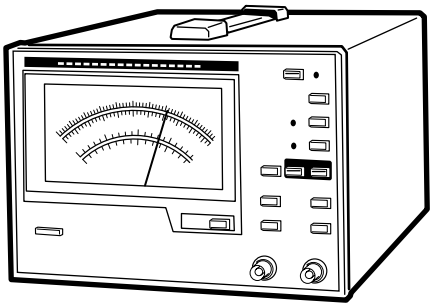
Part No. Z1-002-162, IA001417
Jul. 2009

OPERATION MANUAL

TIME INTERVAL JITTER METER

KJM6755A



KIKUSUI

Use of Operation 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 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.

Disposing of used Kikusui products in the EU

Under a law adopted by member nations of the European Union (EU), used electric and electronic products carrying the symbol below must be disposed of separately from general household waste.
This includes the power cords and other accessories bundled with the products. When disposing of a product subject to these regulations, please follow the guidance of your local authority, or inquire with your Kikusui distributor/agent where you purchased the product.
The symbol applies only to EU member nations.

Disposal outside the EU

When disposing of an electric or electronic product in a country that is not an EU member, please contact your local authority and ask for the correct method of disposal.

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.

⚠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.
⚠WARNING	Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.
⚠CAUTION	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

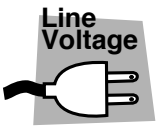
The following safety precautions must be observed to avoid fire hazard, electrical shock, accidents, and other failures. Keep them in mind and make sure that all of them are observed properly.

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 manufactured for general home or consumer use.

Purposes of use

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



Input power

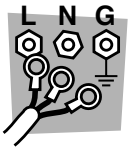
- Use the product with the specified input power voltage.
- For applying power, use the AC power cord provided. Note that the provided power cord is not use with some products that can switch among different input power voltages or use 100 V and 200 V without switching between them. In such a case, use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

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 "Precautions for Installation" described in this manual.
- To avoid electrical shock, connect the protective ground terminal to electrical ground (safety ground).
- When installing products with casters, be sure to lock the casters.

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.

Operations

- 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.

Contents

Preface

Description

KJM6755A is specific equipment for measuring the jitter in DVD players, this instrument fulfills measurement methods specified in the DVD Specifications for Read-Only Disc Ver. 1.0 (hereafter referred to as the DVD Book), indicating values equal to the result of RF to CLOCK signal measurement using a time-interval analyzer (hereafter referred to as TIA).

Compared with TIAs, the use of specific circuits measure jitter has reduced instrument costs dramatically.

Equipped with symmetry follow-up circuit, Equalizer circuit, PLL clock-regeneration circuit and phase-difference correction circuits, these instruments eliminate the need for externally-provided circuits.

GPIB interface is available as an option.

This Operation Manual applies to products running ROM version 2.0x.

For reference to any product, please contact Kikusui distributor/ agent, and provide your instrument ROM version and serial number given on the rear panel.

For checking the ROM version, see 2.3, 'Checking the ROM Version'.

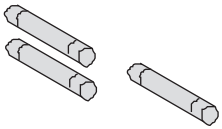
Chapter 1 Setup

1.1 Checking the Package Contents

When the meter is delivered to your site, first check it for damage during transit or to see if it is complete all the accessories required. If any damage or deficiency is found, please contact Kikusui distributor/agent.

We recommend that all packing materials be saved, in case the product needs to be transported at a later date.

Three fuses are included with the product. At the time of delivery, different types of fuses are provided in accordance with the settings of the line voltage range, as follows:



3 pieces

Line voltage range	Inside the fuse holder	Provided separately
90V-110V	1A(T) 1 piece	0.5A(T) 2 pieces
104V-126V	1A(T) 1 piece	0.5A(T) 2 pieces
194V-236V	0.5A(T) 1 piece	1A(T) 2 pieces
207V-250V	0.5A(T) 1 piece	1A(T) 2 pieces

☐ Fuse 0.5A(T):[99-00-0028], 1A(T):[99-00-0029]

Rated voltage: 125 Vac
PLUG: NEMA5-15
[85-AA-0003]

or

Rated voltage: 250 Vac
PLUG: CEE7/7
[85-AA-0005]

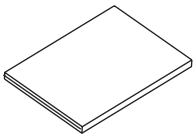
or

Rated voltage: 250 Vac
PLUG: GB1002
[85-10-0790]

1 piece

☐ AC power cord

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



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☐ Operation Manual [Z1-002-162]

Fig. 1-1 Accessories

1.2 Precautions for Installation

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

■ 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 (32°F to 104°F)

Optimum (specification guaranteed) temperature range : 15 °C to 35 °C (59°F to 95°F)

Storage temperature range :-20°C to 70°C (-4°F to 158°F)

■ 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: 20% to 90% R.H
(no dew condensation is allowed)

Condensation may occur even within the operating humidity range. In that case, do not start using themeter 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.

■ **Secure adequate space around the power plug.**

Do not insert the power plug to an outlet where accessibility to the plug is poor. And, do not place objects near the outlet that would result in poor accessibility to the plug.

1.3 Precautions on Moving

When moving or transporting the meter 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.

■ **Remove all wirings connected.**

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

■ **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.

1.4 Checking the Line Voltage and Fuse

As shown in Table 1-1, four line voltage ranges are available for the meter. Check the default settings to determine whether the voltage is suitable for your meter. Use a input power fuse appropriate for your line voltage range.

⚠WARNING • To prevent electric shock, be sure to unplug the AC power cord or turn the switch on the switchboard off before checking or replacing the fuse.

⚠CAUTION • Make sure that the fuse used conforms to the meter specifications, including shape, rating, and characteristics. Using a fuse with different rating or short-circuiting, the fuse holder will damage the meter.

When checking or changing the line voltage range, or when checking or replacing the power fuse, observe the following instructions:

1. Turn off POWER switch and disconnect the power cable.
2. Remove fuse holder as shown in Fig. 1-2 "Removing Fuse Holder".
3. Referring to the LINE VOLTAGE table on the rear panel, check the rating and blowing characteristic of the fuse mounted. If a wrong fuse is used, replace it.

▼ MARK	LINE VOLTAGE	FUSE
100	90V–110V	AC250V 1A (T)
120	104V–126V	
220	194V–236V	AC250V 0.5A (T)
240	207V–250V	

Table 1-1 LINE VOLTAGE

4. Check the line voltage to use from the LINE VOLTAGE table, adjust the voltage selector to the ▼ mark and push in the cover.

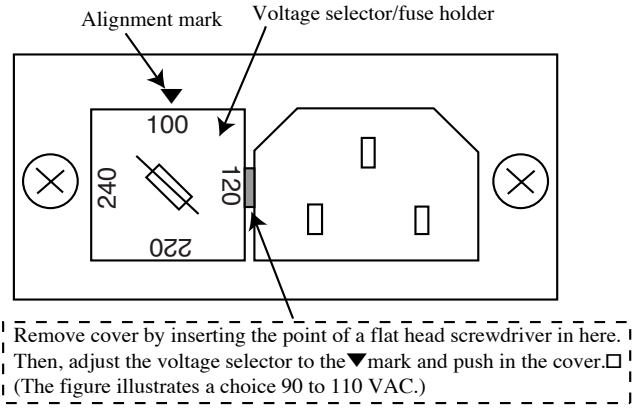


Fig. 1-2 Removing Fuse Holder

1.5 AC Power Cord Connection

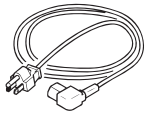
The power cord that is provided varies depending on the destination for the product at the factory-shipment.

⚠WARNING

- This product is designed to be connected to a power supply classified as Overvoltage Category II. Do not connect to a power supply classified as Overvoltage Category III or IV.
- The power cord for 100-V system has a rated voltage of 125 VAC. If this power cord is used at the line voltage of a 200-V system, replace the power cord with that satisfying that line voltage.

  Have a qualified engineer select the appropriate power cord. If obtaining the right power cord is difficult, contact Kikusui distributor/agent.

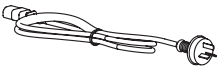
- **Do not use the power cord that comes with the product as a power cord for other equipment.**



[85-AA-0003]
PLUG:NEMA5-15

Power cord for 100 V system
Rated voltage: 125 VAC
Rated current: 10 A

[85-AA-0005]
PLUG:CEE7/7



[85-10-0790]
PLUG:GB1002

Power cord for 200 V system
Rated voltage: 250 VAC
Rated current: 10 A

Fig. 1-3 AC Power Cord with a Three-prong Plug included with the Meter

1. Check that the AC power supply is within the input power supply range of the product.
2. Check that the POWER switch is turned off.
3. Connect the AC power cord to the AC LINE connector on the rear panel.

   Use a AC power cord specified by Kikusui or one that has been selected by a qualified engineer.
4. Insert the power plug to the outlet.

1.6 Grounding

⚠WARNING • Not grounding the meter creates danger of electric shock.

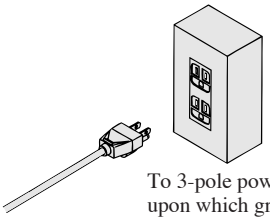
• Connect the ground terminal to an electrical ground (safety ground).

⚠CAUTION • Not performing adequate grounding work on the meter results in malfunction or the meterion of large noises from the meter.

To ensure safety, provide secure grounding.

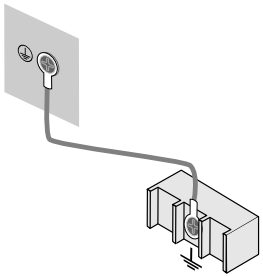
The meter can be grounded by one of the two methods specified below. Select one, and ground the meter securely.

a. Plug the AC power cord into a 3-pole power outlet upon which grounding construction has been performed.



To 3-pole power outlet upon which grounding construction has been performed

b. Connect terminal ⏚ on the meter rear panel to the ground terminal (GND).



To the ground terminal (GND) on switchboards

Fig. 1-4

Chapter 2 Operation

2.1 Power on

1. Check the POWER switch is set to OFF.
2. Referring to the LINE VOLTAGE table on the rear panel, check the line voltage available to the jitter meter and the voltage selector setting match.
3. Connect accessory power code to AC LINE on the rear-panel.
4. Connect the plug to prescribed power line.

⚠CAUTION • Damage to the fuse could result if the line voltage available to the jitter meter and the voltage selector setting do not match.

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5. Using the adjusting screw at the center of the meter, adjust mechanically pointer of the meter to indicate "0".
6. Turn on the POWER switch.

   Front panel displays the status of the jitter meter in which it had been before it was last turned off.

2.2 Initialization

While holding down LOCAL (SHIFT) key, press the METER SCALE key initializes the instrument, restoring all settings on the instrument front panel to default setting.

Below are the default setting, following initialization:

JUDGE key	:OFF
JUDGE level	:8%
TIME CONST	:0.03s
SYMMETRY	:AUTO
DELAY	:AUTO
PLL	:OFF
EQ	:OFF
TRIG EDGE (RF)	:  (rising)
TRIG EDGE (CLK)	:  (rising)
IMPEDANCE (RF)	:1M Ω
IMPEDANCE (CLK)	:1M Ω
METER SCALE	:10%

2.3 Checking the ROM Version

The ROM version is indicated by the meter, using its 0-10% scale divisions. while holding down the LOCAL (SHIFT) key, press the TIME CONST key. This causes the pointer of the meter to indicate 10% at first, then move three times, stopping for approximately 2 seconds in each instance, and finally returning to a measured value.

The three values indicated by the pointer show ver. x.xx.

e.g.: if the meter pointer moves to 10, 1, 2, 3, and then to the measured value, the ROM version is ver. 1.23.

2.4 Operation

2.4.1 Measuring Based on the DVD Book

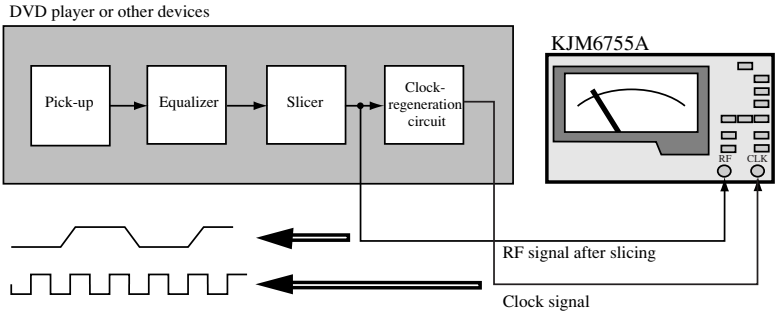


Fig. 2-1

This section describes how to make measurements using the KJM6755A in place of a TIA, using the measurement method given in the DVD Book.

Connection

Connect an RF signal after slicing and clock signal to the instrument from the DVD player or other device, as shown in Fig. 2-1. When the signal output impedance of the device under test is 50Ω and measurement is made with the input impedance of the instrument set to 50Ω, use a 50Ω coaxial cable (3D-2V or the like). If you use a 10:1 oscilloscope probe, the input impedance of the instrument should be set to 1 MΩ. Additionally, when using the 10:1 probe, calibrate the probe to see 2.8 "Calibrating the Probe".

Instrument Settings

SYMMETRY	:MANUAL (only the OFFSET lamp is lit)
DELAY	:AUTO or MANUAL
PLL	:OFF
EQ	:OFF
TRIG EDGE(RF)	:both edges (⎍)*
TRIG EDGE(CLOCK)	:any edge

TIME CONST	:any value (Select any range suitable for easy measurement.)
METER SCALE	:Select any scale according to measured value.

* When measuring a signal, which has been converted both edges to a single edge using a special equipment, always set TRIG EDGE (RF) to a single edge (rising edge or falling edge). If the both-edge setting is selected, measurement will be disabled.

When inputting an RF signal after slicing, always use the instrument with the SYMMETRY mode set to MANUAL. When the operation mode is set to MANUAL, the AUTO lamp goes off and the OFFSET lamp is lit. If SYMMETRY is set to any mode other than MANUAL, accurate measurement is not possible, or measurement may be disabled.

For detail, see 2.5 "Symmetry and Slice Level" and 4.1 "Front Panel".

When SYMMETRY is set to MANUAL, the slice level needs to be set manually. Follow the procedures given below.

1. While holding down the LOCAL (SHIFT) key press the SYMMETRY mode selector key. The meter will indicate a slice level until the keys are released.
2. Turn the SYMMETRY OFFSET/SLICE LEVEL adjusting variable register to set the slice level required. The meter's 0% indication shows about 0% slice level with respect to the full amplitude of an input signal, while 10% (20%) indication shows 100% slice level. Since the internal circuit is AC coupling, the actual slice level changes with the duty ratio of an RF input signal. Set the optimal slice level according to the duty ratio of the input signal. For detail, see 2.5 "Symmetry and Slice Level".
3. The meter indicates the measured value when you release your hand from the LOCAL (SHIFT) key and SYMMETRY mode selector key.

When DELAY mode is set to AUTO, delay time is automatically adjusted so that the average phase difference between the RF and clock signals becomes 180°. Use the instrument with DELAY set to MANUAL, if AUTO mode is not suitable, as with cases in which the jitter distribution has two frequency peaks.

When DELAY mode is set to MANUAL, turn the DELAY TIME setting variable register for optimum phase difference by observing the PHASE MONITOR. For detail, see 2.6 "Adjusting Delay".

2.4.2 Measuring to Use RF Signal after Equalizing and Regenerated Clock Signal

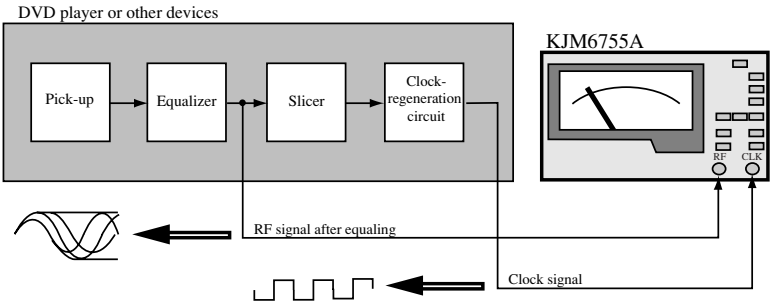


Fig. 2-2

Connection

Connect a RF signal after equalizing and regenerated clock signal to the instrument from the DVD player or other device, as shown in Fig. 2-2.

Instrument Settings

SYMMETRY	:AUTO or AUTO + OFFSET
DELAY	:AUTO or MANUAL
PLL	:OFF
EQ	:OFF
TRIG EDGE(RF)	:both edges(⎍)
TRIG EDGE(CLOCK)	:any edge
TIME CONST	:any value (Select any range suitable for easy measurement.)
METER SCALE	:Select any scale according to the measured value.

When inputting RF output after the equalizing, always use the instrument with SYMMETRY mode set to AUTO or AUTO+OFFSET.

When SYMMETRY mode is set to AUTO, the slice level of the instrument will automatically follow up the symmetry level of the RF signal, with the response characteristics complying with those given in the DVD Book.

When SYMMETRY is set to AUTO+OFFSET, the slice level will automatically follow up the symmetry level of the RF signal, but you may offset the automatic follow-up level by using the SYMMETRY OFFSET/SLICE LEVEL setting variable register.

For detaill, see 2.5 "Symmetry and Slice Level" and 4.1 " Front Panel".

For setting the delay when DELAY mode is set to MANUAL, see 2.6 "Adjusting Delay".

NOTE

- The characteristics of the meter symmetry follow-up circuit comply with those given in the DVD Book (ver. 1.0). A difference between the characteristics of the symmetry follow-up circuit (slicer circuit) in the DVD player and those of the instrument will result in a difference in measured values with respect to 2.4.1 "Measuring Based on the DVD Book".

2.4.3 Measuring to Use RF Signal Only

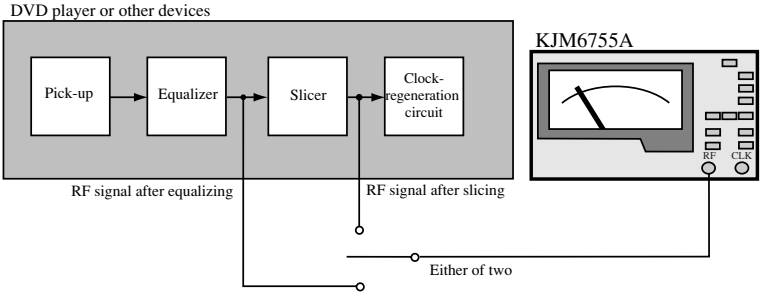


Fig. 2-3

Connection

Connect a RF signal after equalizing or slicing to the instrument from the DVD player or other device, as shown in Fig. 2-3.

Instrument Settings

SYMMETRY:	:AUTO or AUTO+OFFSET (for RF signal after equalizing)
	:MANUAL (for RF signal after slicing)
DELAY	:AUTO or MANUAL
PLL	:ON
EQ	:OFF
TRIG EDGE(RF)	:both edges(⎍)*
TRIG EDGE(CLOCK)	:any edge
TIME CONST	:any value
	(Select any range suitable for easy measurement.)
METER SCALE	:Select any scale according to measured value.

* When measuring a signal, which has been converted both edges to a single edge using a special equipment, always set TRIG EDGE (RF) to a single edge (rising edge or falling edge). If the both-edge setting is selected, measurement will be disabled.

For detail, see 2.5 "Symmetry and Slice Level" and 4.1 "Front Panel". For setting the slice level when SYMMETRY is set to MANUAL, see 2.4.1 "Measuring Based on the DVD Book".

For setting the delay when DELAY is set to MANUAL, see 2.6 "Adjusting Delay".

Pressing the PLL key switches the PLL clock-regeneration circuit between ON or OFF. The key lights to indicate that the circuit is ON.

NOTE

- The characteristics of the PLL clock-regeneration circuit comply with those given in the DVD Book (ver. 1.0). A difference between the characteristics of the PLL clock-regeneration circuit (slicer circuit) in the DVD player and those of the instrument will result in a difference in measured values with respect to 2.4.1 "Measuring Based on the DVD Book".

2.4.4 Measuring to Use Pick-up Output Signal and Regenerated Clock Signal

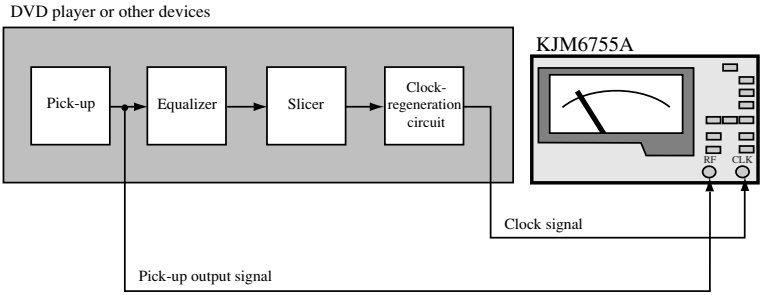


Fig. 2-4

Connection

Connect a pick-up output signal and regenerated clock signal to the instrument from the DVD player or other device, as shown in Fig. 2-4.

Instrument Settings

SYMMETRY	:AUTO or AUTO + OFFSET
DELAY	:AUTO or MANUAL
PLL	:OFF
EQ	:ON
TRIG EDGE(RF)	:both edges( )
TRIG EDGE(CLOCK)	:any edge
TIME CONST	:any value (Select any range suitable for easy measurement.)
METER SCALE	:Select any scale according to the measured value.

When SYMMETRY mode is set to AUTO, the slice level of the instrument will automatically follow up the symmetry level of an RF signal, with response characteristics complying with those given in the DVD Book.

When SYMMETRY is set to AUTO+OFFSET, the slice level will automatically follow up the symmetry level of the RF signal, but you may offset the automatic follow-up level by using the SYMMETRY OFFSET/SLICE LEVEL setting variable register.

For detail, see 2.5 "Symmetry and Slice Level" and 4.1 "Front Panel".

For setting the delay when DELAY mode is set to MANUAL, see 2.6 "Adjusting Delay".

Pressing the EQ key switches the equalizer circuit between ON and OFF. The key lights to indicate that the circuit is ON.

NOTE

- The characteristics of the equalizer circuit comply with those given in the DVD Book (ver. 1.0). A difference between the characteristics of the equalizer circuit (slicer circuit) in the DVD player and those of the instrument will result in a difference in measured values with respect to 2.4.1 "Measuring Based on the DVD Book".

2.4.5 Measuring to Use Pick-up Output Signal Only

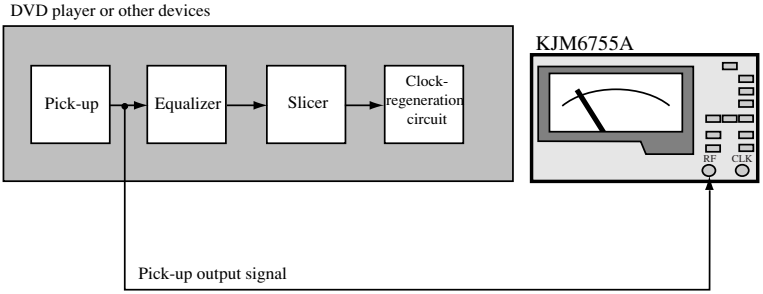


Fig. 2-5

Connection

Connect a pick-up output signal to the instrument from the DVD player or other device, as shown in Fig. 2-5.

Instrument Settings

SYMMETRY	:AUTO or AUTO + OFFSET
DELAY	:AUTO or MANUAL
PLL	:ON
EQ	:ON
TRIG EDGE(RF)	:both edges( )
TRIG EDGE(CLOCK)	:any edge
TIME CONST	:any value (Select any range suitable for easy measurement.)
METER SCALE	:Select any scale according to measured value.

When SYMMETRY mode is set to AUTO, the slice level of the instrument will automatically follow up the symmetry level of an RF signal, with response characteristics complying with those given in the DVD Book.

When SYMMETRY is set to AUTO+OFFSET, the slice level will automatically follow up the symmetry level of the RF signal, but you may offset the automatic follow-up level by using the SYMMETRY OFFSET/SLICE LEVEL setting variable register.

For SYMMETRY mode and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Front Panel".

For setting the delay when DELAY mode is set to MANUAL, see 2.6 "Adjusting Delay".

2.5 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 Value) is "0," indicating that the signal does not contain a DC value. However, when signals are recorded to disc, the pit length on the disc changes, due to various conditions such as optical power at mastering, the developing time of the original disc, and other factors. When a pickup reads the disc, 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 (AUTO: lit, OFFSET: unlit)

The KJM6755A 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.

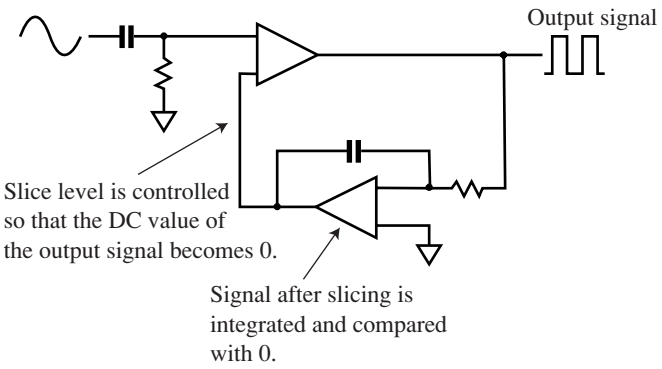


Fig. 2-6

Fig. 2-6 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 AUTO+OFFSET (AUTO: lit, OFFSET: lit)

The AUTO+OFFSET mode lets you offset the slice level that automatically follows up the symmetry level in AUTO action. An offset should be adjusted by turning the variable register next to SYMMETRY mode key, using an adjusting screwdriver.

Operation When SYMMETRY mode is set to MANUAL (AUTO: unlit, OFFSET: lit)

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.

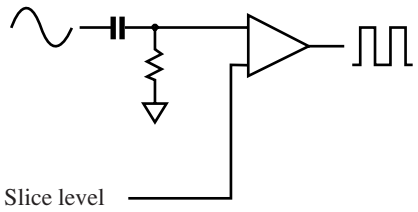


Fig. 2-7

Fig. 2-7 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. The variable range of the slice level will be 0 to 100% when the peak-to-peak amplitude of an input signal is regarded as 100%. However, as shown in the figure above, because the input of the slicer is AC coupled, there is a difference between the set slice level and the actual slicing level arising from the duty ratio of the input signal.

e.g.: When the duty ratio of an input signal is 50%

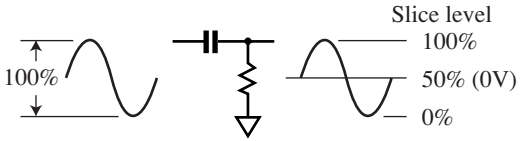


Fig. 2-8

As shown in Fig. 2-8, because a signal whose duty ratio is 50% (such as a sine wave) does not have a DC value, the set slice level agrees with the actual level where the signal is sliced. To slice when the signal is at a point midway between its peaks, set the slice level to 50%.

e.g.: When the duty ratio of an input signal is not 50%

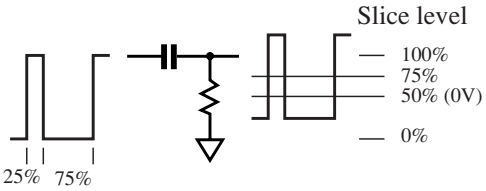


Fig. 2-9

As shown in Fig. 2-9, if a signal whose duty ratio is not 50% is input, coupling it to AC causes a DC offset. In the example above, because the duty ratio of the input signal is 25:75, the signal obtained after coupling to AC will be offset up by 25%. Thus, to slice when the signal is at a point midway between its peaks, set the slice level to 75%.

To enter a signal whose duty ratio is not 50%, an optimum slice level should be set, keeping the above in mind.

Since the frequency bandwidth of the RF input is about 60 MHz, for thin pulses with pulse width below 15 ns, the amplitude may decrease, KJM6755A cannot measure jitter.

Checking Slice Level

The slice level can be adjusted using the SYMMETRY OFFSET/ SLICE LEVEL setting when AUTO + OFFSET or MANUAL mode is set in the SYMMETRY mode.

1. While holding down the LOCAL (SHIFT) key, push the SYMMETRY mode selector key . While the keys are held down, the meter indicates a slice level. The slice level is indicated relative to a meter value as shown below.

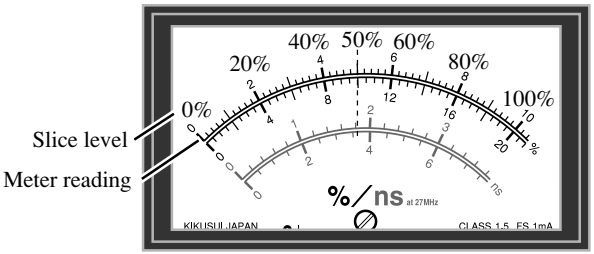


Fig. 2-10

2. To alter the slice level, make the appropriate settings on the variable resistor for SYMMETRY OFFSET/SLICE LEVEL setting.

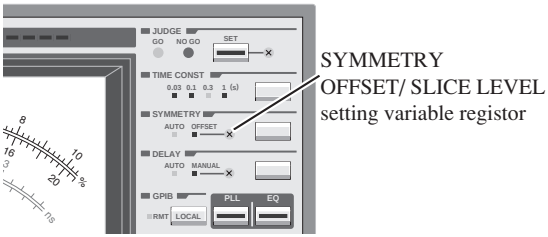


Fig. 2-11

2.6 Adjusting Delay

To measure 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˚.

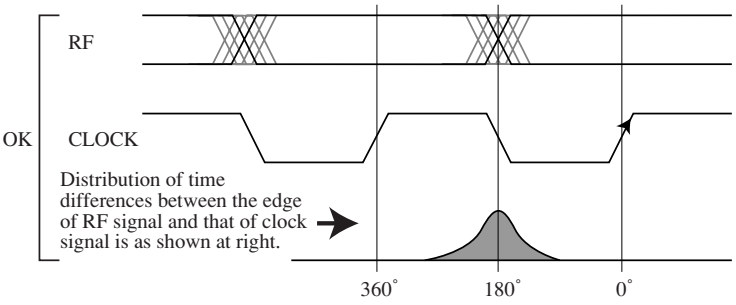


Fig. 2-12

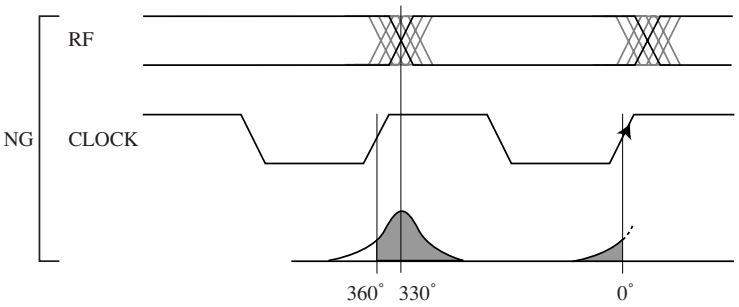
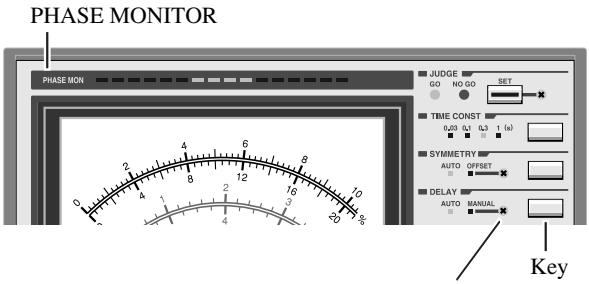


Fig. 2-13

Two timings in Figs. 2-12 and 2-13 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. 2-12, but is distributed at 0˚ and 330˚ in Fig. 2-13. This results in a higher σ 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˚.

This adjustment can be handled by the delay circuit. When DELAY mode is set to AUTO, the instrument automatically adjusts the average phase difference to 180°. When DELAY is set to MANUAL, use the variable register next to the DELAY mode key to adjust the phase difference so that the peak (brightest part) of the PHASE MONITOR above the meter is approximately centered.



DELAY TIME setting variable register when DELAY is set to MANUAL
[Use this VR to center the brightest part within the monitor.]

Fig. 2-14

NOTE

- When DELAY is set to AUTO, it takes some time for the reading to stabilize after the coupling of the signal to the delay circuit from MANUAL mode. Moreover, a jitter of 15% or more or jitter distribution in two or more peaks may disable the correct action.

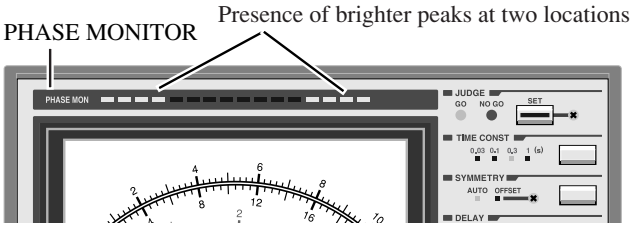
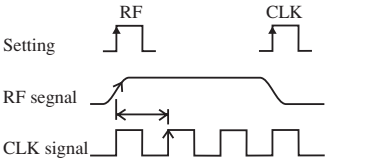


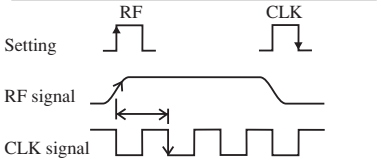
Fig. 2-15

2.7 Selection of Trigger Edge

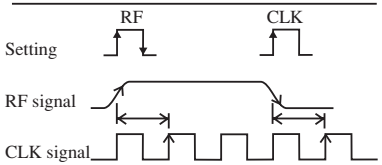
This meter measures the time difference between the RF signal and the clock signal and indicates its dispersion as a σ value. To measure the time difference, specify the two edges of each signal to be measured, using the TRIGGER EDGE selector key.



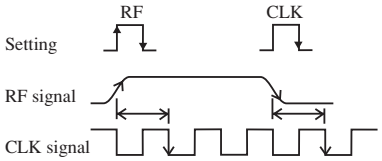
Measure the time difference between the rise of the RF signal and the rise of the clock signal. Then, determine the jitter value.



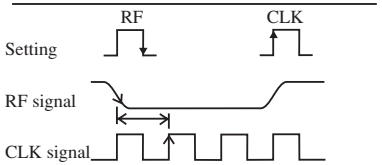
Measure the time difference between the rise of the RF signal and the fall of the clock signal. Then, determine the jitter value.



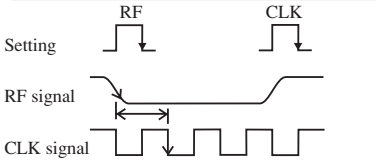
Measure the time difference between the rise of the RF signal and the rise of the clock signal and that between the fall of the RF signal and the rise of the clock signal. Then, determine the jitter value.



Measure the time difference between the rise of the RF signal and the fall of the clock signal and that between the fall of the RF signal and the fall of the clock signal. Then, determine the jitter value.



Measure the time difference between the fall of the RF signal and the rise of the clock signal. Then, determine the jitter value.



Measure the time difference between the fall of the RF signal and the fall of the clock signal. Then, determine the jitter value.

Fig.2-16

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.

NOTE

- When measuring an RF signal that has had one edge converted by edge detection, set the trigger edge of the RF signal in the meter 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.

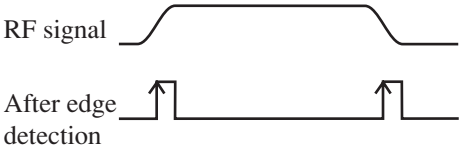


Fig. 2-17

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

2.8 Calibrating the Probe

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

First, calibrate the probe (phase correction) as follows:

Measuring Instrument and Other Items Required for Calibration

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

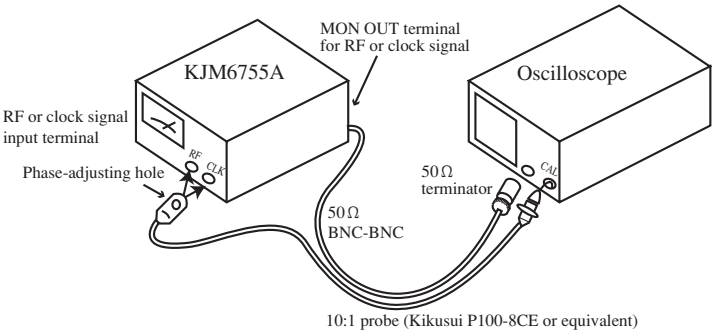


Fig. 2-18

As shown in Fig. 2-18, connect the BNC-BNC cable and probe so that they run parallel, without forming large loops (which are vulnerable to external noise). 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.

NOTE

- If the probe has not been calibrated (phase not corrected), the instrument will not indicate a correct value.
- The clock allowing use of the probe is 100 MHz or less. For a signal above 100MHz, measure at 50Ω input impedance.

Chapter 3 GPIB Operation

The GPIB interface is factory option.

3.1 Summary

The GPIB interface supported by the KJM6755A is controlled by IEEE 488 standard interface. It's electrical and mechanical specifications conform to IEEE std488.1-1987.

3.2 Setting a GPIB Address

Be sure to set address before connecting the external computer. The address is set in the five DIP switches (ADRS) of the GPIB switch. Indication of 16 • 4 • 1 stands for 16 8 4 2 1. 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.

Turn the meter power on again. The address set becomes valid after power on.

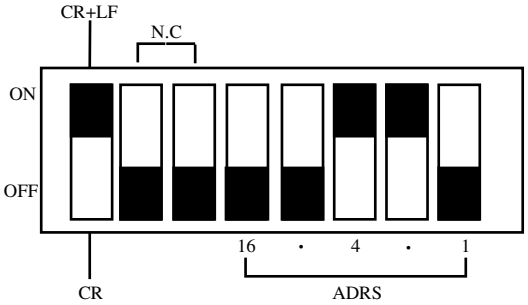


Fig. 3-1 Example Address Setting

NOTE • The address is set to "2" before delivery.

3.3 GPIB Basic Operation

Messages and terminators

■ Program message

The text of data that is transmitted from the controller to a device is called a program message. Program messages are grouped into two types: command messages, which carry device data, and query messages, which request response messages.

Abbreviations are provided for program messages and some character program data. (Abbreviations omit lower-case characters from program message headings.)

■ Response message

The text of data that is transmitted from a device to the controller is called a response message.

All response messages are returned in abbreviations.

■ Message structure

Each message is composed of a program header and data.

■ Terminator

Program message terminator

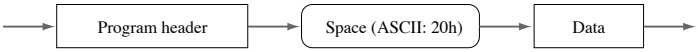
The terminator used to mark the end of a program message is called a program message terminator.

Response message terminator

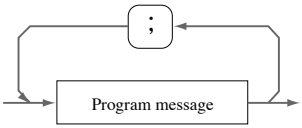
The terminator used to mark the end of a response message is called a response message terminator.

Message

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



- Program messages are separated from one another by a colon (;) (ASCII: 3Bh).



- 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

- Only LF + EOI can be used as a response message terminator.

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.
- 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).
- When sending program messages in abbreviations, use abbreviations only. A mixture of abbreviations and standard program messages will produce errors.

3.4 Device Message

*RST

Brings settings to the same condition as the initial mode set.

■ Program message

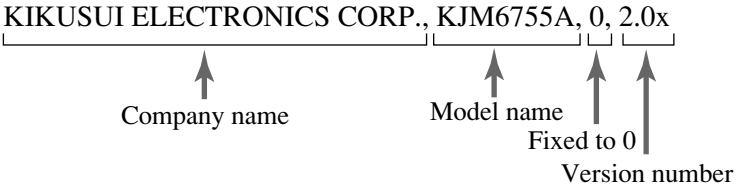
*IDN?

Returns instrument model information.

■ Program message

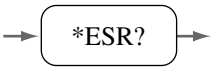
■ Response message

The instrument returns model information in the following format:



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

■ Program message



■ Response message

*ESR? ... Returns the contents of the event status register.

e.g.: When the data is A0h.

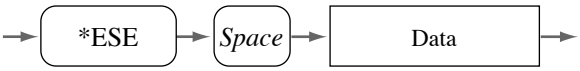
A value of #HA0 is returned.

*ESE

Sets or resets the individual bits of the event status enable register. The default is 0h.

Running *RST resets the bits to their initial value.

■ Program message



■ Program data

Event status enable register set/reset	
Minimum	0h
Maximum	FFh
Resolution	1h
Data type	Hex

Table 3-1

e.g.: To set the CME (Command Error) bit of the event status enable register.

*ESE #H20

■ Response message

*ESE? ... Returns the contents of the event status enable register.

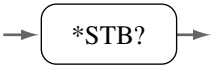
e.g.: When the data is FFh.

A value of #HFF is returned.

*STB?

Returns the contents of the status byte.

■ Program message



■ Response message

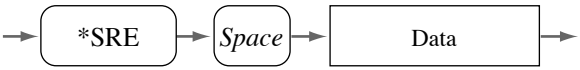
e.g.: When the data is FFh.

A value of #HFF is returned.

*SRE

Sets or resets the individual bits of the service request enable register. Bit 6, however, cannot be set.

■ Program message



■ Program data

Service request enable register set/reset	
Minimum	0h
Maximum	FFh
Resolution	1h
Data type	Hex

Table 3-2

e.g.: To reset all bits of the service request enable register.

*SRE #H0

■ Response message

*SRE? ... Returns the contents of the service request enable register.

e.g.: When the data is FFh.

A value of #HFF is returned.

*CLS

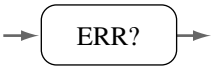
Resets the status byte register and the event status register.

■ **Program message**

ERRor?

Reads an error code from the error queue.

■ **Program message**



■ **Response message**

Message code	Explanation
0	No error
-11	Syntax error
-12	Out of range error
-13	Illegal keyword
-15	Illegal instruction
-18	Error buffer full
-19	None of the above

Table 3-3 Error Messages

e.g.: If an out of range error occurs.

A value of -12 is returned.

CLOCk:IMPedance

Specifies the input impedance of CLOCK INPUT.

■ Program message

■ Program data

Setting value for the input inpedance of CLOCK INPUT	
Data type	Character
Character program data	50, 1M

Table 3-4

e.g.: To set the input impedance of CLOCK INPUT to 50Ω.

CLOC:IMP 50

■ Response message

CLOC:IMP?... Returns the current input impedance of CLOCK INPUT.

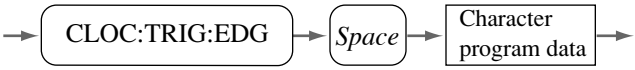
e.g.: When the current input impedance of CLOCK INPUT is 50 Ω .

A value of 50 is returned.

CLOCk:TRIGger:EDGe

Specifies TRIG EDGE of CLOCK INPUT.

■ Program message



■ Program data

Setting the TRIG EDGE of CLOCK INPUT	
Data type	Character
Character program data	POSitive, NEGative

Table 3-5

e.g.: To set TRIG EDGE of CLOCK INPUT to NEGATIVE (⊓↓).

CLOC:TRIG:EDG NEG

■ Response message

CLOC:TRIG:EDG?... Returns the current TRIG EDGE status of CLOCK INPUT.

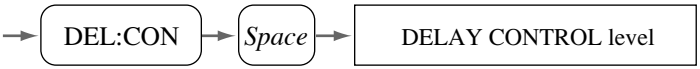
e.g.: When the current TRIG EDGE of CLOCK INPUT is POSITIVE (⊓↑).

A value of POS is returned.

DELay:CONtrol

Sets the DELAY CONTROL level.

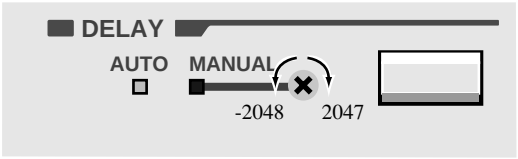
■ Program message



■ Program data

Setting theDELAY CONTROL level	
Data type	Integer
Minimum	-2048
Maximum	2047
Resolution	1

Table 3-6



In panel operations, turning the DELAY TIME setting variable register clockwise means setting the delay in the direction of 2047, while turning it counterclockwise means setting it in the direction of -2048.

e.g.: To set the DELAY CONTROL level to 100.

DEL:CON 100

■ Response message

DEL:CON?…Returns the current DELAY CONTROL level.

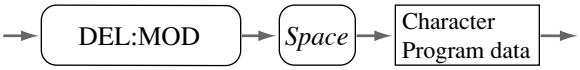
e.g.: When the current DELAY CONTROL level is 1000.

A value of 1000 is returned.

DELay:MODe

Specifies DELAY mode.

■ Program message



■ Program data

Setting the DELAY mode	
Data type	Character
Character program data	AUTo, MANual

Table 3-7

e.g.: To set DELAY mode to MANUAL.

DEL:MOD MAN

■ Response message

DEL:MOD? … Returns the current DELAY mode status.

e.g.: When the current DELAY mode is AUTO.

A value of AUT is returned.

EQ

Specifies ON or OFF for the equalizer circuit.

■ Program message

■ Program data

Setting the EQ	
Data type	Character
Character program data	ON, OFF

Table 3-8

e.g.: To turn on the equalizer circuit.

EQ ON

■ Response message

EQ?… Returns the current status of the equalizer circuit.

e.g.: When the equalizer circuit is currently on.

A value of ON is returned.

JITter:VALue?

Returns a JITTER value.

■ Program message

■ Response message

JIT:VAL?… Returns the current JITTER value (0.00% to 20.00%).

e.g.: When the current JITTER value is 1.00%.

A value of 1.00 is returned.

When the the PLL clock-regeneration circuit is on, no judgment can be made until a clock signal is locked. In this case, a value of 100.00 is returned.

JUDge:LEVel

Sets the JUDGE level.

■ Program message

■ Program data

Setting the JUDGE level	
Data type	Real
Minimum	0.00
Maximum	20.00
Resolution	0.01

Table 3-9

e.g.: To set JUDGE level to 10.00%.
JUD:LEV 10.00

■ Response message

JUD:LEV?…Returns the current JUDGE level.

e.g.: When the current JUDGE level is 1.00%.
A value of 1.00 is returned.

JUDge:RESult?

Returns the JUDGE result.

■ Program message

■ Response message

JUD:RES?…Returns the JUDGE result.

e.g.1: When the result is GO.

A value of GO is returned.

e.g. 2: When the result is NO GO.

A value of NOGO is returned.

e.g.3: When the result is NO JUDGE.

A value of NOJUD is returned.

When the the PLL clock-regeneration circuit is on, no judgment can be made until a clock signal is locked. In this case, a value of NOJUD is returned.

METer:DISPlay

Specifies information to be indicated by the meter.

■ Program message

■ Program data

Specifing information to be indicated by the meter	
Data type	Character
Character program data	MEASure, SET

Table 3-10

e.g.: To set the information to be indicated by the meter to MEASURE.

MET:DISP MEAS

■ Response message

MET:DISP?… Returns the current meter indication.

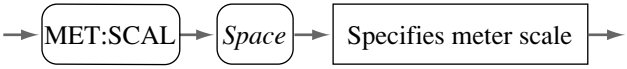
e.g.: When the meter indication is currently SET.

A value of SET is returned.

METer:SCALe

Specifies meter scale.

■ Program message



■ Program data

Specifing meter scale	
Data type	Character
Character program data	10, 20

Table 3-11

e.g.: To specify meter scale to 10%.
MET:SCAL 10

■ Response message

MET:SCAL?… Returns the current scale of the meter.

e.g.: When the current scale of the meter is 20%.
A value of 20 is returned.

PLL

Specifies ON or OFF of the PLL clock-regeneration circuit.

■ Program message

■ Program data

Setting the PLL	
Data type	Character
Character program data	ON, OFF

Table 3-12

e.g.: To turn ON the PLL clock-regeneration circuit.

PLL ON

■ Response message

PLL? … Returns the current status of the PLL clock-regeneration circuit.

e.g.: When the PLL clock-regeneration circuit is ON.

A value of ON is returned.

PLL:STATus?

Returns the status of the PLL clock-regeneration circuit.

■ Program message

■ Response message

PLL:STAT? … Returns the current status of the PLL clock-regeneration circuit.

e.g.1: When the PLL clock-regeneration circuit has locked on to an input signal, enabling normal measurements.

A value of LOCK is returned.

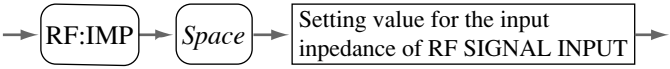
e.g.2: If the PLL clock-regeneration circuit has not yet locked on to an input signal.

A value of UNLOCK is returned.

RF:IMPedance

Specifies the input impedance of RF SIGNAL INPUT.

■ Program message



■ Program data

Setting value for the input inpedance of RF SIGNAL INPU	
Data type	Character
Character program data	50, 1M

Table 3-13

e.g.: To set the input impedance of RF SIGNAL INPUT at 50Ω.

RF:IMP 50

■ Response message

RF:IMP?…Returns the current RF SIGNAL INPUT impedance.

e.g.: When the current input impedance of RF SIGNAL INPUT is 50Ω.

A value of 50 is returned.

RF:TRIGger:EDGe

Specifies the TRIG EDGE of RF SIGNAL INPUT.

■ Program message

■ Program data

Setting the TRIG EDGE of RF SIGNAL INPUT	
Data type	Character
Character program data	POSitive, NEGative, EITher

Table 3-14

e.g.: To set TRIG EDGE of RF SIGNAL INPUT to EITHER(⎍).

RF:TRIG:EDG EIT

■ Response message

RF:TRIG:EDG?… Returns the current TRIG EDGE status of RF SIGNAL INPUT.

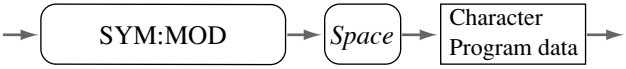
e.g.: When the current TRIG EDGE of RF SIGNAL INPUT is POSITIVE(⎍).

A value of POS is returned.

SYMmetry:MODe

Specifies the SYMMETRY mode.

■ Program message



■ Program data

Setting the SYMMETRY mode	
Data type	Character
Character program data	AUTo, autoOFFSet, MANual

Table 3-15

e.g.: To set SYMMETRY mode to AUTO+OFFSET.
SYM:MOD OFFS

■ Response message

SYM:MOD? …Returns the current SYMMETRY mode status.

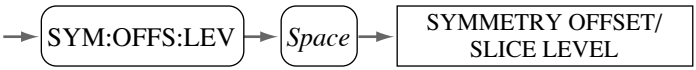
e.g.: When the SYMMETRY mode is currently in MANUAL.
A value of MAN is returned.

SYMmetry:OFFSet:LEVel

Sets the SYMMETRY OFFSET/SLICE LEVEL.

This message is valid only when SYMMETRY mode is set to AUTO+OFFSET or MANUAL.

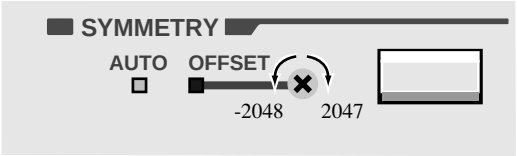
■ Program message



■ Program data

Setting SYMMETRY OFFSET level	
Data type	Integer
Minimum	-2048
Maximum	2047
Resolution	1

Table 3-16



In panel operations, turning the SYMMETRY OFFSET/SLICE LEVEL setting variable register clockwise means setting an offset level in the direction of 2047. Turning it counterclockwise means setting it in the direction of -2048.

e.g.: To set the SYMMETRY offset level to "0".

SYM:OFFS:LEV 0

■ Response message

SYM:OFFS:LEV?… Returns the current SYMMETRY OFFSET/SLICE LEVEL.

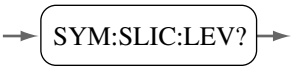
e.g.: When the current SYMMETRY OFFSET/SLICE LEVEL is 2047.

A value of 2047 is returned.

SYMmetry:SLICe:LEVel?

Returns the slice level.

■ Program message

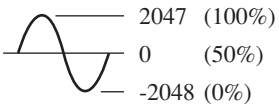


■ Response message

SYM:SLIC:LEV?… Returns slice level.

The slice level is returned in the range of -2048 to 2047 with respect to an input signal.

Note that since the internal circuit is coupled to AC, the actual slice level changes with the duty ratio of an RF signal. For detail, see 2.5 "Symmetry and Slice Level".



e.g.: When the current slice level is 2047(100%).

A value of 2047 is returned.

TIMe:CONst

Set the TIME CONST.

■ Program message

■ Program data

Setting the TIME CONST	
Data type	Character
Character program data	0.03, 0.1, 0.3, 1

Table 3-17

e.g.: To set TIME CONST to 1s.

TIM:CON 1

■ Response message

TIM:CON? …Returns the TIME CONST current.

e.g.: When the current TIME CONST is 0.3 s.

A value of 0.3 is returned.

Details of Event Status Register and Event Status Enable Register

Bit	Register name	Explanation
7	PON (Power ON)	Indicates that the KJM6755A is turned on.
6		Not used with the KJM6755A.
5	CME (Command Error)	Any one of the following events has been encountered whil 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 whil running a message: · Received data out of bounds · Received message not supported
3		Not used with the KJM6755A.
2		Not used with the KJM6755A.
1		Not used with the KJM6755A.
0		Not used with the KJM6755A.

Table 3-18 Event Status Register and Event Status Enable Register

NOTE

- The individual bits of the event status register and the event status enable register are set when they are 1 and are reset when they are 0.
- Run *ESR? to read the event status register and *CLS to reset it.

Details of Status Byte Register and Service Request Enable Register

Bit	Register name	Explanation
7		Not used with the KJM6755A.
6	RQS (Request)	Signifies the generation of a service request. This bit is reset when read by serial polling.
6	MSS (Master Summary Status)	ORed result of the status byte register and service request enab 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 KJM6755A.
3		Not used with the KJM6755A.
2		Not used with the KJM6755A.
1		Not used with the KJM6755A.
0		Not used with the KJM6755A.

Table 3-19 Status Byte Register and Service Request Enable Register

About Status Register

The format of status data is shown below.

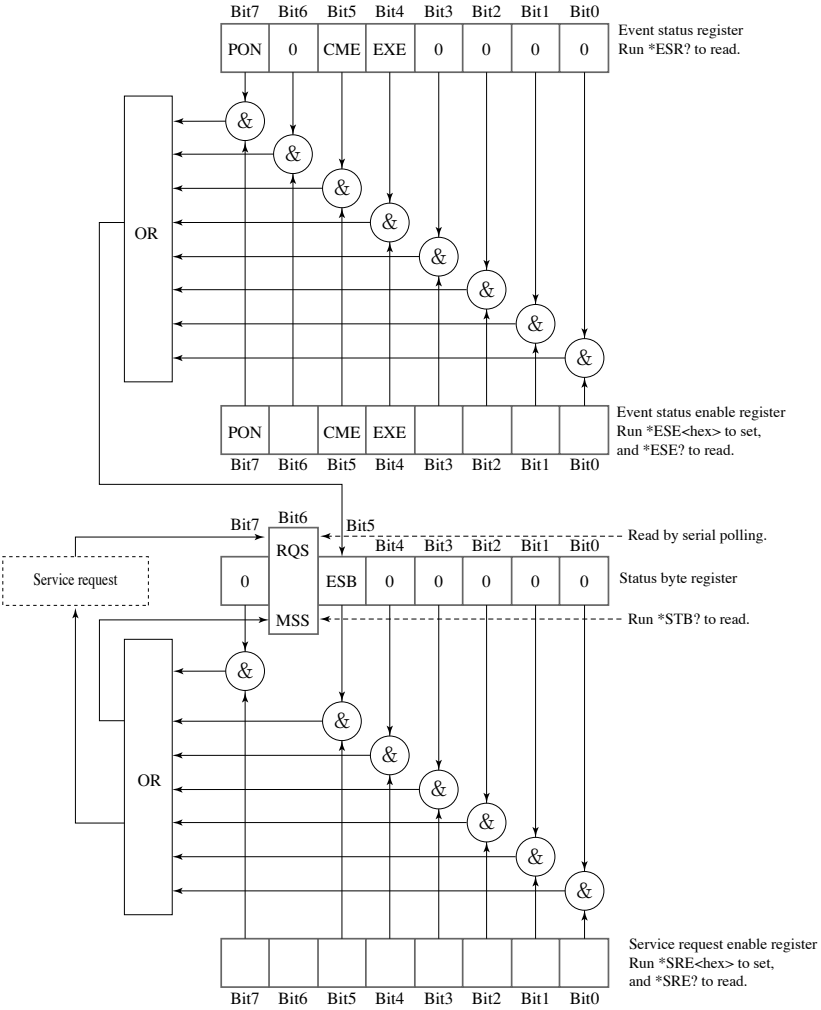


Fig. 3-2 Status Data Format

NOTE

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

Generating a POWER ON SRQ and Recognizing a POWER-ON Event

1. Set PON (bit 7) of the event status enable register. The message *ESE #H80 and *SRE #H20 are transmitted to the KJM6755A.
2. Turn the KJM6755A off and then on, and it will generate an SRQ signal.
3. Read the status byte by serial polling. Check RQS (bit 6) of the status byte. If RQS has been set, it means that a service request has been generated from the KJM6755A.
4. Check ESB (bit 5) of the status byte. If ESB has been set, read the event status register. The message *ESR? is transmitted to the KJM6755A to read the event status register.
5. Check PON (bit 7) of the event status register. If PON has been set, it means that a POWER-ON event has been generated from the KJM6755A.

NOTE

- Since the event status register is reset when read by running *ESR?, none of its bits are set if it is read again by running *ESR?.

3.5 GPIB specifications

GPIB Interface Functions

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

Table 3-20 GPIB Interface Functions

GPIB Connector

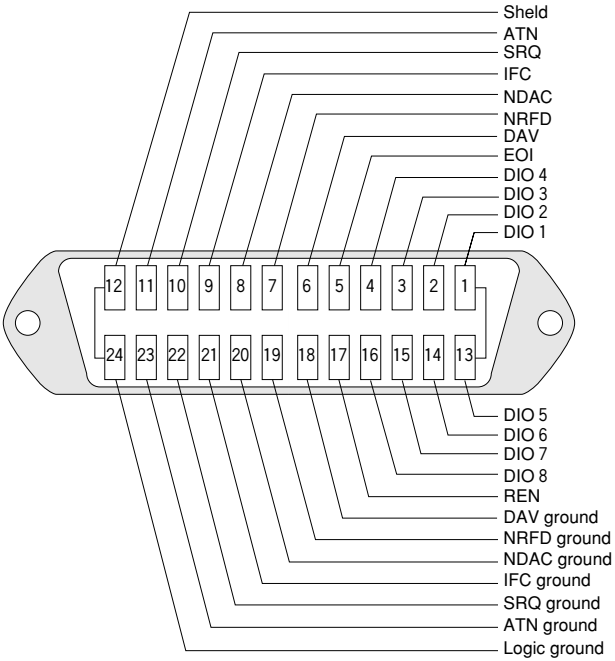


Fig. 3-3 GPIB Connector

3.6 Sample Program

The following demonstrates a sample program in which the KJM6755A 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

Call ibfind("DEV2", rd)          'Opens GPIB device.

Call ibconfig(rd, 6, 1)          'Sets device configuration (enable
                                 'repetition of addressing).

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

Dim strModelInfo As String
strModelInfo = Space(128)
Call ibrd(rd, strModelInfo)      'Reads out model information and
                                 'stores it to a variable.
MsgBox Left(strModelInfo, ibcntl)

'Front panel setup
'-----------------------------------------------------
Call ibwrt(rd, "TIM:CON 0.3")    'Sets TIME CONST to 0.3s
Call ibwrt(rd, "SYM:MOD AUT")    ' Sets SYMMETRY mode to
                                 'AUTO
Call ibwrt(rd, "DEL:MOD AUT")    ' Sets DELAY mode to AUTO
Call ibwrt(rd, "RF:TRIG:EDG POS") 'Sets trigger edge to
                                 'POSITIVE( ⨍⎍ )
                                 '(RF SIGNAL INPUT)
Call ibwrt(rd, "RF:IMP 50")      'Sets impedance to 50 Ω
                                 '(RF SIGNAL INPUT)
Call ibwrt(rd, "CLOC:TRIG:EDG POS")
                                 'Sets trigger edge to POSITIVE
                                 '( ⨍⎍ )(CLOCK INPUT)
Call ibwrt(rd, "CLOC:IMP 50")    'Sets impedance to 50 Ω (CLOCK
                                 'INPUT)
Call ibwrt(rd, "MET:SCAL 20")    'Sets meter scale to 20%/6 ns
```

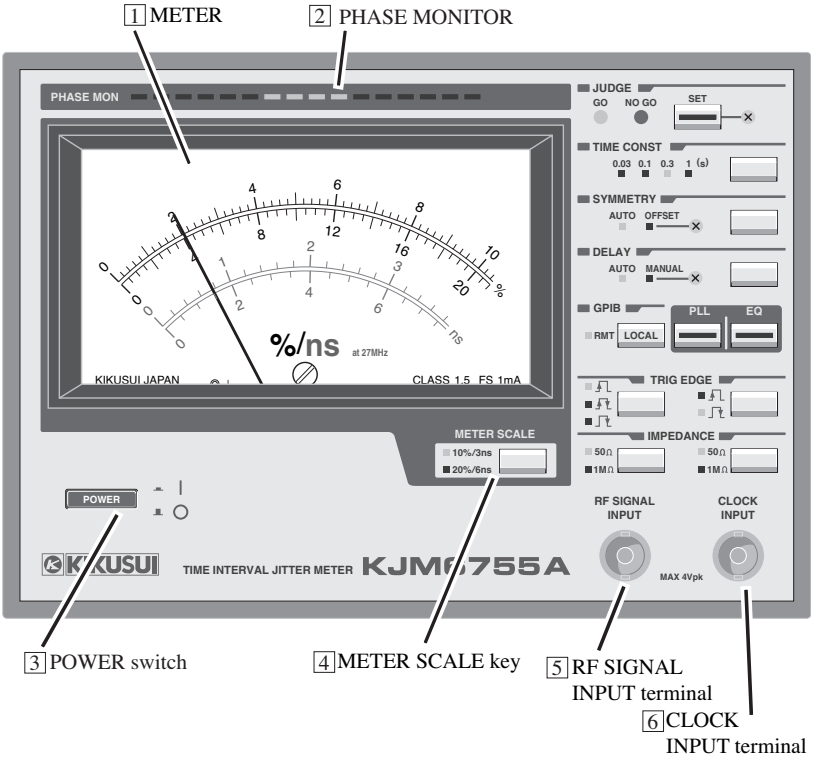
```
Call ibwrt(rd, "JUD:LEV 7.77")  'Sets judgment level to 7.77%
Call ibwrt(rd, "PLL ON")        'PLL clock regeneration circuit to
                                'ON
Call ibwrt(rd, "EQ ON")         'Equalizer circuit to ON

' Jitter value acquisition
'-----------------------------------------------------
Call ibwrt(rd, "JIT:VAL?")      ' Sends jitter value acquisition
                                'message.
Dim strJitterValue As String
strJitterValue = Space(128)
Call ibrd(rd, strJitterValue)   ' Reads out jitter value and stores
                                'it to a variable.
strJitterValue = Left(strJitterValue, ibcntl)
Dim dJitterValue As Double
dJitterValue = Val(strJitterValue)
MsgBox "Jitter Value = " + Str(dJitterValue)

' Judgement information acquisition
'-----------------------------------------------------
Call ibwrt(rd, "JUD:RES?")      'Sends judgment information
                                'acquisition message.
Dim strJudgment As String
strJudgment = Space(128)
Call ibrd(rd, strJudgment)      'Reads out judgment result and
                                'stores it to a variable.
strJudgment = Left(strJudgment, ibcntl)
MsgBox "Judgement  = " + strJudgment
```

Chapter 4 Names and Functions of Controls

4.1 Front Panel



1 METER

This meter indicates a jitter 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 time when clock frequency is 27 MHz. This indication is invalid when clock frequency is not 27 MHz.

2 PHASE MONITOR

Displays the phase difference between RF and clock signals and the distribution of jitter. The leftmost part of the monitor indicates a phase difference of 0˚, while the rightmost part shows a phase difference of 360˚. The frequency jitter distribution is indicated as luminance.

3 POWER switch

Turns instrument power ON or OFF.

Press the switch switches between turn ON and OFF.

4 METER SCAL key

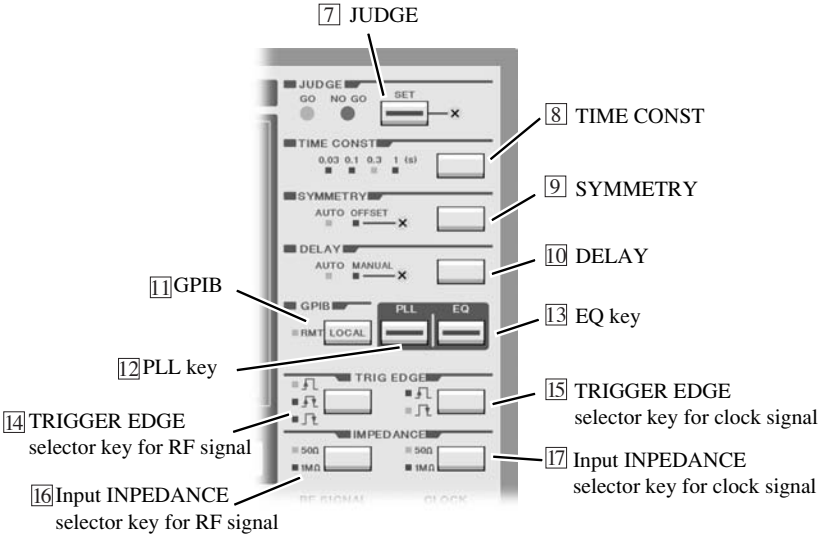
Used to switch to full scale of 10%/3 ns or 20%/6 ns of the meter. Scale status is indicated by the lamp to the left of the key.

5 RF SIGNAL INPUT terminal

Used to input an RF signal.

6 CLOCK INPUT terminal

Used to input a clock signal.



7 JUDGE

JUDGE LED

GO LED lights up when a measured value is lower than a set value; NO GO LED lights up when the measured value is larger than the set value.

When a measured value is over 20%, NO GO LED is blinking.

When judgment-level setting variable register is turned fully clockwise or counterclockwise, GO or NO GO LED is blinking.

SET key lit	The meter indicates a set value.
SET key unlit	The meter indicates a measured value.

Judgement-level set key and judgment-level setting variable register

This judgment-level key is used to set and display the judgment level.

Pressing the SET key lights the LED on top of the key, causing the meter to indicate a set judgment level. Pressing it again turns the LED off, returning the meter to its measured-value indication.

When the LED on top of the SET key is lit, you may turn the variable register next to the key to set the judgment level.

8 TIME CONST

TIME CONST key

Used to select time constant for conversion into rms values when the amount of jitter is to be converted into a rms value.

Pressing the key switches the time constant in order 0.03s, 0.1s, 0.3s and 1s..The selected time constant is indicated by an LED to the left of the key.

9 SYMMETRY

SYMMETRY mode selector key

Used to select the symmetry-level follow-up circuit operation mode.

Pressing the key switches operation mode in order AUTO, AUTO+OFFSET, and MANUAL settings.

AUTO

Selecting this mode lights the AUTO lamp and goes off the OFFSET lamp. In this mode, the slice level will automatically follow up the symmetry level of an RF signal, with response characteristics complying with those given in the DVD Book.

AUTO + OFFSET

Selecting this mode lights both AUTO and OFFSET lamps. In this mode, the slice level will automatically follow up the symmetry level of an RF signal. However, use of the SYMMETRY OFFSET/SLICE LEVEL setting variable register allows you to set an offset from the automatic follow-up level.

MANUAL

Selecting this mode goes off the AUTO lamp and lights the OFFSET lamp. In this mode, the slice level does not follow up the symmetry level of an RF signal. Use the SYMMETRY OFFSET/SLICE LEVEL setting variable register to set the slice level manually. When inputting a signal whose waveform is shaped using any other slicer, always have the symmetry-circuit operation mode set to MANUAL. Using the instrument with the symmetry circuit set to any mode other than MANUAL prevents accurate measurement or completely disables measurement.

While holding down the LOCAL (SHIFT) key, pressing this key causes the meter to indicate a slice level for as long as the key is pressed. The 0% indication of the meter shows about 0% level with respect to the full amplitude of an input signal, while the 10% (20%) indication of the meter shows 100% level. Since the internal circuit is AC coupling, the actual slice level changes with the duty ratio of an RF signal.

SYMMETRY OFFSET/SLICE LEVEL setting variable register

Used to set an offset from the automatic follow-up symmetry level when the symmetry-circuit operation mode is set to AUTO+OFFSET, or to set the slice level when the operation mode is set to MANUAL.

When the symmetry-circuit operation mode is set to AUTO+OFFSET, an offset can be set to the slice level set in AUTO within ± 10% range, where the peak-to-peak amplitude of an RF signal is 100%.

When the symmetry-circuit operation mode is set to MANUAL, the slice level can be set approximately in the 10 to 90% range, where the peak-to-peak amplitude of an RF signal is 100%. Since the internal circuit is AC coupling, the actual slice level changes with the duty ratio of an RF signal. Set an optimum slice level according to the duty ratio of the input signal.

10 DELAY

DELAY mode selector key

Used to switch the DELAY mode.

Pressing the key switches DELAY mode between AUTO and MANUAL. The selected mode is indicated by the lamp to the left of the key.

AUTO

Controls delay time automatically so that the average phase difference between RF and clock signals is 180˚.

MANUAL

Lets you adjust delay time using the DELAY TIME setting variable register.

DELAY TIME setting variable register

Used to set delay time when DELAY mode is set to MANUAL.

Minimum delay applies when this variable register is turned fully counterclockwise, while the maximum delay applies when it is turned fully clockwise. Adjust the variable register so that the jitter distribution is centered within the monitor.

11 GPIB

LOCAL (SHIFT) key

Pressing this key when the instrument is set to GPIB-controlled remote status (RMT lamp lit) restores front-panel instrument control (local status).

This key also functions as a SHIFT key. While pressing this key, press another key to perform SHIFT-key functions.

12 PLL key

Used to make an ON/OFF setting for the PLL clock-reproducing circuit. When the PLL key is OFF, a clock is reproduced from an RF signal. It is ON while the LED on the key is lit, and OFF while the key is not lit.

When it is ON and PLL has unlocked, the LED on the key is blinking.

13 EQ key

Used to make an ON/OFF setting for the equalizer. When it is ON, the equalizer acts on the RF signal. It is ON while the LED on the key is lit, and OFF while the key is not lit.

14 TRIGGER EDGE selector key for RF signal

Used to switch the trigger edge of a RF signal.

Pressing the key switches the trigger edge in order rising edge ( ), both edges ( ), and falling edge ( ) setting. Trigger-edge status is indicated by the lamp to the left of the key.

15 TRIGGER EDGE selector key for clock signal

Used to switch the trigger edge of a clock signal.

Pressing the key switches the trigger edge between rising edge ( ) and falling ( ) setting. Trigger edge status is indicated by the lamp to the left of the key.

16 Input IMPEDANCE selector key for RF signal

Used to switch the input impedance of a RF signal.

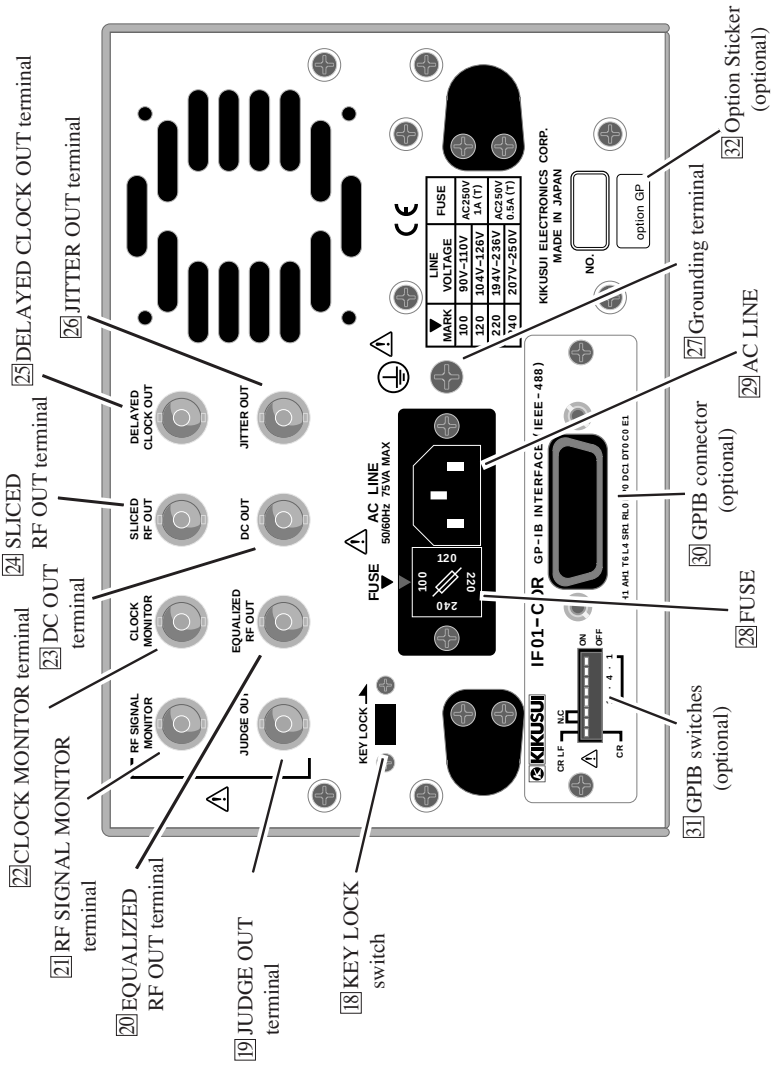
Pressing the key switches the input impedance between 50Ω and 1MΩ. Impedance status is indicated by the lamp to the left of the key.

17 Input IMPEDANCE selector key for clock signal

Used to switch the input impedance of a clock signal.

Pressing the key switches the input impedance between 50Ω and 1MΩ. Impedance status is indicated by the lamp to the left of the key.

4.2 Rear Panel



18 KEY LOCK switch

Slide this switch in the direction of the arrow to lock the keys on the front panel.

19 JUDGE OUT terminal

Outputs the result of GO/NO GO judgment at the TTL level. Judgement is GO when output is high and NO GO when it is low.

20 EQUALIZED RF OUT terminal

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

21 RF SIGNAL MONITOR terminal

Used to monitor an RF signal, this terminal outputs an amplitude approximately equal to 1/10 (terminated with 50Ω) of input amplitude. It's also used to calibrate the probe. Output impedance is about 50Ω.

22 CLOCK MONITOR terminal

Used to monitor a clock signal, this terminal outputs an amplitude approximately equal to 1/10 (terminated with 50Ω) of input amplitude. It's also used to calibrate the probe. Output impedance is about 50Ω.

23 DC OUT terminal

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

24 SLICED RF OUT terminal

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

25 DELAYED CLOCK OUT terminal

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 to 0.3 Vp-p (terminated with 50Ω). The output impedance is about 50Ω.

26 JITTER OUT terminal

Outputs the waveform of jitter sampled before conversion into a root-mean-square value. Output impedance is about 600Ω.

27 Grounding terminal

Connects this terminal to electrical ground.

28 FUSE

Fuse holder and voltage selector for input power

Place a fuse matching the line voltage in the fuse holder and insert with the line voltage indication positioned at the ▼ mark. The relationship between line voltage and correct fuses is given in the LINE VOLTAGE table on the rear panel.

29 AC LINE

Power code connector for supplying line voltage

30 GPIB connector (optional)

A 24-pin connector complying with the IEEE-488-1978 GPIB Standard, which connects instrument to computer. Firmly insert a GPIB cable connector into this connector and secure the cable with screws.

31 GPIB switches (optional)

Used to set the GPIB address of the meter.

32 Option sticker (optional)

Indicates that optional are installed in this meter.

Chapter 5 Maintenance

Periodic maintenance, inspection, and calibration are recommended to keep the product long-lived with unfailing initial performance.

5.1 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.

⚠WARNING • Turn OFF the POWER switch before cleaning.

⚠CAUTION • 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.

5.2 Inspection

Check the power code 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.

5.3 Calibration

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

For calibration, please contact Kikusui distributor/agent.

5.4 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.

Chapter 6 Specifications

Measurement Principle

The KJM6755A uses a measurement system that converts the time interval between an RF signal and clock signal into a voltage proportional to clock period (T), then converts that voltage into the amount of jitter, using a conversion-into-rms value circuit for measurement. The unit of the amount of jitter is %.

Input

Number of input channels	2(RF, CLOCK)
RF SIGNAL INPUT terminal	8-16 modulated signal Minimum pulse width 15 ns
CLOCK INPUT terminal	25MHz to 150MHz clock signal Duty ratio within 45:55 to 50:50
Signal voltage range	0.2 to 2Vp-p
Input connector	BNC
Input impedance	1MΩ(18pF±3pF), 50Ω
Maximum input voltage	4Vpk(DC+AC)

Measurement

Measurement range	0 to 20%
Specification guaranteed range	2 to 15% (clock frequency: 25 MHz to 60 MHz) 5 to 15% (clock frequency: 60 MHz to 150 MHz)
Residual jitter	1% or less (clock frequency: 25 MHz to 60 MHz) 2% or less (clock frequency: 60 MHz to 150 MHz)
Measurement accuracy	±5% of full scale of the meter
Time constant for conversion into rms value	30ms, 100ms, 300ms, 1s

Indicating

Indicator	Analog meter
Unit	%, ns Note: Unit ns is for reference values when clock frequency is 27MHz.
Scale (FS)	10%, 20%, 3ns, 6ns (Full scale:10%, 20%, 3.7ns, 7.4ns)
GO or NO GO judgment	Two LEDs, red and green, indication

Trigger

Symmetry follow-up		AUTO, AUTO+OFFSET, MANUAL The response characteristics of AUTO comply with those given in those givenin the DVD Specifications for Read-Only Disk Ver.1.0, Aug. 1996.
Trigger edge	RF	Rising edge, falling edge and both edges
	CLOCK	Rising edge and falling edge
Delay circuit		Clock signal is delayed to adjust the phase of an input signal. AUTO/MANUAL selection Phase adjusting range in MANUAL mode: 0 to 360°

Output(Rear)

RF MONITOR	Output amplitude	Approx. 1/10(terminated with 50Ω) of input amplitude
	Output impedance	Approx. 50Ω
CLOCK MONITOR	Output amplitude	Approx. 1/10(terminated with 50Ω) of input amplitude
	Output impedance	Approx. 50Ω
SLICED RF OUT	Output amplitude	Approx. 0.2 to 0.3V(terminated with 50Ω)
	Output impedance	Approx. 50Ω
DELAYED CLOCK OUT	Output amplitude	Approx. 0.2 to 0.3V(terminated with 50Ω)
	Output impedance	Approx. 50Ω
EQUALIZED RF OUT	Output amplitude	Approx. 0.2 to 0.3V (sine wave input with 4MHz, terminated with 50Ω)
	Output impedance	Approx. 50Ω
DC OUT	Output amplitude	0.2V/%、accuracy of ±0.15V
	Output impedance	Approx. 600Ω
JITTER OUT	Output amplitude	Approx. 20mV/%
	Output impedance	Approx. 600Ω
JUDGE OUT	Output logic	H:GO、L:NOGO、TTL level

NOTE

- This meter has an AGC circuit in its input block to stabilize the amplitude of the RF signal. The RF signal is then processed in the HPF circuit, equalizer circuit, and slice circuit (for symmetric correction). The process is intended to stabilize the slice (symmetric correction) characteristic of the RF signal regardless of its input amplitude.

  For the above reason, the characteristics of the EQUALIZED RF OUT signal include the characteristics of the AGC circuit and HPF circuit as well as the characteristics of the equalizer comply with those given in the DVD Book.

Equalizer circuit

Equalizer circuit in KJM6755A is designed in order to 8-16 modulated signal of reference clock of 27MHz.

However, frequency response characteristics based on the DVD book is prescribed in reference clock of 26.16MHz. Therefore, because reference frequency of 26.16MHz is converted into 27MHz, frequency characteristics of the KJM6755A is described 5.0MHz as 5.16MHz and 10MHz as 10.3MHz.

Complies with DVD Specifications for Read-Only Disc Ver. 1.0, Aug. 1996.

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

PLL clock-regeneration circuit

Frequency response characteristics based on the DVD book is mentioned by open-loop characteristics. However, frequency response characteristics of the KJM6755A is managed by close-loop characteristics equivalent to open-loop characteristics. Frequency response characteristics can be valid at reference clock of 27MHz.

Complies with DVD Specifications for Read-Only Disc Ver. 1.0, Aug. 1996.

Synchronizing available signal	8-16 modulated signal that channel clock is equivalent to 25M to 30MHz
Lock-up time	700ms or less
Synchronizing available jitter range	5 to 17%
Residual jitter	0.7% or less
Frequency response characteristics (Closed loop characteristics)	1kHz：0.2±1.7dB (amplitude ratio as reference is 100Hz)
	3kHz：1.3±1.7dB (amplitude ratio as reference is 100Hz)
	7kHz：1.0±1.7dB (amplitude ratio as reference is 100Hz)
	15kHz：-4.0±1.7dB (amplitude ratio as reference is 100Hz)

GPIB interface (factory option)

Complies with IEEE Std. 488-1978. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E1
Operated in address mode. Allows user to set and read each feature on the front panel.

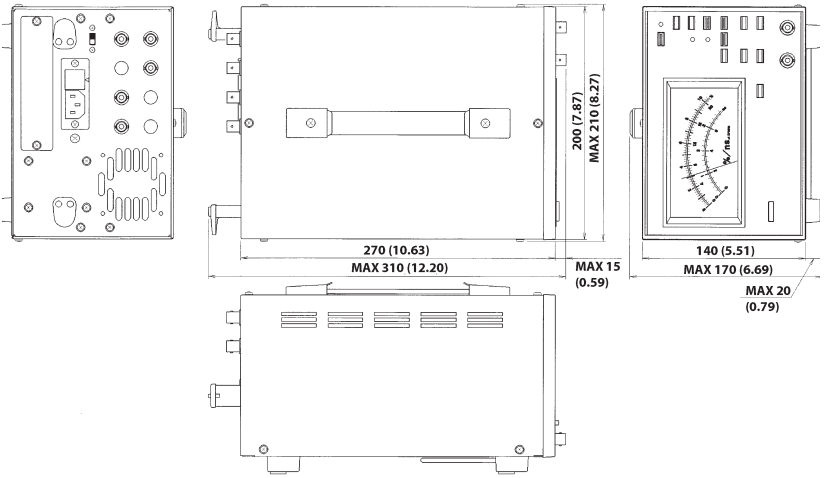
General specifications

Warm-up time			Approx. 30 minutes		
Storage temperature and humidity range			Temperature: -20˚C to 70˚C (-4˚F to 158˚F) Humidity: 90% or less R.H. (no condensation)		
Operating remperature and humidity ranges			Temperature:0˚C to 40˚C (32˚F to 104˚F) Humidity: 20 to 85% R.H. (no condensation)		
Specification guaranteed temperature and humidity ranges			Temperature:15˚C to 35˚C (59˚F to 95˚F) Humidity: 20 to 85% R.H. (no condensation)		
Allowable range of supplied voltage			90 to 110V, 104 to 126V 194 to 236V, 207 to 250V AC		
Allowable power frequency range			45 to 65Hz		
Maximum power consumption			75VA		
Insulation resistance			50MΩ or more (500 V DC)		
Withstand voltage			1500 V AC for one minute		
Earth continuity			25 A AC/0.1Ω max.		
Safety*1, *2			Conforms to the requirements of the following directive and standard. Low Voltage Directive 2006/95/EC EN 61010-1 Class I Pollution degree 2		
Electromagnetic compatibility (EMC)*1			Conforms to the requirements of the following directive and standard. EMC Directive 2004/108/EC EN 61326-1 EN 61000-3-2 EN 61000-3-3 Under following conditions •Used the shielded cable which length is less than three meters when any SIGNAL cables are connected.		
Dimensions (mm)			See "External dimensions"		
Weight			Approx. 5 kg (11.02 lb)		
Battery backup			Setup data is backed up.		
Accessories			Quantity		
			▼ Mark	Line Voltage	▼ Mark	Line Voltage
			100	90V-110V	220	194V-236V
			120	104V-126V	240	207V-250V
	Power code		1		
	Fuse	T 1.0A 250V	1		2
		T 0.5A 250V	2		1
	Operation Manual		1		

*1 Only on models that have CE marking on the panel. Not applicable to custom order models.

*2 This instrument is a Class I equipment. Be sure to ground the protective conductor terminal of the instrument. The safety of the instrument is not guaranteed unless the instrument is grounded properly.

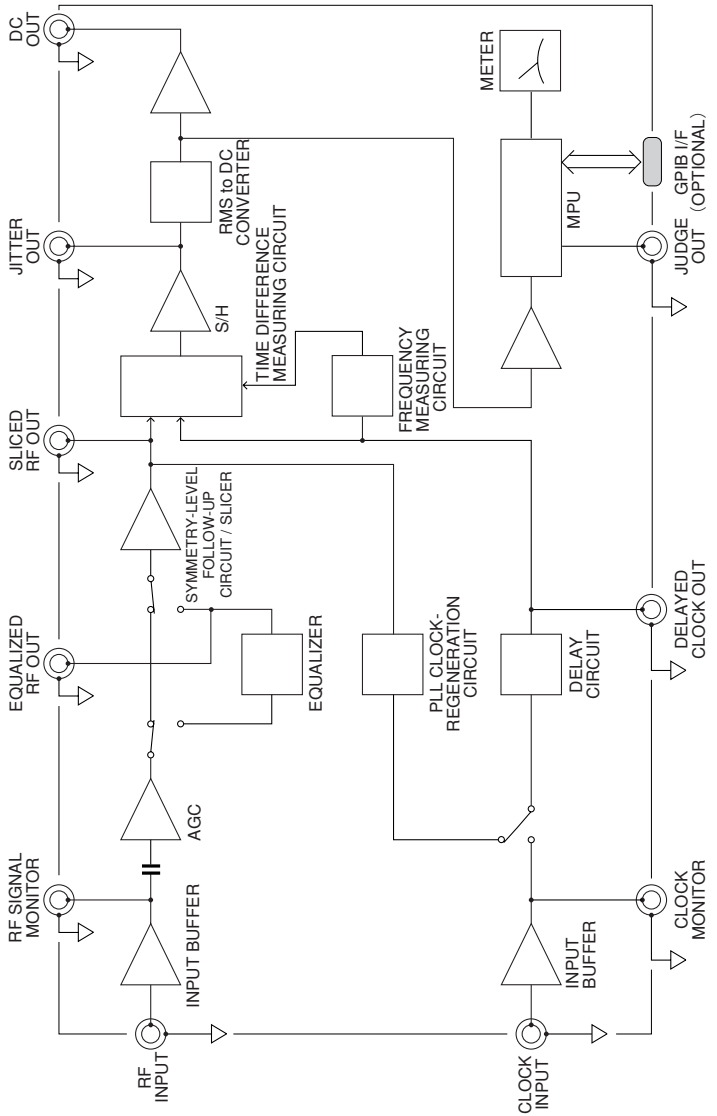
External dimensions



[Unit: mm (inch)]

Appendix

KJM6755A Block Diagram



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