuring range	←
21	GO	OUT	Judgement output	←
22	NOGO	OUT	Judgement output	←
23	N.C	-	Spare terminal (Leave this pin unconnected)	←
24	RTN	IN	Return of setup memory address.	
25	GND	-	Ground	←

5.3 Switching the Recall Operation

Two recall methods are possible using the EXT I/O port: recall using INC, DEC, and RESET signals and direct recall.

One of the operations must be selected in advance using the EXT I/O menu.

1. While holding down the SHIFT key, press the EXT I/O key.
   The following screen appears.



2. Each time the EXT I/O key while holding down the SHIFT key is pressed the cursor (blink indication) changes allowing you to select the parameter.
   EXT-RECALL ↔ PORT OUT
3. Turn the rotary knob at the EXT-RECALL position to switch the recall method.
   INC/DEC ↔ DIRECT
4. Press the START STOP or DISPLAY key.
   The KJM6775 returns to measurement display.

5.4 Recalling the Contents of the Setup Memory

5.4.1 Recalling by INC, DEC or RTN terminal

Connecting the INC, DEC, or RTN terminal of the EXT I/O connector to the GND terminal allows you to increment the address of the setup memory to recall the contents of that memory address.

NOTE
- Do not connect the INC, DEC, and RTN terminals to GND terminals together.
- Provide an interval of 100 ms or more between a recall action and the next action (H-level period).

Incrementing the setup memory address

Connecting the INC terminal (No. 11) to the GND terminal (pin No. 1, 10, 13, 14, or 25) causes the INC terminal to become "Low". Holding the INC terminal "Low" for 100 ms or more causes the setup memory address to be incremented by 1 and the contents of the resulting setup memory address to be recalled.

Decrementing the setup memory address

Connecting the DEC terminal (No. 12) to the GND terminal (pin No. 1, 10, 13, 14, or 25) causes the DEC terminal to become "Low". Holding the DEC terminal "Low" for 100 ms or more causes the setup memory address to be decremented by 1 and the contents of the resulting setup memory address to be recalled.

Returning the setup memory address

Connecting the RTN terminal (No. 24) to the GND terminal (pin No. 1, 10, 13, 14, or 25) causes the RTN terminal to become "Low". Holding the RTN terminal "Low" for 100 ms or more causes the setup memory address to return to "1" and the contents of the resulting memory 1 to be recalled.

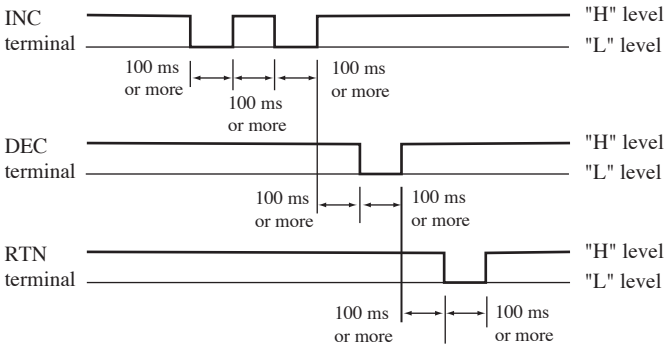


Fig.5-2 Timing Chart

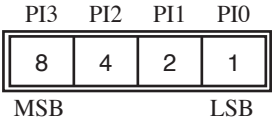
5.4.2 Recall by Specifying the Address

By entering the address number at PI0 to PI3 of the EXT I/O connector and connecting the INC pin to the GND pin, the setup memory at the entered address can be recalled.

NOTE • Provide an interval of 100 ms or more between a recall action and the next action (H-level period).

Entering the address of the recall number

Enter a value in the range of 1 to 15 at PI0 to PI3.



Executing the direct recall

Connecting the INC pin (no. 11) to the GND pin (no. 1, 10, 13, 14, or 25) causes the INC pin to become "Low". Holding the INC pin "Low" for 100 ms or more causes the setup memory at the address number entered at PI0 to PI3 to be recalled.

The PI0 to PI3 signal must be stable at least 10 ms before and after the low state of the INC signal.

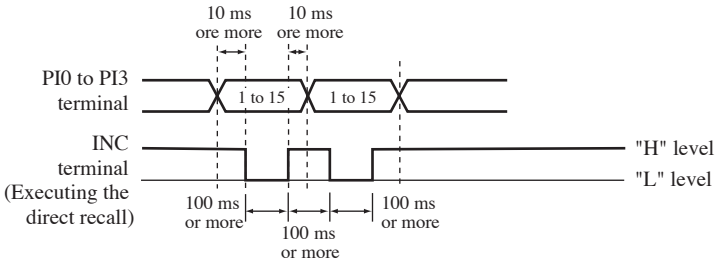


Fig.5-3 Timing Chart

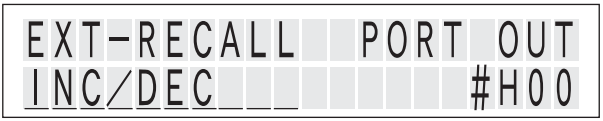
5.5 Data Input/Output

This allows you to read out data input to the PI0 to PI3 terminals of the EXT I/O connector via GPIB. It also allows you to output data to the PO0 to PO3 terminals from GPIB and front panel (local status).

The use of this 4-bit signal allows you to control a jig or another device or check its status.

For details of GPIB messages, see the PORT1 and PORT2 messages in Chapter4 "GPIB Control".

1. While holding down the SHIFT key, press the EXT I/O key.
   The following screen appears.



2. Each time the EXT I/O key while holding down the SHIFT key is pressed the cursor (blink indication) changes allowing you to select the parameter.
   EXT-RECALL ↔ PORT OUT
3. Turn the rotary knob at the PORT OUT position to change the data from PO0 terminal to PO3 terminal.
   #H00 ↔ #H01← • • • → #H0F
4. Press the START STOP or DISPLAY key.
   The KJM6775 returns to measurement display.

5.6 Output of Setup Memory Address

Outputs setup memory address that is recalled to the MEM0 to MEM3 terminals of the EXT I/O connector.

MEM0 is LSB and MEM3 is MSB.

Below is an output example when address number 10 is recalled.

MEM3 (8)	MEM2 (4)	MEM1 (2)	MEM0 (1)
H	L	H	L

If the panel settings are changed after a recall, the recall operation becomes invalid. Thus, low level signals are output for MEM0 to MEM3.

5.7 Judgement Output

The judgement of whether the measured value is larger or smaller than the JUDGE level set on the panel will be output to the GO or NOGO terminal of the EXT I/O connector.

Condition		GO	NOGO
1	LOWER preset value≤measurement value≤UPPER preset value	H	L
2	Except condition 1	L	H

NOTE • If the LOWER preset value is greater than or equal to the UPPER preset value, the LOWER preset value is void, and the lower judgment is not performed.

5.8 Within-Measuring-Range Output

An indication of whether the measured value is within the measuring range of the instrument is output to the IN MEAS RANGE terminal of the EXT I/O connector. The measuring range of the instrument is within 20%. If the measured value exceeds 20%, a "Low" signal is output. If it is 20% or less, a "High" signal is output.

In addition, if the measurement is stopped or the measurement is not in progress because no input signal is applied and during the time after the setting is changed until the first measurement is finished, a "low" signal is output.

Chapter6 Maintenance

This chapter describes the maintenance and inspection of the KJM6775. To maintain the KJM6775's original performance for as long as possible, conduct periodic inspection and maintenance.

6.1 Cleaning

If the panel or any other exterior surface of the product is smeared, clean the surface by wiping lightly with a soft cloth moistened with a neutral detergent solution.

⚠CAUTION
- Turn off the POWER switch before cleaning.
- Never use organic solvents, such as thinner and benzine, for cleaning. Use of organic solvents could result in surface discoloration, marking erasure, clouded display and so on.

6.2 Inspection

Power code: Check for ruptures in the covering, play or cracks in the plug and so on.

⚠WARNING
- Ruptures in the covering or any other defect in the power code could cause electrical shock hazards. Discontinue using the power cable immediately.

For purchasing accessories, please contact Kikusui distributor/agent.

6.3 Calibration

This product was calibrated at shipment. However, recalibration is required after long-term usage.

For calibration, please contact Kikusui distributor/agent.

6.4 Replacing the Fuse

⚠ WARNING
- To prevent electric shock, be sure to unplug the AC power cord before replacing the fuse.
- Make sure that the fuse used conforms to the KJM6775 specifications, including shape, rating, and characteristics.
  Using a fuse with different rating or short-circuiting, the fuse holder will damage the KJM6775.

1. Turn the POWER switch of the KJM6775 and remove the power cord plug.
2. Remove the power cord from the AC LINE connector on the rear panel.
3. Remove the fuse holder using a tool such as a flat-blade screwdriver as shown in Fig.6-1.
   Fuse rating: 250 V AC, 2.5 A (T)

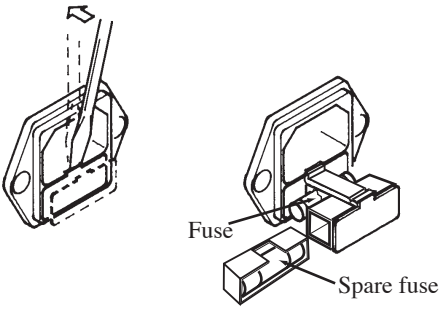


Fig.6-1 Removing the fuse holder

6.5 Replacing the Backup Battery

An internal battery backs up the contents of the panel memory even if the instrument is turned off. If the panel settings in effect before the instrument was turned off and those after it is turned on differ, the battery should be replaced.

Battery life varies, depending on usage; generally it should be replaced after three years from shipment.

For replacement, please contact Kikusui distributor/agent.

6.6 Troubleshooting

The problems specified below do not necessarily indicate failures. Please perform the following checks before requesting repairs.

If the remedy does not solve the problem or if your case does not match any of the items, execute "3.2 Initialization" and set the panel again.

If the situation still does not improve, contact your Kikusui distributor/agent.

Table 6-1

Symptom	Check Item	Description
• The KJM6775 does not start when the POWER switch is pressed.	• Confirm that the AC power cord is connected.	See "1.4 Checking the Line Voltage" on page 1-5.
	• Confirm that the fuse is blown.	See "6.4 Replacing the Fuse" on page 6-2 and replace a new fuse. If the fuse blows again, request for repairs.
• Nothing appears on the display or the display is dark.	• Confirm that the contrast is low.	See "[4] SETTING KEYS" on page 2-2 and adjust the contrast.
	• Confirm that the backlight is turned off.	See "3.8 Configuration Menu" on page 3-27 and turn on the backlight.
• Keys do not work.	• Confirm that the KEY-LOCK function is off.	See "[14] KEY LOCK" on page 2-5.
	• Confirm that the KJM6775 is in remote mode.	See "[4] SETTING KEYS" on page 2-2 and be in local status.
• An error message appears.		See table 6-2 on page 6-6, check the error information, and resolve the cause of the error.

Symptom	Check Item	Description
• Cannot make measurements.	• Confirm that the START LED is lit up.	Press the START/STOP key to start the measurement. If the LED turns off after making measurements, the KJM6775 is set to single measurement. See " 61: START MODE" on page 3-29.
	• Confirm that the media setting is correct.	Set the media speed and measurement function correctly.
	• Confirm that the input amplitude is adequate.	Input amplitude must be at least 0.2 Vp-p. When using the 10:1 probe, the amplitude is reduced to 1/10 at the input terminal. Therefore, the input must be at least 2 Vp-p.
		Check the input impedance. When using a 50 Ω cable, be sure to make measurements at 50 Ω.
	• Confirm that the arming signal being applied.	If the arming function is turned on, measurements do not start until an arming signal is applied. Check the amplitude and timing.
• The time it takes for the KJM6775 or DC output to change is slow.	• Confirm that the sampling time is set correctly.	Jitter calculation is not performed until preset sampling value × the number of blocks has been completed. Set an appropriate value.
	• Confirm that the average function is turned on.	See " 11: AVERAGE METER" and " 12: AVERAGE DCOUT" on page 3-28 and set an appropriate value.
	• Confirm that the arming signal period is long.	If the period of the arming signal is long, the measurement interval slows down. Check whether the arming signal is appropriate.
• EQ cannot be turned on.	• Confirm that media, speed, and function are set to values that match the EQ specifications.	The EQ can be turned on only when making RF to CLOCK measurements of DVD, DVD-ROM, DVD-R, DVD-RW, DVD+R, or DVD+RW at ×1.00 speed.
• PLL cannot be turned on.	• Confirm that media, speed, and function are set to values that match the PLL specifications.	The PLL can be turned on only when making RF to CLOCK measurements of CD, CD-ROM, CD-R or CD-RW at ×1.00, ×2.00, ×4.00, or DVD, DVD-ROM, DVD-R, DVD-RW, DVD+R, or DVD+RW at ×1.00 speed.

Symptom	Check Item	Description
• PLL does not lock.	• Confirm that the frequency is correct.	The PLL of the KJM6775 can lock up to ±10 % of the center frequency of each media.
	• Confirm that the amount of jitter is too large.	The PLL of the KJM6775 can lock up to 17 %.
• The jitter measurement value is too large.	• Confirm that the inhibit signal timing is correct.	The jitter of the ID or track jump section of the signal is mixed. Check the timing of the inhibit signal and RF signal. In addition, there are limitations in the inhibit period and time. See "Inhibit" on page 7-7.
	• Confirm that the duty cycle of clock signal is outside the specifications.	The duty cycle specification of the clock signal is 45:55 to 50:50.
	• Confirm that the delay phase is correct.	When measuring the time interval jitter, the phase of the two signals must be matched. See "3.4.9 Setting the Delay" on page 3-19. When using the KJM6775 with the delay turned off, take measures to match the delay such as by adjusting the length of the external cable before making measurements.
	• Confirm that the edge (logic) of the RF signal, clock signal, arming signal, and inhibit signal are correct.	The edge of the RF signal after both edges have been detected cannot be measured on both edges. If the edge of other signals is not correct, measurements may not be made correctly. Check the edge settings. See "Recommended Settings" on page 3-12

6.1 List of Error messages

Table 6-2 List of error message

Indication		Description
E01 to E09	LOW BATTERY	Appears when the internal battery is flat.
E11	KEY LOCK	Displayed when the panel is operated during key lock.
E12	REMOTE	Displayed when the panel other than the LOCAL key is operated in remote mode.
E13	LOCAL LOCK OUT	Displayed when the panel is operated when the GPIB I/F is set to remote mode and local lock is enabled.
E21	Can't Select (Media)	Displayed when the operation is invalid for the current media and the setting did not change.
E22	Can't Select (SPEED)	Displayed when the operation is invalid for the speed setting and the setting did not change.
E23	Can't Select (FUNC)	Displayed when the operation is invalid for the current function and the setting did not change.
E24	DELAY FIXD	Displayed when an attempt to change the delay phase is made when PLL is on. The delay phase cannot be changed when the PLL is in use.
E31	RF NO SIGNAL	Displayed when there is no signal applied to the RF input or the amplitude is too small. The message may also be displayed when the signal is a burst signal. Make the measurement by setting 51: INPUT CHECK (as described in section "3.8 Configuration Menu" on page 3-27) to DISABLE.
E32	CLOCK NO SIGNAL	Displayed when the counter for measuring the clock frequency used to perform percentage calculations cannot make measurements or the frequency is outside the range. If the clock signal is a burst signal, measurements cannot be made using the frequency counter. In this case, set 31: T REFERENCE (as described in section "3.8 Configuration Menu" on page 3-27) to PANEL SPEED to make the measurements.
E41	RECALL ERROR	Displayed when a memory recall operation is performed when the recall memory is corrupt due to LOW BATTERY.

Indication		Description
E51	NO DATA	Displayed when the number of samples is 0. Possible causes are: sample time is too short and inappropriate, inhibit was enabled over the entire interval, or the arming signal was not applied. The measurement is aborted unless the arming signal is applied for approximately 4 s in which case the number of samples is set to 0.
E71 to E79	ERROR (CAL)	Displayed when an error is found in the calibration data. Contact your Kikusui agent.
E81 to E89	ERROR (CPLD)	Displayed when an error occurs in the internal hardware operation. Contact your Kikusui distributor/agent.
E91 to E95	ERROR (DSP)	Displayed when an error occurs in the internal software operation. Contact your Kikusui distributor/agent.
E96 to E99	ERROR (CPU)	

Chapter 7 Specifications

This chapter provides the electrical and mechanical specifications for the KJM6775.

Input

RF INPUT	Input signal		EFM signal, 8-16 modulation signals, Wobble signal, Bi-Phase signal
		Minimum pulse width	Time interval measurement: 5 ns Others: 15 ns
	Signal voltage range		0.2 Vp-p to 2 Vp-p
	Input impedance		Approx. 1 MΩ (17 pF ± 3 pF), Approx. 50 Ω
	Input coupling		AC, DC
	Maximum input voltage		±4 V (DC+AC peek)
	Input connector		BNC
	Frequency band(-3 dB)		DC: DC to 250 MHz AC:35 Hz to 250 MHz
CLOCK INPUT	Clock frequency range		4.0 MHz to 220 MHz
	Duty ratio range		45:55 to 50:50
	Signal voltage range		0.2 Vp-p to 2 Vp-p
	Input impedance		Approx. 1 MΩ (17 pF ± 3 pF), Approx. 50 Ω
	Input coupling		AC, DC
	Maximum input voltage		±4 V (DC+AC peek)
	Input connector		BNC
	Frequency band (-3 dB)		DC: DC to 250 MHz AC: 35 Hz to 250 MHz

Measurement

- Time interval jitter measurement

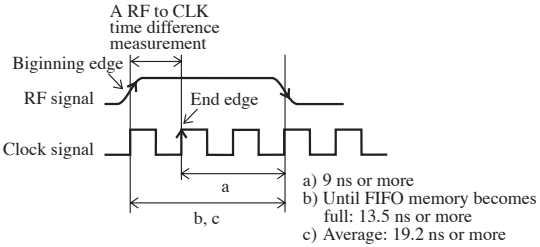
Measuring range	Clock frequency range	4.0 MHz to 220 MHz	
	Jitter value range	0 % to 20 % of clock period	
	Calculation range	0 T to 1.0 T (T = period of clock signal)*1	
Specification-assured range		4 % to 15 %	
Measuring accuracy*2	Display indication	±(0.4 % + 80 ps of clock period)	
	Analog meter indication	±(0.4 % + 80 ps of clock period + 1 % of fs)	
Time resolution		25 ps	at DVD-R, DVD+R, DVD-RW, DVD+RW: ×1.75 to ×8.0 at DVD-RAM1: ×1.65 to ×7.4 at DVD-RAM2 : ×0.82 to ×3.7 at CD-R, CD-RW: ×11.0 to ×50.0 Clock frequency Corresponds to 48 MHz to 220 MHz.
		50 ps	at DVD-R, DVD+R, DVD-RW, DVD+RW: ×0.88 to ×1.70 at DVD-RAM1: ×0.82 to ×1.60 at DVD-RAM2: ×0.80 or more at CD-R, CD-RW: ×5.6 to ×10.5 Clock frequency Corresponds to 24 MHz to 48 MHz.
		100 ps	at DVD-R, DVD+R, DVD-RW, DVD+RW: ×0.80 to ×0.86 at DVD-RAM1: ×0.80 at CD-R, CD-RW: ×2.8 to ×5.4 Clock frequency Corresponds to 12 MHz to 24 MHz.
		200 ps	at CD-R, CD-RW: ×1.40 to ×2.7 Clock frequency Corresponds to 6 MHz to 12 MHz.

Time resolution(Cont'd)	400 ps	at CD-R, CD-RW: ×0.90 to ×1.35 Clock frequency Corresponds to 4 MHz to 6 MHz.
Residual jitter	2 % or less of clock period[*1]	
Maximum sampling period[*3]	74 MSPS (Up to 100 consecutive data points)[*4] 52 MSPS (Upper limit to average value)	

*1.The clock period is derived from the media speed setting. The clock frequencies of the CD and DVD standard speeds are 4.3218 MHz, and 27.0 MHz, respectively.

*2.The clock period derived from the media speed setting is applied. If the media speed setting is not correct, the calculation range will not be correct. In this case, the specifications cannot be guaranteed.

*3.Continuous measurement requirement
a) The time from the end edge to the next RF signal edge is 9 ns or more.
b) The time from the beginning edge to the next RF signal edge is 13.5 ns or more.
c) The average of the time above b is 19.2 ns or more.



*4.The KJM6775 has built-in FIFO memory (temporary storage memory) as waiting for calculate processing, data is acquired continuously until the FIFO memory becomes full, even if measurement of sampling period exceeds upper limit to average value: 52 MSPS to 74 MSPS. When the signal is applied at 74 MSPS, the FIFO memory becomes full at 100 data points.

• Wobble jitter measurement

Measuring range	Clock frequency range	120 kHz to 1.2 MHz (Average) 80 kHz to 2.4 MHz (Maximum)	
	Jitter value range	0 % to 20 %	
	Calculation range	0.5 T to 1.5 T (T = period of wobble signal)*1	
Specification-assured range		4 % to 15 %	
Measuring accuracy*2	Display indication	±0.5 % of wobble period	
	Analog meter indication	±(0.5 % of wobble period+1 % of fs)	
Measuring resolution		200 ps	Media setting value DVD-R: ×0.94 to ×8.0 DVD-RAM1: ×0.88 to ×7.4 DVD-RAM2: ×0.80 to ×3.7
		400 ps	Media setting value DVD-R: ×0.80 to ×0.92 DVD-RAM1: ×0.80 to ×0.86
Residual jitter		2 % or less of wobble period	
Maximum sampling period		17 MSPS	

*1.The wobble period is derived from the media speed setting. The wobble frequency of the DVD standard speed (27 MHz) is 145.16 kHz, period comes to approx. 6.9 μs.
Moreover, wobble frequency of DVD-RAM1(29.18 MHz) is 156.88 kHz, period comes to approx. 6.4 μs.

*2.The wobble period derived from the media speed setting is applied. If the media speed setting is not correct, the calculation range will not be correct. In this case, the specifications cannot be guaranteed.

• Bi-Phase jitter measurement

Measuring range	Clock frequency range	3.1 μs to 140 μs (1T average) 1.5 μs to 620 μs (Maximum)	
	Jitter value range	0 % to 20 %	
	Calculation range	0.5 T to 1.5 T (T = 1T pulse width of Bi-Phase signal)*1	
Specification-assured range		4 % to 15 %	
Measuring accuracy*2	Display indication	±0.5 % of 1T Bi-Phase pulse width	
	Analog meter indication	±(0.5 % of 1T Bi-Phase pulse width+1 % of fs)	
Measuring resolution		200 ps	Media setting value CD-R, CD-RW: ×50.0
		400 ps	Media setting value CD-R, CD-RW: ×25.0 to ×49.5
		800 ps	Media setting value CD-R, CD-RW: ×12.5 to ×24.5
		1.6 ns	Media setting value CD-R, CD-RW: ×6.4 to ×12.0
		3.2 ns	Media setting value CD-R, CD-RW: ×3.2 to ×6.2
		6.4 ns	Media setting value CD-R, CD-RW: ×1.60 to ×3.1
		12.8 ns	Media setting value CD-R, CD-RW: ×0.90 to ×1.55
Residual jitter		2 % or less of 1T Bi-Phase pulse width	
Maximum sampling period		17 MSPS	

*1.The 1T pulse width is derived from the media speed setting. The 1T average pulse width of the CD standard speed is 158.75 μs.

*2.The pulse width derived from the media speed setting is applied. If the media speed setting is not correct, the calculation range will not be correct. In this case, the specifications cannot be guaranteed.

Sample time

Sample time setting range	0.6 μs to 1 s[*1]
Sample time setting resolution	0.2 μs (0.6 μs to 100 μs) 1 μs (100 μs to 1 ms) 10 μs (1 ms to 10 ms) 0.1 ms (10 ms to 0.1 s) 1 ms (0.1 s to 1 s)
Sample time setting accuracy	±(Setting value × 0.01 % + 4 Sample time[*2] + 0.15 μs)
Block sample setting range	1 to 100[*1]

*1.The maximum number of samples is 2^{24}-1. Take into account the period of the input signal and the media type, and set the value so that it does not overflow.

(Reference) In the case of an EFM signal of 220 MHz clock with 4T average and σ equal to approximately 4%, overflow occurs after 3 s.

*2.When one edge of the RF edge is selected, the sample time is equal to 4 periods of the RF signal; when both edges are selected, the sample time is equal to 2 periods.

Arming

Input level	at x1	H level: 2.5 V to 5.0 V L level: 0 V to 1.0 V
	at x10	H level: 0.25 V to 0.5 V L level: 0 V to 0.1 V
Input impedance		Approx. 1 MΩ
Input coupling		DC
Maximum input voltage		±10 V (DC+AC peek)
Input connector		BNC
Arming edge		POSITIVE, NEGATIVE
Arming signal minimum pulse width		100 ns
Arming delay setting range		OFF and 0.2 μs to 1 s
Arming delay setting resolution		0.2 μs (0.2 μs to 100 μs) 1 μs (100 μs to 1 ms) 10 μs (1 ms to 10 ms) 0.1 ms (10 ms to 0.1 s) 1 ms (0.1 s to 1 s)

Inhibit

Input level	at x1	H level: 2.5 V to 5.0 V L level: 0 V to 1.0 V
	at x10	H level: 0.25 V to 0.5 V L level: 0 V to 0.1 V
Input impedance		Approx. 1 MΩ
Input coupling		DC
Maximum input voltage		±10 V (DC+AC peek)
Input connector		BNC
Inhibit polarity		NORMAL, INVERT
Inhibit valid time	In measurement of two signal	1 μs to 1 s
	In measurement of single signal	100 μs to 10 ms (at an inhibit period of 75 % or less)

Indicating

Indicator	Analog meter, LCD display 2 × 20 letters
Unit	%, s
Scale	10 %, 20 % 1 ns, 2 ns, 5 ns, 10 ns, • • •••50 μs
GO, NO GO judgement	Red(NOGO), Green(GO) 2LED display

Trigger

Symmetry follow-up		AUTO, AUTO+OFFSET, MANUAL	
		CD-ROM CD-R CD-RW	The response characteristics of AUTO comply with those given in the Compact Disk Reference Measuring Methods Specification Guideline Ver. 1.0 May 1999
		DVD-ROM DVD-R DVD+R DVD+RW DVD-RW	The response characteristics of AUTO comply with those given in the DVD Specifications for Read-Only Disk Ver. 1.0 Aug 1996
		DVD-RAM1	The response characteristics of AUTO comply with those given in the DVD Specifications for Rewritable Disk Ver. 1.0 July 1997
		DVD-RAM2	The response characteristics of AUTO comply with those given in the DVD Specifications for Rewritable Disk Ver. 2.0 Sept 1999
Trigger edge	RF	Rising edge, falling edge and both edges selectable	
	CLOCK	Rising edge and falling edge selectable	
Manual level setting range		-1.0 V to +1.0 V	
Manual level resolution		2 mV	
Manual level accuracy		±(Setting value×2 % + 20 mV)	
Delay circuit (only when making measurements using two time interval jitter signals)		Clock signal is delayed to adjust the phase of an RF signal. Phase adjusting range:0˚ to 360˚	
Clock signal trigger level setting range		-1.0 V to +1.0 V	
Clock signal trigger level resolution		2 mV	
Clock signal trigger level accuracy		±(Setting value×2 % + 20 mV)	

Equalizer circuit

Equalizer circuit in KJM6775 is designed in order to 8-16 modulated signal of reference clock of =27 MHz.

Frequency response characteristics based on the DVD book is prescribed in reference clock of 26.16 MHz. Therefore, because reference frequency of 26.16 MHz is converted into 27 MHz, frequency characteristics of the KJM6775 is described 5.0 MHz as 5.16 MHz and 10 MHz as 10.3 MHz.

DVD book: DVD Specifications for Read-Only Disk Ver. 1.0, Aug. 1996.

Frequency characteristics	5.16 MHz: +3.2 dB ± 0.3 dB (Amplitude ratio as reference is 10 kHz)
	10.3 MHz: -2.8 dB ± 1.0 dB (Amplitude ratio as reference is 10 kHz)
Group delay frequency characteristics	Maximum group delay deviation ≤ 6 ns (range: 0.7 MHz ≤ f ≤ 6.7 MHz)

PLL clock-regeneration circuit

Frequency response characteristics based on the DVD book is mentioned by open-loop characteristics. However, frequency response characteristics of the KJM6775 is managed by close-loop characteristics equivalent to open-loop characteristics. Frequency response characteristics can be valid at reference clock of =27 MHz (DVD standard speed mode) or 4.3 MHz (CD standard speed mode).

The frequency response characteristics of each PLL are those obtained by scaling the specifications of the corresponding book or standard.

CD standard speed mode	Synchronizing available signal	EFM signal that channel clock is equivalent to 4.1 MHz to 4.5 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz) Comply with the Compact Disk Reference Measuring Methods Specification Guideline Ver.1.0 May 1999	1 kHz: 0.19 dB ± 1.7 dB 5 kHz: -0.15 dB ± 1.7 dB 10 kHz: -1.17 dB ± 1.7 dB 20 kHz: -3.82 dB ± 1.7 dB 25 kHz: -5.10 dB ± 1.7 dB
CD double speed mode	Synchronizing available signal	EFM signal that channel clock is equivalent to 8.2 MHz to 9 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz)	2 kHz: 0.19 dB ± 1.7 dB 10 kHz: -0.15 dB ± 1.7 dB 20 kHz: -1.17 dB ± 1.7 dB 40 kHz: -3.82 dB ± 1.7 dB 50 kHz: -5.10 dB ± 1.7 dB
CD quadruple speed mode	Synchronizing available signal	EFM signal that channel clock is equivalent to 16.4 MHz to 18 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz)	4 kHz: 0.19 dB ± 1.7 dB 20 kHz: -0.15 dB ± 1.7 dB 40 kHz: -1.17 dB ± 1.7 dB 80 kHz: -3.82 dB ± 1.7 dB 100 kHz: -5.10 dB ± 1.7 dB

CD octuple speed mode	Synchronizing available signal	EFM signal that channel clock is equivalent to 32.8 MHz to 36 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz)	8 kHz: 0.19 dB ± 1.7 dB 40 kHz: -0.15 dB ± 1.7 dB 80 kHz: -1.17 dB ± 1.7 dB 160 kHz: -3.82 dB ± 1.7 dB 200 kHz: -5.10 dB ± 1.7 dB
DVD standard speed mode	Synchronizing available signal	8-16 modulated signal that channel clock is equivalent to25 MHz to 30 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz) Comply with the DVD Specifications for Read-Only Disk Ver.1.0 Aug 1996	1 kHz: 0.2 dB ± 1.7 dB 3 kHz: 1.3 dB ± 1.7 dB 7 kHz: 1.0 dB ± 1.7 dB 15 kH: -4.0 dB ± 1.7 dB
DVD double speed mode	Synchronizing available signal	8-16 modulated signal that channel clock is equivalent to50 MHz to 60 MHz
	Frequency response characteristics (Closed loop characteristics, reference is 100 Hz)	2 kHz: 0.2 dB ± 1.7 dB 6 kHz: 1.3 dB ± 1.7 dB 14 kHz: 1.0 dB ± 1.7 dB 30 kHz: -4.0 dB ± 1.7 dB
All mode common	Lock-up time	Within 700 ms*1
	Synchronizing available jitter range	0 % to 17 %
	Residual jitter	2 % or less

*1.STANDARD is selected at CONFIG menu71: LOCK MODE

Output(Rear)

RF MONITOR	Output amplitude	Approx. 1/4 (terminated with 50 Ω) of input amplitude
	Output impedance	Approx. 50 Ω
	Output connector	BNC
CLOCK MONITOR	Output amplitude	Approx. 1/4 (terminated with 50 Ω) of input amplitude
	Output impedance	Approx. 50 Ω
	Output connector	BNC
SLICED RF OUT	Output amplitude	Approx. 0.2 V to 0.3 V (terminated with 50 Ω)
	Output impedance	Approx. 50 Ω
	Output connector	BNC
DELAYED CLOCK OUT	Output amplitude	Approx. 0.2 V to 0.3 V (terminated with 50 Ω)
	Output impedance	Approx. 50 Ω
	Output connector	BNC
EQUALIZED RF OUT	Output amplitude	Approx. 0.2 V to 0.3 V (sine wave input with 4 MHz, terminated with 50 Ω)
	Output impedance	Approx. 50 Ω
	Output connector	BNC
DC OUT	Output amplitude*1	0.2 V/%
	Output impedance	Approx. 600 Ω
	Output connector	BNC

*1.Under standard setup, the offset and gain of the output amplitude can be modified from the front panel.
The output amplitude accuracy conforms to the measurement accuracy of each function.

EXT I/O interface

Input voltage range	H: 4.0 V to 5.0 V, L: 0 V to 1.0 V
Maximum input voltage	-0.5 V to 5.5 V
Output voltage range	H: 3.9 V to 5.0 V, L: 0 V to 0.4 V
Output impedance	240 Ω to 290 Ω
Maximum output current	10 mA
Input/output connector	25pin D-SUB connector (female)
Signal level	TTL

GPIB interface (optional)

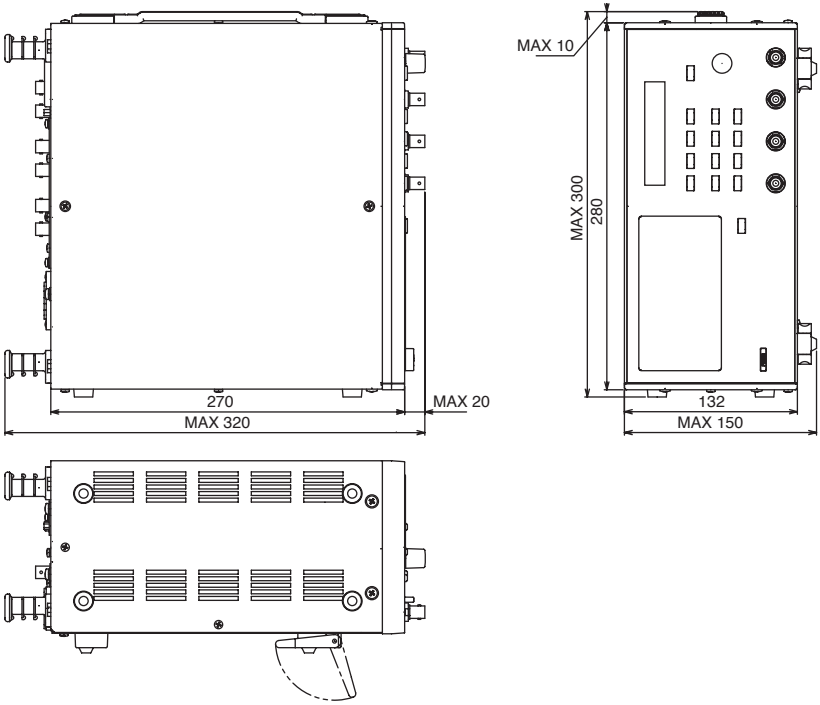
IEEE Std.488-1978 SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E1
Operated in address mode. Allows you to set the function of each panel other than the POWER switch, KEY-LOCK and Configuration menu read the setting condition of a function, and read out a measured value.

General specifications

Warm-up time	30 minutes or more	
Storage temperature and humidity range	Temperature: -20 ˚C to 60 ˚C Humidity: 90 % or less R.H. (no condensation)	
Operating temperature and humidity range	Temperature: 0 ˚C to 40 ˚C Humidity: 20 % to 85 % R.H. (no condensation)	
Specification guaranteed temperature and humidity range	Temperature: 15 ˚C to 35 ˚C Humidity: 20 % to 85 % R.H. (no condensation)	
Supplied voltage range	Rated voltage: 100 V to 240 V AC Allowable voltage: 90 V to 250 V AC	
Power frequency range	Rated frequency: 50 Hz/60 Hz Allowable frequency: 45 Hz to 65 Hz	
Power consumption	Maximum: 120 VA	
Insulation resistance	50 MΩ or more (500 V DC)	
Withstand voltage	1500 V AC for one minute	
Earth continuity	25 A AC / 0.1 Ω or less	
Dimensions (mm)	Approx. 280 (W)×132 (H)×270 (D) Maximum: approx. 300 (W)×150 (H)×320 (D)	
Weight	Approx. 5 kg	
Battery life	Approx. three years	
Battery backup	Setup data is backed up.	
Accessories	Power cord for 100 V system [85-AA-0003]	1
	Power cord for 200 V system [85-AA-0005]	
	Operation manual [Z1-002-722]	1
	Fuse 2.5 A (T) [99-00-0027]*1	2

*1.The fuse including a spare fuse is contained in the fuse holder.

External dimensions



[Unit:mm]

Appendix

This Appendix introduces measurement principle of jitter and the block diagram.

A.1 Measurement Principle of RF to Clock Time Interval Jitter

The time interval jitter is derived by measuring the time difference from the RF signal edge to the next clock signal edge several times and determining the standard deviation from the collected data. The unit is seconds.

The percentage display value is derived by taking one clock period to be 100 %.

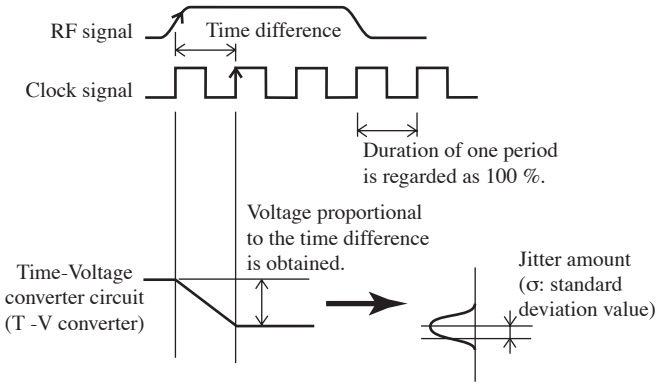


Fig.A-1

A.2 Measurement Principle of Wobble Jitter and Bi-Phase jitter

The Wobble jitter is derived by measuring the Wobble period several times and determining the standard deviation from the collected data; the Bi Phase jitter is derived by measuring the time of 1T in the Bi Phase pulse width several times and determining the standard deviation from the collected data.

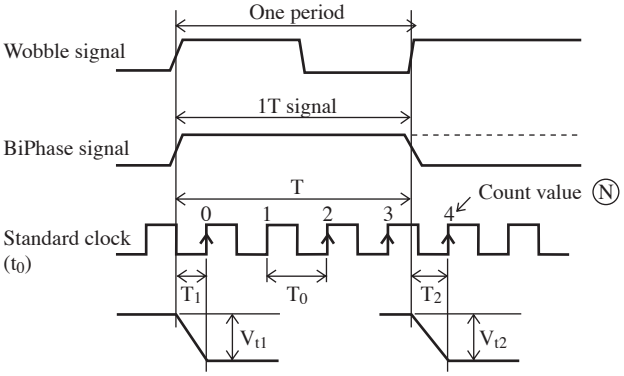


Fig.A-2

For Wobble and Bi Phase jitter measurement, the measurement of a single time data point is determined by counting the standard clock signal with a counter and increasing or decreasing the fractional time around the time interval.

$T = T_0 \times N + T_1 - T_2$

T1 and T2 are measured using the time-to-voltage converter as with the time interval jitter measurement.

A.3 KJM6775 Block diagram

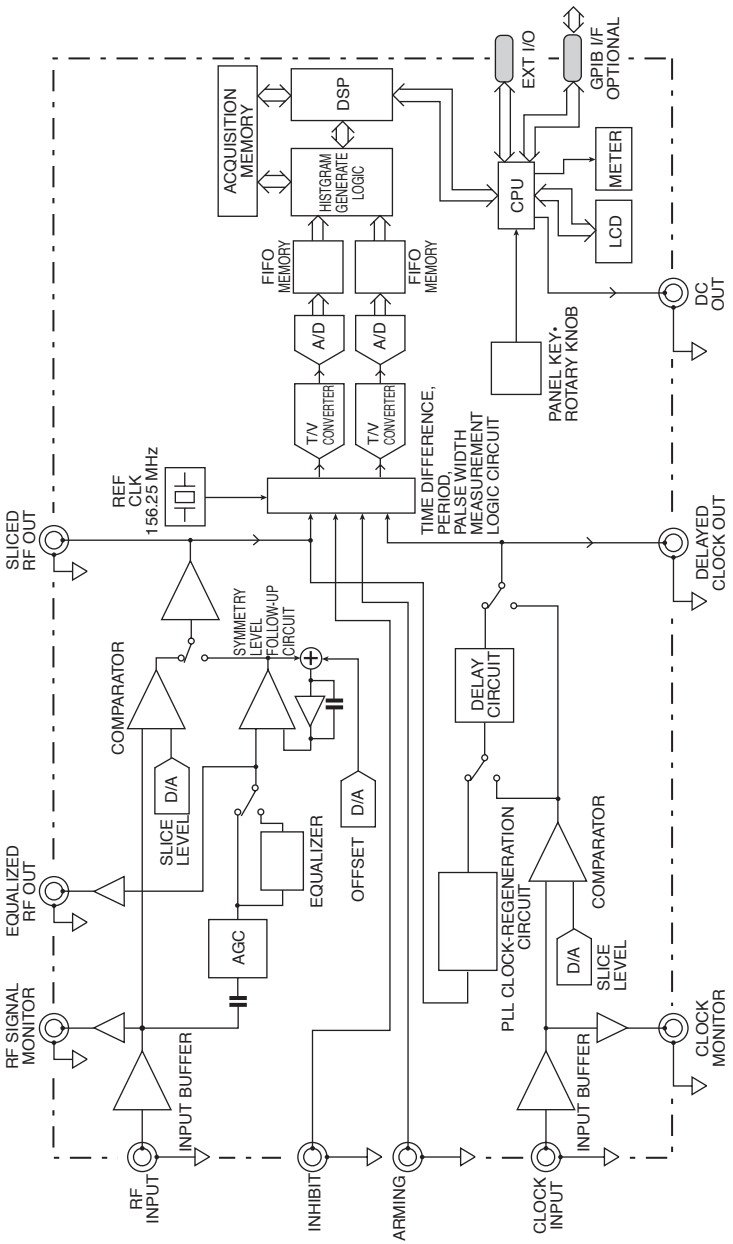


Fig.A-3

Index

W

Z