Operation Manual

Time interval jitter meter
KJM 6755

KJM6755 Operation Manual Errata

Please make the following changes to the text in this document.

Page X

This Operation Manual applies to products running ROM version   1.2x
⇩
2.0x

Page 3-16

JITter:VALue?

■ Response message

JIT:VAL?····Returns the current JITTER value (0.0% to 20.0%).
⇩
(0.00% to 20.00%)

e.g.

When the current JITTER value is 1.0%.   ⇨   1.00%.

A value of 1.0 is returned.   ⇨   A value of 1.00 is returned.

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JUDge:LEVel.

■ Program data

Table 3-9 "set the JUDGE level"

Minimum 0.0 ⇨ 0.00
Maximum 20.0 ⇨ 20.00

e.g.

To set JUDGE level to 10.0% ⇨ To set JUDGE level to 10.00%
JUD:LEV 10.0 ⇨ JUD:LEV 10.00

■ Response message

e.g.

When the current JUDGE level is 1.0%   ⇨   1.00%

A value of 1.0 is returned.   ⇨   A value of 1.00 is returned.

KJM6755 取扱説明書 正誤表

本取扱説明書の記述を以下のように変更いたします。お手数ですが訂正してご使用ください。

変更1

ページⅧ

この取扱説明書はバージョン 1.2x
⇩
のROMを搭載した製品に適用します。

この取扱説明書はバージョン 2.0x
⇩
のROMを搭載した製品に適用します。

変更2

ページ3-16　[JITter:VALue?]

JIT:VAL?···現在のJITTER値(0.0%～20.0%)を返します。
⇩
JIT:VAL?···現在のJITTER値(0.00%～20.00%)を返します。

例)···が1.0%の場合 ⇨ 例)···が1.00%の場合
1.0を返します。 ⇨ 1.00を返します。

変更3

ページ3-17　[JUDge:LEVel?]

■プログラムデータ

JUDGE レベル設定値の最小値 0.0 ⇨ 0.00
JUDGE レベル設定値の最大値 20.0 ⇨ 20.00

例)···10.0%にする場合 ⇨ 例)···10.00%にする場合
JUD:LEV 10.0 ⇨ JUD:LEV 10.00

■レスポンスメッセージ

例)···が1.0%の場合 ⇨ 例)···が1.00%の場合
1.0を返します。 ⇨ 1.00を返します。

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 it gets lost or soiled, a new Operation Manual can be purchased. In either case, please contact your Kikusui agent, and provide the "Kikusui Part No." given on this page.

· This manual has been prepared with the utmost care; however, if you have any questions, or note any errors or omissions, please contact your Kikusui 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 cable 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.
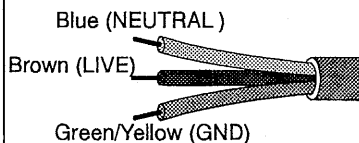
Power Requirements of this Product (cont'd)

☐ AC power cable

The product is porvided with AC power cables described below. If the cable has no power plug, attach a power plug or crimp-style terminals to the cable in accordance with the wire colors specified in the drawing.
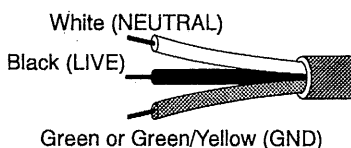
■■■■■ WARNING ■■■■■

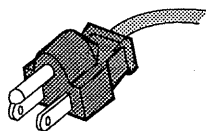- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.

☐ Without a power plug

Blue (NEUTRAL)

Brown (LIVE)

Green/Yellow (GND)

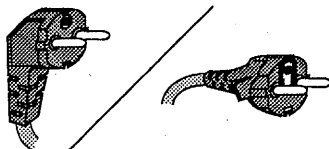### ☐ Without a power plug

White (NEUTRAL)

Black (LIVE)

Green or Green/Yellow (GND)

☐ Plugs for USA

☐ Plugs for Europe

☐ Provided by Kikusui agents

Kikusui agents can provide you with suitable AC power cable. For further information, contact your Kikusui agent.

⚠ 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. Kikusui assumes no liability against any damages or problems resulting from negligence of the precautions.

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.)
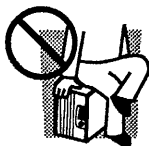
Purposes of use

- If the product is to be used for purposes not described in this manual, contact your Kikusui agent in advance.
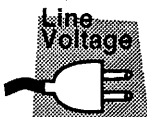
Input power

- Use the product with the specified input power voltage.
- For applying power, use the AC power cable provided. The shape of the plug differs according to the power voltage and areas. Use the cable which is suitable for the line voltage used.

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.

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III

Cover

- There are parts inside the product which may cause physical hazards. Do not remove the external cover. If the cover must be removed, contact your Kikusui agent in advance.
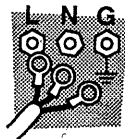
Installation

- 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 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.
- Be sure to use the AC power cable provided. Consult your Kikusui agent if other cable than included is to be used for some reason.
- 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.

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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 cable. Be sure to unplug the AC power cable or stop applying power before checking.
- If any abnormality or failure is detected in the products, stop using it immediately. Unplug the AC power cable or disconnect the AC power cable 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 your Kikusui agent.

Maintenance and checking

- To avoid electrical shock, be absolutely sure to unplug the AC power cable or stop applying power before performing maintenance or checking.
- Do not remove the cover when performing maintenance or checking. If the cover must be removed, contact your Kikusui agent in advance.
- 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 your Kikusui agent.

Safety Symbols

This operation manual and this product use the following safety symbols. Note the meaning of each of the symbols to ensure safe use of the product. (As using symbols depend on the product, all of symbols may not be used.)
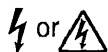
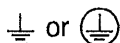|	
⚡ or ⚠	Indicates the presence of 1000V or higher. Never attempt to touch this part when the power switch of the product is turned on. If you need to touch, turn off the power switch and then check the voltage of the terminal.
▬ WARNING ▬	Indicates the possibility of personal injury or death. Never fail to follow the operating procedure. Do not proceed beyond a WARNING sign until the noted conditions are fully understood and met.
▒ CAUTION ▒	Indicates the existence of damage to the product or connected equipment. Always follow the operating procedure. Do not proceed beyond a CAUTION sign until the indicted conditions are fully understood and met.
⊏▭⊐ NOTE ⊏▭⊐	Indicates additional information such as operating procedure.
— Description —	Describes technical terms used in this manual.
⊘	Indicates action prohibited.
⚠	Indicates general warning, caution, risk of danger. When this mark is indicated on the product, refer the relevant section of the Operation Manual.
⏚ or ⏚	Indicates a grounding (earth) terminal.
⏚	Indicates a chassis grounding terminal.

CONTENTS

Preface

Description

KJM6755 is specific equipment for measuring the jitter in DVD players, this instrument fulfills measurement methods specified in the DVD Specifications for Read-Only Disk 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 and phase-difference correction circuits, these instruments eliminate the need for externally-provided circuits.

Equalizer circuit, PLL clock-regeneration circuit and GPIB interface are available as a option.

This Operation Manual applies to products running ROM version 1.2x.

For reference to any product, please contact your Kikusui 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 Unpacking and Packing

■Unpacking

When the product 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 your Kikusui agent.

Fig. 1-1 Unpacking/packing

Accessories					
	Description	Code	Quantity ▼MARK 100 (90V-110V) / 120 (104V-126V)	▼MARK 220 (194V-236V) / 240 (207V-250V)	Check
1	Input power cable	85-10-0171	1		
		85-10-0141		1	
2	Fuse T 1.0A 250V		1	2	
	T 0.5A 250V		2	1	
3	Operation manual	Z1-001-832	1	1	

■Packing

▨▨▨▨▨▨▨▨▨▨▨▨ **CAUTION** ▨▨▨▨▨▨▨▨▨▨▨▨

· Use proprietary packing when transporting product.

· If package is needed, please contact your Kikusui agent.

· Disconnect input power cable, connection cables, etc. from body when packing.

Packing should Refer to Fig.1-1 "Unpacking/packing" to avoid placing cushioning material in the wrong direction.

1.2 Precautions for Installation

Observe the following precautions:

■Do not use the product in inflammable atmosphere.

Do not use the product near combustibles, such as alcohol and thinner, or in inflammable atmosphere to avoid possible explosion or fires.

■Avoid high temperatures and exposure to direct sunlight.

Do not install the product near heaters or sources of heat or in places that are subject to sharp 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 70 °C

■Avoid high humidity.

Do not install the product with high humidity, such as a places near a boiler, humidifier, or tap water.

Operating humidity range : 20% to 85%

Storage humidity range : 20% to 90%

Dew may condense on the product even when it is used within the operating humidity range. In the event of dew condensation, allow the product to dry fully before returning it to service.

■Avoid placing corrosive atmosphere.

Do not use the product in corrosive atmosphere or in an environment dominated by sulfuric acid mist. Corrosive could corrode the conductors used in the product or impair the contact of its connectors, resulting in malfunctions or failures or, in the worse case, in fires.

■Keep in relatively dust-free environment.

■Do not use the product in a poorly ventilated place.

Allow adequate spaces around the product to ensure air flow to and from the air holes on its top and bottom side.

■Do not use the product in an unstable place.

■Do not use the product near sources of intense electromagnetic fields.

1.3 Checking the Line Voltage and Fuse

WARNING

· To avoid electrical shock, unplug the product from the AC outlet before attempting to check or replace the fuse.

CAUTION

· Use a fuse of the proper shape, rating, and characteristics for product. Damage to the product could result if a fuse or fuse holder of the wrong rating is used shorted.

<1> Turn off 【POWER】 switch and disconnect the power cable.
<2> Remove fuse holder as shown in Fig. 1-2 "Removing Fuse Holder".

Alignment mark   Voltage selector/fuse holder
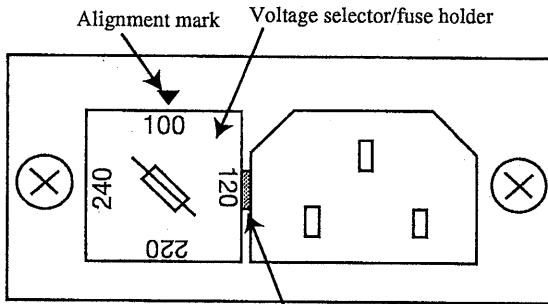
Remove cover by inserting the point of a flat head screwdriver in here.
Then, adjust the voltage selector to the ▼mark and push in the cover.
(The figure illustrates a choice 90 to 110 VAC.)

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
120	104V–126V	1A (T)
220	194V–236V	AC250V
240	207V–250V	0.5A (T)

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

1. 4 Grounding

━━━━━━━━━ WARNING ━━━━━━━━━

- Improper or no grounding may cause electrical shock.
- Connect the ground terminal to electrical ground (safety ground).

To ground this product, connect the 3-P plug to a grounded 3-P receptacle.

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 cable 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.

<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.
All the indicators will be turned on once before 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	:0.1s
SYMMETRY	:AUTO
DELAY	:AUTO
OPTION PLL	:OFF
OPTION EQ	:OFF
TRIG EDGE (RF)	:⌐ (rising)
TRIG EDGE (CLK)	:⌐ (rising)
IMPEDANCE (RF)	:1MΩ
IMPEDANCE (CLK)	:1MΩ
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

DVD player or other devices
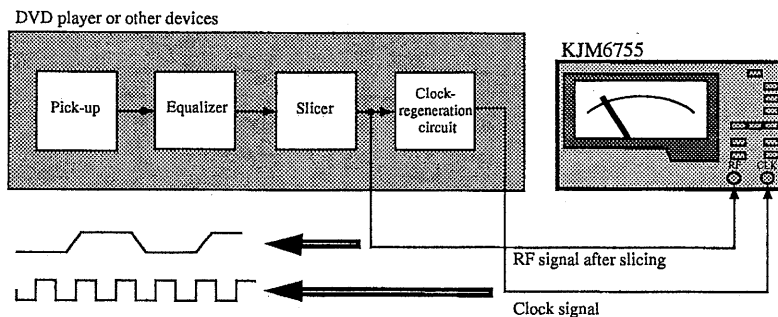
Fig. 2-1

This section describes how to make measurements using the KJM6755 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 50 Ω and measurement is made with the input impedance of the instrument set to 50 Ω, use a 50 Ω 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 2.7 "Calibrating the Probe".

Instrument Settings

SYMMETRY   :MANUAL

When inputting an RF signal after slicing, always use the instrument with the SYMMETRY 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 SYMMETRY and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Description of 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.

DELAY   :AUTO or MANUAL

When DELAY 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 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".

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.

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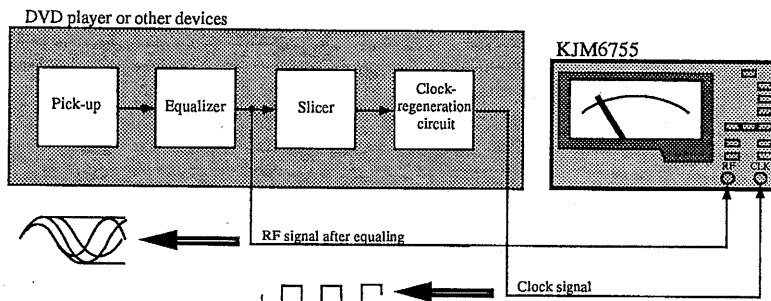

Fig. 2-2

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

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

When SYMMETRY 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 SYMMETRY and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Description of Front Panel".

DELAY   :AUTO or MANUAL

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

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

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┌────────────┐ **NOTE** ┌────────────┐

· The characteristics of the instrument 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" in 2.4 "Operation ".

2.4.3 Measuring to Use RF Signal Only (When the Instrument is Equipped with the Optional PLL Clock-regeneration Circuit)
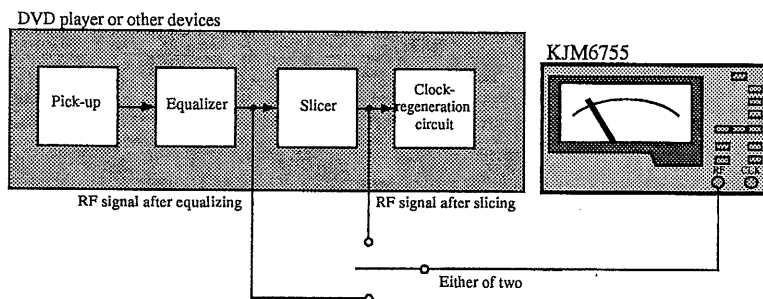

Fig. 2-3

For instruments equipped with the optional PLL clock-regeneration circuit, jitter may be measured with just a RF signal.

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)

For SYMMETRY and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Description of Front Panel". For setting the slice level when SYMMETRY is set to MANUAL, see 2.4.1 "Measuring Based on the DVD Book" in 2.4 "Operation".

DELAY   :AUTO or MANUAL

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

OPTION PLL   :ON

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

NOTE

· The characteristics of the PLL clock-regeneration circuit
of the instrument comply with those given in the DVD
Book (ver. 1.0). A difference between the characteristics
of the clock-regeneration circuit in the DVD player
(ROM) 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" in 2.4 "Operation".

2.4.4 Measuring to Use Pick-up Output Signal and Regenerated Clock Signal (When the Instrument is Equipped with the Optional Equalizer Circuit)
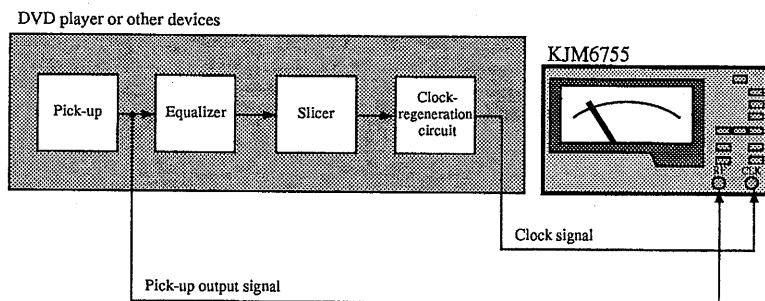
DVD player or other devices

Fig. 2-4

For an instruments equipped with the optional equalizer circuit, jitter may be measured using a pick-up output signal and regenerated clock signal.

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

When SYMMETRY 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 and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Description of Front Panel".

DELAY   :AUTO or MANUAL

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

OPTION EQ   :ON

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

TRIG EDGE(RF)   :both edges(Π)

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

NOTE

· The characteristics of the instrument equalizer circuit comply with those given in the DVD Book (ver. 1.0). A difference between the characteristics of the equalizer 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" in 2.4 "Operation".

2.4.5 Measuring to Use Pick-up Output Signal Only (When the Instrument is Equipped with the Optional PLL clock Regeneration and Equalizer Circuits)
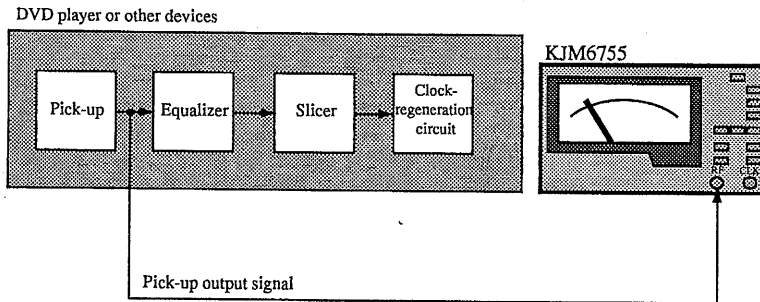
DVD player or other devices

Fig. 2-5

For instruments equipped with the optional PLL clock regeneration and equalizer circuits, jitter can be measured with just a pick-up output signal.

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

When SYMMETRY 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 and slice level, see 2.5 "Symmetry and Slice Level" and 4.1 "Description of Front Panel".

DELAY   :AUTO or MANUAL

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

OPTION PLL	:ON
OPTION 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

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 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 is set to AUTO
(AUTO: lit, OFFSET: unlit)

The KJM6755 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.

Output signal

Slice level is controlled so that the DC value of the output signal becomes 0.

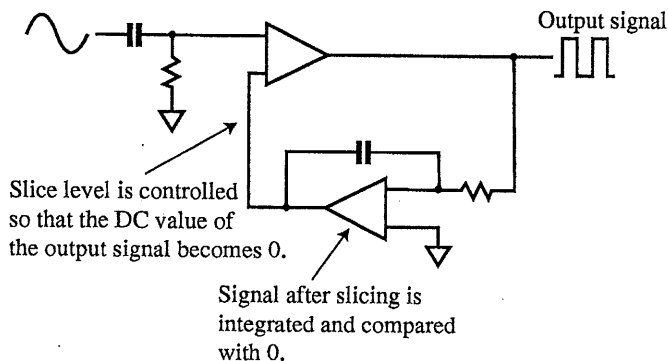Signal after slicing is integrated and compared with 0.

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 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 this mode, using an adjusting screwdriver.

Operation When SYMMETRY 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.
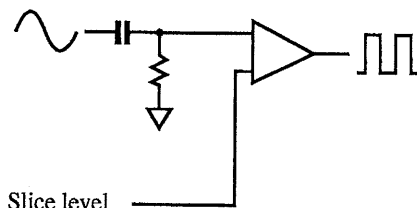

Slice level

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.

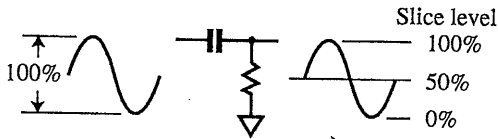## e.g.: When the duty ratio of an input signal is 50%

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.

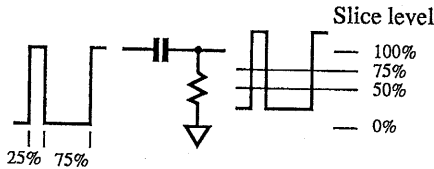## e.g.: When the duty ratio of an input signal is not 50%

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, the actual slice level is located to a point 25% below the set slice level.

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, KJM6755 cannot measure jitter.

Checking Slice Level

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.
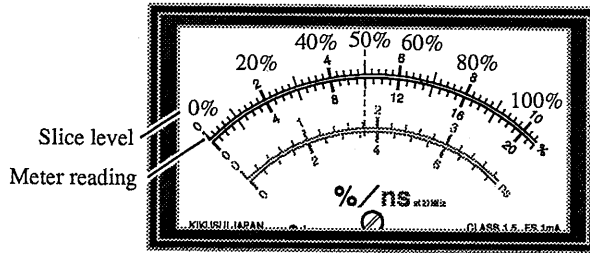

Fig. 2-10

SYMMETRY
OFFSET/ SLICE LEVEL
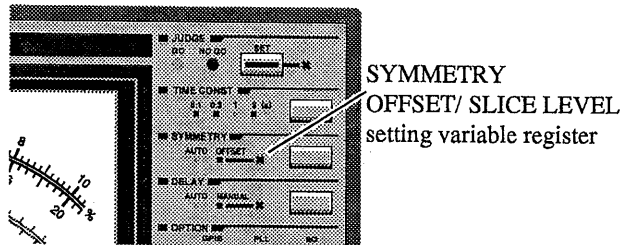setting variable register

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°.
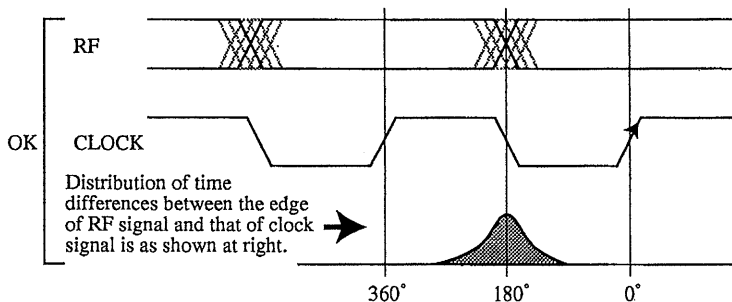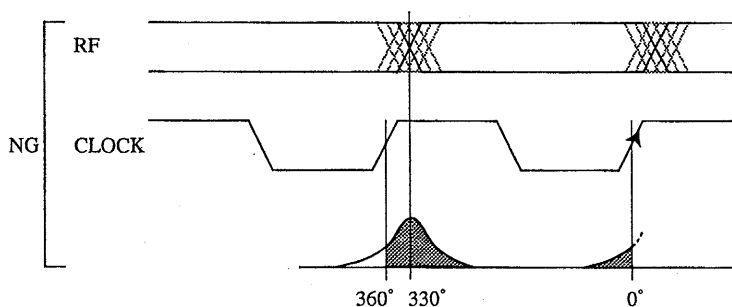

Fig. 2-12

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°flin 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 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.

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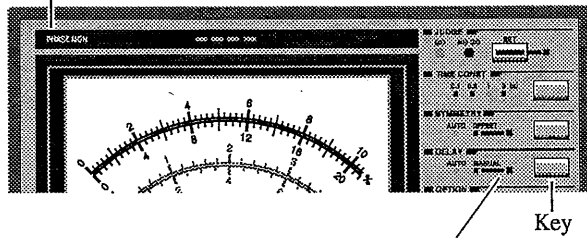
DELAY TIME setting variable register when DELAY is set to MANUAL
[Use this VR to center the brightest part within the monitor.]

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
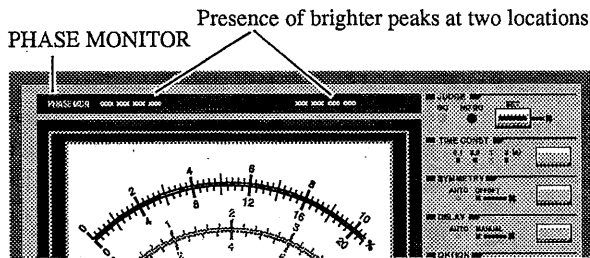may disable the correct action.

Presence of brighter peaks at two locations
PHASE MONITOR

Fig. 2-15

2.7 Calibrating the Probe

In addition to a 50 Ω 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

50 Ω BNC-BNC cable   1

50 Ω terminator   1

Adjusting screwdriver   1
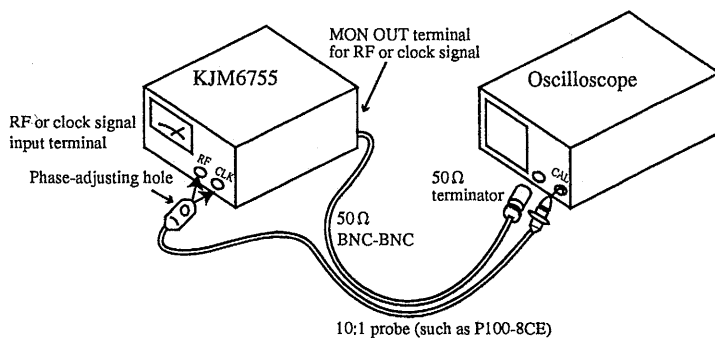
Fig. 2-16

As shown in Fig. 2-16, 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 50 Ω input impedance.

3.1 Summary

The GPIB interface supported by the KJM6755 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.
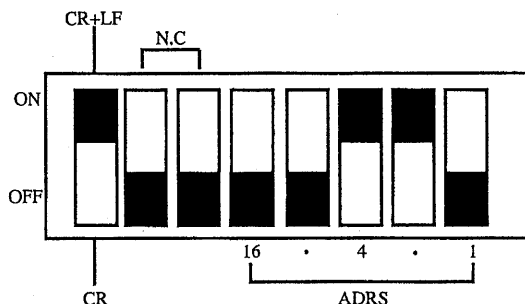

Fig. 3-1 Example Address Setting

┌─────────────── 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

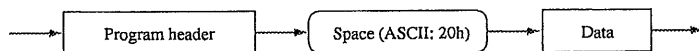The terminator used to mark the end of a program message is called a program message terminator.

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 header │───▶( Space (ASCII: 20h) )──▶│ Data │──▶
```

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

```
        ┌────( ; )────┐
        │             │
   ──▶──┤ Program message ├──▶
```
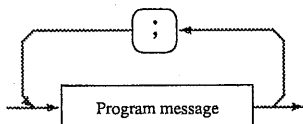
· The kinds of program message terminators listed can be used without presetting. (A CR alone, without an EOI, cannot be used.)

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

```
┌──────────┐
│   *RST   │
└──────────┘
```
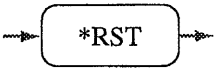
*IDN? . . . .

Returns instrument model information.

■ Program message

```
┌──────────┐
│  *IDN?   │
└──────────┘
```
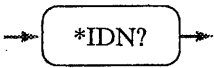
■ Response message

The instrument returns model information in the following format:

KIKUSUI ELECTRONICS CORP., KJM6755, 0, 1.00

     Company name   Model name

                                     Fixed to 0

                                     Version number
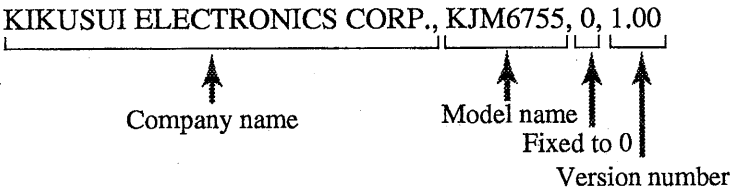
*ESR? . . . .

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

■ Program message

```
──▶─( *ESR? )─▶──
```
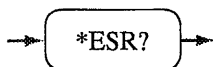
■ Response message

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

e.g.: When the data is A0h.

A value of #HA0 is returned.

*ESE . . . .

Set or reset the individual bits of the event status enable register. The default is 0h.

Running *RST resets the bits to their initial value.

■ **Program message**
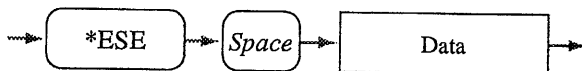
■ **Program data**

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? . . . .

Return the contents of the status byte.

■ Program message

```
──▶─( *STB? )─▶──
```

■ Response message

e.g.: When the data is FFh.

A value of #HFF is returned.

*SRE

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

■ Program message

$\longrightarrow$ (*SRE) $\longrightarrow$ (*Space*) $\longrightarrow$ [Data] $\longrightarrow$
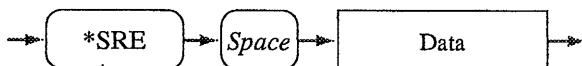
■ Program data

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.
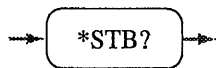
e.g.: When the data is FFh.

A value of #HFF is returned.

*CLS

Reset the status byte register and the event status register.

■ Program message

```
→[ *CLS ]→
```

&INI?
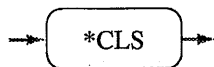
Returns the status of instrument option(s).

■ Program message

```
→[ &INI? ]→
```
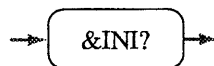
■ Response message

&INI?··· Returns the status of instrument option(s).

e.g.1: When no option is installed in the instrument.

A value of NONE is returned.

e.g.2: When the optional PLL clock-regeneration circuit is installed.

A value of PLL is returned.

e.g.3: When the optional equalizer circuit is installed.

A value of EQ is returned.

e.g.4: When both optional PLL clock-regeneration and equalizer circuits are installed.

A value of PLL,EQ is returned.

ERRor?
. . . .

Read an error code from the error queue.

■ **Program message**

→[ERR?]→
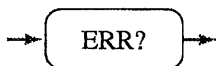
■ **Response message**

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**
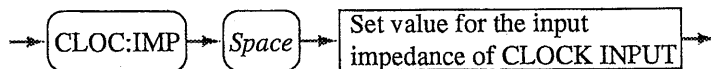
$$\rightarrow \boxed{\text{CLOC:IMP}} \rightarrow \boxed{Space} \rightarrow \boxed{\begin{array}{l}\text{Set value for the input} \\ \text{impedance of CLOCK INPUT}\end{array}} \rightarrow$$

■ **Program data**

Set 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 50 Ω.

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

→ [CLOC:TRIG:EDG] → [*Space*] → [Character program data] →
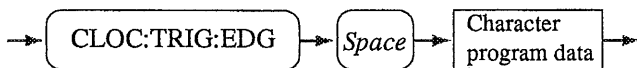
■ Program data

Set 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**

$$\rightarrow \boxed{\text{DEL:CON}} \rightarrow \boxed{Space} \rightarrow \boxed{\text{DELAY CONTROL level}}$$

■ **Program data**

Set the DELAY CONTROL level	
Data type	Integer
Minimum	-2048
Maximum	2047
Resolution	1

Table 3-6
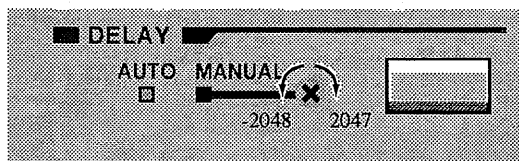
In panel operations, turning the DELAY TIME setting variable register clockwise means setting the delay in the direction of 2047, while turning it counterclockwise means setting it in the direction of -2048.

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

DEL:CON 100

■ **Response message**

DEL:CON?··· The current DELAY control level is returned.

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

A value of 1000 is returned.

DELay:MODe . . . .

Specifies DELAY mode.

■ **Program message**

```
--▶[    DEL:MOD    ]--▶( Space )--▶[ Character      ]--▶
                                   [ Program data   ]
```
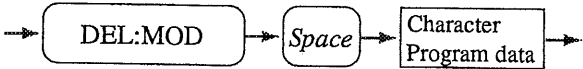
■ **Program data**

Set 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. (This message is valid only when the optional equalizer circuit has been installed.)

■ **Program message**

■ **Program data**

Set the OPTION 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**

```
→ ( JIT:VAL? ) →
```
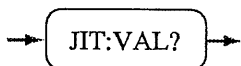
■ **Response message**

JIT:VAL?··· Returns the current JITTER value (0.0% to 20.0%).

e.g.: When the current JITTER value is 1.0%.

A value of 1.0 is returned.

When the instrument is equipped with the optional PLL clock-regeneration circuit, no judgment can be made until a clock signal is locked. In this case, a value of 100 is returned.

JUDge:LEVel

Set the JUDGE level.

■ Program message

→ JUD:LEV → *Space* → JUDGE level
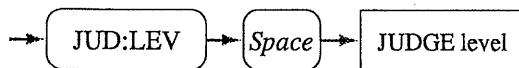
■ Program data

Set the JUDGE level	
Data type	Real
Minimum	0.0
Maximum	20.0
Resolution	0.1

Table 3-9

e.g.: To set JUDGE level to 10.0%.

JUD:LEV 10.0

■ Response message

JUD:LEV?··· Returns the current JUDGE level.

e.g.: When the current JUDGE level is 1.0%.

A value of 1.0 is returned.

JUDge:RESult?

Returns the JUDGE result.

■ Program message

```
⟶ ( JUD:RES? ) ⟶
```
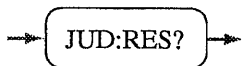
■ Response message

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 instrument is equipped with the optional PLL clock-regeneration circuit, 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**

$$\rightarrow \boxed{\text{MET:DISP}} \rightarrow \boxed{Space} \rightarrow \boxed{\begin{array}{l}\text{Character}\\\text{program data}\end{array}} \rightarrow$$
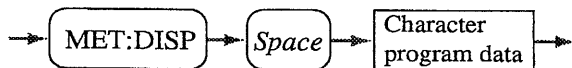
■ **Program data**

Specifies 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**
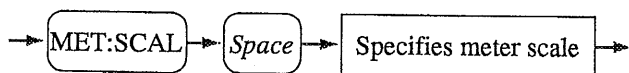
■ **Program data**

Specifies 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. (This message is valid only when the optional PLL clock-regeneration circuit is installed.)

■ Program message

■ Program data

Set the OPTION 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

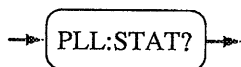PLL? ⋯ Returns the current status of the PLL clock-regeneration circuit.

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. (This query is valid only when the optional PLL clock-regeneration circuit is installed.)

■ Program message

→ PLL:STAT? →

■ 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.
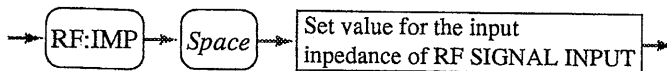
A value of LOCK is returned.

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**

→ RF:IMP → Space → | Set value for the input inpedance of RF SIGNAL INPUT | →

■ **Program data**

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

Table 3-13

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

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 50 Ω.

A value of 50 is returned.

. . . .

Specifies the TRIG EDGE of RF SIGNAL INPUT.

■ Program message

```
 ──▶│ RF:TRIG:EDG │─▶│ Space │─▶│ Character    │─▶
                                 │ program data │
```

■ Program data

Set 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(𝗙𝘁).

   RF:TRIG:EDG EIT

■ Response message

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

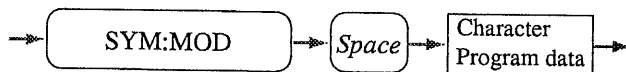e.g.: When the current TRIG EDGE of RF SIGNAL INPUT is POSITIVE
(𝗙𝗟).

A value of POS is returned.

SYMmetry:MODe . . . .

Specifies the SYMMETRY mode.

■ **Program message**

■ **Program data**

Set 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.

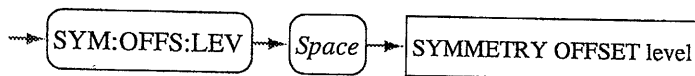e.g.: When the SYMMETRY mode is currently in MANUAL.

A value of MAN is returned.

SYMmetry:OFFSet:LEVel . . . .

Sets the SYMMETRY offset level.

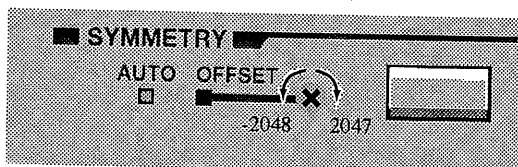This message is valid only when SYMMETRY mode is set to AUTO+OFFSET or MANUAL.

■ **Program message**

~~► SYM:OFFS:LEV ►► *Space* ►► SYMMETRY OFFSET level

■ **Program data**

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 level.

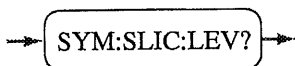e.g.: When the current SYMMETRY offset level is 2047.

A value of 2047 is returned.

. . . .

Returns the slice level.

■ Program message

SYM:SLIC:LEV?

■ 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".
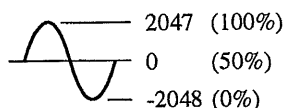
2047 (100%)
0   (50%)
-2048 (0%)

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

A value of 2047 is returned.

TIMe:CONst

Set the TIME CONST.

■ **Program message**

→ (TIM:CON) → (*Space*) → [Set value for TIME CONST] →
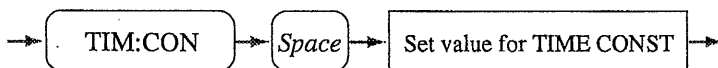
■ **Program data**

Set the TIME CONST	
Data type	Character
Character program data	0.1, 0.3, 1, 3

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.

Returns "0.3."

Details of Event Status Register and Event Status Enable Register

Bit	Register name	Explanation
7	PON (Power ON)	Indicates that the KJM6755 is turned on.
6		Not used with the KJM6755.
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 KJM6755.
2		Not used with the KJM6755.
1		Not used with the KJM6755.
0		Not used with the KJM6755.

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 KJM6755.
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 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 KJM6755.
3		Not used with the KJM6755.
2		Not used with the KJM6755.
1		Not used with the KJM6755.
0		Not used with the KJM6755.

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

About Status Register

The format of status data is shown below.
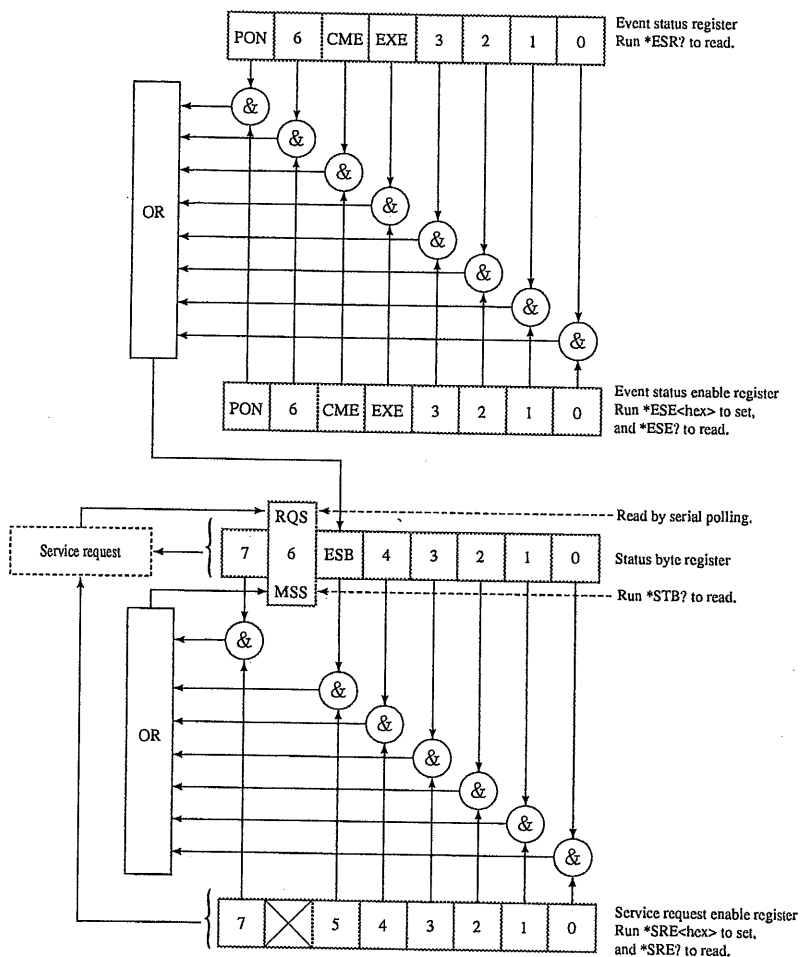

Fig. 3-2 Status Data Format

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 KJM6755.

<2> Turn the KJM6755 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 KJM6755.

<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 KJM6755 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 KJM6755.

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 function
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

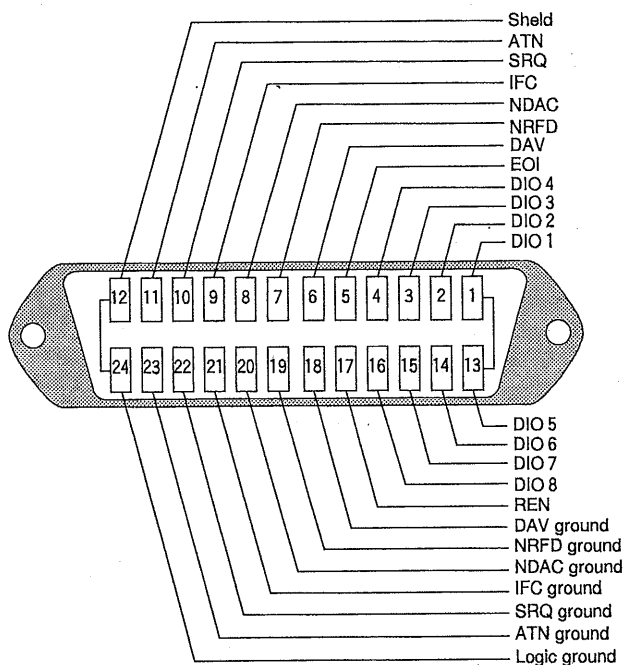## GPIB Connector . . . .

Fig. 3-3   GPIB Connector

3.6 Sample Program

The following demonstrates a sample program in which the KJM6755 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 7.7")    'Sets judgment level to 7.7%

' 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
```
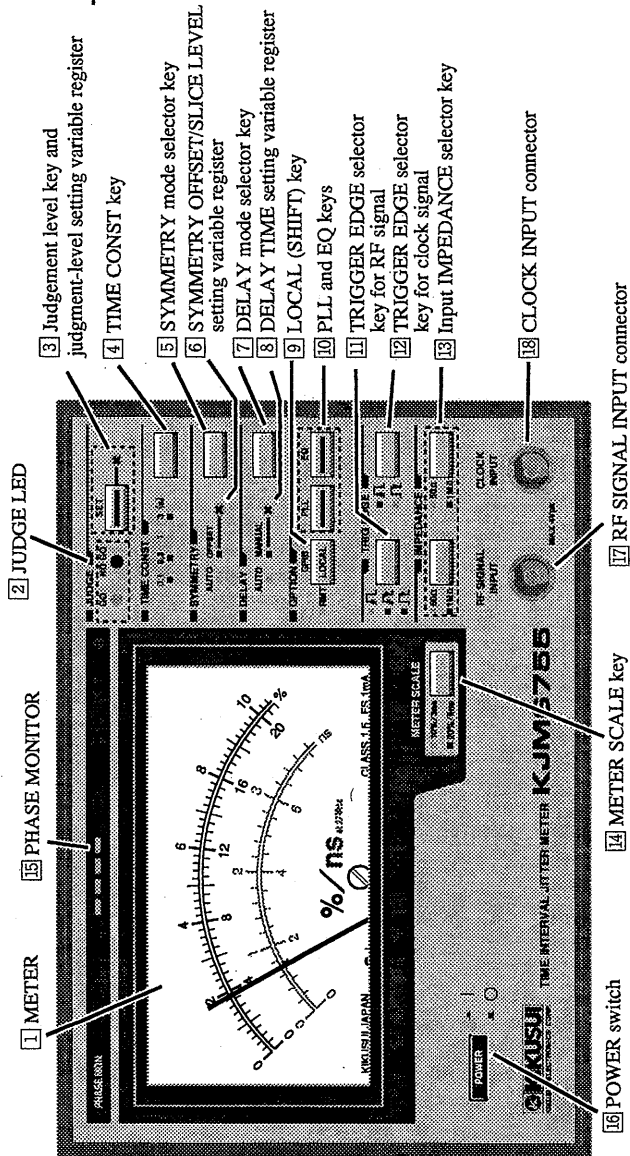
4.1 Description of Front Panel

③ Judgement level key and judgment-level setting variable register

④ TIME CONST key

⑤ SYMMETRY mode selector key

⑥ SYMMETRY OFFSET/SLICE LEVEL setting variable register

⑦ DELAY mode selector key

⑧ DELAY TIME setting variable register

⑨ LOCAL (SHIFT) key

⑩ PLL and EQ keys

⑪ TRIGGER EDGE selector key for RF signal

⑫ TRIGGER EDGE selector key for clock signal

⑬ Input IMPEDANCE selector key

⑱ CLOCK INPUT connector

② JUDGE LED

⑮ PHASE MONITOR

① METER

⑭ METER SCALE key

⑰ RF SIGNAL INPUT connector

⑯ POWER switch

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 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.

SET key lit   The meter indicates a set value.

SET key unlit   The meter indicates a measured value.

3 Judgement-level 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.

4 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 0.1s, 0.3s, 1s and 3s. The selected time constant is indicated by an LED to the left of the key.

5 SYMMETRY mode selector key

Used to select the symmetry-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.

6 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 $\pm 10\%$ 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.

7 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.

8 DELAY TIME setting variable register

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

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

⑨ 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.

⑩ PLL and EQ keys

When the instrument has optional circuits, these keys allow the corresponding circuit to be turned ON or OFF. A key light when the relevant circuit is ON and goes off when it is OFF.

⑪ 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.

⑫ 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.

⑬ Input IMPEDANCE selector key

Used to switch input impedance.

Pressing the key switches the input impedance between $50\,\Omega$ and $1M\,\Omega$. Impedance status is indicated by the lamp to the left of the key.

⑭ METER SCALE 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.

⑮ 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.

⑯ POWER switch

Turns instrument power ON or OFF.
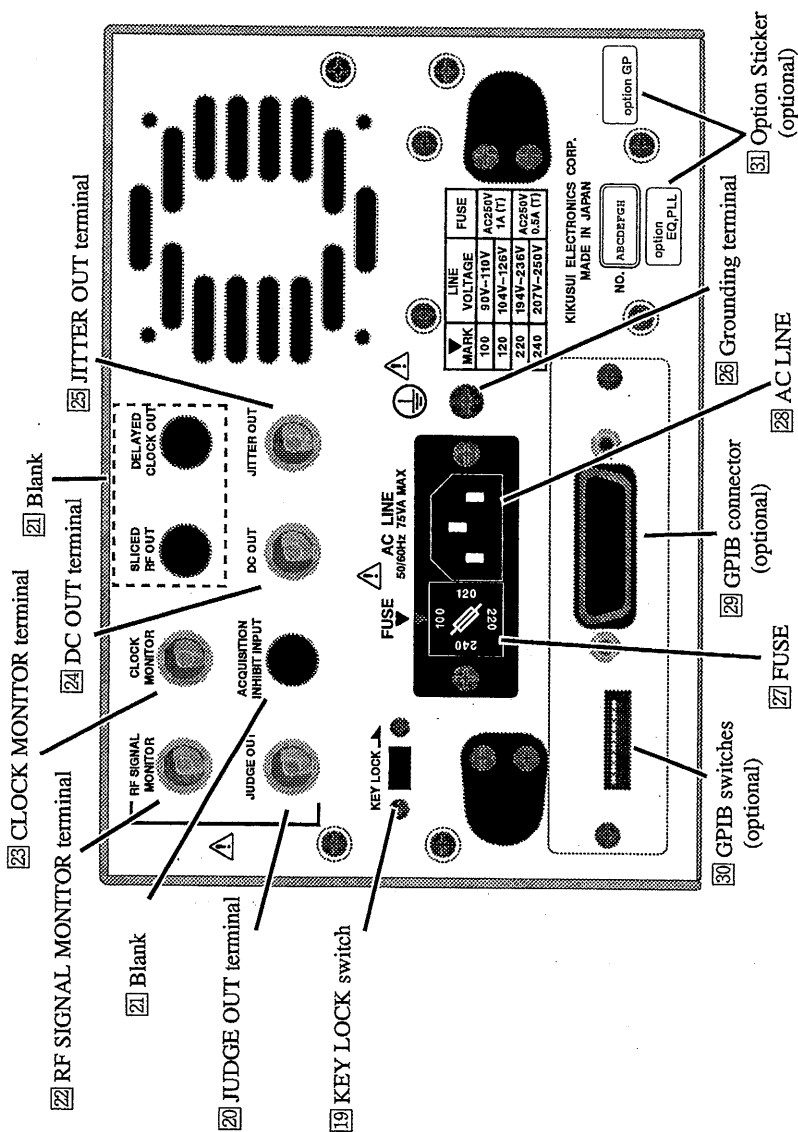
Press the switch switches between turn ON and OFF.

⑰ RF SIGNAL INPUT connector

Used to input an RF signal.

⑱ CLOCK SIGNAL INPUT connector

Used to input a clock signal.

4.2 Description of Rear Panel

19 KEY LOCK switch

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

20 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.

21 Blank

Dedicated terminals for custom-made items

22 RF SIGNAL MONITOR terminal

Used to monitor an RF signal, this terminal outputs an amplitude approximately equal to 1/5 of input amplitude. It's also used to calibrate the probe. Output impedance is about $50\,\Omega$.

23 CLOCK MONITOR terminal

Used to monitor a clock signal, this terminal outputs an amplitude approximately equal to 1/5 of input amplitude. It's also used to calibrate the probe. Output impedance is about $50\,\Omega$.

24 DC OUT terminal

Outputs a voltage proportional to a measured value (0.2 V/%). Output impedance is about $50\,\Omega$.

25 JITTER OUT terminal

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

26 Grounding terminal

Connects this terminal to electrical ground.

27 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.

28 AC LINE

Power cable connector for supplying line voltage

29 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.

30 GPIB switches (optional)

Used to set the instrument address

31 Option sticker (optional)

Indicates that optional are installed in this instrument.

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.

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.

5.2 Inspection

Check the power cable 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 cable could cause electrical shock hazards. Discontinue using the power cable immediately.

For purchasing accessories, please contact your Kikusui agent.

5.3 Calibration

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

For calibration, please contact your Kikusui 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 your Kikusui agent.

Measurement Principle

The KJM6755 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	$1M\Omega(18pF\pm3pF)$, 50Ω
Maximum input voltage	4Vpk(DC+AC)

Measurement

Measurement range	0 to 20%
Specification assurance 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	$\pm5\%$ of full scale of the meter
Time constant for conversion into rms value	100ms, 300ms, 1s, 3s

Indicating . . . .

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

Trigger . . . .

Symmetry follow-up		AUTO, AUTO+OFFSET, MANUAL
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 SIGNAL MONITOR output	Outputs amplitude about 1/5 of input amplitude, approx. 50 Ω
CLOCK MONITOR output	Outputs amplitude about 1/5 of input amplitude, approx. 50 Ω
DC OUT	Outputs a measured jitter value. Approx. 600 Ω 0.2 V/%, accuracy of ±0.15V
JITTER OUT	Outputs an instantaneous jitter value. About 600 Ω, 20 mV/%
JUDGE OUT	Outputs GO/NO GO judgment result. TTL level High: GO, Low: NO GO

Others

Warm-up time	Approx. 30 minutes
Storage temperature and humidity range	Temperature: -20 to 70℃ Humidity: 90% or less R.H. (no condensation)
Operating remperature and humidity ranges	Temperature:0 to 40℃ Humidity: 20 to 85% R.H. (no condensation)
Guaranteed temperature and humidity ranges	Temperature:15 to 35℃ 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
Dimensions (mm)	Approx. 200(W) x 140(H) x 270(D) Maximum: approx. 210(W) x 170(H) x 310(D)
Weight	Approx. 5 kg
Battery backup	Setup data is backed up.

Accessories			Code	Quantity			
				▼ Mark	Line Voltage	▼ Mark	Line Voltage
				100	90V-110V	220	194V-236V
				120	104V-126V	240	207V-250V
	Power cable		85-10-0171	1			
			85-10-0141			1	
	Fuse	T 1.0A 250V		1		2	
		T 0.5A 250V		2		1	
	Operation Manual		Z1-001-832	1		1	

Specifications of equalizer circuit (optional)

Equalizer circuit in KJM6755 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 KJM6755 is described 5MHz as 5.16MHz and 10MHz as 10.3MHz.

Complies with DVD Specifications for Read-Only Disk 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)

Specifications of PLL clock-regeneration circuit (optional)

Frequency response characteristics based on the DVD book is mentioned by open-loop characteristics. However, frequency response characteristics of the KJM6755 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 Disk 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％以下
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)

specifications of GPIB interface (optional)

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.

External dimensions

[Unit: mm]

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SYMBOL

A

C

D

E

F

G

I

KJM 6755