

INSTRUCTION MANUAL

CURSOR UNIT

MODEL CU01-COS

KIKUSUI ELECTRONICS CORPORATION

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## 1. GENERAL

### 1-1. Description

Model CU01-COS Cursor Unit is used to display two cursor lines on Model COS5030A-PG Programmable Oscilloscope. The two cursor lines (horizontal lines) are displayed independent of the displayed signal waveforms. The vertical positions of the cursor lines can be programmed and stored, thereby greatly facilitating waveform amplitude determination on the CRT screen.

### 1-2. Features

- o Up to 96 memory steps:

The vertical positions of the cursor lines can be programmed for each of the 96 memory steps which are the maximum memory steps of the programmable oscilloscope. This feature is especially advantageous when the oscilloscope is used on a production line where various models of devices may be manufactured, as the cursor lines are automatically controlled by the stored program.

- o Wide setting range of cursors:

The two cursors can be positioned at any positions on the CRT screen, covering from a small amplitude of 0.1 DIV to the full amplitude of 8 DIV.

- o Smooth operation:

The cursors can be vertically moved very smoothly by light-touch operation. As the control button is pressed once, the corresponding cursor moves by one resolution distance ( $1/256 = \text{approx. } 0.03 \text{ DIV}$ ). If the button is kept depressed, the cursor moves continuously. (For both cursors, in both upward and downward directions.)

- o On-off control of cursor lines:

The cursor lines can be on-off controlled with a cursor on-off button on the front panel of the Cursor Unit.

- o Battery-protected memory:

The memory (C-MOS RAM) is backed-up by a battery so that the stored program is protected against instrument power turning off and line power failure.

## 2. SPECIFICATIONS

### 2-1. Specifications

#### Major Specifications

Item	Specification	Remarks
Number of cursor lines	2 (upper and lower)	
Movable range of cursor lines	±4 DIV from CRT center	Both cursor lines
Resolution of movement of cursor lines	8 DIV × 1/256 (approx. 0.03 DIV)	8 bits per unit resolution
Cursor line stability (1) Cursor line stability (2)	0.005 DIV/°C or less 0.05 DIV/hour or less	Allowing 30 minutes or more of stabilization time after turning on power.
Number of memory steps	96 steps	BCD compatible
On-off control of cursor lines	With switch	On front panel
Vertical positioning of cursor lines	With pushbutton switch. One press for one unit resolution (approx. 0.03 DIV). Continuous pressing for continuous movement.	Both upper and lower cursor lines, in both upward and downward directions.

#### Memory Protection

Item	Specification	Remarks
Life of backup battery	Approx. 12 months	When in no load state
Backup battery voltage alarm	POWER lamp (LED) blinks when voltage has become low.	
Type of backup battery	Two dry cells, SUM-3	

### Power Requirements

Item	Specification	Remarks
Line voltage	100 V, 115 V, 215 V, 230 V, ±10%	Selectable at device rear panel
Frequency	50 - 60 Hz	
Power consumption	Approx. 12 VA	

### Mechanical Specifications

Item	Specification	Remarks
External dimensions	310W × 90H × 215D mm (12.20W × 3.54H × 8.46D in.)  310W × 70H × 205D mm (12.20W × 2.76H × 8.07D in.)	Maximum dimensions  Chassis section
Weight	Approx. 3.5 kg (7.7 lbs)	

### Ambient temperature and humidity

To satisfy performance specifications:

+5°C to +35°C (41°F to 95°F), 85% RH

Operable range:

0°C to 40°C (32°F to 104°F), 90% RH

### Accessories

	Kikusui code	Qt'y
Cable, inter-device connection, 14 pins, 1 meter	89-04-0110	1
Fuse, slow blow, 0.2 A	99-02-0112	1
Fuse, slow blow, 0.4 A	99-02-0114	1
Instruction manual	Z1-940-010	1

### 3. GENERAL PRECAUTIONS

#### 3-1. Unpacking the Device

The device is shipped from the manufacturer's factory after full mechanical and electrical inspection to ensure perfect structures and performances. Please unpack the device immediately upon receiving it and check for sign of damage which might have been caused when in transportation. If any sign of damage is found, please immediately notify the bearer and your Kikusui dealer.

#### 3-2. Checking the AC Line Voltage

The input line voltage and fuse rating are indicated on the rear panel. Before operating the instrument, ensure that the AC line voltage setting of the device is correct. If the device voltage does not conform with the line voltage, the device may not operate normally or may be damaged.

#### 3-3. Environmental Conditions

The ambient temperature range for normal operation of the device is 0°C to 40°C (32°F to 104°F). Note that malfunctioning may be caused if the device is operated or stored in unreasonably high temperature and high humidity for a long period of time. Do not use the device in a place where strong magnetic or electric field exists. Such fields may disturb device operation.

#### 3-4. Cables for Inter-device Connections

Be sure to correctly connect the cables with the device power turned off. Note that the device may be damaged if the cables are wrongly connected or if they are connected with power on.

#### 3-5. Memory Backup Battery

This device has a backup battery source (two SUM-3 dry cells) for its internal memory unit. When the dry cells have discharged, the POWER lamp (LED) on the front panel will blink. To replace the dry cells in such a case, contact your Kikusui dealer.

## 4. PANEL DESCRIPTION

### 4-1. Description of Front Panel

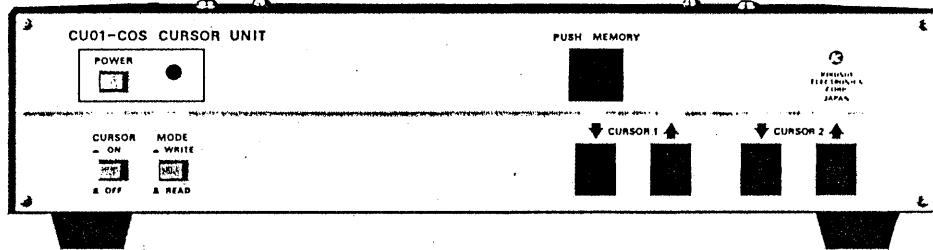








Figure 1

- ① POWER: Main power switch of the device. The depressed state is for power on. Power is turned off when this button is pressed again.
- ② (Green LED): This power pilot lamp lights to indicate that device power is on. It blinks when the memory backup battery source voltage has dropped.
- ③ CURSOR:
- |                          |     |
|--------------------------|-----|
| <input type="checkbox"/> | ON  |
| <input type="checkbox"/> | OFF |
- For on-off control of the cursor lines. When on, the cursor lines are displayed on the CRT screen; when off, they disappear. On-off control can be made irrespective of setting of the READ/WRITE MODE switch.
- ④ MODE:
- |                          |       |
|--------------------------|-------|
| <input type="checkbox"/> | WRITE |
| <input type="checkbox"/> | READ  |
- Selects operating mode of the memory. If the PUSH MEMORY button 5 is pressed when this button is in the WRITE () state, data for the cursor lines displayed on the CRT screen of the oscilloscope is stored in the memory of this device. When this button is in the READ () state, the cursor lines are displayed on the CRT for the data stored in the memory.



- ⑤ PUSH MEMORY: If you press this button when in the WRITE mode, data for the cursor positions is stored in the memory and a pip sound is generated.
- ⑥  CURSOR 1  : Touch-type switches for movement of cursor line 1. The cursor line moves downward as the  button is pressed; it moves upward as the  button is pressed. As the button is pressed once, the cursor line moves by one unit resolution (approximately 0.03 DIV). If you keep it pressed, the cursor line moves continuously.
- ⑦  CURSOR 2  : Touch-type switches for movement of cursor line 2. The functions are the same with those of the CURSOR 1 switches.

#### 4-2. Description of Rear Panel

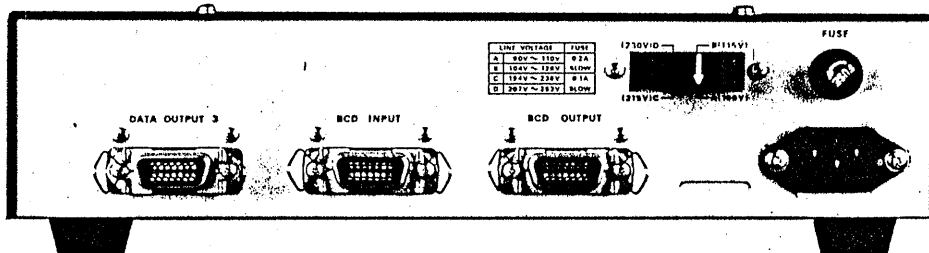


Figure 2

- ⑧ DATA OUTPUT 3: 14-pin connector for signals to control the cursor lines on the CRT of the programmable oscilloscope. Connect this connector to the 14-pin cursor adaptor connector (DATA INPUT 3) on the rear panel of the programmable oscilloscope using the 14-pin cable supplied.

- ⑨ BCD INPUT: BCD input connector for signals to access addresses of the internal memory of this device. Connect this connector to the 14-pin connector (BCD OUTPUT) of the Step Controller (SC01-COS or SC02-COS) using the 14-pin cable supplied.
- ⑩ BCD OUTPUT: This connector provides BCD output signals to drive other devices of the programmable oscilloscope system.
- ⑪ FUSE, 0.2 A, SLOW: Main power fuse of the device. To remove the fuse holder cap, turn it counterclockwise.
- ⑫ AC 100V, 50/60 Hz: Main power input connector of the device. Connect the power cable to this connector.
- ⑬ AC line voltage selector: To select the AC line voltage on which this device is to be operated. Referring to the table on the left-hand side, set the arrowhead mark of the plug in the correct position.

## 5. OPERATION METHOD

### 5-1. Connections

Correctly connect this device to other devices using the cables supplied. An example of measuring setup with Remote Controller RC01-COS and Step Controller SC02-COS is shown in Figure 3.

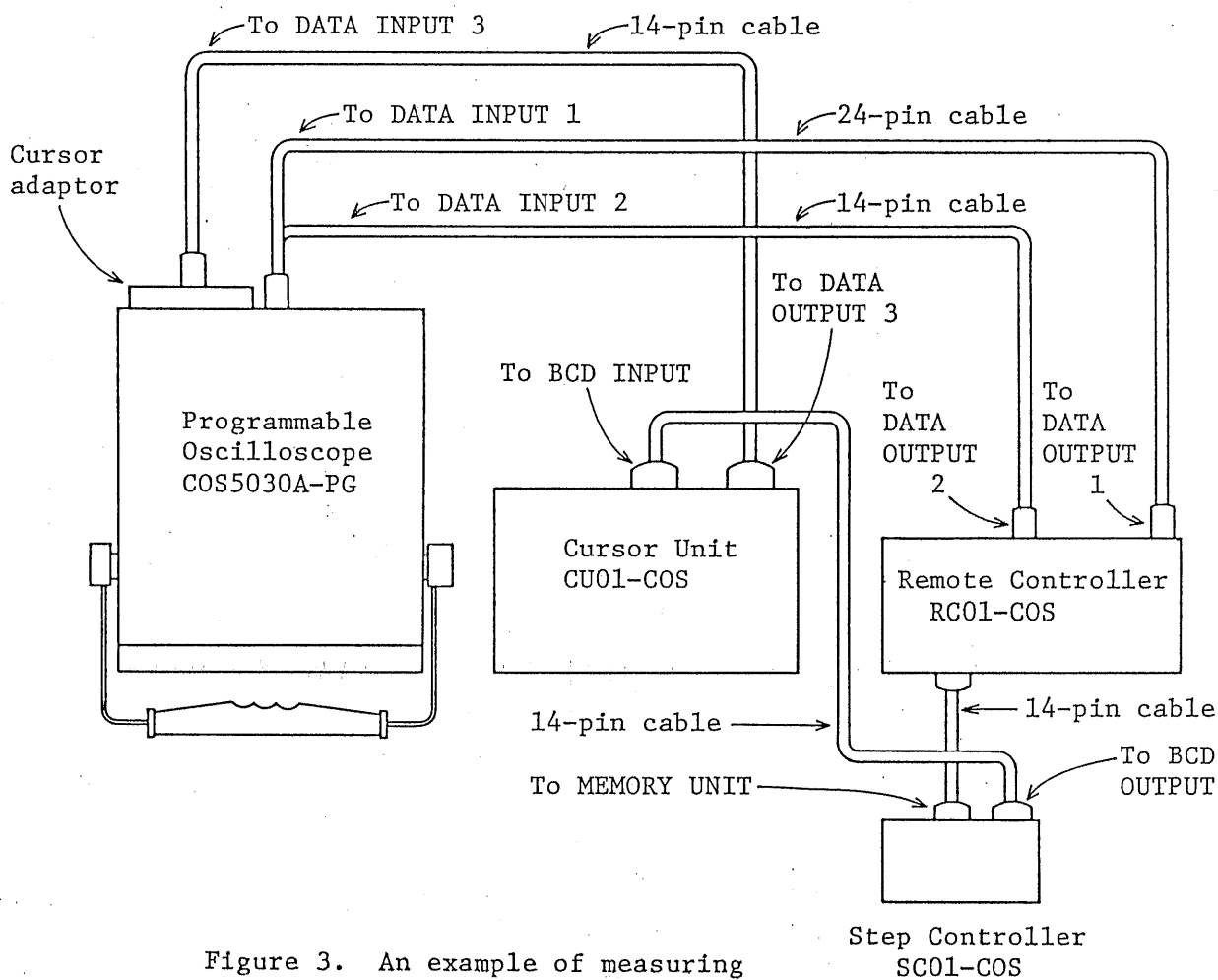


Figure 3. An example of measuring setup with Cursor Unit

For the various combinations of devices, refer to respective instruction manuals.

## 5-2. Preliminary Setting

The operating principle here is explained for the case of the measuring setup of Figure 3. For other measuring methods, refer to the instruction manuals of respective devices.

### (A) Setting of Programmable Oscilloscope COS5030A-PG panel items

Item	Setting
POWER	OFF
INTEN	Mid-position (pushed in)
FOCUS	Mid-position
ILLUM	Extreme counterclockwise
↑ ↓ POSITION	Mid-position (pushed in)
↔ POSITION	Mid-position (pushed in)
A SWEEP VARIABLE	CAL'D position (pushed in)
TRIGGER LEVEL	Mid-position (pushed in)
HOLD OFF	NORM position

### (B) Setting of Remote Controller RC01-COS panel items

Item	Setting
POWER	OFF
INTEN	Position 1
DUAL-CH1-CH2	CH1
↑ ↓ POSITION	0 (both CH1 and CH2)
VOLTS/DIV	20 mV/DIV (both CH1 and CH2)
AC-DC-GND	DC, GND (both CH1 and CH2)
×5 MAG	<input type="checkbox"/> (NORM), (both CH1 and CH2)
CH2 POLARITY	<input type="checkbox"/> (NORM)
TRIGGERING SOURCE	INT (LINE at OFF)
TRIGGERING COUPLING	AC, FLAT, (TV at OFF)
TRIGGERING SLOPE	+
TRIGGERING LEVEL	0
TRIGGERING MODE	AUTO

Item	Setting
HORIZ DISPLAY	A
B TRIG'D	<input type="checkbox"/> (OFF)
×5 MAG	<input type="checkbox"/> (OFF)
A, B TIME/DIV	0.5 mS/DIV (both A and B)
A SWEEP VARIABLE	1
↔ POSITION	0
DELAY TIME POSITION	0
EXT SELECTOR	1 (both A and B)
START	00
END	95
READ/WRITE	<input checked="" type="checkbox"/> WRITE
PULL-REMOTE (eight red knobs)	Red knobs pushed in

(C) Setting of Step Controller SC02-COS panel items

Item	Setting
<input type="checkbox"/> AUTO, <input checked="" type="checkbox"/> MANUAL	<input checked="" type="checkbox"/> MANUAL
TIME INTERVAL	MIN
PULL-REMOTE (eight red knobs)	Pushed-in state

(D) Setting of Cursor Unit CU01-COS panel items

Item	Setting
POWER	OFF
MODE	<input checked="" type="checkbox"/> WRITE
CURSOR	<input type="checkbox"/> OFF

After the above setting is over, connect the power cables to AC line receptacles and proceed as follows:

- (1) Turn on the POWER switches of the devices and check that the power lamps (LED's) light. A trace will be displayed on the CRT in approximately 20 seconds. If no trace is displayed when

more than 60 seconds has elapsed, repeat the above setting procedure all over again.

- (2) Pull out the INTEN knob of Programmable Oscilloscope COS5030A-PG and adjust it together with the FOCUS control so that the displayed trace image becomes sharpest.
- (3) Pull out the CH1 POSITION knob of Programmable Oscilloscope (COS5030A-PG and adjust it together with the TRACE ROTATION control (screwdriver adjustment) so that the trace is aligned with the horizontal center line of the graticule.
- (4) Connect the 960BNC probe (accompanies the oscilloscope) to the CH1 INPUT terminal. Connect the probe tip to the CALIB terminal of Programmable Oscilloscope COS5030A-PG. (Set the attenuation ratio of the 960BNC probe at 10:1.)
- (5) Change the AC-DC-GND switch of Remote Controller RC01-COS to the AC, GND-OFF state. A calibration signal waveform as shown in Figure 4 will be displayed on the CRT.

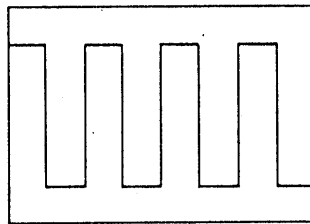


Figure 4

- (6) Adjust again the FOCUS control so that the displayed waveform image becomes sharpest.
- (7) Set the CURSOR ON-OFF switch of Cursor Unit CU01-COS to the ON (⏏) state so that the cursor lines are displayed on the CRT. Move the cursor lines to the required positions by means of the CURSOR positioning switches (6) and (7) explained in Section 4-1 "Description of Front Panel."

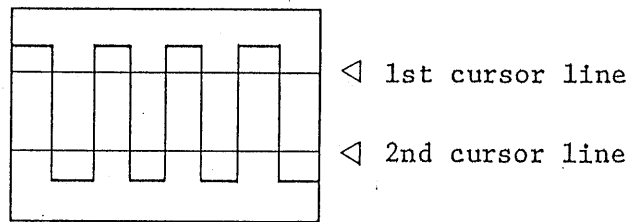


Figure 5

- (8) The cursor lines may be moved to the crests of the displayed waveform for easy monitoring of the peak-to-peak value of the displayed waveform.

The above is the basic operation of this device. The read/write procedures of cursor line data are explained in the subsequent sections.

### 5-3. Write Procedure

To write in memory the position data of the cursor lines displayed on the CRT, proceed as follows:

- (1) Set both the MODE switch of this device and the READ/WRITE switch of Remote Controller RC01-COS to the WRITE state.
- (2) Set the START and END digital switches of Remote Controller RC01-COS to the start and end points, respectively, of the program.
- (3) Select the step where the data is to be written, by means of the Step Controller.
- (4) Display the signal with an amplitude convenient for measurement, by means of the panel items of Remote Controller RC01-COS.
- (5) Move the cursor lines to the required positions by means of the CURSOR positioning switches of this device.
- (6) Press the MEMORY switch of Remote Controller RC01-COS.

When the above is done, the data set by (5) is stored at the step set by (3) in the memory of this device and that of Remote Controller RCQ1-COS. In this case, if the AUTO/MANUAL switch of the Step Controller is set in the AUTO state, the step number automatically advances when the write operation is over.

#### 5-4. Read Procedure

To operate Programmable Oscilloscope COS5030A-PG with data stored in this device and Remote Controller RCQ1-COS, proceed as follows:

- (1) Set both the MODE switch of this device and the READ/WRITE switches of Remote Controller RCQ1-COS to the READ state.
- (2) Set the START and END digital switches of Remote Controller RCQ1-COS to the start and end steps of the program to be read.
- (3) Change the step number to the one to be read and displayed.

When the above procedure is done, the oscilloscope will be controlled by the stored program and the cursor lines can be displayed on the CRT. The start and end points can be selected as required in (2), enabling to read different sections of the stored program without rewriting it.

If the AUTO/MANUAL switch of the Step Controller is set in the AUTO state, the step automatically advances at each period preset by the TIME INTERVAL switches.