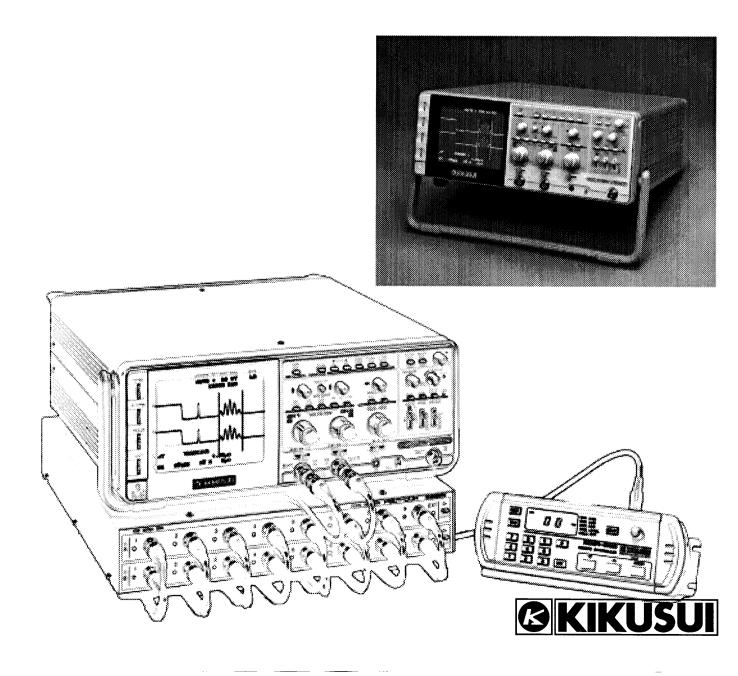


PROGRAMMABLE OSCILLOSCOPE

COR5540R

Operation Manual



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.

Reproduction and reprinting of this product as well as this operation manual, whole or partially, without our permission is prohibited. Both unit specifications and manual contents are subject to change without notice.

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⚠ 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.



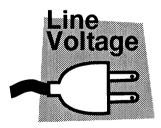
Users

- 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.



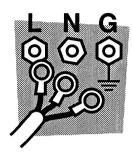
Fuse

• 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.



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 "Conditions at the Installation Location" 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.



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.

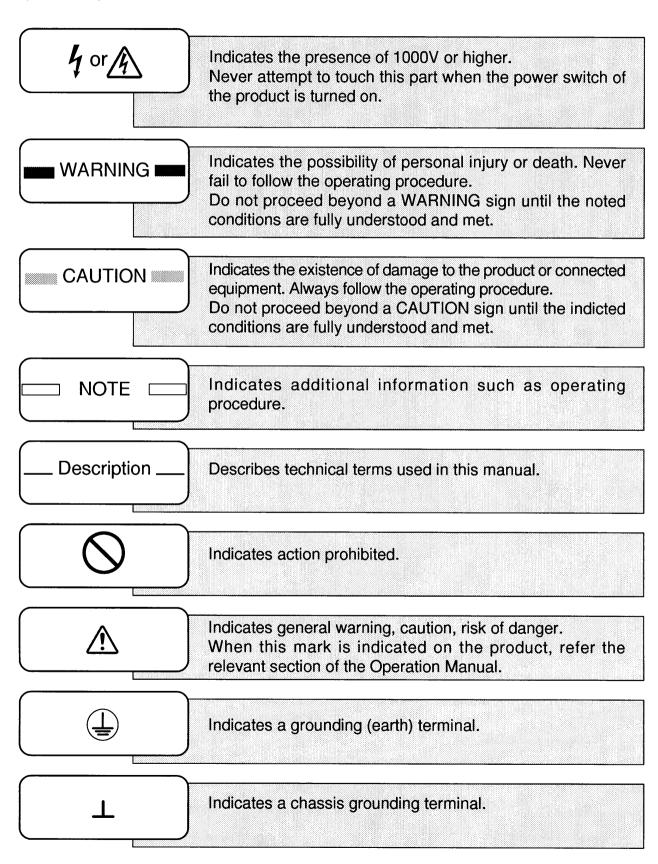


Service

• 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.)



Operation Manual Contents

The manual contains the following:

♦ ! Precautions for use

Symbols indicating caution to prevent fire, electric shock or failure. Read thoroughly before use.

♦Safety symbols

Describes symbols used to indicate special safety measures. Read thoroughly before use.

◆Introduction

Gives overview of product features.

♦ Chapter 1: Setup

Basics, from unpacking and installation to operation.

♦ Chapter 2: Before taking measurements

Simple tuning before wave form observation for accurate measurements.

◆Chapter 3: Basic operations

Describes basic operations.

◆Chapter 4: GPIB control

Describes GPIB control.

♦Chapter 5: Descriptions and functions

Introduces descriptions and functions of switches, displays, connectors, etc. on front and rear panels.

◆Chapter 6: Maintenance and calibration

Describes maintenance and calibration.

♦ Chapter 7: Specifications

Gives electrical and mechanical specifications.

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Preface

Outline

The COR5540R 40MHz Oscilloscope with magnified sweep was developed using Kikusui's advanced electronics technology and extensive experience in manufacturing measurement instruments.

The COR5540R is a fully programmable oscilloscope, capable of automated use with the optional probe selector, remote control or GPIB control.

Features

Excellent operability

Direct knob control of major function settings.

■ Compact and lightweight

High performance, advanced functions and low weight, made possible through extensive use of surface mounted parts.

Display readout

Display readout provides a wide range of information to support accurate and rapid measurement.

■ 100 setup memories

Built-in setup memory can store up to 100 panel settings, which can be recalled immediately by a setup switch on the panel or an optional remote control.

■ Comment display

Comments can be added to each of the 100 setup memories. By storing memo or point for measurement in the memory, measurement efficiency can be improved.

■ Alternate Mag. Sweep

Any desired wave form can be immediately magnified. Magnification ratios are x10 and x20. An alternate Mag. Sweep in which main sweep and mag. sweep alternate is also available.

■ Standard equipment for GPIB

Automatic computer setting is available. Operation is easily synchronized with products from other manufacturers. Setup memory contents can be saved to floppy disks.

■ Marker cursor

In addition to a conventional measure cursor, a marker cursor indicating only positional information is available.

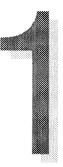
Up to four cursors can be displayed at once to facilitate GO/NOGO judgment.

■ Remote control

An optional remote control (RC01-COR) is available to improve line production efficiency.

■ Probe selector to deal with multiple input

Up to four probe selector units (PS01-COR) can be connected to increase input to a maximum of 64 channels.





Chapter 1: Setup

This chapter covers basics, from unpacking and installation to operation.

1.1	Unpacking and packing	1-2
1.2	Precautions for installation	1-4
1.3	Fuse check	1-5
1.4	Operation of handle / stand	1-6

1.1 Unpacking and packing

Unpacking

Check package for damage incurred during transportation. Check that no parts are missing. In case of damage or missing parts, please contact your Kikusui agent.

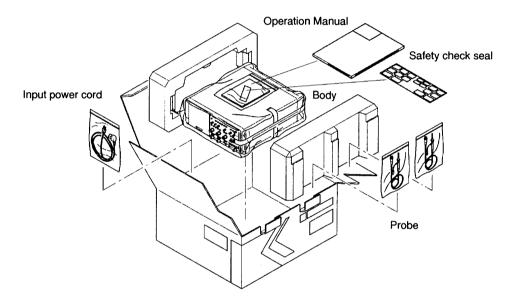


Fig 1-1: Unpacking / packing

Accessory						
	Description Quantity Chec					
1	Input power cord	1				
2	Probe	2				
3	Operation Manual	1				
4	Safety check seal	1				

Packing

NOTE	

- Use proprietary packing when transporting product.
- If package is needed, please contact your Kikusui agent.
- Disconnect input power cord, connection cables, etc. from body when packing.

Packing should be done by two or more persons. 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 in flammable atmosphere.

To avoid risk of explosion or fire, do not use near alcohol, thinner or other combustibles, or near combustible vapors.

Avoid high temperatures and exposure to direct sunlight.

Do not place near heating elements or heaters, or in areas subject to rapid temperature changes.

Operating temperature range: 0 to 50℃

Optimum (specification guaranteed) temperature range: 10 to 40°C

Storage temperature range: -40 to 75℃

Avoid high humidity.

Do not place in area with high humidity (e.g., near water heaters, humidifiers, water faucets, etc.).

Operating humidity range:

95%RH or less (10 to 30 $^{\circ}$ C), 75%RH or less (31 to

 40° C), 45%RH or less (41 to 50°C)

Storage humidity range:

95%RH or less (0 to 50°C), 45%RH or less (-40 to 0

 \mathbb{C} , 50 to 75 \mathbb{C})

If condensation occurs within the operating humidity range, do not use until condensation has evaporated.

Avoid placing in corrosive atmosphere.

Avoid installing in a corrosive atmosphere, or in an environment with sulfuric acid mist. Doing so may lead to conductor corrosion or unreliable connector contacts, malfunction, failure, or fire.

- **■** Keep in relatively dust-free environment.
- Use only in areas with adequate ventilation.

Secure sufficient space to allow movement of air for cooling at sides, rear and bottom.

- Place on flat, vibration-free surface.
- Keep away from strong magnetic or electric fields.

1.3 Fuse check

WARNING .

 To avoid electric shock, always unplug power cord, or turn OFF switch on switchboard before examining or replacing fuse.

CAUTION

- Make sure fuses are of proper shape, rating and characteristics for product. Use of improper fuse or fuse holder can lead to damage.
- 1. Turn OFF [POWER] switch and unplug power cord.
- 2. Remove fuse holder as shown in Fig. 1-2.

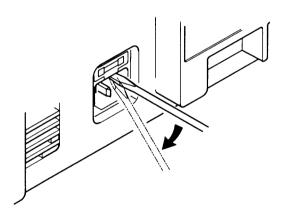


Fig. 1-2: Removing fuse holder

3. Check rating and blowing characteristics of mounted fuse. Replace if fuse is blown, or has incorrect ratings.

Fuse

Rating: 250V 2.0A

Blowing characteristic: Slow blow (T)

Dimension: 20 x 5 (mm)

1.4 Operation of handle / stand

The portable handle also serves as a height-adjustment stand during installation.

CAUTION

- · Check locking procedure before using as a stand.
- The handle should be manipulated with the instrument standing upright. Place product on a flat surface and take care not to overturn.

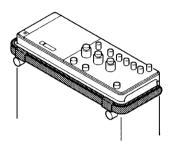
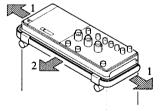


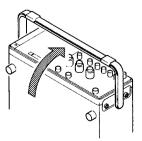
Fig. 1-3: Handle

1) When carrying:

- 1. Turn handle forward and position instrument as shown in Fig. 1-3.
- 2. While pulling bases of the handle outward with both hands, pull handle forward so that the bases come to the center.

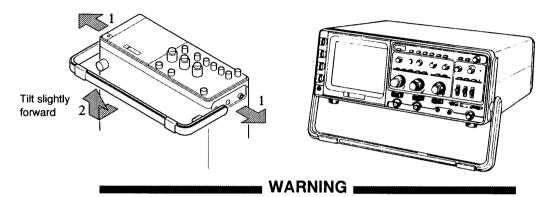


3. With the bases of the handle at the center, raise handle over the panel. Turn handle until it locks securely.



2) When used as a stand:

- 1. Turn handle forward and position instrument as shown in Fig. 1-3.
- 2. Pull bases of the handle outward with both hands, and pull handle forward until the bases are locked at the front. Then, tilt slightly toward panel.

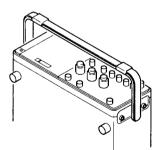


 If the instrument is installed while unlocked, the handle may suddenly return to its original position, causing the body to fall and possibly leading to injury.

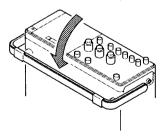
3) How to store:

■ Storage from carrying position:

1. Position instrument with panel facing forward.



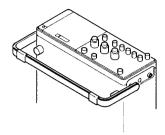
2. Gently turn handle forward.



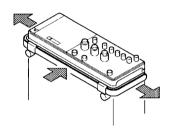
3. While pulling bases of handle outward, gently push handle until it locks. The handle is now in storage position.

■ Storage from standing position:

1. Position instrument with handle facing forward.



2. While pulling bases of handle outward, gently push handle until it locks. The handle is now in storage position.







Chapter 2. Before taking measurements

This chapter describes simple adjustments before waveform observation for high-accuracy measurement.

2.1	Power on	. 2-2
2.2	Display adjustment	. 2-2
2.3	Trace rotation	. 2-3
2.4	Change of scale factor	. 2-4
2.5	Probe compensation	. 2-4
2.6	Maximum allowable input voltage	. 2-6

2.1 Power on

- 1. Check that [POWER] switch is set to OFF.
- 2. Connect accessory power cord to AC LINE on rear panel.
- 3. Connect plug to prescribed power line.
- 4. Turn ON [POWER] switch. The screen will display in approximately twenty seconds.

NOTE	
------	--

 The allowable input voltage range is 90 to 250VAC (45 to 440Hz), but rated voltage to the range 100 to 240VAC (50 to 400Hz) whenever possible.

2.2 Display adjustment

Brightness of trace or spot:

Adjust with [INTEN]. Turning up increases brightness.

Brightness of characters or cursor on CRT readout:

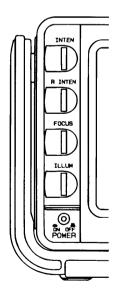
Adjust with [R INTEN]. Turning up increases brightness.

Clarity of trace, characters or cursor on screen:

Adjust with [FOCUS].

Brightness of lighting for internal graticule on screen:

Adjust with [ILLUM]. Turning up increases brightness.



2.3 Trace rotation

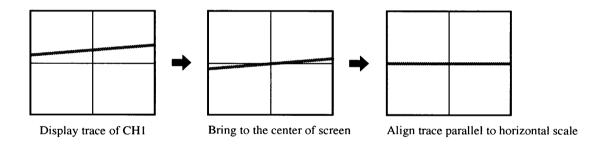
Adjusting to set trace parallel to horizontal scale.

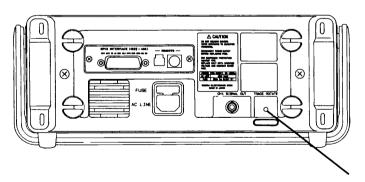
	NICT	_	
	NOT	-	
L 1		_	

 Proper positioning of trace to horizontal scale may be affected by terrestrial magnetism. After a change in direction after transportation, always recheck trace's relative alignment.

Adjustment of trace rotation

- 1. Choose GND for input coupling of CH1 to display trace.
- 2. Check that the trace parallels the horizontal scale. If adjustment is necessary, follow procedures given below:
- 3. Adjust vertical and horizontal position knobs to center trace in the screen.
- 4. Adjust TRACE ROTATE knob on the rear panel until line parallels horizontal scale.

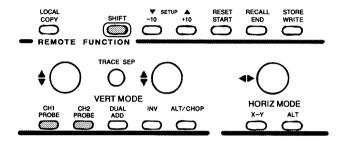




TRACE ROTATE knob

2.4 Change of scale factor

When using a probe, change the scale factor according to the probe.



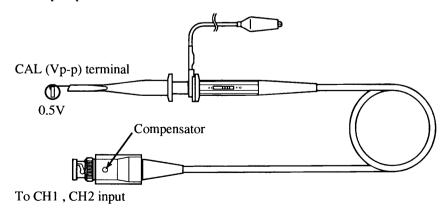
While holding down [SHIFT] switch on REMOTE FUNCTION, press [CH1/PROBE] or [CH2/PROBE] switch to cycle scale factor through P x 10 \rightarrow P x 100 \rightarrow OFF settings.

"P x 10" or "P x 100" will be displayed over range indication on screen, as will the value multiplied by 10 or 100.

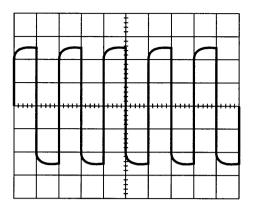
2.5 Probe compensation

Do not start measurement without phase compensation of probe.

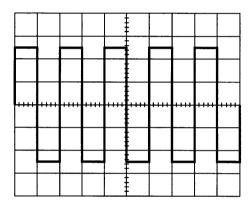
- 1. Connect probe to input terminal of CH1 or CH2.
- 2. When using a probe switchable to 1:1 or 10:1, set probe at 10:1 and scale factor to x10.
- 3. Set VOLTS/DIV at 10mV.
- 4. Connect tip of probe to CAL terminal.



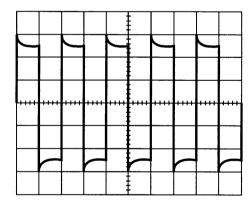
5. Adjust compensator until optimal waveform is obtained. See Fig. 2-1.



Under compensated



Proper compensation



Over compensated

Fig. 2-1: Probe compensation

2.6 Maximum allowable input voltage

The maximum allowable input voltage is specified for channel input terminals (CH1, CH2), Z-axis input terminal and probe. Use a voltage lower than the maximum specified.

Maximum allowable input voltage for channel input terminals

400Vpeak (DC + AC peak), but repetition frequency of 1kHz or less for AC

Maximum allowable input voltage for Z-axis input terminal

100Vpeak (DC + AC peak), but repetition frequency of 1kHz or less for AC

Maximum allowable input voltage for probe

600Vpeak (DC + AC peak), but repetition frequency of 1kHz or less for AC

WARNING

- If a voltage exceeding the maximum allowable input voltage is applied, electric shock or damage to the COR5540R or probe may result.
- The maximum allowable input voltage for probe is 600V peak, but when used at the attenuation ratio of 1:1, it is limited to the maximum allowable input voltage of input terminals.



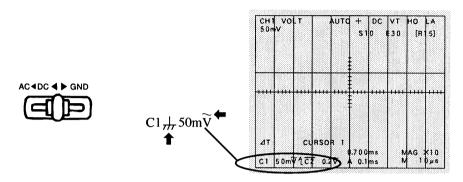
Chapter 3: Basic operation

This chapter describes basic operations.

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3.1.1 Vertical axis (CH1, CH2)

1) Selection of input coupling



Place above switch to the AC/DC side to cycle settings through AC \rightarrow DC \rightarrow AC. Setting state displays as " \sim " for AC or "-" for DC over "V" of scale factor.

Set switch to GND to execute GND. GND indicator will be displayed at scale factor. To cancel GND, reposition switch to AC/DC.

AC

Input signal becomes AC coupling connected to vertical amplifier through capacitor. DC component in the input signal is eliminated. The AC coupling lower limit frequency (-3dB attenuation point) is 10Hz.

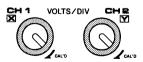
DC

Input signal becomes serial coupling into vertical amplifier, and all frequency components in input signal are coupled to the vertical amplifier.

GND

Input of the vertical amplifier is grounded, and input terminal opens.

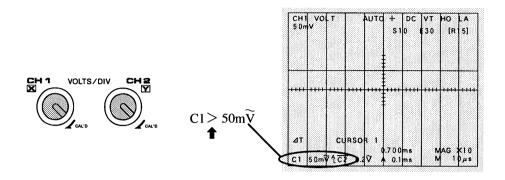
2) Setting input range



Vertical-axis sensitivity of CH1 and CH2 can be switched in twelve ranges from 2mV/DIV to 10V/DIV by 1-2-5 sequence. Turning clockwise increases sensitivity.

You can turn knobs freely in either direction, but setting will not exceed the extreme value of 2mV/DIV or 10V/DIV. If the extreme settings are reached, "Volts/Div Limit" will display for about two seconds to indicate limit of sensitivity setting.

3) Setting input range continuously



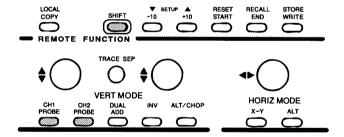
Vertical-axis sensitivity is continuously changed.

When the VARIABLE knob is turned clockwise to the extreme position (calibration position, CAL'D), the sensitivity set at VOLTS/DIV is calibrated.

Turning knob counterclockwise from the CAL'D position brings the state into UNCAL. Sensitivity by VOLTS/DIV can be set at a value of 1/2.5 or less. In this way, sensitivity can be continuously varied between the sensitivities set by VOLTS/DIV.

When this knob is set to other than the CAL'D position, the symbol, ">" is added to the scale factor on display.

4) Change of scale factor



While holding down [SHIFT] switch on REMOTE FUNCTION, press [CH1/PROBE] or [CH2/PROBE] switch to cycle scale factor through P x 10 \rightarrow P x 100 \rightarrow OFF settings.

"P x 10" or "P x 100" will be displayed over the range indication on screen, as will the value multiplied by 10 or 100.

5) Vertical position



Vertical position of trace or spot of CH1 or CH2 is set.

Turn clockwise to move up on the screen, and turn counterclockwise to move down.

When CH2 is inverted:

CH2 reverses usual motion.

When X-Y operation has been chosen:

Set horizontal position using the vertical POSITION knob of CH1, and set vertical position using the vertical POSITION knob of CH2.

6) Trace separation

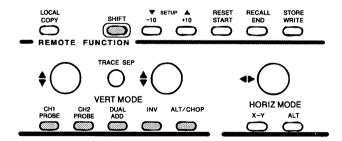


Sets vertical position at alternate magnified sweep, alternating sweep and magnified sweep. Turning clockwise moves trace of magnified sweep up.

Capable of setting about ±4DIV against main sweep.

For magnified sweep, refer to 3.2.1 "4) Setting magnified sweep", 3-7 p.

7) Selection of display channel



■ Single channel display

Selection of CH1

Press [CH1] Switch to choose CH1. Scale factor (C1 and vertical-axis range) is displayed.

Selection of CH2

Press [CH2] switch to choose CH2. Scale factor (C2 and vertical-axis range) is displayed.

CH2 invert

Press [INV] switch to invert CH2. To cancel invert, press the [INV] switch once again.

When CH2 is inverted, "-" is displayed over scale factor of CH2.

ADD display

While holding down [SHIFT] switch on REMOTE FUNCTION, press [DUAL/ADD] switch; ADD display appears.

Readout shows "+" between scale factors of CH1 and CH2.

2-channel display

To display CH1 and CH2 simultaneously, press [DUAL] switch.

CH1 and CH2 are selected, and scale factors of both channels are displayed.

Switching of ALT/CHOP

Pressing of [ALT/CHOP] switch cycles state through ALT \rightarrow CHOP \rightarrow ALT... Readout shows AL \rightarrow CP \rightarrow AL ... between scale factors of CH1 and CH2.

• Alternate mode (ALT)

Display channel is switched each time a sweep is completed. Used for observation at fast sweep rate.

• Chop mode (CHOP)

Waveforms of both channels are alternately displayed at a chop rate of about 500 kHz. Used for observation at slow (slower than 1ms/DIV) sweep rate or signal with flicker and low repetition rate.

3.1.2 Horizontal axis

1) Setting horizontal range



Selection can be made in 21 increments from 0.1 µs to 0.5 s, by 1-2-5 sequence.

Turning clockwise accelerates sweep time. You can turn the knob freely in either direction, but setting will not exceed the extreme value of 0.1 µs or 0.5 s. If the extreme settings are reached, "Time/Div Limit" will display for about two seconds to indicate that the sweep time has reached its limit.

2) Setting horizontal range continuously

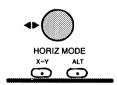


Sweep time is continuously changed.

When the knob is turned clockwise to its limit (calibrated position, CAL'D), the calibrated sweep time can be obtained. Turning the knob counterclockwise from the CAL'D position brings the state into UNCAL; a sweep time can be set that is slower than the setting by TIME/DIV by a factor of more than 2.5.

In this way, the sweep time can be varied continuously between times set by TIME/DIV. When this knob is set to other than the CAL'D position, the symbol, ">" is added to the scale factor of the readout.

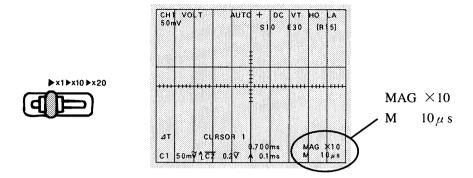
3) Setting horizontal position



Sets horizontal position of trace. Turning clockwise moves the trace to the right.

For magnified sweep, turning either to the right or left to the limit initiates continuous movement. To stop the moving trace, turn knob in opposite direction.

4) Setting magnified sweep



This switch sets magnification ratio to magnify display horizontally. Magnification ratios can be chosen from x1, x10 or x20. Place the MAG switch to the right to cycle magnification ratio through x10 \rightarrow x20 \rightarrow OFF \rightarrow x10 settings. When set at x10 or greater, magnification ratio and magnified sweep time are displayed in the lower right of screen.

Magnification is always made using the screen center as a reference.

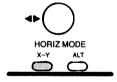
5) Setting alternate mag.



Pressing [ALT] switch when magnified sweep (MAG switch) is set at x10 or x20 starts alternate magnified sweep (alternate mag. Operation), alternating main sweep and magnified sweep.

Press [ALT] switch again to cancel operation.

6) X-Y display



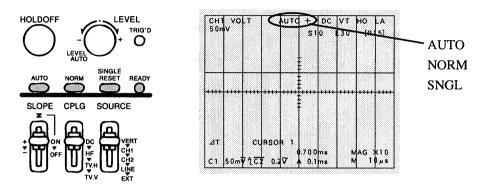
X-Y operation with CH1 as X-axis and CH2 as Y-axis.

Press [X-Y] switch, and X-Y display appears. "X-Y" is displayed at the horizontal range on screen.

Press [X-Y] switch again to cancel operation.

3.1.3 Trigger

1) Setting trigger mode and SINGLE RESET



A trigger mode is chosen from [AUTO], [NORM], or [SINGLE] by pressing switch.

AUTO

When there is no trigger signal, sweep is repeated automatically in a specified cycle.

When a trigger signal is applied, sweep is automatically changed to trigger sweep.

"AUTO" appears on screen.

NORM

Used for observation of a signal with slow repetition at 50Hz or less, or for rare phenomena. "NORM" appears on screen.

SINGLE

Used when amplitude or cycle is so unstable that display cannot be controlled, or if a single phenomenon is to be observed.

When SINGLE is set, the state is changed to sweep standby, and READY LED is lit with "SNGL" displayed on screen.

At trigger signal, a sweep is carried out only once, and READY LED goes out at the same time when sweep is started. When [SINGLE/RESET] switch is pressed after completion of sweep, READY LED is lit, and the state is changed to standby.

2) Setting slope



Selects synchronous polarity (slope) of trigger point.

Depress [SLOPE] switch to cycle setting between + and -. The state displays as "+" or "-" to the right of trigger mode.

• +

Synchronization occurs when trigger signal crosses trigger level from negative to positive (rise of signal).

• -

Synchronization occurs when trigger signal crosses trigger level from positive to negative (fall of signal).

3) Setting coupling

CPLG



Selects a coupling method of trigger signal source and trigger circuit.

Depress [CPLG] switch to cycle settings through DC \rightarrow HF \rightarrow TV.H \rightarrow TV.V \rightarrow DC... Setting state displays as "DC", "HF", "TVH" or "TVV."

• DC

DC coupling in which all frequency components of the trigger signal are coupled to the trigger circuit.

• HF (High-frequency Reject)

DC coupling and high-frequency component of 50kHz or more is attenuated. This coupling method is suitable for observation of low-frequency signals containing a high-frequency component, as high-frequency components in the trigger signal are reduced.

· TV.H

A synchronous separation circuit for separating synchronizing signal from TV video signal is connected to trigger circuit, and horizontal synchronizing signal is used as trigger signal source.

· TV.V

A synchronous separation circuit for separating synchronizing signal from TV video signal is connected to trigger circuit, and vertical synchronizing signal is used as trigger signal source.

4) Setting trigger source

SOURCE



Selects trigger signal source to be connected to trigger circuit.

Depress [SOURCE] switch to cycle through the settings VERT \rightarrow CH1 \rightarrow CH2 \rightarrow LINE \rightarrow EXT \rightarrow VERT... Setting state displays as "VT", "C1", "C2", "LN" or "EXT."

• VERT

VERT indicates VERT MODE TRIG, and input signal of the channel selected in the VERT MODE is the trigger signal source.

However, input signal of CH1 becomes trigger signal source in the following cases:

- 1. When DUAL operation has been chosen;
- 2. When ADD operation has been chosen.

• CH1

Input signal of channel 1 becomes trigger signal source for CH1.

• CH2

Input signal of channel 2 becomes trigger signal source for CH2.

LINE

AC input power source of COR5540R becomes trigger signal source for LINE.

• EXT

Signal connected to the EXT input terminal becomes trigger signal source for EXT.

5) Trigger level



Sets trigger level and adjusts starting point to draw observed waveform.

When turned counterclockwise to the limit, "LA" appears on the upper right of screen, indicating LEVEL AUTO. The LEVEL AUTO automatically sets trigger level at an optimal value.

6) Hold-off



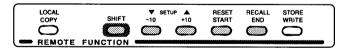
Adjusts sweep pause time (hold-off time) from completion of sweep to start of subsequent sweep.

When turned counterclockwise to furthest setting, "HO" on the upper right of screen disappears, and the hold-off time becomes the minimum.

Used for observation of a complex signal when synchronization cannot be effected by adjusting trigger level alone.

3.1.4 Setup memory

1) Operation of recall mode



■ Recall of optional address by 1 step

- 1. Press [RECALL] switch (to go to recall mode).
- 2. The previous address "RXX" is displayed, and that address setting is recalled.
- 3. Press [▼] or [▲] switch to change address by one step and recall that address setting.

Recall of optional address by 10 steps

- 1. Press the [RECALL] switch (to go to recall mode).
- 2. The previous address "RXX" is displayed, and that address setting is recalled.

3. While holding down [SHIFT] switch, press [▼/-10] or [▲/+10] switch to change address by ten steps and recall that address setting. (Afterwards, press only [▼] or [▲] switch to recall address by one step).

■ Turning off of recall mode

1. Press [RECALL] switch again to cancel the recall mode. The recalled address will remain unchanged.

Setting start and end addresses

Sets range of address at recall.

- 1. While holding down [SHIFT] switch, press [RESET/START] switch.
- 2. The previous start address is displayed as "[SXX]EXX."
- 3. Use $[\nabla]$ or $[\triangle]$, or $[SHIFT] + [\nabla /-10]$ or $[\triangle /+10]$ to set start address.
- 4. While holding down [SHIFT] switch, press [RECALL/END] switch.
- 5. The previous end address is displayed as "[SXX]EXX."
- 6. Use $[\nabla]$ or $[\triangle]$, or $[SHIFT] + [\nabla /-10]$ or $[\triangle /+10]$ to set end address.

Setting example:

Start address is set at 10 and end address at 20.

[SHIFT] + [RESET/START] → Setting at address 10, → [SHIFT] + [RECALL/END] → setting end address at 20

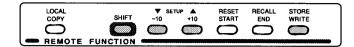
The above procedure sets the loop range of step operation at recall from 10 to 20. Continuing to press the [▲] switch will repeat 11 addresses from 10, 11, 12...20 and 10...

Press [RESET] switch to return to start address.



· A value smaller than start address cannot be set for end address.

2) Operation of store mode



■ Writing of optional address by one step

- 1. Press [STORE] switch (to go to store mode).
- 2. The previous address is displayed as "SXX."
- 3. Press [▼] or [▲] switch, and address is changed by one step (setting is not recalled).
- 4. Set panel.
- 5. While holding down [SHIFT] switch, press [STORE/WRITE] switch. The setting in 4. is stored in the setup memory of the address chosen in 3, and the address is incremented +1.

Writing of optional address by ten steps

- 1. Press [STORE] switch (to go to the store mode).
- 2. The previous address is displayed as "SXX."
- Press [▼/-10] or [▲/+10] switch while holding down [SHIFT] switch. The address is changed by ten steps (setting is not recalled).
 (Afterwards, press [▼] or [▲] switch to recall address by one step).
- 4. Set panel.
- 5. While holding down [SHIFT] switch, press [STORE/WRITE] switch. The setting in 4. is stored in the setup memory of the address chosen in 3, and the address is incremented +1.

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¬ INI	,, ,	
 	, ı –	

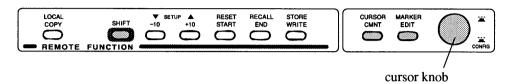
 Addresses in store mode can be stored, unrestricted by the range from start address to end address.

■ Turning off store mode

 Press [STORE] switch again to cancel store mode. The recalled address will remain unchanged.

3.1.5 Comment

1) Operation of comment



■ Turning On / Off comment

- 1. While holding down [SHIFT] switch, press [CURSOR/CMNT] switch. Comment is displayed.
- 2. While holding down [SHIFT] switch, press[CURSOR/CMNT] switch again. Displayed comment disappears.

Editing of comment

To edit comment, press [SHIFT] + [MARKER/EDIT]. Press switch to repeat CMNT <>, CMNT SEL, CMNT ERS, and (EDIT OFF).

Up to 64 characters (64 bytes) can be entered as comment.

Movement of cursor:

- 1. While holding down [SHIFT] switch, press [MARKER/EDIT] switch to go to edit mode, and "CMNT <>" is displayed. (If comment is off, it is automatically turned on.)
- 2. Move the comment cursor "_" on screen using the cursor knob, and determine input position.

Entry of characters

- 1. While holding down [SHIFT] switch, press [MARKER/EDIT] switch to display "CMNT SEL".
- Turn cursor knob to select a character.
 Characters are displayed in clockwise order, as follows:
 (Space) A, B, C... X, Y, Z (Space) a, b, c... x, y, z (Space) +, -, *, /, <, >, %, μ, °, ', ,, ∠
 ,..; (Space) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (Space) A, B, C...
- 3. When a character is chosen, press the cursor knob. The character is entered and the comment cursor moved to the right by one.

Erasing characters

- 1. While holding down [SHIFT] switch, press [MARKER/EDIT] switch to display "CMNT FRS"
- 2. Press the cursor knob. All entered comments are erased.

Exit from edit mode

1. While holding down [SHIFT] switch, press [MARKER/EDIT] to exit from edit mode. (Exits from edit mode, but comment display remains.)

3.1.6 Measure cursor and marker cursor

There are two kinds of cursors: measure cursor and marker cursor.

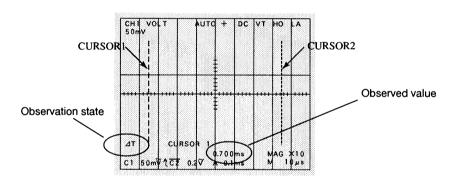
Choose the cursor suitable to the task.

Measure cursor displays measured values on screen for measurement of waveforms.

Marker cursor is for marking and does not display measured values.



1) Operation of measure cursor



- 1. Press [CURSOR] switch to effect sequential switching as $\triangle T \rightarrow 1/\triangle T \rightarrow \triangle V \rightarrow OFF \rightarrow \triangle T...$
- 2. Press cursor knob to effect sequential switching as CURSOR1 → CURSOR2 → TRACKING → CURSOR1...
- 3. Move cursor chosen in 2 using the cursor knob.

2) Operation of marker cursor

- Press [MARKER] switch to effect sequential switching as TIME1 → TIME2 → TIME3
 → TIME4 → VOLT1 → VOLT2 → VOLT3 → VOLT4 → OFF → TIME1...
- 2. When two or more markers are displayed, press cursor knob to switch active marker.
- 3. Move the marker chosen in 2 using the cursor knob.

When two markers are displayed:

Press the cursor knob to effect sequential switching as MARKER1 \rightarrow MARKER2 \rightarrow TRACKING \rightarrow MARKER1...

When three markers are displayed:

Press the cursor knob to effect sequential switching as MARKER1 → MARKER2 → MARKER3 → TRACKING → MARKER1...

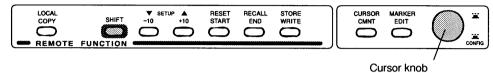
When four markers are displayed:

Press the cursor knob to effect sequential switching as MARKER1 → MARKER2 → MARKER3 → MARKER4 → TRACKING → MARKER1...

* A	ctive marker:	
	MARKER1 →	
	MARKER2 →	
	MARKER3 →	
	MADKEDA	

3.1.7 Configuration mode

Displays GPIB setting, correction of dislocation due to terrestrial magnetism, and the connection state of options.



- 1. While holding down [SHIFT] mode, press cursor knob to go to configuration mode.
- 2. The following configuration menu is displayed:

GPIB : •
OFFSET CAL :
OPTION CHECK :
EXIT :

- 3. Move menu cursor ◀ by turning the cursor knob.
- 4. To select, press cursor knob at the desired position in the menu.

GPIB

Sets GPIB.

Turn cursor knob to move menu cursor to GPIB position and press cursor knob. The following menu appears:

Move menu cursor ◀ by turning the cursor knob. However, pressing at EXIT returns menu to configuration menu.

MODE : NORM

DELIMITER : CR + LF

ADDRESS : 02

EXIT :

■ Setting MODE

Place move menu cursor \P to MODE position and turn cursor knob to cycle display through $T_ONLY \to L_ONLY \to NORM \to T_ONLY...$

NORM : Normal communication mode (address mode)

T_ONLY : Talk-only mode L_ONLY : Listen-only mode

Press cursor knob to execute.

■ Setting DELIMITER

Place menu cursor \blacktriangleleft at DELIMITER position and turn cursor knob to cycle through CR + EOI \rightarrow CR + LF + EOI \rightarrow EOI \rightarrow CR + LF \rightarrow CR + EOI...

Press cursor knob to execute.

■ Setting ADDRESS

Place menu cursor ◀ at ADDRESS position and turn cursor knob to set any address from 00 to 30.

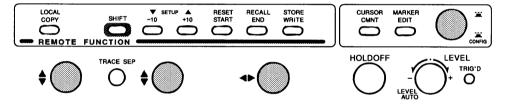
Press cursor knob to execute.

■ To finish GPIB setting

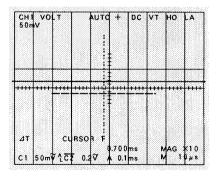
Press cursor knob at EXIT position to finish GPIB setting and return to configuration menu.

2) OFFSET CAL

Corrects dislocation due to terrestrial magnetism.



- Turn cursor knob in the configuration menu and place menu cursor at OFFSET CAL
 position. Press cursor knob to go to calibration mode for offset by terrestrial magnetism at
 each position.
- 2. On display, a vertical cursor, a horizontal cursor and a single trace are displayed, as shown in the following drawing.



- 3. Turn CH1 vertical POSITION, CH2 vertical POSITION and horizontal POSITION knobs to align trace and cursors with the center of screen.
- 4. When positions are set, press cursor knob. The trace disappears, and state returns to configuration mode.

3) OPTION CHECK

Displays connection state of options.

- 1. Turn cursor knob from configuration menu to move menu cursor to OPTION CHECK position; press cursor knob.
- 2. Model name of option connected on screen is shown. Press cursor knob again to finish.

4) To finish configuration mode

Turn cursor knob to move menu cursor to EXIT position and press cursor knob. The configuration menu is done.

3.1.8 ON / OFF of external Z-axis input



While holding down [SHIFT] switch, depress [SLOPE] switch to cycle external Z-axis input signal setting between ON and OFF.

Maximum allowable input voltage for Z-axis input terminal

100Vpeak (DC + AC peak) -- repetition frequency of 1kHz or less for AC.

WARNING _____

• Exceeding maximum allowable input voltage can lead to electric shock and instrument damage.

N	IOI	Έ	
---	-----	---	--

- · Since terminal is used by both the external Z-axis input and EXT trigger, turn off Z-axis input when not being for that purpose.
- If trigger source is EXT, the trigger signal will take precedence even if Z-axis input is ON. In this case the external Z-axis input will not function.

3.1.9 Local switch

Press [LOCAL] switch on occasion of which has been set to remote by external controller, to enable panel switches and set state to local. If the instrument is set to LLO (local lock-out), [LOCAL] switch will not function. In this case, you will see "LOCK OUT" on screen.

3.1.10 Setting copy

Used to copy setting written in setup memory to other COR5540R.

- 1. Turn the COR5540R [POWER] OFF.
- 2. Connect the COR5540R to another COR5540R via GPIB connector.
- 3. Turn [POWER] switches ON for both COR5540R.
- 4. Set GPIB mode to Talk Only for the COR5540R sending data. (See 3.1.7 Configuration mode, 1) GPIB)
- 5. Set GPIB mode to Listen Only for another COR5540R receiving data. (See 3.1.7 Configuration mode, 1) GPIB)
- 6. While holding down [SHIFT] switch, press [LOCAL/COPY] switch of the COR5540R sending data.
- 7. All contents of setup memory are copied to another COR5540R.

3.1.11 Initialization

While holding down [SHIFT] switch on REMOTE FUNCTION, press [SINGLE/RESET] switch to initialize, and set panel as follows:

COUPLING : AC
VERT MODE : DUAL
VOLT/DIV (CH1, CH2) : 0.1V/DIV
TIME/DIV : 0.1ms/DIV
SWEEP MODE : AUTO

LEVEL : LEVEL AUTO

TRIG SOURCE : VERT
TRIG SLOPE : +

CURSOR : \triangle T (0.700ms)

EXT-Z : OFF

MAG : X 1

CH2 INV : OFF

PROBE (CH1, CH2) : X 1

HOLDOFF : MIN

Each variable is set to CAL'D, and hold-off is at minimum value.

3.1.12 REMOTE terminal

Two types of connectors, a DIN connector and modular jack, are available at REMOTE terminal.

DIN connector

Use to connect an optional remote controller or probe selector. Refer to Operation Manual of those for connection method.

Modular jack

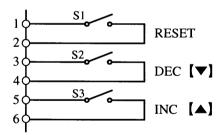
6-pole modular jack, conforming to FCC Standard. The panel can be set by calling the contents of setup memory when a switch is connected. In this case (differing from $[\blacktriangle]$ or $[\blacktriangledown]$ switch on the panel) it automatically goes to recall mode.

1) How to use modular jack

N	No-voltage input terminal		
2	RESET input terminal		
3	DEC input terminal		
5 6	INC input terminal		

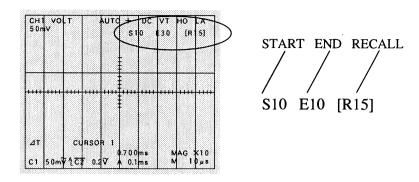


(Seen from rear panel)



S1, S2, S3: Push switch, foot switch, etc. (Normally open type)

- 1. Connect push switches or foot switches (see above) to modular connector, according to table
- 2. Turn instrument [POWER] switch OFF.
- 3. Plug modular connector into jack.
- 4. Turn instrument [POWER] switch ON.
- 5. Turn ON (short) one of the connected RESET, DEC, or INC switches; instrument automatically goes to recall mode, and contents of setup memory are recalled. The following start, end, and recall address appear on screen.



6. Recalling setup memory using these switches repeat range from start address to end address. To modify range, see operation of recall mode in 3.1.4 Setup memory, 1) Operation of Recall mode.



- The ON (short) time of RESET, DEC, or INC switches should be a cycle of 0.3 second or greater, and the OFF (open) time should be a cycle of 0.5 second or greater.
- 7. Pressing one of the S1 to S3 switches results in the following actions:
 - · S1: RESET

Recalls start address.

· S2: DEC

Decrements address by one and recalls contents of that address.

· S3: INC

Increments address by one and recalls contents of that address.





This chapter explains GPIB control.

4.1.1	Outline	4-2
4.1.2	Preparation before use	4-2
4.1.3	GPIB Basic Operations	4-3
4.1.4	Device message	4-5
4.1.5	Status byte register	4-49
4.1.6	Local switch	4-50
417	GPIB connector	4-50

4.1.1 Outline

The GPIB interface of this instrument is controlled by an IEEE488 standard interface bus.

Electric and mechanical specifications conform to IEEE std488.1-1987.

4.1.2 Preparation before use

- 1. Turn [POWER] switch OFF.
- 2. Connect GPIB cable while power switch is OFF.
- 3. Turn [POWER] switch ON.
- 4. Check GPIB address.

While holding down [SHIFT] switch, press cursor knob to access configuration mode and to display the following:

GPIB :
OFFSET CAL :
OPTION CHECK :
EXIT :

Turn cursor knob to move menu cursor to GPIB position and press cursor knob. The following menu will appear.

Move menu cursor ◀ by pressing cursor knob. When pressed at EXIT, it will return state to configuration mode.

MODE : NORM •
DELIMITER : CR + LF
ADDRESS : 02
EXIT :

Setting MODE

Place menu cursor \blacktriangleleft to MODE position and turn cursor knob to cycle display through T_ONLY \rightarrow L_ONLY \rightarrow NORM \rightarrow T_ONLY settings.

NORM : Normal communication mode

T_ONLY : Talk-only mode L_ONLY : Listen-only mode

Press cursor knob to execute.

■Setting terminator (DELIMITER)

Place menu cursor \blacktriangleleft DELIMITER position and turn cursor knob to cycle display through CR + EOI \rightarrow CR + LF + EOI \rightarrow EOI \rightarrow CR + LF \rightarrow CR + EOI... settings.

Press cursor knob to execute.

Setting ADDRESS

Place menu cursor ◀ at ADDRESS position and turn cursor knob to set any address from 00 to 30.

Press cursor knob to execute.

To finish GPIB configuration

Press cursor knob at EXIT position to finish GPIB setting and return to configuration menu.

4.1.3 GPIB Basic Operations

1) Message and terminator

Program message

Communication sent from controller to device is called 'program message'.

Program messages are: command messages, used to send device data; and query messages, used to request response message.

Response message

Communication sent from device to controller is called 'response message'.

Message components

Each message consists of program header and data sections.

■ Terminator (DELIMITER)

· Program message terminator

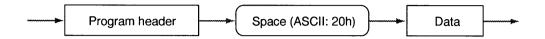
Portion indicating end of program message is called 'program message terminator'.

· Response message terminator

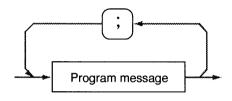
Portion indicating end of response message is called 'response message terminator'.

2) Message

· Space (ASCII: 20h) is required between program header and data sections.



· A program messages is combined with other program messages by a ";" (ASCII: 3Bh).



3) Suffix unit

Item	Unit	Mnemonic
Time	μs	US
	ms	MS
	S	S
Voltage	V	V
	mV	MV

Table 4-1

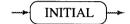
4.1.4 Device message

1) System device message

■ INITIAL (INI)

Initializes instrument setting.

Program message



Proper panel setting follows:

COUPLING : AC
VERT MODE : DUAL
VOLT/DIV (CH1, CH2) : 0.1V/DIV

TIME/DIV : 0.1ms/DIV SWEEP MODE : AUTO

LEVEL : LEVEL AUTO

TRIG SOURCE : VERT

TRIG SLOPE : +

CURSOR : \triangle T (0.700ms)

EXT-Z : OFF

MAG : X 1

CH2 INV : OFF

PROBE (CH1, CH2) : X 1

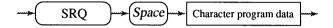
HOLDOFF : MIN

Each variable is set to CAL'D. Hold-off is at minimum value.

■ SRQ

Sets ON / OFF of generation of SRQ.

Program message



Program data

ON / OFF of SRQ	
Data format	Characters
Character program data	ON, OFF

Table 4-2

e.g.: To set SRQ generation to ON

SRQ ON

Response message

SRQ?...Returns current ON / OFF state of SRQ generation.

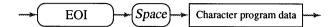
e.g.: When current SRQ generation is ON:

ON is returned.

EOI

Sets program message terminator.

Program message



Program data

Setting program message terminator	
Data format	Characters
Character program data	ONLY, CR, CRLF, CREOI, CRLFEOI

Table 4-3

e.g.: To set program message terminator to CRLF:

EOI CRLF

Response message

EOI?... Returns current state of program message terminator.

e.g.: When current program message terminator is EOI:

ONLY is returned.

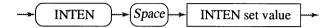
e.g.: When current program message terminator is CRLFEOI:

CR + LF + EOI is returned.

■ INTEN (INT)

Sets brightness of trace or spot.

Program message



Program data

Setting INTEN		
Minimum value	-2048	
Maximum value	2047	
Resolution	1	
Data format	Real numbers	

Table 4-4

e.g.: To set INTEN to 1000:

INTEN 1000

Response message

INTEN?... Returns current state of INTEN.

e.g.: When current INTEN is 500:

500 is returned.

■ MODEL? (MOD?)

Returns instrument model name.

Program message



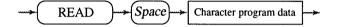
Response message

MODEL?... Returns instrument model name "COR5540R".

READ (REA)

Sets ON / OFF of READ OUT INTEN (Character INTEN).

Program message



Program data

ON / OFF of READ OUT INTEN		
Data format	Characters	
Character program data	ON, OFF	

Table 4-5

e.g.: To set READ OUT INTEN to OFF:

READ OFF

Response message

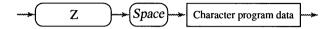
READ?... Returns current ON / OFF state of READ OUT INTEN.

e.g.: When current READ OUT INTEN is ON:

ON is returned.

Sets ON / OFF of external input Z-axis.

Program message



Program data

ON / OFF of external input Z-axis	
Data format	Characters
Character program data	ON, OFF

Table 4-6

e.g.: To set external input Z-axis to OFF:

Z OFF

Response message

Z?... Returns current ON / OFF state of external input Z-axis.

e.g.: When current external input Z-axis is ON:

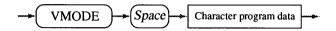
ON is returned.

2) Vertical axis device message

■ VMODE (VMO)

Sets VERT MODE (operation mode of vertical axis).

Program message



Program data

Setting VERT MODE		
Data format	Characters	
Ch	CHANNEL1 (CH1), CHANNEL2 (CH2),	
Character program data	ADD, DUAL	

Table 4-7

e.g.: To set VERT MODE to CH1:

VMODE CH1

Response message

VMODE?... Returns current state of VERT MODE.

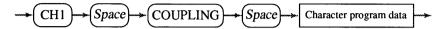
e.g.: When current VERT MODE is DUAL:

DUAL is returned.

■ CHANNEL1 COUPLING (CH1 COU)

Sets input coupling of CH1.

Program message



Program data

Input coupling of CH1	
Data format	Characters
Character program data	AC, DC, GROUND (GRO)

Table 4-8

e.g.: To set CH1 input coupling to DC:

CH1 COU DC

Response message

CH1 COU?... Returns current state of CH1 input coupling.

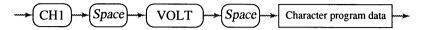
e.g.: When current CH1 input coupling is AC:

AC is returned.

■ CHANNEL1 VOLT (CH1 VOL)

Sets input sensitivity of CH1.

Program message



Program data

Input sensitivity of CH1	
Data format	Characters
Character program data	2MV, 5MV, 10MV, 20MV, 50MV, 0.1V, 0.2V, 0.5V, 1V, 2V, 5V, 10V

Table 4-9

e.g.: To set input sensitivity of CH1 to 0.1V:

CH1 VOL 0.1V

Response message

CH1 VOL?... Returns current state of CH1 input sensitivity.

e.g.: When current CH1 input sensitivity is 10mV:

10MV is returned.

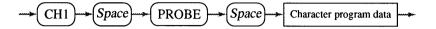
e.g.: When current CH1 input sensitivity is UNCAL:

UNCAL is returned.

■ CHANNEL1 PROBE (CH1 PRO)

Sets scale factor of CH1 probe.

Program message



Program data

	Probe of CH1
Data format	Characters
Character program data	X1, X10, X100

Table 4-10

e.g.: To set scale factor of the probe of CH1 to X10:

CH1 PRO X10

Response message

CH1 PRO?... Returns current state of CH1 probe.

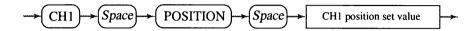
e.g.: When current CH1 probe is X1:

X1 is returned.

■ CH1 POSITION (CH1 POS)

Sets position for CH1.

Program message



Program data

Setting CH1 position	
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer

Table 4-11

e.g.: To set CH1 position to 1000:

CH1 POS 1000

Response message

CH1 POS?... Returns current state of CH1 position.

e.g.: When current CH1 position is 500:

500 is returned.

■ CHANNEL1? (CH1?)

Returns setting state for CH1.

Program message



Response message

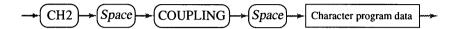
CH1?...Returns setting state in the following order:

[VOLT?] [PROBE?] [COUPLING?] [POSITION?]

■ CHANNEL2 COUPLING (CH2 COU)

Sets input coupling of CH2.

Program message



Program data

	Input coupling of CH2
Data format	Characters
Character program data	AC, DC, GROUND (GRO)

Table 4-12

e.g.: To set CH2 input coupling to DC:

CH2 COU DC

Response message

CH2 COU?... Returns current state of CH2 input coupling.

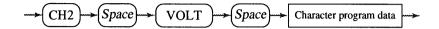
e.g.: When current CH2 input coupling is AC:

AC is returned.

■ CHANNEL2 VOLT (CH2 VOL)

Sets input sensitivity of CH2.

Program message



Program data

	Input sensitivity of CH2
Data format	Characters
Character program data	2MV, 5MV, 10MV, 20MV, 50MV, 0.1V, 0.2V, 0.5V, 1V, 2V, 5V, 10V

Table 4-13

e.g.: To set input sensitivity of CH2 to 0.1V:

CH2 VOL 0.1V

Response message

CH2 VOL?... Returns current state of CH2 input sensitivity.

e.g.: When current CH2 input sensitivity is 10mV:

10MV is returned.

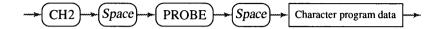
e.g.: When current CH2 input sensitivity is UNCAL:

UNCAL is returned.

■ CHANNEL2 PROBE (CH2 PRO)

Sets scale factor of CH2 probe.

Program message



Program data

	Probe of CH2
Data format	Characters
Character program data	X1, X10, X100

Table 4-14

e.g.: To set scale factor of CH2 probe to X10:

CH2 PRO X10

Response message

CH2 PRO?... Returns current state of CH2 probe.

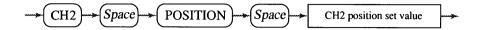
e.g.: When current CH2 probe is X1:

X1 is returned.

■ CH2 POSITION (CH2 POS)

Sets position for CH2.

Program message



Program data

	Setting CH2 position
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer

Table 4-15

e.g.: To set CH2 position to 1000:

CH2 POS 1000

Response message

CH2 POS?... Returns current state of CH2 position.

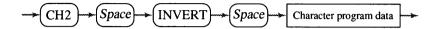
e.g.: When current CH2 position is 500:

500 is returned.

■ CHANNEL2 INVERT (CH2 INV)

Sets ON / OFF of CH2 invert.

Program message



Program data

Setting invert of CH2	
Data format	Characters
Character program data	ON, OFF

Table 4-16

e.g.: To set CH2 invert to ON:

CH2 INV ON

Response message

CH2 INV?... Returns current invert state of CH2.

e.g.: When current CH2 invert is OFF:

OFF is returned.

■ CHANNEL2? (CH2?)

Returns setting state for CH2.

Program message



Response message

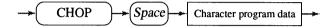
CH2?...Returns setting state in the following order:

[VOLT?] [PROBE?] [COUPLING?] [POSITION?] [INVERT?]

■ CHOP (CHO)

Sets ON / OFF of chop mode.

Program message



Program data

	Setting the chop mode
Data format	Characters
Character program data	ON, OFF

Table 4-17

e.g.: To set chop mode to ON:

CHOP ON

Response message

CHOP?... Returns current ON / OFF state of chop mode.

e.g.: When current chop mode is OFF (when in the alternate mode):

OFF is returned.

3) Horizontal axis device message

■ HORIZONTAL MODE (HOR MOD)

Sets horizontal axis operation mode.

Program message



Program data

Setting HORIZONTAL MODE	
Data format	Characters
Character program data	A, XY

Table 4-18

e.g.: To set horizontal axis operation mode to A:

HOR MOD A

Response message

HOR MOD?... Returns current state of horizontal axis operation mode.

e.g.: When current horizontal axis operation mode is XY:

XY is returned.

■ HORIZONTAL ALTERNATE (HOR ALT)

Sets ON / OFF of horizontal axis alternate magnified sweep.

Program message



Program data

Setting horizontal axis alternate magnified sweep	
Data format	Characters
Character program data	ON, OFF

Table 4-19

e.g.: To set horizontal axis alternate magnified sweep to ON:

HOR ALT ON

Response message

HOR ALT?... Returns current ON / OFF state of horizontal axis alternate magnified sweep.

e.g.: When current horizontal axis alternate magnified sweep is OFF:

OFF is returned.

■ HORIZONTAL MAGNIFY (HOR MAG)

Sets horizontal axis magnification ratio.

Program message



Program data

Setting magnification ratio	
Data format	Characters
Character program data	X1, X10, X20

Table 4-20

e.g.: To set horizontal axis magnification ratio to X1:

HOR MAG X1

Response message

HOR MAG?... Returns current state of horizontal axis magnification ratio.

e.g.: When current horizontal axis magnification ratio is X20:

X20 is returned.

■ HORIZONTAL POSITION (HOR POS)

Sets position of horizontal axis.

Program message



Program data

Setting position of horizontal axis	
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer

Table 4-21

e.g.: To set horizontal axis position to 1000:

HOR POS 1000

Response message

HOR POS?... Returns current position state of horizontal axis.

e.g.: When current horizontal axis position is 500:

■ HORIZONTAL TRACE (HOR TRA)

Sets trace separation.

Program message



Program data

	Setting trace separation
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer

Table 4-22

e.g.: To set trace separation to 1000:

HOR TRA 1000

Response message

HOR TRA?... Returns current state of trace separation.

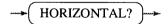
e.g.: When current trace separation is 500:

500 is returned.

■ HORIZONTAL? (HOR?)

Returns setting state for horizontal axis.

Program message



Response message

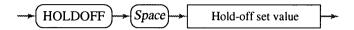
HOR?...Returns setting state in the following order:

[MODE?] [ALTERNATE?] [MAGNIFY?] [POSITION?] [TRACE?]

■ HOLDOFF (HOL)

Sets hold-off.

Program message



Program data

Setting hold-off	
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer

Table 4-23

e.g.: To set hold-off to 1000:

HOL 1000

Response message

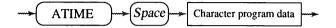
HOL?... Returns current state of hold-off.

e.g.: When current hold-off is 500:

ATIME (ATI)

Sets horizontal range.

Program message



Program data

Setting horizontal range	
Data format	Characters
Character program data	0.1US, 0.2US, 0.5US, 1US, 2US, 5US, 10US, 20US, 50US, 0.1MS, 0.2MS, 0.5MS, 1MS, 2MS, 5MS, 10MS, 20MS, 50MS, 0.1S, 0.2S, 0.5S

Table 4-24

e.g.: To set horizontal range to 0.1ms:

ATIM 0.1MS

Response message

ATIME?... Returns current state of horizontal range.

e.g.: When current horizontal range is 10ms:

10MS is returned.

e.g.: When current horizontal range is UNCAL:

UNCAL is returned.

4) Trigger device message

■ ATRIGGER MODE (ATR MOD)

Sets "A" trigger mode.

Program message



Program data

	Setting "A" trigger mode
Data format	Characters
Character program data	AUTO (AUT), NORMAL (NOR), SINGLE (SIN), RESET (RES)
	SINGLE (SIN), RESET (RES)

Table 4-25

e.g.: To set "A" trigger mode to NORMAL:

ATR MOD NORMAL

Response message

ATR MODE?... Returns current state of "A" trigger mode.

e.g.: When current "A" trigger mode is AUTO:

AUTO is returned.

■ ATRIGGER SOURCE (ATR SOU)

Sets "A" trigger signal source.

Program message



Program data

Setting "A" trigger signal source	
Data format	Characters
Character program data	VERTICAL (VER), CHANNEL1 (CH1), CHANNEL2 (CH2), LINE (LIN),
	EXTERNAL (EXT)

Table 4-26

e.g.: To set "A" trigger signal source to CH1:

ATR SOU CHI

Response message

ATR SOU?... Returns current state of "A" trigger signal source.

e.g.: When current "A" trigger signal source is VERTICAL:

VERTICAL is returned.

■ ATRIGGER COUPLING (ATR COU)

Sets "A" trigger input coupling.

Program message



Program data

Setting "A" trigger input coupling	
Data format	Characters
Character program data	DC, HFREJECT (HER), TVV, TVH

Table 4-27

e.g.: To set "A" trigger input coupling to TVV:

ATR COU TVV

Response message

ATR COU?... Returns current state of "A" trigger input coupling.

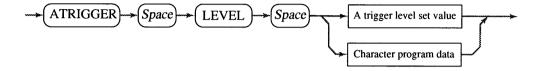
e.g.: When current "A" trigger input coupling is DC:

DC is returned.

■ ATRIGGER LEVEL (ATR LEV)

Sets "A" trigger level.

Program message



Program data

	Setting "A" trigger level
Minimum value	-2048
Maximum value	2047
Resolution	1
Data format	Integer or characters
Character program data	AUTO (AUT)

Table 4-28

e.g.: To set "A" trigger level to 1000:

ATR LEV 1000

Response message

ATR LEV? ... Returns current state of "A" trigger level.

e.g.: When current "A" trigger level is AUTO:

AUTO is returned.

■ ATRIGGER SLOPE (ATR SLO)

Sets "A" trigger slope.

Program message



Program data

	Setting "A" trigger slope
Data format	Characters
Character program data	PLUS (+, PLU), MINUS (-, MIN)

Table 4-29

e.g.: To set "A" trigger slope to MINUS:

ATR SLO MIN

Response message

ATR SLO?... Returns current state of "A" trigger slope.

e.g.: When current "A" trigger slope is PLUS:

PLUS is returned.

ATRIGGER? (ATR?)

Returns setting state for "A" trigger.

Program message



Response message

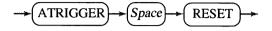
ATR?...Returns setting state in the following order:

[MODE?] [SOURCE?] [COUPLING?] [LEVEL?] [SLOPE?]

■ ATRIGGER RESET (ATR RES)

Same operation as RESET of ATRIGGER MOD.

Program message



e.g.: To reset "A" trigger:

ATR RES

5) Cursor device message

■ CURSOR MODE (CUR MOD)

Sets cursor mode.

Program message



Program data

	Setting cursor mode
Data format	Characters
Character program data	MEASURE(MEA), MARK(MAR)

Table 4-30

e.g.: To set cursor mode to MARK:

CUR MOD MARK

Response message

CUR MOD?... Returns current state of cursor mode.

e.g.: When current cursor mode is MEASURE:

MEASURE is returned.

■ CURSOR MEASURE (CUR MEA)

Sets measure cursor.

Program message



Program data

Setting measure cursor	
Data format	Characters
	OFF, VOLT (VOL), TIME (TIM), PERTIME (PER)

Table 4-31

e.g.: To set measure cursor to VOLT:

CUR MEA VOL

Response message

CUR MEA?... Returns current state of measure cursor.

e.g.: When current measure cursor is TIME:

TIME is returned.

■ CURSOR MARK (CUR MAR)

Sets marker cursor.

Program message



Program data

Setting marker cursor		
Data format	Characters	
Character program data	OFF, VOLT1, VOLT2, VOLT3, VOLT4, TIME1, TIME2, TIME3, TIME4, BOX	

Table 4-32

e.g.: To set marker cursor to TIME1:

CUR MAR TIME1

Response message

CUR MEA?... Returns current state of marker cursor.

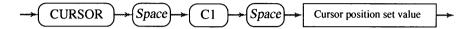
e.g.: When current marker cursor is BOX:

BOX is returned.

■ CURSOR C1 (CUR C1)

Sets position of cursor 1.

Program message



Program data

Setting cursor position	
Minimum value	TIME: 24, VOLT: 224
Maximum value	TIME: 2023, VOLT: 1823
Resolution	1
Data format	Integer

Table 4-33

e.g.: To set position of cursor 1 to 1024:

CUR C1 1024

Response message

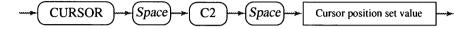
CUR C1?... Returns current position state of cursor 1.

e.g.: When current cursor 1 position is 100:

■ CURSOR C2 (CUR C2)

Sets position of cursor 2.

Program message



Program data

Setting cursor position		
Minimum value	TIME: 24, VOLT: 224	
Maximum value	TIME: 2023, VOLT: 1823	
Resolution	1	
Data format	Integer	

Table 4-34

e.g.: To set position of cursor 2 to 1024:

CUR C2 1024

Response message

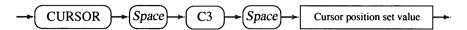
CUR C2?... Returns current position state of cursor 2.

e.g.: When current cursor 2 position is 100:

■ CURSOR C3 (CUR C3)

Sets position of cursor 3.

Program message



Program data

	Setting cursor position
Minimum value	TIME: 24, VOLT: 224
Maximum value	TIME: 2023, VOLT: 1823
Resolution	1
Data format	Integer

Table 4-35

e.g.: To set position of cursor 3 to 1024:

CUR C3 1024

Response message

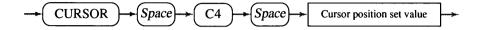
CUR C3?... Returns current position state of cursor 3.

e.g.: When current cursor 3 position is 100:

■ CURSOR C4 (CUR C4)

Sets position of cursor 4.

Program message



Program data

Setting cursor position		
Minimum value	TIME: 24, VOLT: 224	
Maximum value	TIME: 2023, VOLT: 1823	
Resolution	1	
Data format	Integer	

Table 4-36

e.g.: To set position of cursor 4 to 1024:

CUR C4 1024

Response message

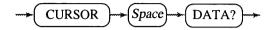
CUR C4?... Returns current position state of cursor 4.

e.g.: When current cursor 4 position is 100:

■ CURSOR DATA? (CUR DAT?)

Returns measured value between cursors.

Program message



■ CURSOR? (CUR?)

Returns setting state for cursor.

Program message



Response message

CURSOR?...Returns setting state in the following order. Display changes according to mode.

[MODE?] [MEASURE?] [C1?] [C2?] [DATA?]

[MODE?] [MARK?] [C1?] [C2?] [C3?] [C4?]

6) Comment device message

■ COMMENT (COM)

Turns comment ON / OFF.

Program message



Program data

Setting ON / OFF of comment		
Data format	Characters	
Character program data	ON, OFF	

Table 4-37

e.g.: To turn ON comment:

COM ON

Response message

COM?... Returns current ON / OFF state of comment.

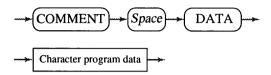
e.g.: When current comment is OFF:

OFF is returned.

■ COMMENT DATA (COM DAT)

Sets comment data. Can be set up to 64 bytes.

Program message



Program data

	Setting comment data
	Characters
Character program data	A, B, C ••• X, Y, Z, a, b, c ••• x, y, z, +, -, *, /, <, >,,%, μ, °, ', Δ, ., :, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Table 4-38

e.g.: To enter comment data as KIKUSUI COR5540R:

COM DAT

KIKUSUI COR5540R

Send a program message terminator in COMMENT DATA, then send character program data.

When data string is smaller than 64 bytes, dummy spaces will fill remaining spaces. Any portion exceeding 64 bytes will be ignored.

Response message

COM DAT?... Returns current comment data.

e.g.: When current comment data is PROGRAMMABLE OSCILLOSCOPE:

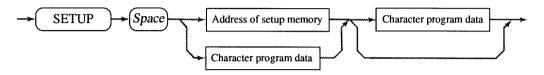
PROGRAMMABLE OSCILLOSCOPE is returned.

7) Setup memory device message

SETUP (SET)

Recalls setup memory. Also executable by STEP (STE).

Program message



Program data

Recall of setup memory		
Minimum value	0	
Maximum value	99	
Resolution	1	
Data format	Integer or characters	
Character program data	UP, DOWN (DOW), WRITE (WRI)	

Table 4-39

e.g.: To recall setup memory 10:

SET 10

e.g.: To increment address of setup memory by 1:

SET UP

e.g.: To decrement address of setup memory by 1:

SET DOW

e.g.: To write data in address 10 of setup memory:

SET 10 WRI

e.g.: To increment address of setup memory by 1 and write:

SET UP WRI

e.g.: To decrement address of setup memory by 1 and write:

SET DOW WRI

Response message

SET?... Returns current setup memory address.

e.g.: When STORE address of current setup memory is 20, and RECALL address is 30:

20 30 is returned.

8) Option device message

■ OPTION? (OPT?)

Returns option connecting state:

Program message



Response message

OPTION?.. Any of the following states is returned:

NONE,

PS01-COM,

PS01-COR,

PS01-COR RC01-COR,

PS01-COR X2,

PS01-COR X2 RC01-COR,

PS01-COR X3,

PS01-COR X3 RC01-COR,

PS01-COR X4,

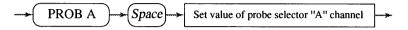
PS01-COR X4 RC01-COR,

RC01-COR

PROB A (PRO A)

Sets "A" channel of probe selector.

Program message



Program data

	Setting probe selector
Minimum value	1
Maximum value	32
Resolution	1
Data format	Integer

Table 4-40

e.g.: To set probe selector "A" channel to 4:

PRO A 4

Response message

PRO A?... Returns current state of probe selector "A" channel.

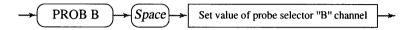
e.g.: When current probe selector "A" channel is 32:

A32 is returned.

■ PROB B (PRO B)

Sets "B" channel of probe selector.

Program message



Program data

Setting probe selector		
Minimum value	1	
Maximum value	32	
Resolution	1	
Data format	Integer	

Table 4-41

e.g.: To set probe selector "B" channel to 4:

PRO B 4

Response message

PRO B?... Returns current state of probe selector "B" channel.

e.g.: When current probe selector "B" channel is 32:

B32 is returned.

■ PROB? (PRO?)

Returns setting state for probe selector.

Program message



Response message

PRO?...Returns setting state as follows:

[PROB A?] [PROB B?]

4.1.5 Status byte register

The instrument can generate SRQ to inform external computers of its status.

When SRQ is generated, bits for status byte are assigned to identify generation factor, and "1" is set in the corresponding bit. The generation factor can be identified by reading status byte from computer.

Structure of status data is shown below.

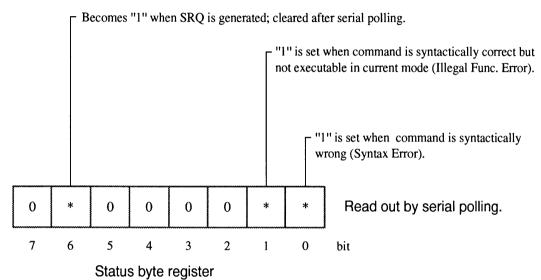


Fig. 4-1: Structure of status data

NOTE _____

- · When powered on, "0" is set for each status byte.
- When status byte is set by error, you must execute DEVICE CLEAR to clear register.

4.1.6 Local switch

The message "REMOTE" is displayed during remote operation.

When instrument has been set to remote by external controller via GPIB, panel switches do not function. To set instrument to local state to enable panel switches, press [LOCAL] switch.

When instrument is set to LLO (Local Lock Out) state, [LOCAL] switch will not work. In this case, "LOCK OUT" is displayed.

To set instrument to local state from LLO state, send GTL (Go To Local) command from host computer.

4.1.7 GPIB connector

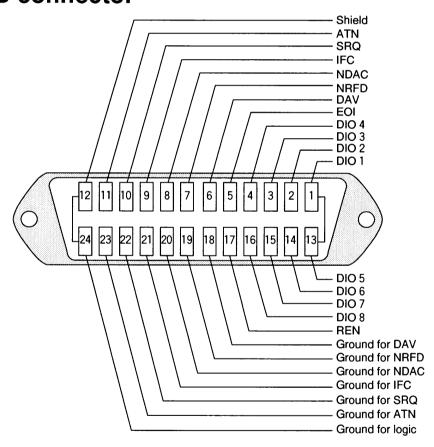


Fig. 4-2: GPIB connector





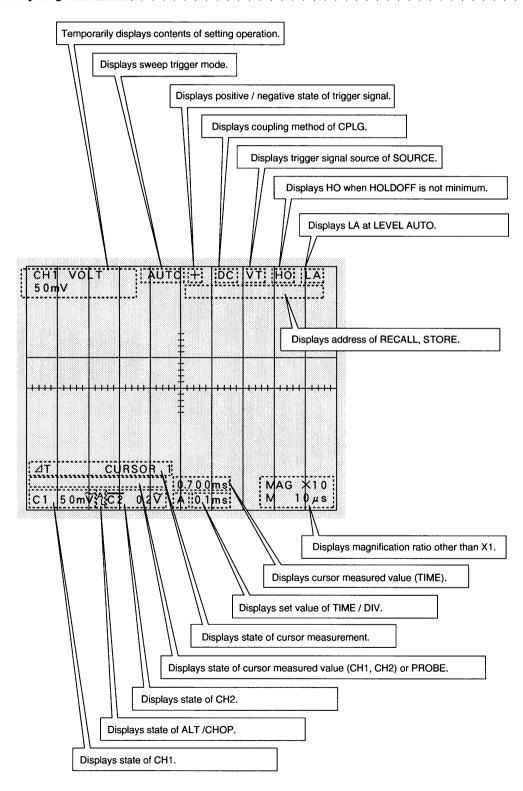
Chapter 5: Names and functions of Controls

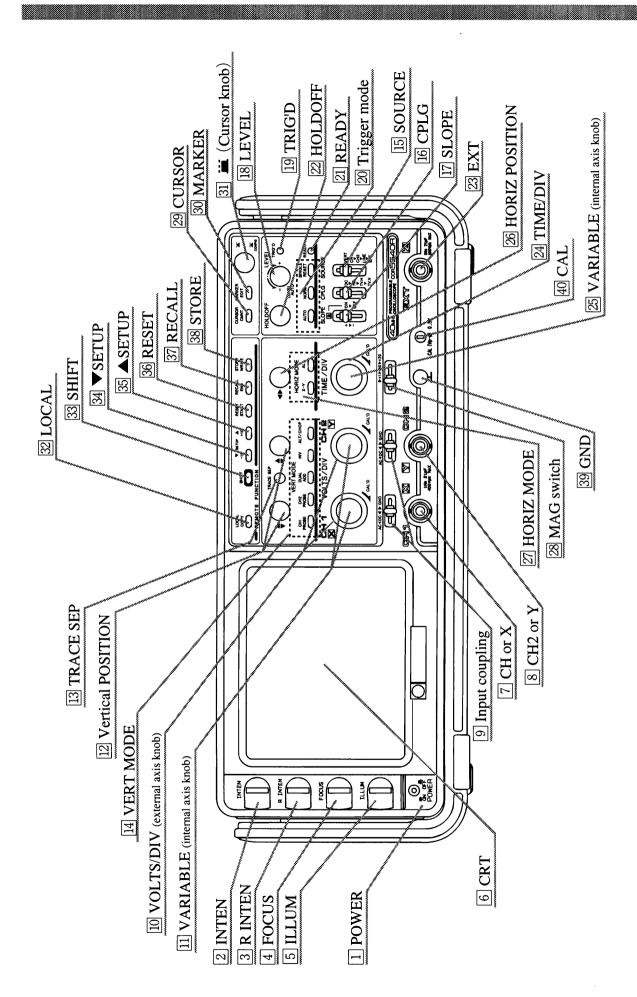
This chapter gives descriptions and functions of switches, displays, connectors, etc., for front and rear panels.

5.1	Description of front panel	5-2
5.2	Description of rear panel	5-12

5.1 Description of front panel

1) Display on CRT





2) Power source and CRT control

1 POWER

Turns Power of instrument ON / OFF.

Press to turn ON and press again to turn OFF. When instrument is first turned ON, setting returns to state when turned OFF. Setting items to be stored are vertical range, sweep range, comment and cursor.

2 INTEN

Adjusts brightness of trace or spot.

Turning up increases brightness.

3 R INTEN

Adjusts brightness of characters and cursors on screen.

Turning up increases brightness.

4 FOCUS

Adjusts traces, characters or cursors for clear display.

5 ILLUM

Adjusts internal graticule brightness on CRT.

Turning up increases brightness.

6 CRT

Uses high-brightness CRT with internal graticule, having effective display for vertical axis of 8DIV (10mm/DIV) and for horizontal axis of 10DIV (10mm/DIV).

Filter is removable.

3) Vertical axis

7 CH1 or X

Vertical axis input terminal for channel 1.

Becomes input terminal of X-axis (horizontal direction) during X-Y operation.

8 CH2 or Y

Vertical axis input terminal for channel 2.

Becomes input terminal of Y-axis (vertical direction) during X-Y operation.

9 Input coupling

Switch to choose coupling method of input signal of CH1 and CH2 with vertical amplifier.

Chosen from AC, DC or GND.

10 VOLTS/DIV (external axis knob)

Vertical axis sensitivity of CH1 and CH2 can be changed in twelve ranges from 2mV/DIV to 10V/DIV by 1-2-5 sequence.

11 VARIABLE (internal axis knob)

Continuously changes sensitivity of vertical axis.

Turning clockwise to extreme position (calibrated position, CAL'D) calibrates sensitivity set by VOLTS/DIV.

Turning knob counterclockwise from calibrated position sets sensitivity value set by VOLTS/DIV at 1/2.5 or less. Sensitivity can be varied continuously between sensitivities set by VOLTS/DIV.

When this knob is turned away from calibrated position, ">" symbol is added to scale factor on CRT readout.

12 Vertical POSITION

Sets vertical position of trace or spot of CH1 and CH2.

Adjusted up on screen when turned clockwise. When CH2 is set to INVERT, it is adjusted down.

When X-Y operation is selected, horizontal position is set by [POSITION] knob of CH1. Turning knob clockwise moves trace to right of screen.

13 TRACE SEP

Sets vertical position at alternate magnified sweep, main sweep and magnified sweep alternating.

Capable of separation of approximately ±4DIV against main sweep.

14 VERT MODE

Switch to choose operation mode of vertical axis.

[CH1] displays channel 1 signal only, [CH2] channel 2 signal only, and [DUAL] for the two signals simultaneously.

[INV] switch switches channel 2 polarity.

When [DUAL] is pressed to choose 2-phenomena display, [CHOP/ALT] switch is enabled.

Press [CHOP/LT], and ALT or CHOP is chosen alternately.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press the following key to activate function indicated by blue letters:

· [SHIFT] + [PROBE]

Pressing again will cycle vertical sensitivity display for CH1 or CH2 through 1, 10 or 100x magnifications.

· [SHIFT] + [DUAL/ADD]

Pressing keys sets to ADD mode. The sum of signals of CH1 and CH2 is displayed.

If CH2 has been set to INVERT at this time, the difference between signals CH1 and CH2 is displayed.

4) Trigger

15 SOURCE

Switch to choose trigger signal source to be connected to trigger circuit.

Chosen from VERT, CH1, CH2, LINE or EXT.

16 CPLG

Switch to choose coupling method of trigger signal source with trigger circuit.

Chosen from DC, HF, TV.H or TV.V.

17 SLOPE

Switch to choose synchronous polarity (slope) of trigger point.

Chosen from + or -.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, operate [SLOPE] switch to turn ON/OFF the Z-axis terminal commonly used as EXT input terminal.

When turned ON, the terminal becomes Z-axis signal input terminal. It becomes EXT input terminal when turned OFF.

18 LEVEL

Sets trigger level and adjusts starting point to draw observed waveform.

When turned counterclockwise to the limit, "LA" is displayed on the upper right of screen, indicating LEVEL AUTO. LEVEL AUTO automatically sets trigger level at an optimal value.

19 TRTIG'D

LED is lit during synchronized sweep.

20 Trigger mode

Switch to choose trigger mode.

Chosen from AUTO, NORM or SINGLE.

The three switches are linked. [SINGLE] switch also serves as reset switch in single sweep operation.

21 READY

Lit in sweep standby mode when trigger mode is set at SINGLE. Off when single sweep is started.

22 HOLDOFF

Adjusts sweep pause time (hold-off time) from completion of sweep to start of subsequent sweep. When turned counterclockwise limit, "HO" on the upper right of screen disappears and hold-off time becomes the minimum.

Used for observation of a complex signal when synchronization cannot be done by adjusting trigger level alone.

23 **EXT**

External trigger input terminal. Also serves as input terminal for signal for external brightness modulation. Functions when trigger [SOURCE] switch is set to EXT.

5) Horizontal axis

24 TIME/DIV

Switch to set sweep time.

Select from 21 settings, from 0.1 µs to 0.5 s, by 1-2-5 sequence.

Turning clockwise accelerates sweep time. The switch can be turned in either direction without limit, but setting will not exceed extremes of 0.1 µs or 0.5 s. When this occurs, "Time/Div Limit" is displayed for about two seconds to show that sweep time has reached limit.

25 VARIABLE (internal axis knob)

Continuously changes sweep time.

When knob is turned clockwise to extreme setting (calibrated position, CAL'D), calibrated sweep time can be obtained. Turning knob counterclockwise from CAL'D position brings sets state to UNCAL. A sweep time can be set that is slower by a factor of 2.5 than setting by TIME/DIV.

In this way, sweep time can be varied continuously between times set by TIME/DIV.

When knob is set away from CAL'D position, the symbol, ">" is added to scale factor of the readout on screen.

26 Horizontal POSITION

Adjusts horizontal position of trace.

27 HORIZ MODE

· X-Y

X-Y operation with CH1 as X-axis and CH2 as Y-axis.

· ALT

Pressing this switch when the MAG switch is set at X10 or above, starts alternate magnified sweep, alternating main sweep and magnified sweep.

28 MAG switch

Switch to set magnification ratio for horizontal display.

Magnification ratio can be chosen from X1, X10 or X20. When set at X10 or above, magnification ratio and magnified sweep time are displayed on the lower right of screen.

Magnification is always made using the center of screen as a reference.

6) Cursor and comment

29 CURSOR

Switch to choose measurement mode by cursor.

Pressing switch cycles through " $\triangle T$ " \Rightarrow " $1/\triangle T$ " \Rightarrow " $\triangle V$ " \Rightarrow OFF settings.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [CMNT] switch. Comment displayed is turned ON/OFF.

30 MARKER

Switch to choose marker to appear on screen.

Pressing switch repeats TIME1 \Rightarrow TIME2 \Rightarrow TIME3 \Rightarrow TIME4 \Rightarrow VOLT1 \Rightarrow VOLT2 \Rightarrow VOLT3 \Rightarrow VOLT4 \Rightarrow BOX \Rightarrow OFF.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [EDIT] switch, and the switch is enabled to select comment editing.

Repeatedly pressing switch cycles through \Leftrightarrow SEL \Rightarrow ERS \Rightarrow OFF settings.

31 **(cursor knob)**

Measure cursor can be moved by knob when [CURSOR] switch is pressed. Active measure cursor can be selected by pressing knob. Pressing knob repeatedly cycles through CURSOR1 ⇒ CURSOR2 ⇒ TRACKING options.

Marker cursor can be moved by knob when [MARKER] switch is pressed. Active marker cursor can be chosen by pressing knob. Pressing knob repeatedly cycles through CURSOR1 ⇒ CURSOR2 ⇒ TRACKING settings.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press cursor knob to enter configuration mode.

The following are set in configuration mode:

- · GPIB
- · OFFSET CAL
- · OPTION CHECK

To finish configuration mode, move menu cursor ◀ to EXT position with cursor knob, then press it.

7) Remote function

32 LOCAL

Switch to choose operation by external control or from panel switches. Press this switch during GPIB control to go to local mode and to enable panel switches.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [COPY] switch. Contents of setup memory can now be copied to a second COR5540R connected via GPIB connector.

33 SHIFT

Press [SHIFT] switch for operation to execute functions on each of the switches indicated by blue letters.

34 ▼SETUP

Used to specify address of setup memory in the recall or store mode. Pressing decrements address by one.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [-10] switch to specify address in -10 steps.

35 ▲ SETUP

Used to specify address of setup memory in the recall or store mode. Pressing increments address by one.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [+10] switch to specify address in +10 steps.

36 RESET

Switch to return address to start address in recall mode.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [START] switch to specify start address in recall mode.

37 RECALL

Used to recall setting stored in setup memory.

Press this switch and then specify address of setup memory. Press again to cancel recall mode leave recalled settings unchanged.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [END] switch to specify end address in recall mode.

38 STORE

Used to store setting in setup memory.

Press this switch and then specify address of setup memory. Press again to cancel store mode.

Operation of [SHIFT]

While holding down [SHIFT] switch on REMOTE FUNCTION, press [WRITE] switch to write setting in address specified in store mode. "1" is added to displayed address.

8) Others

39 **GND**

Grounding terminal (GND) for signal.

Used by plugging a banana jack terminal.

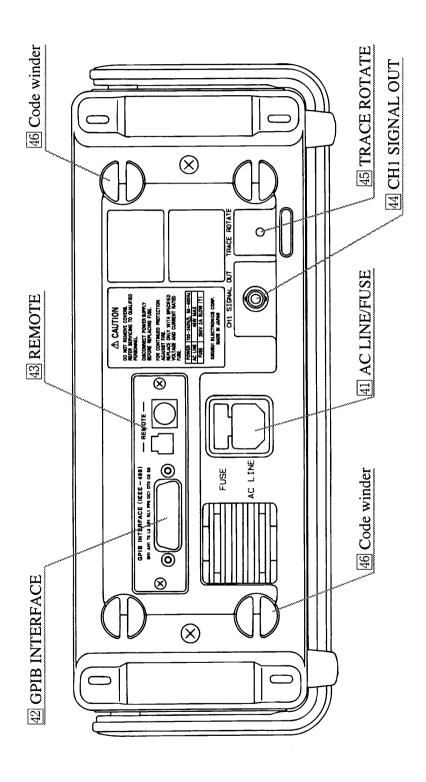
40 CAL

Output terminal for probe correction.

Positive polarity square wave of the frequency at 1kHz \pm 5% and voltage at 0.5 Vpp \pm 2% is put out.

Output resistance is approximately 1 k Ω .

5.2 Description of rear panel



41 AC LINE/FUSE

Connector for power cord for AC power source. Also serves as fuse holder.

42 GPIB INTERFACE

Connector for GPIB interface.

43 REMOTE

· DIN connector

Connector for optional remote controller or probe selector.

· Modular jack

No-voltage input terminal for RESET input terminal, DEC input terminal and INC input terminal (For details, see 3.1.12 REMOTE terminal).

44 CH1 SIGNAL OUT

Output terminal for CH1 input signal. Can be used as input signal source for frequency counter, etc.

Output amplitude is approximately 50mV/DIV, falling to approximately 25mV/DIV when a 50 Ω load is connected.

45 TRACE ROTATE

Aligns internal graticule parallel to horizontal trace. When turned clockwise as seen from front panel, trace inclines to the right.

46 Cord winder

Cord winder to wind power cord for storage.





This chapter describes instrument maintenance and calibration. Keep up regular maintenance, inspection and calibration to ensure performance.

6.1	Cleaning	6-2
6.2	Inspection	6-3
6.3	Maintenance	6-3
6.4	Calibration	6-3

6.1 Cleaning

CAUTION

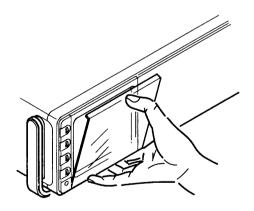
- · Turn OFF [POWER] switch before cleaning.
- Do not use volatile substance such as thinner or benzine, which can discolor surfaces, make printed letters illegible or blur the CRT filter.

1) Panel face

If panel face is stained, lightly wipe with a soft cloth soaked in dilute mild detergent.

2) Filter

Remove filter as shown in drawing below. Wipe off dust on CRT surface and filter with soft dry cloth.



6.2 Inspection

Power cord: Check for broken covering, plug loosening, split, etc.



· Broken covering or the like may lead to electric shock. If such a defect is found, immediately stop using the instrument.

For purchase of accessories, please contact your Kikusui agent.

6.3 Maintenance

■ Replacement of backup battery

Even after power is turned OFF, panel and other settings are backed up by an internal battery. If you find that panel settings are no longer retained when instrument is turned off and on, the battery needs to be replaced.

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

For replacement, please contact your Kikusui agent.

6.4 Calibration

This product was calibrated at shipment. Recalibration is advised after long-term usage.

For calibration, please contact your Kikusui agent.





This chapter provides electric and mechanical specifications and descriptions of accessories.

7.1	Specification	7-	1
7.2	Options	7-	8

7.1 Specification

1) Vertical axis

Item	Specification	Note
Sensitivity	2mV to 10V/DIV	1-2-5 sequence, 12 range
Sensitivity tolerance	3%	15℃ to 35℃
		1kHz, 4 to 5DIV reference
Sensitivity continuous	Capable of attenuation to 1/2.5 or more	
change	of specified value	
Frequency band width	At DC coupling	50kHz, 8DIV reference
	DC to 40 MHz, within -3dB	15℃ to 35℃
	At AC coupling	
	10 Hz to 40 MHz, within -3dB	
Rise time	8.8ns or less	
Square wave	Overshoot : Within 3%	15℃ to 35℃
characteristics	Ringing : Within 3%	5mV to 0.2V/DIV
	Aberration : Within 5%	5DIV reference
	Low band distortion	
	(100Hz to 100kHz): Within 2%	
	Characteristics at ADD is +3% of the	
	above values.	
Input impedance	$1M\Omega \pm 2\%$	
	21pF±3pF	
Maximum allowable	400Vpeak (DC+ACpeak)	AC: 1kHz or less
input voltage		
Input coupling	AC, DC, GND	
Vertical axis operation	·	
mode	DUAL (CHOP, ALT)	
Time difference	Within ±1ns	
between channels		
Interference between	100: 1 or less in the same range	20MHz sine wave input
channels		
Common mode	20: 1 or less against in-phase signal	20MHz sine wave input
rejection ratio	of 6DIV or less	
(CMRR)		
Signal delay time	30ns or more	
Chop frequency	500kHz±20%	At DUAL, CHOP, at Readout off
CH1 signal output	DC offset: 25mV or less	At 50 Ω termination
	Output voltage: 25mV/DIV	(Doubled when output terminal is
	Frequency characteristics:	open)
	DC to 40MHz, within -3dB	
	Output impedance: Apporox. 50 Ω	

2) Synchronization

Item	Specification	Note
Trigger signal source	CH1, CH2, EXT, LINE, V-MODE	Signal source of V-MODE is as
		follows
		Single channel: Operating channel
		Others: CH1
Coupling method	DC, HF-REJ, TV-V, TV-H	HF-REJ attenuates signal of 50kHz
		or more.
Polarity	+,-	
Trigger sensitivity	DC to 10MHZ : 0.4DIV	At input of NTSC full field color bar
CH1, CH2	DC to 40MHZ : 1.5DIV	signal for TV-V and TV-H
	TV-V, TV-H : 1.5DIV	
Trigger sensitivity	DC to 10MHZ : 0.2V	At input of NTSC full field color bar
EXT	DC to 40MHZ : 0.75V	signal for TV-V and TV-H
	TV-V, TV-H : 1.5V	
Level Auto	Satisfies value that 0.5DIV (0.25V) is	
sensitivity	added to trigger sensitivity	
Trigger mode	AUTO, NORM, SINGLE	
EXT trigger input	Shared with EXT Z input terminal	
Input impedance	$1M\Omega \pm 10\%$	
	21pF±3pF	
Maximum allow-	100Vpeak	AC: 1kHz or less
able input voltage	(DC+ACpeak)	

3) Horizontal axis

Item	Specification	Note
Sweep time	0.1 μ s to 0.5s/DIV	1-2-5 sequence, 21 range
Sweep tolerance	3%	15℃ to 35℃
		at display center 8DIV
Sweep time	Capable of delay to 2.5 times or more	
continuous change	of specified value	
Variable hold-off	Available	
Magnified sweep	10 times, 20 times,	Magnified portion: Screen center
	Maximum sweep time: 5ns/DIV	
Difference of magni-	10 times: ±4%	15℃ to 35℃
fied sweep times	20times: $\pm 5\%$	at screen center 8DIV
Sweep mode	Main sweep, magnified sweep,	
	alternate magnified sweep	
Trace separation	± 4 DIV or more separable	

4) X-Y operation

Item	Specification	Note
Sensitivity	2mV to 10V/DIV	
Sensitivity tolerance	X axis: 4%	15℃ to 35℃
	Y axis: 3%	1kHz 4 to 5DIV reference
Frequency band width	Within DC to 2MHz	
(X-axis)	Within -3dB	
X-Y phase difference	Within 3 degrees at DC to 100kHz	

5) Z-axis

Item	Specification	Note
EXT Z input terminal	Shared with EXT trigger terminal	
Sensitivity	Brightness modulation checked at 3 Vp-p Increased by negative signal input,	
	while decreased by positive input signal	
Frequency range	DC to 2MHz	
EXT Z input	$1M\Omega \pm 10\%$	
impedance	$21pF\pm3pF$	
EXT Z input maximu	n 100Vpeak	AC: 1kHz or less
allowable voltage	(DC+ACpeak)	

6) Cursor

Item	Specification	Note
⊿T	Time interval measurement with CURSOR1 and CURSOR2	
Measuring range	\pm 4.6DIV at the center of CRT screen	
Measuring accuracy	$\pm (3\% \text{ of reading} + 0.05 \text{DIV})$	When MAG is off
1/⊿T	1/⊿T(frequency) measurement by determining time interval	
∠V	Voltage measurement with CURSOR1 and CURSOR2	
Measuring range	± 3.6 DIV at the center of CRT screen	
Measuring accuracy	\pm (3% of reading + 0.05DIV)	-

7) Calibrated voltage

Item	Specification	Note
Waveform	Positive polarity square wave	
Frequency	1kHz±5%	
Duty	Within 45 : 55	
Output voltage	0.5Vp-p±2%	
Output resistance	Apporox. 1k Ω	

8) CRT

Item	Specification	Note
Cathode-ray tube	6 inch rectangle, white, with internal	
	graticule	1
	Effective viewing area: 8 x 10 cm	
Acceleration voltag	e Apporox. 12kV	

9) Power requirements

Item	Specification	Note
Voltage range	Rated voltage : 100V to 240V Allowable input voltage: 90V to 250V	
Frequency	Rated frequency : 50Hz to400Hz Allowable input frequency: 45Hz to440Hz	
Power consumption	45W at maximum	

10) Environmental resistance

Item	Specification	Note
Ambient temperature		Excluding case where
Specification guaranteed	+10°C to $+40$ °C	temperature range is otherwise
temperature range		specified.
Operating temperature range	0℃ to +50℃	
Storage temperature range	-40°C to +75°C	
Humidity range	95%RH (10℃ to 30℃)	There should be no
	75%RH (31℃ to 40℃)	condensation.
	45%RH (41℃ to 50℃)	
Storage humidity	95%RH (0℃ to 50℃)	
range	45%RH (-40 $^{\circ}$ C to 0 $^{\circ}$ C, 50 $^{\circ}$ C to 75 $^{\circ}$ C)	
Insulation resistance	$30M\Omega$ or more (500VDC)	
Withstand voltage	1500VAC (1 minute)	

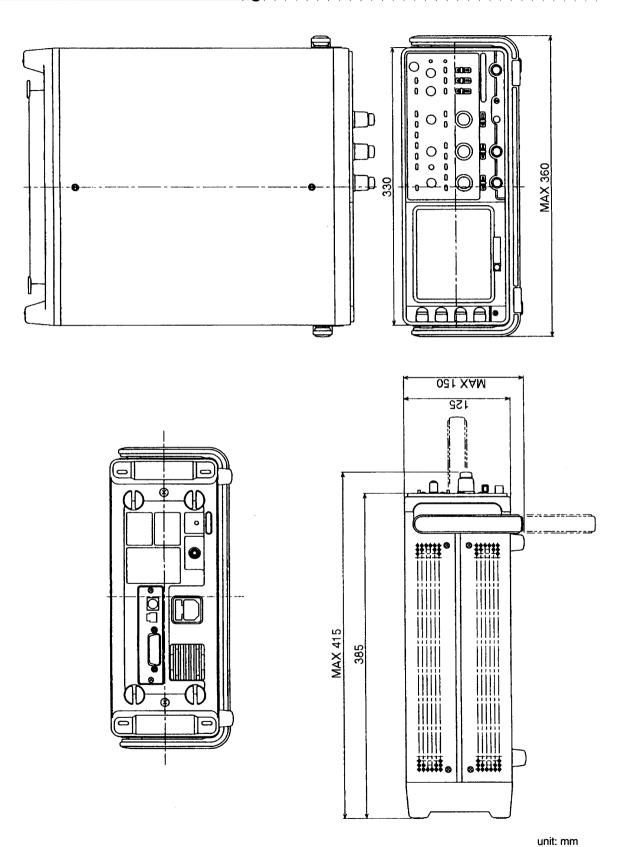
11) GPIB

Item	Specification	Note	
Interface function	SH1 : Source handshake full function		
	AH5 : Acceptor handshake full function		
(IEEE488-1978)	T5 : Talker function		
(IEC625)	L3 : Listener function		
	SR1 : Service request full function		
	RL1 : Remote local function available		
	PPO : No parallel polling function		
	DC1 : Device clear full function		
	DT0 : No device trigger function		
	C0 : No control function		
	E1 : Open collector driver		
Format	Device command: ASCII		
Remote operation	Panel setting excluding setting focus, trace rotation,		
	readout INTEN, and illumination		

12) General

Item	Contents	
Memory backup	Panel setting information	
	Battery: Lithium	
	Period: 3 years or longer at 25℃ (from shipment)	
Dimension	330W X 125H X 360D (Largest part: 360W X 145H X 420D)	
Weight	Apporox. 7kg	
Accessories		
Power cord	1	
Probe	2, P060-6CE model (10:1 / 1:1)	
Operation Manual	1	

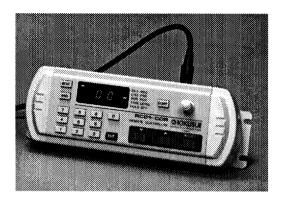
13) Dimensional outline drawing



7.2 Option

1) Remote controller

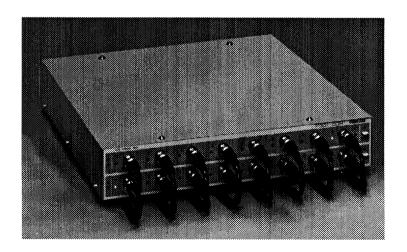
You can connect a remote controller (RC01-COR) to instrument to recall setup memory contents and adjust positions.



2) Probe selector

Connect a probe selector (PS01-COR) to instrument to increase the number of input channels.

Up to 4 probe selector units can be connected, resulting in a maximum of 64 channels.



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