HIOKI

Instruction Manual

# 7075
# 7075-01

# WAVEFORM GENERATOR

HIOKI E. E. CORPORATION

December 2008 Revised edition 9 7075A981-09 08-12H

# Contents

# Introduction

Thank you for purchasing the HIOKI "7075 WAVEFORM GENERATOR". To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

### About the Warranty

Our warranty does not cover direct or indirect damage that might occur on the user's premises.

# Inspection

When you receive the product, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories, displays, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.
Before shipping the unit, always remove the floppy disk, and preferably use the original packing.

### Accessories

7990 WAVEFORM CREATION SOFTWARE
Power cord
Instruction Manual

### Options

9165 CONNECTION CORD
9166 CONNECTION CORD
9151-02 GP-IB CONNECTOR CABLE (2 m)
9151-04 GP-IB CONNECTOR CABLE (4 m)

# Safety Notes

**⚠ DANGER**

**This product is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the product. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from product defects.**

This manual contains information and warnings essential for safe operation of the product and for maintaining it in safe operating condition. Before using the product, be sure to carefully read the following safety notes.

### Safety symbols

- The ⚠ symbol printed on the product indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
- In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the product.

Indicates AC (Alternating Current).

The following symbols in this manual indicate the relative importance of cautions and warnings.

**⚠ DANGER** — Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.

**⚠ WARNING** — Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.

**⚠ CAUTION** — Indicates that incorrect operation presents a possibility of injury to the user or damage to the product.

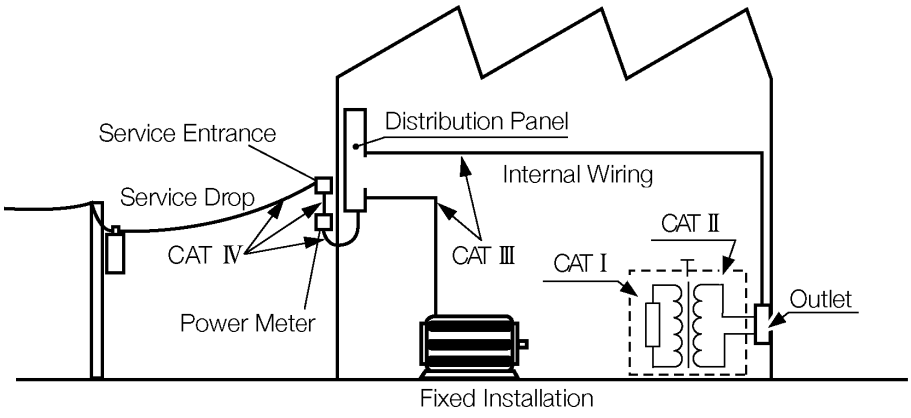
**NOTE** — Advisory items related to performance or correct operation of the product.

## Overvoltage Categories (CAT)

This product conforms to the safety requirements for CAT II measurement products.
To ensure safe operation of measurement products, IEC 60664 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called overvoltage categories. These are defined as follows.

| | |
|---|---|
| CAT I | Secondary electrical circuits that are connected to a wall outlet through a transformer or similar device. |
| CAT II | Primary electrical circuits in equipment connected to a wall outlet via a power cord (portable tools, household appliances, etc.) |
| CAT III | Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders between the distribution panel and outlets. |
| CAT IV | The circuit from the service drop to the service entrance, then to the power meter and to the primary overcurrent protection device. |

Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measurement product designed for CAT III environments can endure greater momentary energy than one designed for CAT II. Using a measurement product in an environment designated with a higher-numbered category than that for which the product is rated could result in a severe accident, and must be carefully avoided.



# Notes on Use

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

**⚠ DANGER**

**To avoid electric shock, do not remove the product's cover and panel. The internal components of the product carry high voltages and may become very hot during operation.**

**⚠ WARNING**

- **Before turning the product on, make sure the source voltage matches that indicated on the product's power connector. Connection to an improper supply voltage may damage the product and present an electrical hazard.**
- **To avoid electric shock and ensure safe operation, connect the power cable to a grounded (3-contact) outlet.**
- **To avoid electric shock, do not allow the product to get wet, and do not use it when your hands are wet.**
- **Do not use the product where it may be exposed to corrosive or combustible gases. The product may be damaged or cause an explosion.**

**⚠ CAUTION**

- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.
- Do not use excessive force on the touch panel, and do not use sharp objects that could damage the touch screen.
- This product should be installed and operated indoors only, between 0 and 40℃ and 85% RH or less.
- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This product is not designed to be entirely water- or dust-proof. To avoid damage, do not use it in a wet or dusty environment.
- If an abnormal display or other condition occurs while operating the unit, immediately turn the power switch off, and contact your supplier or our offices.
- The top of the product normally gets hot during operation, so be careful when touching the case.

### Before using the product

Before using the product the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.

**⚠ WARNING**

**Before using the product, make sure that the insulation on the cable is undamaged and that no bare conductors are improperly exposed. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.**

# Chapter 1
# Overview

## 1.1 Product Overview

The 7075 is a multi-channel waveform generator with function generator and arbitrary waveform generator function. The function generator provides eight basic waveform types, such as sine and square waves. The arbitrary waveform output allows generating long-duration, high-quality waveforms. Basic capabilities include 128,000-word-long memory, 10-MHz clock rate and 16-bit resolution.
The function generator and arbitrary waveform output can be swept according to each waveform parameter, so this waveform generator is ideal for simulating a variety of signal sources and test situations.
A large LCD with touch panel provides very easy operation.

# 1.2 Features

### (1) Easy operation

Interactive operation is provided by the touch panel. Frequently used keys are arranged on the panel for easy operation.

### (2) Built-In 4-channel generator

The compact unit includes an internal 4-channel waveform generator. The single unit can generate all signals to simulate a 3-phase motor.

### (3) Independent channel operation capability

Sweep sequences can be controlled separately for each channel by rear-panel control signals.

### (4) Multiple units can be operated synchronously (providing up to 16 channels)

Up to 16 channels can be synchronously output to test multiple phenomena.

### (5) Various conditions of the waveform output (frequency, amplitude, offset, etc.) can be swept

The sweep is easily set, and by using the sequence function, complex patterns can be output easily.

### (6) Long-duration arbitrary waveforms can be generated from 128,000 words/channel memory

The 128,000-word arbitrary waveform memory allows long-duration waveform output.

### (7) 16-bit amplitude resolution

The 16-bit amplitude resolution provide high-quality waveforms.

### (8) Actual waveforms can be used by downloading from the Memory HiCorder

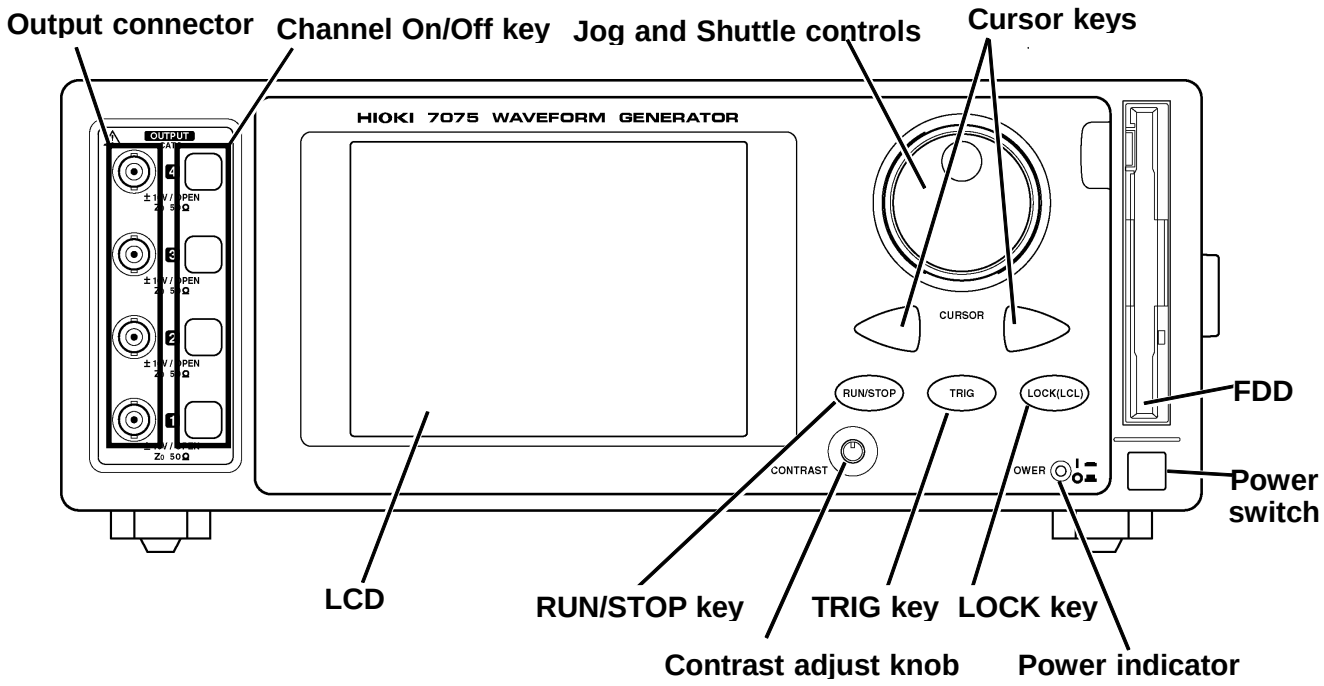
Waveform voltage and time axis data can be downloaded from our Memory HiCorder and the same waveform immediately output.

### (9) Waveform creation software included

Our Model 7990 WAVEFORM CREATION SOFTWARE for Windows95/NT is provided for easy arbitrary waveform creation on a PC.

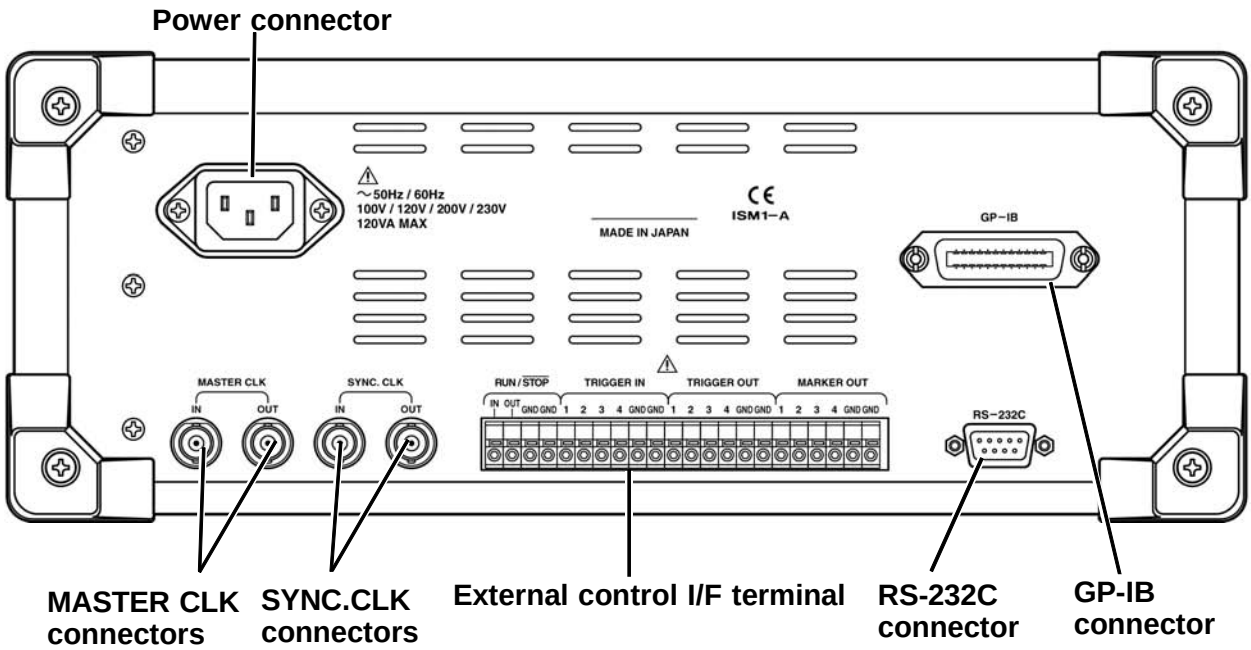
# 1.3 Names and Functions of Parts

## 1.3.1 Front Panel




| | |
|---|---|
| **Output connector** | These waveform output connectors for channels 1 to 4 are ordered from the bottom up. |
| **Channel On/Off key** | These analog output on/off keys light red when on (during output). |
| **LCD** | The touch panel over the 5.7-inch LCD accepts direct input by finger touch. |
| **Jog and Shuttle controls** | These controls adjust numeric levels and select rows in the sweep table. |
| **Cursor keys** | These keys are used together with the Jog and Shuttle controls to adjust numeric levels and shift digit selection. |
| **RUN/STOP key** | This key runs and stops waveform output. The key lights red during waveform output. |
| **TRIG key** | During sweep operation, this key interrupts an infinite loop or the specified hold. This key is disabled when it lights red. |
| **LOCK key** | This key lights red during remote GP-IB operation, and when the keys are locked. All keys are disabled in this case. Pressing LOCK(LCL) for more than 2 seconds unlocks the keys. |
| **Contrast adjust knob** | This dial adjusts screen contrast. Turning it to the left darkens the display, and turning it to the right lightens the display. |
| **Power indicator** | Indicator flashes red when the power of the unit is ON. |
| **FDD** | The 3.5-inch floppy disk (2HD/2DD) can be used. |
| **Power switch** | The power of the unit is turned on and off. |

## 1.3.2 Rear Panel



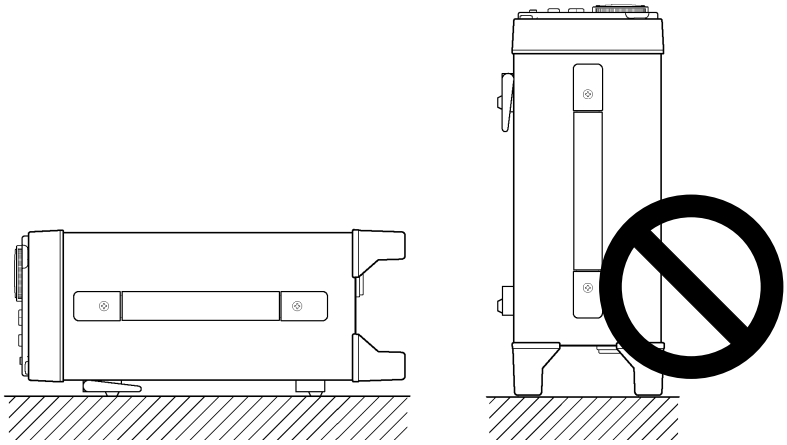

| | |
|---|---|
| **Power connector** | Connect the supplied power cord. |
| **MASTER CLK connectors** | These connectors link the master and slave units for synchronized operation. |
| **SYNC.CLK connectors** | |
| **External control I/F terminals** | Trigger terminals for RUN/STOP control and sequence control For details on each terminal, see Chapter 7. |
| **RS-232C connector** | 9-pin connector for the RS-232C interface |
| **GP-IB connector** | 24-pin connector for the GP-IB interface |

# Chapter 2
# Preparation for Use

## 2.1 Installation of the Unit

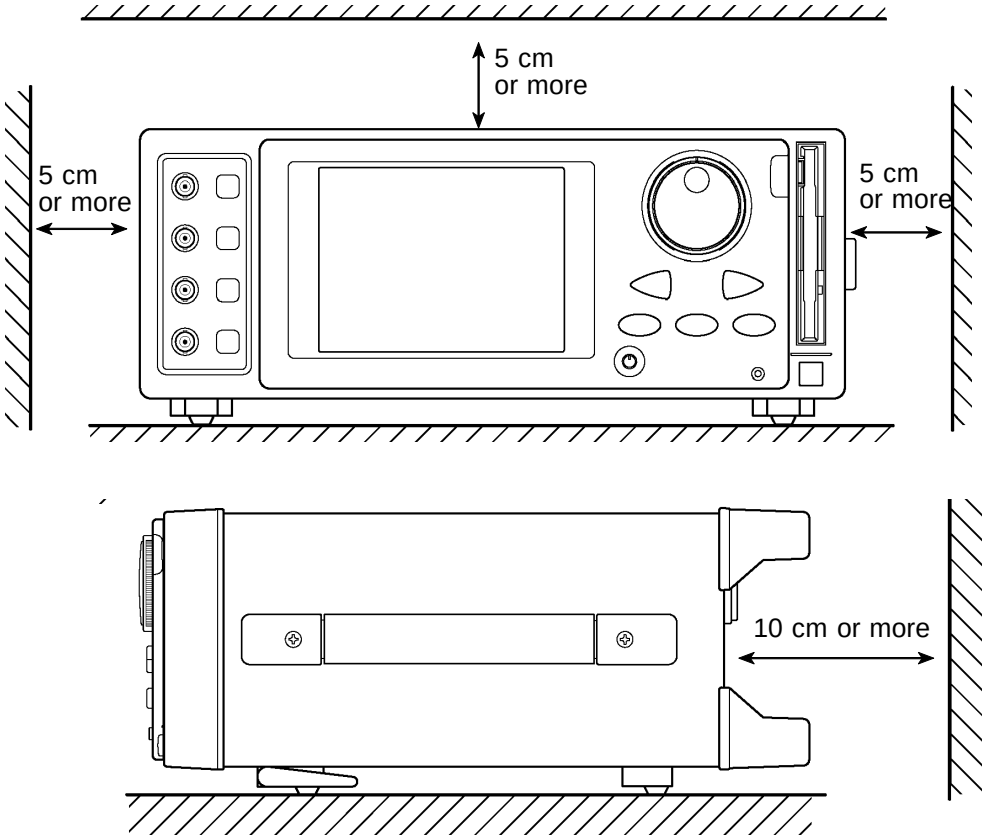
**⚠ CAUTION**

**Do not install the product with any side except the bottom facing down. This may cause a fire or other malfunction in the product.**



⚠ CAUTION

**Ventilation holes for heat radiation are provided on the top of the product. Leave sufficient space around the ventilation holes and install the product with the holes unobstructed. Installation of the product with the ventilation holes obstructed may cause a malfunction or fire.**




## Installation Conditions

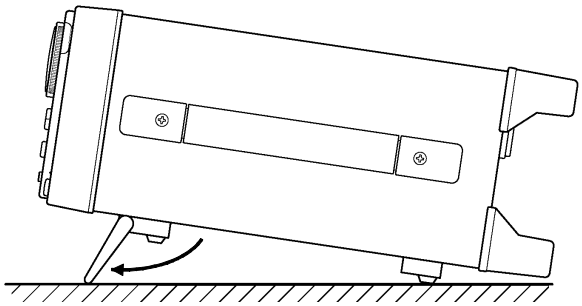
Locate the unit so that the following conditions are met.
Temperature: 10 to 40°C, Humidity: 85%RH or less (with no condensation)
Avoid the following locations:

- Subject to direct sunlight
- Subject to high levels of dust, steam, or corrosive gases
- In intense electromagnetic fields, near high-voltage equipment or power lines.
- Near a heat source.
- On an unstable or vibrating surface.

## Placement

⚠ CAUTION

Do not apply strong downward pressure with the stand extended. Damage to the stand will result.



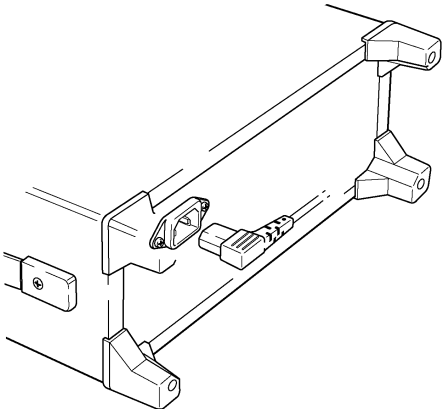
The unit should be placed either level, or tilted using the bail.

# 2.2 Connecting the Power Cord

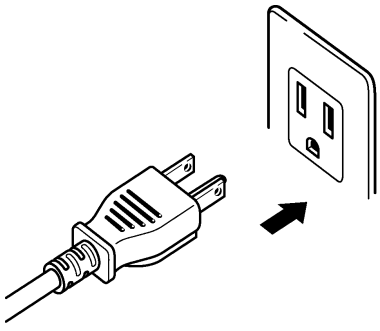
**⚠ WARNING**

- **Before turning the product on, make sure the source voltage matches that indicated on the product's power connector. Connection to an improper supply voltage may damage the product and present an electrical hazard.**
- **To avoid electric shock and ensure safe operation, connect the power cable to a grounded (3-contact) outlet.**

1. Verify that the power switch of the unit is set to OFF.
2. Make sure that the power supply matches the ratings, and plug the power cord into the power connector on the rear panel.



3. Plug the power cord into the outlet.



## 2.3 Output Terminal

Waveforms are output from the analog output terminals, with the lowest terminal being channel 1. BNC cables can be directly connected.

**⚠ WARNING**

**The minimum load impedance of the analog output terminals is 40 Ω. Avoid connecting loads with less than 40 Ω, or short-circuiting the output, as the unit could be damaged or overheat.**

**⚠ CAUTION**

Avoid applying external voltage to the analog output terminals, as the unit could be damaged.

**NOTE**

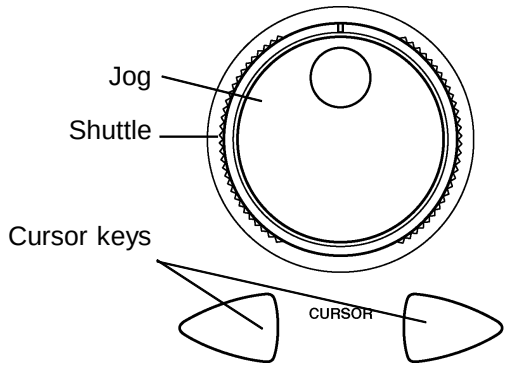
To obtain optimum quality high-frequency waveform output, the load should be terminated at 50 Ω impedance. In this case, the waveform amplitude is half of the value set on the 7075.

# 2.4 Basic Operation

**⚠ CAUTION** Do not use excessive force on the touch panel, and do not use sharp objects that could damage the touch screen.

**Touch panel** Various settings and adjustments can be made with the touch panel on the 7075. Press the buttons on the screen gently to open windows and make selections.

### Jog and Shuttle controls

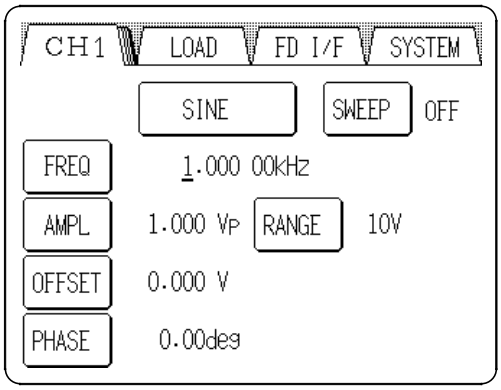



The Jog and Shuttle controls are used in combination with the cursor keys to set and change values.

| | |
|---|---|
| Shuttle | Used to move between items. |
| Jog | Changes the value of the flashing item selected by the cursor, and moves the selection. |
| Cursor keys | Shifts the selected digit within an item. The upper or lower digit within an item can be selected. |

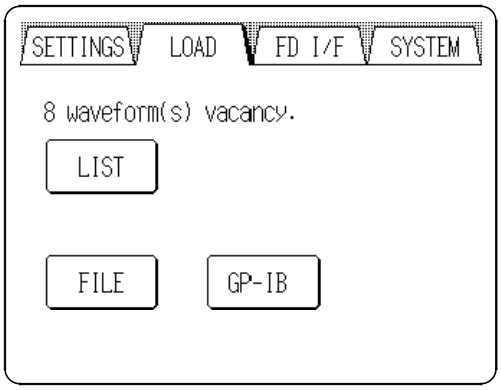
# 2.5 Screen Description

The 7075 has the following four main screens.
Pressing the tabs at the top of the LCD selects each main screen. The tabs do not appear on lower level screens, but pressing the Return button returns to the higher level at which the main screen selection tabs are accessible.



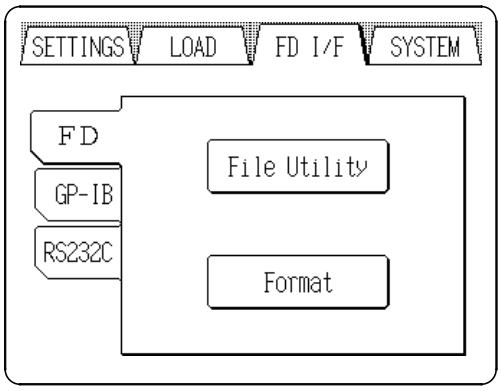

Output Setting screen

The output channels and waveforms, and various waveform parameter settings can be selected and set from this screen.
The output values of each items are displayed.



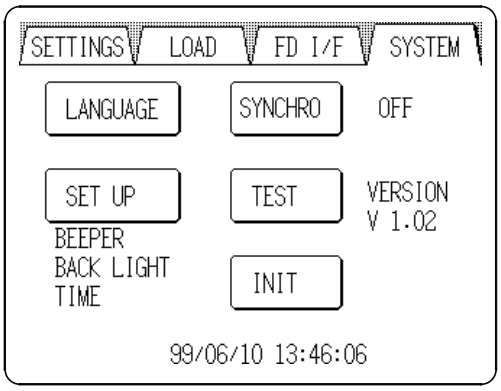

Waveform Input screen

Custom waveform data can be entered from this screen.




FD I/F screen

The output state can be saved to floppy disk and the interface can be set up from this screen.

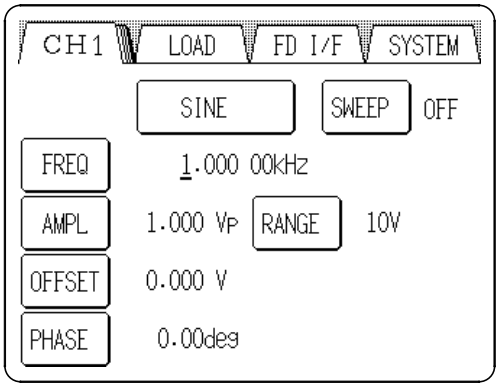



SYSTEM screen

Various conditions of the unit can be set and self testing can be performed from this screen.

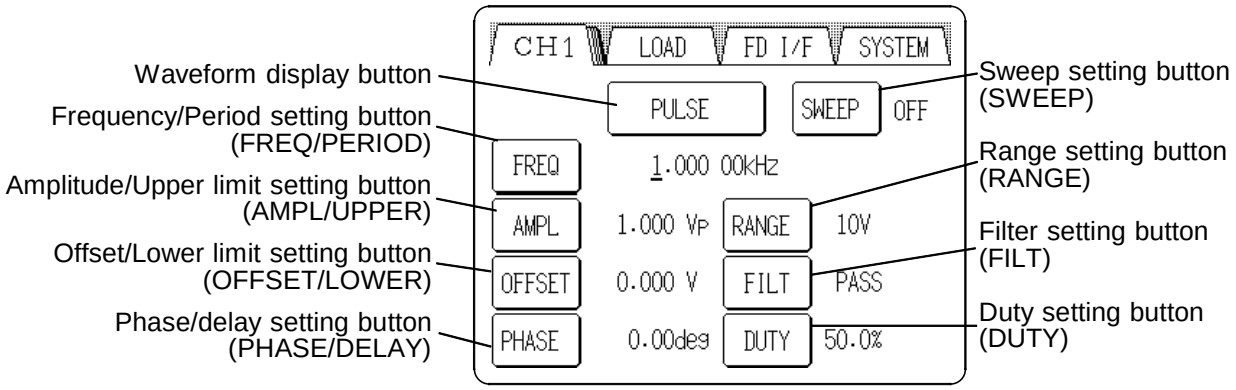
# 2.6 Example of Basic Operations

## 2.6.1 Before Operations



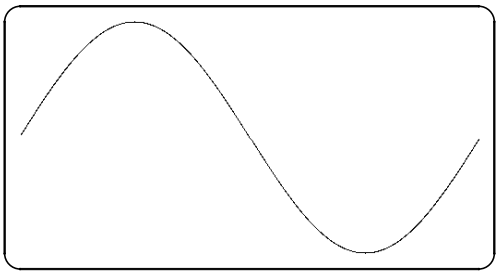

1. Connect the power cord and connecting cables to the unit.
2. Turn on the power.
3. The Output Setting screen is displayed after the opening message screen.

## 2.6.2 Output Setting Screen Buttons

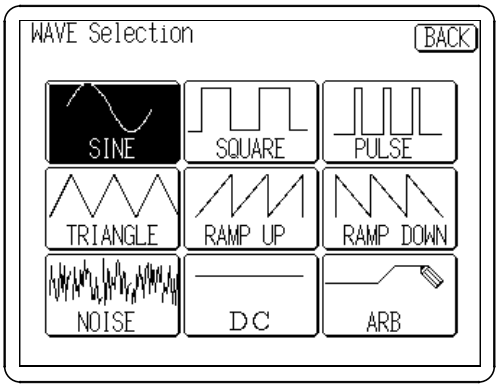



**NOTE** The above buttons may not appear or may appear grayed out depending on the waveform and output conditions. In such cases, they are disabled.

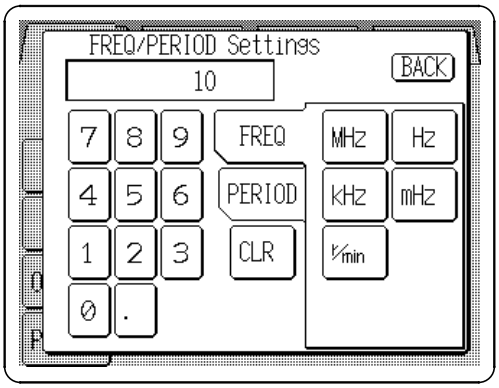
## 2.6.3 Simple Waveform Output



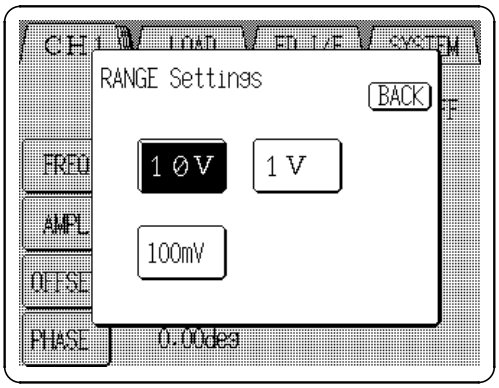
Example
Waveform: Sine waveform
Output channel: Channel 1
Output frequency: 10 kHz
Output amplitude: 5 Vp



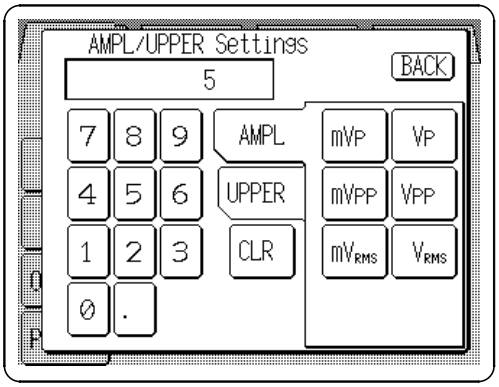

1. Press the Waveform display button on the Output setting screen, and the WAVE Selection screen appears.
2. Press the **SINE** button.



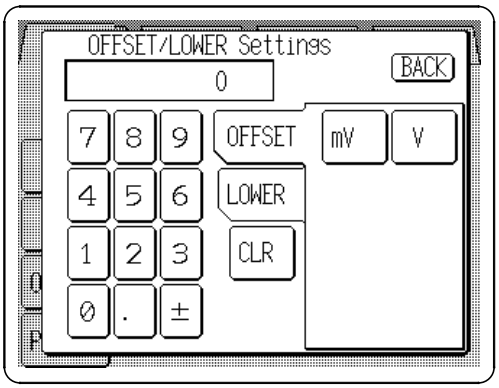

3. Press the Frequency/Period setting button (**FREQ**/**PERIOD**) on the Output setting screen, and the FREQ/PERIOD Settings window appears.
4. Set to **10 kHz**.



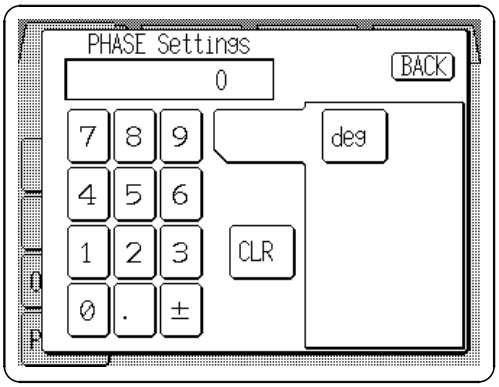

5. Press the Range setting button on the Output setting screen, and the Range setting window appears.
6. Select the **10 V** button.




7. Press the Amplitude/Upper limit setting button (**AMPL**/ **UPPER**) on the Output setting screen, and the AMPL/ UPPER (amplitude/upper limit) Settings window appears.
8. Set to **5 Vp**.




9. Press the Offset/lower limit setting button (**OFFSET**/ **LOWER**) on the Output setting screen, and the OFFSET/ LOWER(lower limit) Settings window appears.
10. Set to **0 V**.

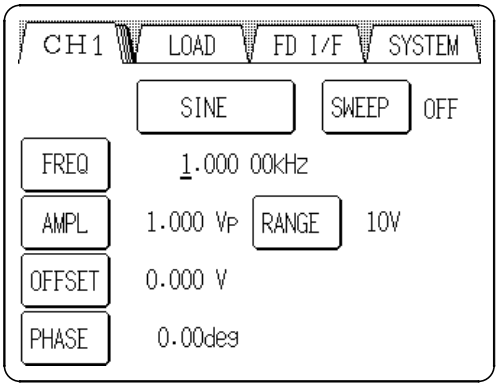



11. Press the Phase/delay setting button (**PHASE**/ **DELAY**) on the Output setting screen, and the PHASE Settings window appears.
12. Set to **0 deg**.
13. When finished settings, press the Channel On/Off key (CH1) at the lower left front panel. The key will light red to indicate standing by for output.
14. Press the **RUN/STOP** key at the lower right front panel. The key will light red as the waveform is output.

# Chapter 3
# Output Setting Screen

On this screen, the output channel, waveform, waveform parameters can be set.

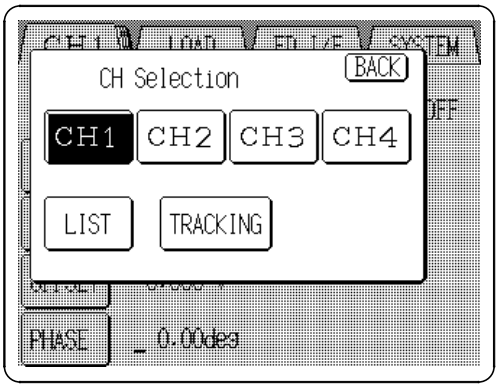
## 3.1 Selecting the Output Settings Screen




Pressing the **SETTINGS** tab at the upper left of the screen causes the main Output settings screen to appear.

If the tabs are not visible at the top of the screen, a lower level screen is currently displayed. Press the **BACK** button to return to a higher level, and then perform the above step.

## 3.2 Selecting the Channel

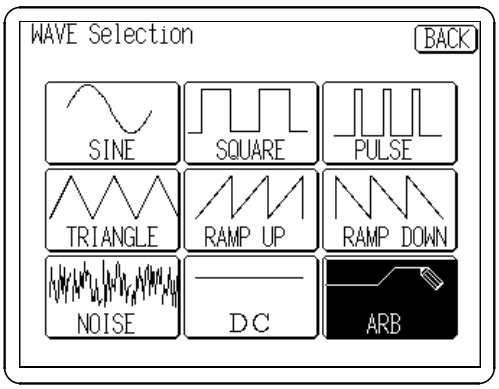



1. Pressing a tab to display channel numbers opens the CH Selection window.
2. Pressing the button for the channel to be set selects that channel number and returns to the main Output settings screen.
   Pressing the **LIST** button in the CH Selection window displays a list of the status of all channels.
   Pressing the **TRACKING** button enables setting the waveform, frequency, etc. of all channels simultaneously.

# 3.3 Selecting the Waveforms

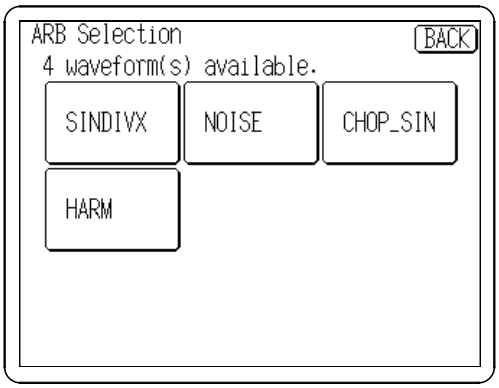
Select the waveform to be output from the following list.

Function generator: Sine, square, pulse, triangle, ramp-up, ramp-down, noise and DC waveforms
Arbitrary waveforms (8 pre-stored waveforms)



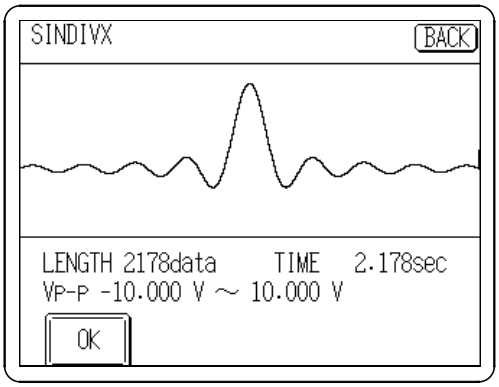

1. Press the Waveform display button, and the Waveform selection window opens.
2. Select the waveform to be output.

   For arbitrary waveforms, select ARB to display a list of the arbitrary waveforms that have been stored in the unit.
   Otherwise, choose the desired waveform and return to the main Output settings screen.




(Arbitrary waveform selection)

1. On the arbitrary waveform screen, select the waveform to be output.




   The information of waveform size, output time, and amplitude for the specified waveform is displayed.

2. To set the waveform, press the **OK** button.

   To change the waveform, press the **BACK** button to return the ARB selection screen and select the waveform again.

**NOTE**

- The waveform cannot be selected while RUN is active.
- Arbitrary waveforms cannot be selected until they have been stored in the unit. See Chapter 4, "Waveform Input Screen" to enter waveforms.

# 3.4 Setting the Waveform Parameter

Waveform parameters can be set by two methods.

### Direct numeric entry

Pressing the button for an item to be set opens the numeric entry window. A value can then be entered by the tenkeys. Pressing the **CLR** button clears the entered value.

### Changing with the Jog dial

The currently selected (blinking) digit can be changed by turning the dial to the right to increase, or to the left to decrease. Other digits can be selected with the cursor keys.
Items can be selected by any of the following methods:

- Turn the Shuttle ring to the right or left
- Press a cursor key
- Press the field of the item to be selected

**NOTE** Depending on the setting format, some settings cannot be performed with the Jog dial.

## 3.4.1 Frequency/Period Settings

Set the frequency of the output waveform.

**Setting range**

The setting range and resolution

- Function generator

| | |
|---|---|
| Sine and square waveforms | 0 to 10 MHz (10 mHz) |
| Pulse, triangle, ramp-up, ramp-down waveforms | 0 to 200 kHz (10 mHz) |
| Noise, DC | ———— |

- Arbitrary waveforms

Determined by the sampling clock and waveform size.
0 to 10 MHz (10 mHz)

**Setting units**

**Hz** Output and arbitrary waveform sample blocks are set in frequency units.

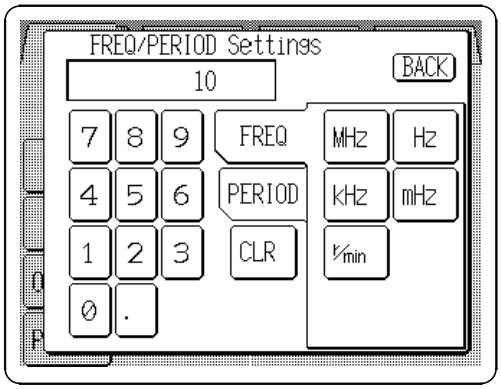
**r/min** Output and arbitrary waveform sample blocks are set in rpm (revolutions per minute) units.

**s** Output and arbitrary waveform sample blocks are set in period units.

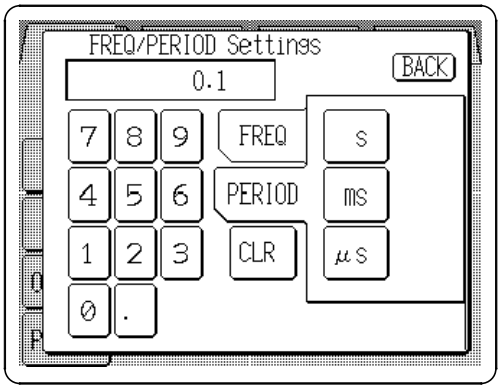
## Method

### Direct Entry

1. Press the Frequency/Period setting button (**FREQ**/**PERIOD**) to open the FREQ/PERIOD settings window.
2. Select either frequency or period entry format. For arbitrary waveforms, the setting affects both output values or sampling clock frequencies.
3. Enter the numeric value by the tenkeys.
4. Select the units. Pressing the unit button accepts the value entered in step 3, and returns to the main Output settings screen. The main screen shows the entered format, or if the setting is invalid, the entry is cleared.




When the frequency is set




When the period is set

### Jog Dial Entry

The Jog dial can be used to set frequency or clock frequency. When a arbitrary waveform is selected, the clock frequency is displayed at the left side and the output frequency can be set within parentheses.

**NOTE**

- Setting is inhibited when sweep is active
- Setting is inhibited for noise or DC waveforms
- All settings are stored as frequencies within the 7075. Because rpm (r/min) and period (s) formats are converted to facilitate the internal analysis functions, entered values and actual setting values may differ slightly, in which case the actual setting is made as close as possible to the entered value.
- When changing a waveform, if the setting frequency exceeds the settable range of that waveform, the maximum allowable value is used.
- The Jog dial can be used to set frequency and clock frequency formats, but not the rpm (r/min) or period (s) formats.

## 3.4.2 Amplitude/Upper Limit Value Settings

Set the amplitude or upper limit value of the output waveform.

**Setting range**

Regardless of the output waveform, the settings can be made in the following range.

• When setting the amplitude

| | |
|---|---|
| 10V range | 0 to 10 Vp (resolution 1 mVp) |
| 1V range | 0 to 1 Vp (resolution 0.1 mVp) |
| 0.1V range | 0 to 0.1 Vp (resolution 0.01 mVp) |

• When setting the upper limit value

| | |
|---|---|
| 10V range | Lower limit value to 10 V (resolution 2 mV) |
| 1V range | Lower limit value to 1 V (resolution 0.2 mV) |
| 0.1V range | Lower limit value to 0.1 V (resolution 0.02 mV) |

**Setting units**

**Vp** For amplitude setting, sets the amplitude of one polarity

**Vpp** For amplitude setting, sets peak-to-peak amplitude

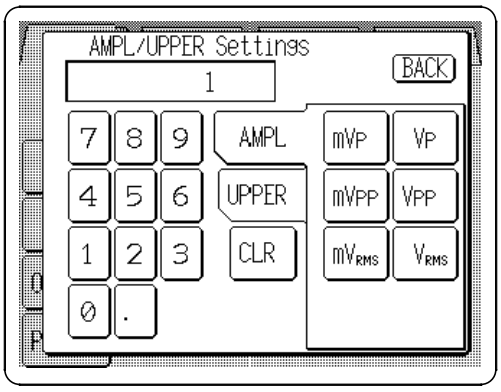
**$V_{RMS}$** For amplitude setting, sets the root-mean-square amplitude (only for sine waves)

**V** Sets the voltage when setting the upper limit

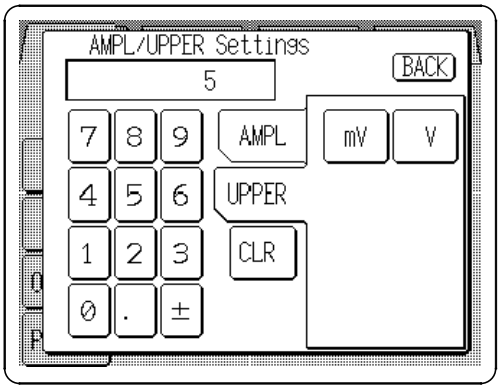
**Method**

### Direct Entry

1. Press the Amplitude/Upper limit setting button (**AMPL**/**UPPER**) to open the AMPL/UPPER Settings window.
2. Select either amplitude or upper limit entry format.
3. Enter the numeric value by the tenkeys.
4. Select the units. Pressing the unit button accepts the value entered in step 3, and returns to the main Output settings screen. The main screen shows the entered format, or if the setting is invalid, the entry is cleared.




When the amplitude is set




When the upper limit is set

### Jog Dial Entry

The Jog dial can be used to set amplitude or upper limit value.

NOTE

- Setting is inhibited for DC waveforms
- Amplitude/offset and upper/lower limit settings are interdependent: a change to the setting format of one item is automatically applied to the other.
  Amplitude --- upper limit
  Offset --- lower limit
- The output voltage range is the setting at high-impedance load.
- The sum of the peak amplitude and the absolute value of the offset is limited to the set range. Overrange setting is not possible.
- The RMS amplitude unit selection is automatically changed to Vp units if the waveform selection is changed.

## 3.4.3 Offset/Lower Limit Value Settings

Set the offset voltage or lower limit value of the output waveform.

**Setting range**

Offset

| | |
|---|---|
| 10 V range | -10 V to 10 V (resolution 1 mV) |
| 1 V range | -1 V to 1 V (resolution 0.1 mV) |
| 0.1 V range | -0.1 V to 0.1 V (resolution 0.01 mV) |

Lower limit value

| | |
|---|---|
| 10 V range | -10 V to upper limit value (resolution 2 mV) |
| 1 V range | -1 V to upper limit value (resolution 0.2 mV) |
| 0.1 V range | -0.1 V to upper limit value (resolution 0.02 mV) |

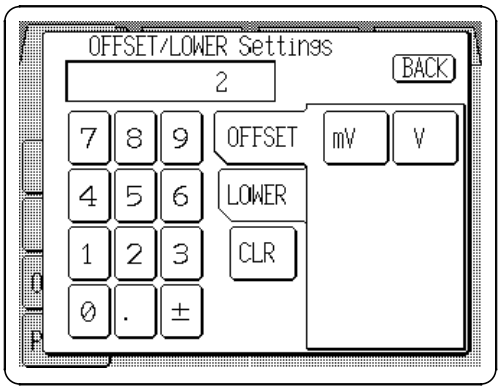
**Setting unit** **V**: Set the voltage value

⚠CAUTION When the Channel ON/OFF key is ON, the preset offset value is output regardless of whether the RUN/STOP key is on or off. (When the channel is on, the key lights in red.)

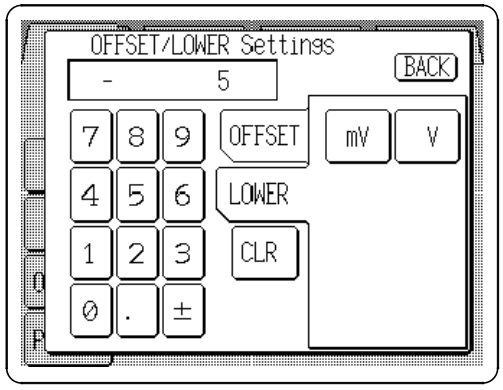
## Method

### Direct Entry

1. Press the Offset/Lower limit setting button (**OFFSET**/**LOWER**) to open the OFFSET/LOWER Setting window.
2. Select either offset voltage or lower limit value entry format.
3. Enter the numeric value by the tenkeys.
4. Select the units. Pressing the unit button accepts the value entered in step 3, and returns to the main Output settings screen. The main screen shows the entered format, or if the setting is invalid, the entry is cleared.




When the offset is set




When the lower limit is set

### Jog Dial Entry

The Jog dial can be used to set offset voltage or lower limit value.

NOTE
- Setting is inhibited when sweep is active
- Setting is inhibited for DC waveforms
- Amplitude/offset and upper/lower limit settings are interdependent: a change to the setting format of one item is automatically applied to the other.
  Amplitude --- upper limit
  Offset --- lower limit
- The output voltage range is the setting at high-impedance load.
- Settings exceeding the range are not possible. The voltage to which the absolute amplitude and offset voltage values has been added must be within the range set.

## 3.4.4 Phase/Delay Settings

For the function generator (Sine, square, pulse, triangle, ramp-up, and ramp-down waveforms), set the phase. For the arbitrary waveforms, set the delay.

**Setting range** The setting range and resolution

• Function generator

| | |
|---|---|
| Sine, square, pulse, triangle, ramp-up, ramp-down waveforms | -360.00 to 360.00 deg (0.01 deg) |
| Noise, DC | ———— |

• Arbitrary waveforms

-128000 to 128000

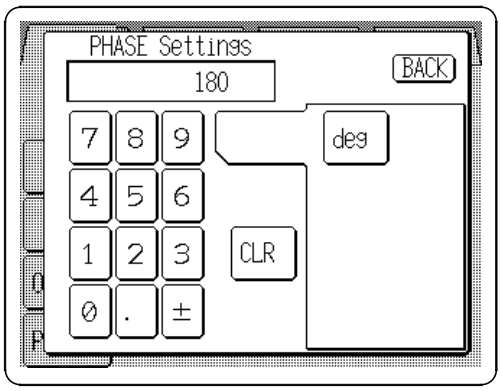
**Setting unit**

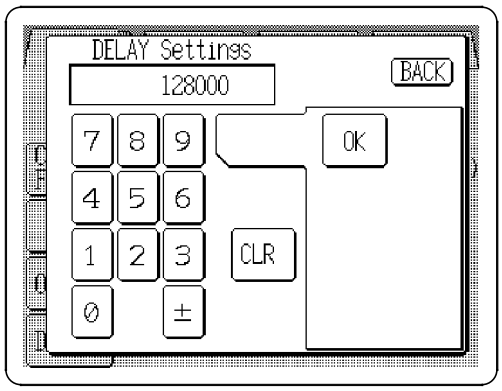
**deg** A phase angle can be set for the function generator. There are no units for the delay setting.

**Method**

### ■ Direct Entry

1. Press the Phase/Delay setting button (**PHASE**/**DELAY**) to open the PHASE/DELAY Setting window.
2. Enter the numeric value by the tenkeys.
3. Pressing the **deg** or **OK** button returns to the main Output Settings screen. If the setting is invalid, the entry is cleared.




### ■ Jog Dial Entry

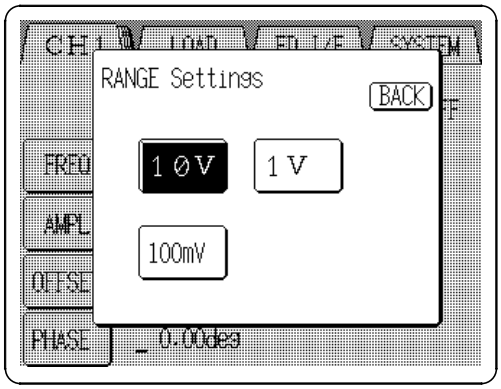
The Jog dial can be used to set phase or delay.

**NOTE**

• Phase and delay values are positive, indicating leading phase.

• The delay is set to 0 when changing the waveform type from function generator to arbitrary waveform.

## 3.4.5 Range Settings

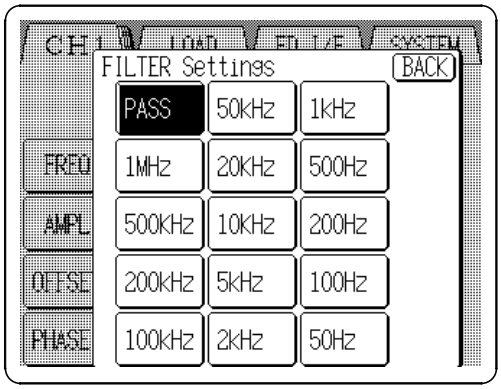



Select the output range.
10 V: output range upto ±10V
1 V: output range upto ±1V
100 mV: output range upto ±100 mV

1. Press the Range setting button (**RANGE**) to open the RANGE Settings window.
2. Press the button for the desired range to select that range and return to the main Output settings screen.

**NOTE** When changing ranges, the amplitude/upper limit and offset/lower limit values are automatically changed to correspond with the new range selection.

## 3.4.6 Filter Settings




Select the cut-off frequency of the low pass filter.

1. Press the Filter setting button (**FILT**) to open the FILTER Settings window.
2. Press the button for the desired cut-off frequency to select that range and return to the main Output Settings screen.

**NOTE** Filter selection is not available for sine wave, square wave and DC waveforms.

## 3.4.7 Duty Settings

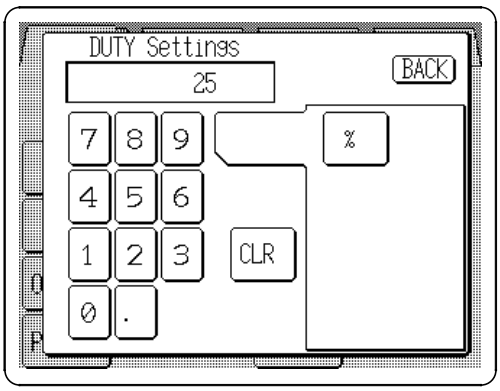
The duty cycle of pulse waveforms can be set.

**Setting range** 1 to 99% (resolution 0.1%)

**Setting unit** **%**: the percentage of high level in each cycle

**Method**

### ■ Direct Entry




1. Press the Duty setting button (**DUTY**) to open the DUTY Settings window.
2. Enter the numeric value by the tenkeys.
3. Select the units. Pressing the **%** button accepts the value entered, and returns to the main Output Settings screen. If the setting is invalid, the entry is cleared.

### ■ Jog Dial Entry

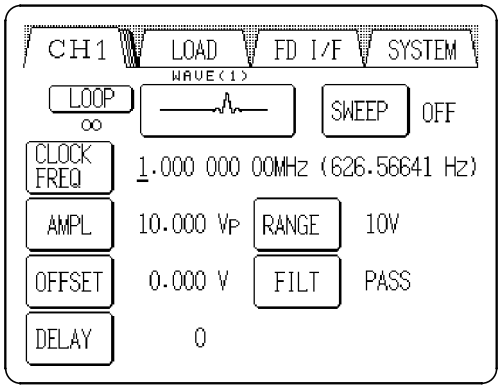
The Jog dial can be used to set duty.

**NOTE**

- Setting is inhibited when sweep is active
- Setting is inhibited for waveforms excluding pulse.
- Waveforms with less than 100 ns pulse width may not be output correctly.
- Pulse width generates 100 ns jitter.

## 3.4.8 Setting the Number of Loops

Set the number of loops for arbitrary waveforms.



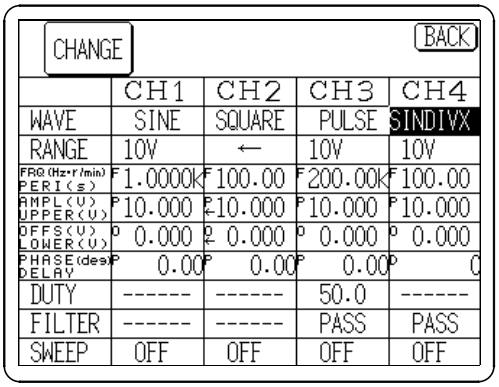

Setting range: 1 to 65535 or ∞

1. Select the arbitrary waveform on the output setting screen, the **LOOP** button is displayed.
2. Press the **LOOP** button and the Arbitrary waveform setting window opens.
3. Enter the number of loops by the tenkeys.

**NOTE**

- Can be set individually for each channel.
- The number of loops of sweep data is set to ∞ when shipped from the factory, and when the device is reset.
- This setting is not effect on sweep data of the arbitrary waveforms.
- Even when one channel is inactive because of a setting for the number of loops of sweep data (total number of loops), the LED on the **RUN/STOP** key remains lit if outputs are being made on other channels.

# 3.5 Displaying the States of All Channels List




1. Press the channel number tab to open the CH Selection window.
2. Press the **LIST** button to display a list of the states of all channels.
3. Turn the Jog dial to change the selected (reverse display) setting item.
   Press the **CHANGE** button to modify the selected item. Other setting items can also be selected by pressing the desired item itself. Pressing a selected (reverse display) item allows editing its contents.

The meanings of the symbols in the table are as follows:

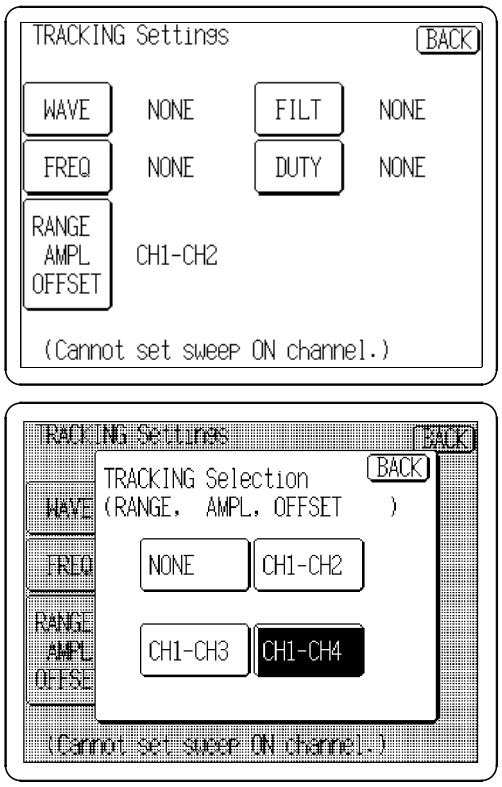
| Item | Meanings of the symbols |
|---|---|
| Frequency/period display column [FREQ/ PERI] | F frequency (Hz)<br>r frequency (r/min)<br>P period (s) |
| Amplitude/upper limit value display column [AMP/ UPPER] | P amplitude (Vpeak)<br>PP amplitude (Vpp)<br>R amplitude ($V_{RMS}$)<br>U upper limit (V) |
| Offset/lower limit displays value [OFFS/LOWER] | O offset (V)<br>L low limit value(V) |
| Phase/delay display column [PHASE/DELAY] | P phase (deg)<br>D delay |

# 3.6 Setting Multiple Channels at the Same Time

**Setting items** Waveform, frequency (period), amplitude, offset, filter, duty

**Selections**

| | |
|---|---|
| **None** | All channels are set independently |
| **CH1-CH2** | Channels 1 and 2 are set simultaneously |
| **CH1-CH3** | Channels 1 and 3 are set simultaneously (7075-01 is not possible) |
| **CH1-CH4** | All channels are set simultaneously (7075-01 is not possible) |




1. Press the channel number tab to open the CH Selection window.
2. Press the **TRACKING** button to display a list of the states of all channels.
3. Press the button for the channels to be set simultaneously. The selection window for simultaneous settings opens. Select the channels to be set simultaneously and the Channel 1 settings to be copied to the other channels.
4. For other settings, select the channels to be set simultaneously in the same way.
5. When an item is set on a channel to be set simultaneously with another, the setting for the other channel is also set in the same way.

**NOTE**

- Setting is inhibited when sweep is active
- Some settings cannot be set for multiple channels simultaneously.

# 3.7 Waveform Sweep Settings

### (1) Overview

The frequency, amplitude, offset and duty cycle of waveforms can be swept. A table display allows easy entry of sweep time, sweep start value, end value and number of loops. Frequency or duty cycle, amplitude and offset can be swept simultaneously.

### (2) Sweep waveforms

All waveforms selectable in "3.3 Selecting the Waveforms" can be swept.

### (3) Sweep items

Frequency (DC waveform, waveforms excluding noise)
Amplitude (Waveforms excluding DC)
Offset (All waveform)
Duty (Pulse waveform)

### (4) Sweep settings (lines)

The sweep time, sweep start value, end value and number of loops are set at one time (in the same row of the table). Up to 128 lines can be created.

### (5) Number of loops of sweep data

The number of loops of sweep data (up to 128 lines) can be set. (1 to 65535, or ∞ see Section 3.7.17)

### (6) Marker Output Function

When the sweep data takes a value within the specified range, or when the data is at a specified line, signals can be output externally from the marker output terminal on the rear panel.

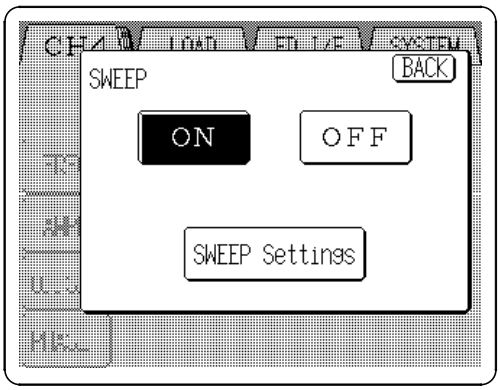
### (7) Monitor function

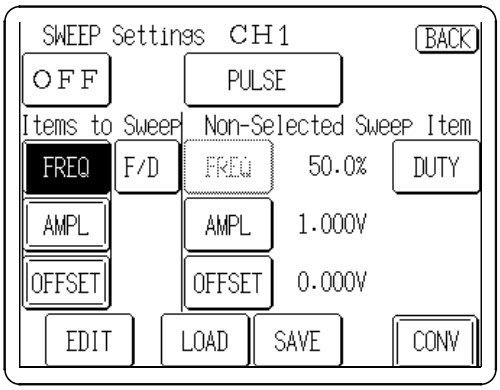
Approximate instantaneous values output during RUN on the Output Setting screen can be monitored.

**NOTE**

- The monitor values are updated approximately every 200 ms.
- Switching the display channel allows the specified channel values to be monitored.
- The element number of loops monitor can display up to 1024 cycles. When the number of cycles exceeds 1024, the count is reset to zero and counting continues.
- The total number of loops monitor displays up to 65535 cycles. If the number of cycles exceeds 65535, the display shows "----".

## 3.7.1 Selecting the Sweep Settings Screen



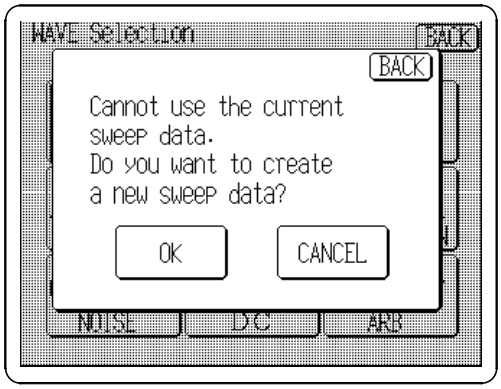




Select the Sweep Settings screen

1. Press the **SWEEP** button on the Output Settings screen, and the Sweep selection window opens.
2. Press the **SWEEP Settings** button, and the SWEEP Settings screen opens.

## 3.7.2 Selecting the Sweep Waveform

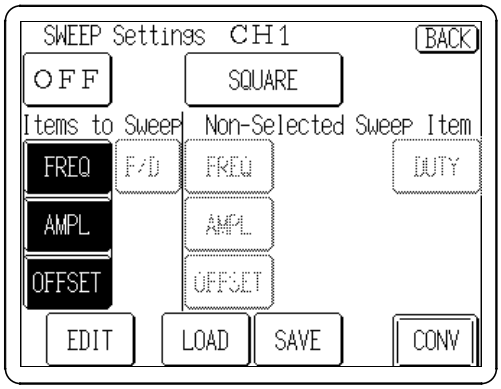
Press the Waveform display button to select the waveform.
The method of settings is same as the procedure in Section 3.3.




When selecting a waveform, the display shown at the left may appear.
Press the **OK** button to delete all sweep data, or press **CANCEL** to leave the waveform unchanged.
This display can appear for the following reasons:

- The frequency setting cannot be changed after changing the waveform (when changing from a sine or square wave to another waveform).
- The offset setting cannot be changed after changing the waveform (when changing from DC to another waveform).

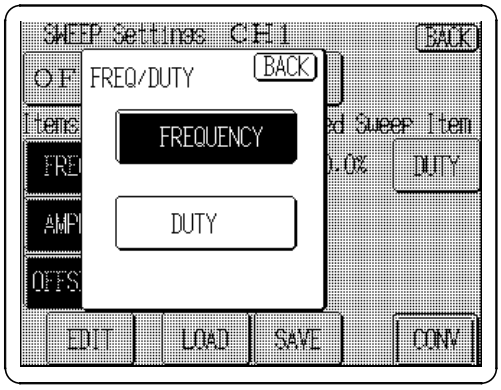
## 3.7.3 Selecting Items to Sweep




Press the **FREQ**, **AMPL** or **OFFSET** buttons so that the items to be swept are displayed in reverse.

Buttons displayed in reverse (white on black) indicate the items that are settable on the SWEEP Editor screen, described later.

## 3.7.4 Sweep Settings (Pulse Waveforms)




The frequency or duty cycle of pulse waveforms can be swept.
Simultaneous sweeping is not possible.
Press the **F/D** button to open the FREQ/DUTY window.
Press the **FREQUENCY** or **DUTY** button to sweep that item.

## 3.7.5 Non-Selected Sweep Item Settings

⚠CAUTION When the Channel ON/OFF key is ON, the preset offset value is output regardless of whether the RUN/STOP key is on or off. (When the channel is on, the key lights in red.)

Non-selected items (non-reversed buttons) can be selected for setting according to "3.7.3 Selecting Items to Sweep."
Grayed-out items are not settable.

### Frequency

Press the **FREQ** button to set the frequency.
The setting method is the same as direct entry in "3.4.1 Frequency/Period Settings." However, note that even when the period or r/min units have been used for setting, the display shows equivalent frequency units.

### Amplitude

Press the **AMPL** button to set the amplitude.
The setting method is the same as direct entry in "3.4.2 Ampllitude/Upper Limit Settings." However, note that the upper limit value cannot be set and even when the pp or RMS units have been used for setting, the display shows equivalent peak units.

### Offset

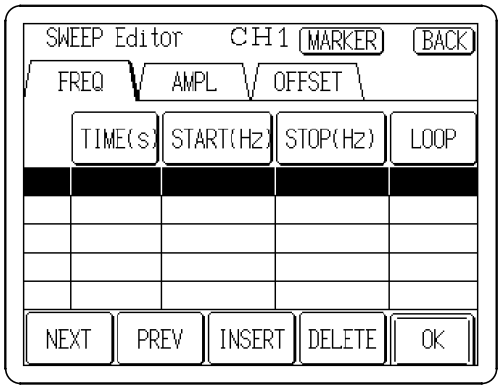
Press the **OFFSET** button to set the offset.
The setting method is the same as direct entry in "3.4.3 Offset/Lower Limit Settings." However, note that the lower limit value cannot be set.

### Duty

Press the **DUTY** button to set the duty.
The setting method is the same as direct entry in "3.4.7 Duty Settings."

**NOTE** Phase (delay) and range setting values are valid when the sweep is off. Use the Output setting screen to set.

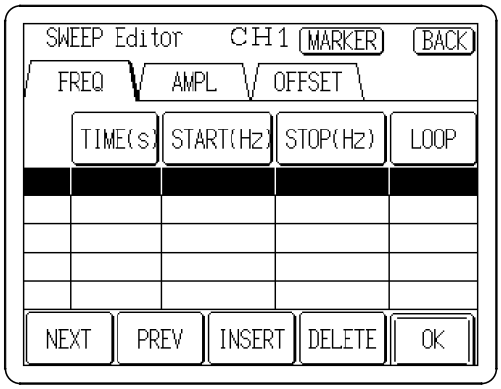
## 3.7.6 Selecting the Sweep Editor Screen




To select the screen for setting the sweep selection items:

Press the **EDIT** button on the SWEEP Settings screen, and the SWEEP Editor screen appears.

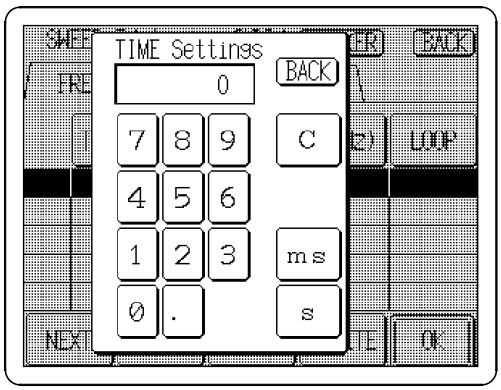
## 3.7.7 Selecting the Sweep Items to Edit




Select the item to edit among those that were selected in "3.7.3 Selecting the Items to Sweep."

Select the item to sweep.

## 3.7.8 Setting the Sweep Time




Set the time from start to finish of the sweep item.
Setting the value: 0.01 ms to 1000 s (resolution 10 µs or 5 digits)

1. Click the **TIME(s)** button or the reversed row in the time entry area to open the Sweep Time Settings window.
2. Enter the numeric value by the tenkeys.
3. Select the units. Pressing the unit button accepts the value entered in step 2, and returns to the Sweep table edit screen. If the setting is invalid, the entry is cleared.

## 3.7.9 Setting the Start Value

Set the starting value of the item selected in "3.7.7 Selecting the Sweep Items to Edit." Pressing the **START** (unit) button or the Start Value entry area on the reversed row enables entry of the starting sweep value.

### Frequency

Press the **START(Hz)** button to set the frequency.
The setting method is the same as direct entry in "3.4.1 Frequency/Period Settings." However, note that even when the period or r/min units have been used for setting, the display shows equivalent frequency units.

### Amplitude

Press the **START(V)** button to set the amplitude.
The setting method is the same as direct entry in "3.4.2 Amplitude/Upper Limit Settings." However, note that the upper limit value cannot be set and even when the pp or RMS units have been used for setting, the display shows equivalent peak units.

### Offset

Press the **START(V)** button to set the offset. The setting method is the same as direct entry in "3.4.3 Offset/Lower Limit Settings." However, note that the lower limit value cannot be set.

### Duty

Press the **START(%)** button to set the duty. The setting method is the same as direct entry in "3.4.7 Duty Settings."

## 3.7.10 Setting the End Value

⚠CAUTION When the Channel ON/OFF key is ON, the preset offset value is output regardless of whether the RUN/STOP key is on or off. (When the channel is on, the key lights in red.)

Set the ending value of the item selected in "3.7.7 Selecting the Sweep Items to Edit." Pressing the **END(Unit)** button or the End Value entry area on the reversed row enables entry of the ending sweep value.

### Frequency

Press the **END(Hz)** button to set the frequency.

The setting method is the same as direct entry in "3.4.1 Frequency/Period Settings." However, note that even when the period or r/min units have been used for setting, the display shows equivalent frequency units.

### Amplitude

Press the **END(V)** button to set the amplitude.
The setting method is the same as direct entry in "3.4.2 Amplitude/Upper Limit Settings." However, note that the upper limit value cannot be set and even when the pp or RMS units have been used for setting, the display shows equivalent peak units.

### Offset

Press the **END(V)** button to set the offset. The setting method is the same as direct entry in "3.4.3 Offset/Lower Limit Settings." However, note that the lower limit value cannot be set.

### Duty

Press the **END(%)** button to set the duty. The setting method is the same as direct entry in "3.4.7 Duty Settings."

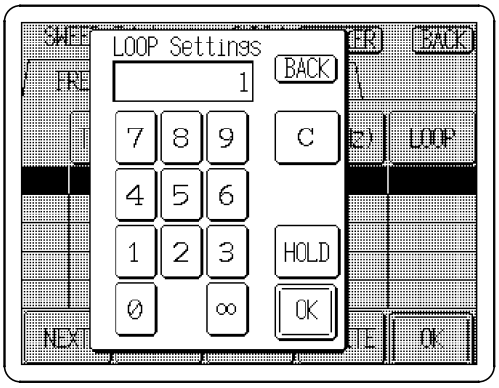
## 3.7.11 Setting the Number of Loops

Set the number of loops of item set in sections 3.7.8 to 3.7.10.

**1** to **1024** Loop for the specified time

∞ Sweeping repeats from the starting value to the ending value until the front panel TRIG key is pressed, or until a signal is input at one of the four TRIGGER IN external trigger input terminals.

**HOLD** This function can be used with specific number of loops, but not with infinite looping. The last data value is saved until the front panel TRIG key is pressed, or until an external trigger signal is received. This action is repeated for the specified number of number of loops.
After the specified number of loops is completed, or after canceling infinite looping or HOLD, the sweep action specified in the subsequent line is performed. When the last sweep line has completed, the first line is repeated.




1. Press the **LOOP** button to open the LOOP Settings window.
2. Press the ∞ button on the tenkeys to select infinite looping, or press the **HOLD** button so that it displays in reverse.
   Specify the number of loops using the tenkeys.
3. Press the **OK** button to accept the settings and return to the SWEEP Editor Screen. If a setting is invalid, its entry is cleared.

## 3.7.12 Entering Multiple Lines

Repeat the procedures in Sections 3.7.8 to 3.7.11 to enter multiple lines.

1. Turn the Jog dial to the right or press the **NEXT** button so that the next row is displayed in reverse.
2. Follow the procedures in Sections 3.7.8 to 3.7.11.
3. Repeat preceding steps 1 and 2.

## 3.7.13 Inserting a Line

1. Turn the Jog dial or press the **NEXT** or **PREV** buttons so that the line following the one to be inserted is displayed in reverse.
2. Press the **INSERT** button to insert the new line above the selected line.

**NOTE** Line cannot be inserted after 128 lines have been set.

## 3.7.14 Deleting a Line

1. Turn the Jog dial or press the **NEXT** or **PREV** buttons so that the line following the one to be deleted is displayed in reverse.
2. Press the **DELETE** button to insert the new line above the selected line.

## 3.7.15 Creating Sweep Data

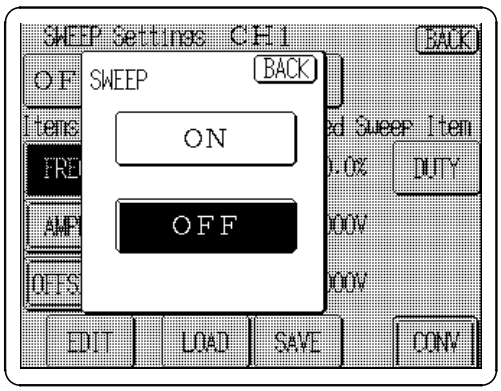
Sweep data can be created from the parameters entered for each item. When a sweep parameter is changed, the waveform data is automatically recalculated and the sweep progresses linearly from the original value to the new value.

1. Pressing the **OK** button displays the "Converting..." message while the sweep data is created, and then the Sweep Settings screen reappears.
2. Pressing the **BACK** button on the Sweep Table Edit screen returns to the Sweep Settings screen without creating the waveform data. Pressing the **CONV** button on this screen does create the sweep data.

**NOTE**

- If a selection does not have sweep settings, when changing items, be sure to press the **CONV** button to create the sweep data.
- Waveforms are not created when RUN is active.

## 3.7.16 Sweep Data Output



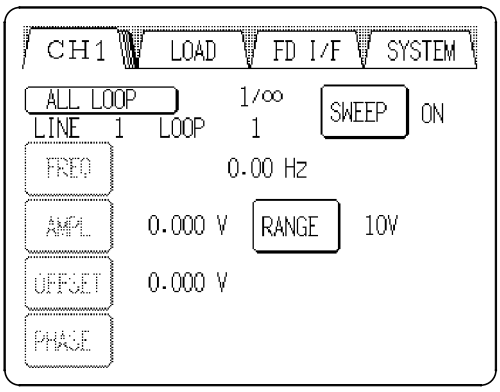

1. Press the Sweep setting button on the Sweep Settings screen to open the **Sweep ON/OFF** switching window.
2. Press the **ON** button to enable sweep output.
3. Press the **Channel ON/OFF** keys of the channels to be output to activate the output relays (awaiting output). The keys of the channels to be output light red.
4. Press the **RUN/STOP** key to output the waveform. This key lights red during output.
5. When the sweep output setting is on, you can monitor approximate instantaneous values output during RUN on the Output Setting screen.

**NOTE**

- With sweep enabled on CH1 and CH2
  Simultaneous setting on all channels is disabled. (For details, see Section 3.6)
- With sweep enabled on CH3
  Simultaneous setting on channels CH3 and CH4 is disabled. (For details, see Section 3.6)
- With sweep enabled on CH4
  Simultaneous setting on channel CH4 is disabled. (For details, see Section 3.6)

## 3.7.17 Setting the Total Number of Loops

Set the output time of sweep data created in Sections 3.7.8 to 3.7.14.




1. Press the **BACK** button with sweep ON in Section 3.7.16 to return to the Output setting screen (see Section 2.5). The **ALL LOOP** button appears on the upper left of the Output setting screen.
2. Press the **ALL LOOP** button to open the All loop setting window.
   Specify the number of loops to repeat sweep using the tenkeys. The setting range is 1 to 65535 or ∞ (infinite).

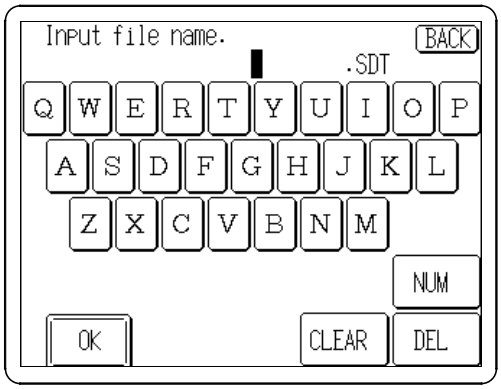
**1** to **65535** Outputs are repeated as many times as specified. When the last data is output, operations stop. (The last offset value is output.) If the last line is set to HOLD or ∞ (see 3.7.11), operations stop after the last trigger is input.

∞ Outputting repeats until it is stopped by the **RUN/STOP** key or the external RUN/STOP signal input. (The offset value when operations stop is output.)

**NOTE**

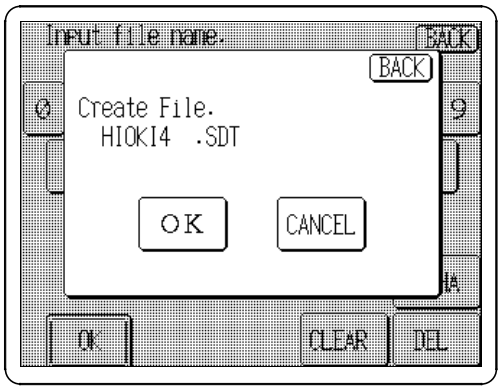
- The number of loops of sweep data is set to ∞ when shipped from the factory, and when the device is reset.
- Even when one channel is inactive because of a setting for the number of loops of sweep data (total number of loops), the LED on the **RUN/STOP** key remains lit if outputs are being made on other channels. When all channels stop because of a setting for the number of loops of sweep data (total number of loops), the LED on the **RUN/STOP** key goes off.
- When the synchronized operation, see Section 7.3.

## 3.7.18 Saving Sweep Settings



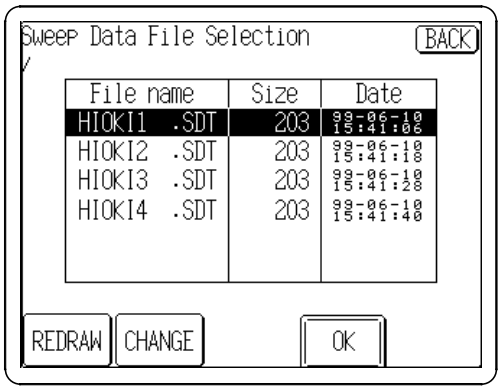

To save the sweep settings (output waveform, sweep items and item settings) to floppy disk:

1. Press the **SAVE** button to display the Sweep Filename entry screen.
2. Enter a file name (up to 8 characters).
3. Press the **OK** button. A confirmation window appears. If no file name is entered, the data will be stored in the file named TEMPDATA.SDT.




4. Click the **OK** button to save the sweep settings file to the floppy and return to the Sweep Settings screen, or click the **CANCEL** button to return to the Sweep Settings screen without saving the data.

## 3.7.19 Loading Sweep Settings




Sweep settings that have been saved to floppy disk can be loaded back into the unit:

1. Press the **LOAD** button to display the Sweep Data File Selection screen.
2. Turn the Jog dial to select (or just press on) the file name of the file to be loaded.
3. Press the **OK** button to load the sweep settings file to the unit. The sweep data is automatically regenerated.

**NOTE** Sweep setting files cannot be loaded while RUN is active.

# 3.8 Marker Output Function

When the sweep data takes a value within the specified range, or when the data is at a specified line, signals can be output externally from the marker output terminal on the rear panel.

**(1) Output value marker**

You can set an output range for the preset line of the sweep data. (Only one line can be selected.)

**(2) Line number marker**

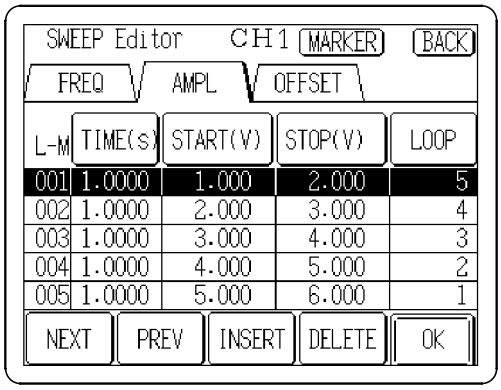
A line can be selected for the sweep data you wish to output. (More than one line can be set.)

NOTE

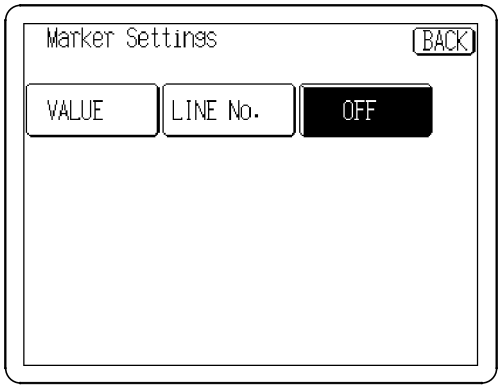
- The output value marker and the line number are output from the same output terminal.
- The type of marker (output value marker or the line number) can be selected for each channels.
- The output value marker and the line number marker cannot be set simultaneously for a channel.

## 3.8.1 Selecting the Marker Screen

Shift to the screen for marker output settings.




Press the **MARKER** button on the SWEEP Editor screen (see Section 3.7.6, "Selecting the Sweep Editor Screen") to display the Marker Settings screen.

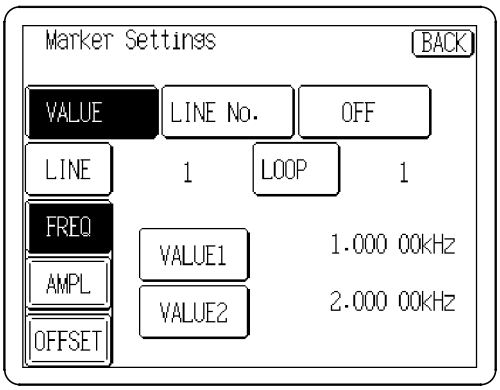



Select the **VALUE** or **LINE No.** button on the Marker Settings screen.
If there is no sweep data, the marker cannot be selected.

NOTE

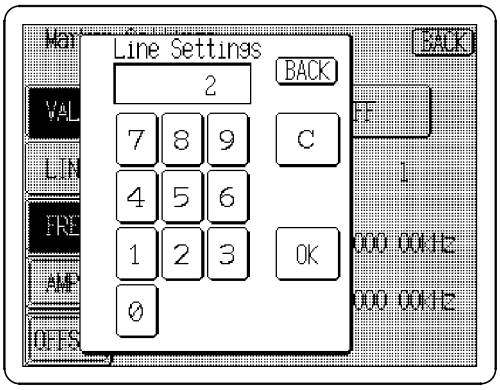
The maker selection is set to OFF when shipped from the factory, and when the device is reset.

## 3.8.2 Setting the Output Value Marker



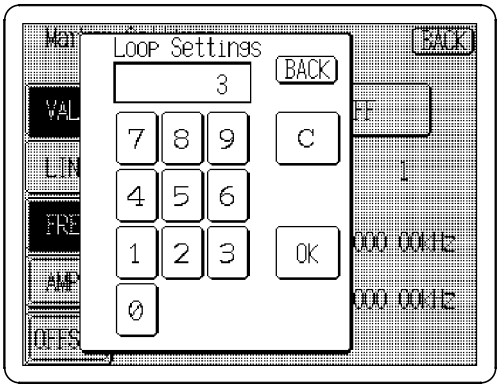

Press the **VALUE** button on the Marker Settings screen so that it displays in reverse. The screen shown on the left is displayed.

Specify the following output items.
Example
When the second item (second line) on the SWEEP Editor screen in Section 3.8.1 is output by the following marker settings
Output line: 002
Number of loops before outputting: third loop
Amplitude: 2.4 V to 2.8V



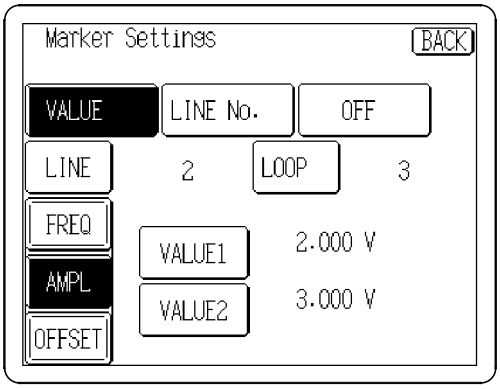

**(1) Setting the output line**
Specify the line number to be output.

1. Press the **LINE** button to open the Line Setting window.
2. Specify the output number "2" (second line in this example) using the tenkeys.(up to 128) You cannot specify numbers you are not using.
3. Press the **OK** button to return to the Marker Settings screen. The specified number is displayed.
   (The default setting is 1.)



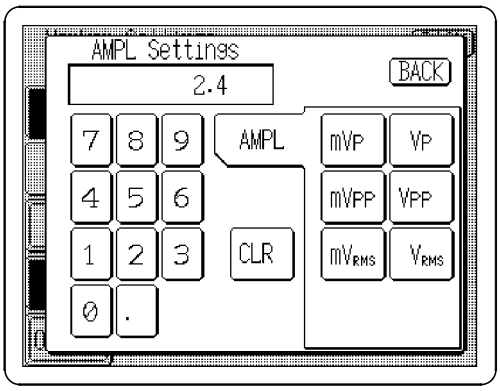

**(2) Setting the output loop.**
Specify the number of loops required before outputting the line.

1. Press the **LOOP** button to open the Loop setting window.
2. Specify the number of number of loops before output "3" using the tenkeys.
3. Press the **OK** button to return to the Marker Settings screen. The specified number of loops until output is displayed.
   This setting is disable when the setting value exceeds the number of loops set in "3.7.11 Setting the number of loops." (The default setting is 1.)




**(3) Selecting a marker output item**
Select the item you wish to output [frequency, amplitude, offset, or duty(pulse waveform only)]. Only one item can be selected for the output marker on the screen and it is highlighted.

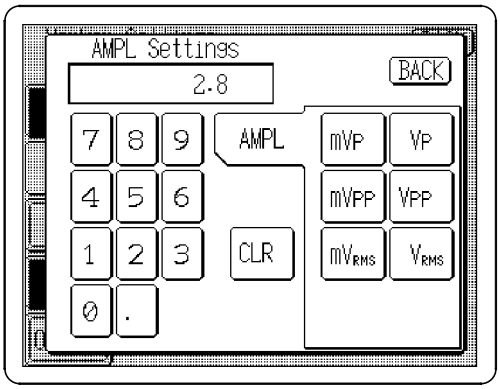
Press the **AMPL** button.
Only the items set in "3.7.3 Selecting Items to Sweep" and "3.7.4 Sweep Settings (Pulse Waveforms)" are effective.



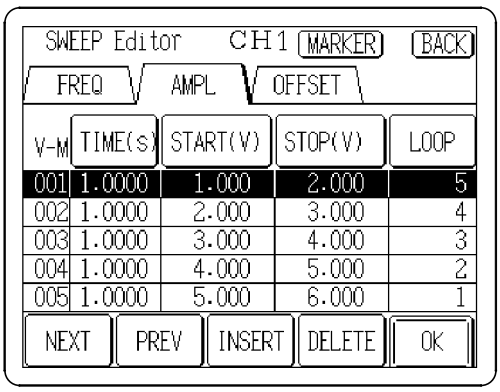

### (4) Setting the output range

Specify the output range (VALUE1/VALUE2) of the item selected for the output marking.
When the output value is in the setting range (VALUE1 to VALUE2), the output marker is active.

1. Press the **VALUE1** button to open the marker output range setting window (in this example, AMPL Settings window).
2. Enter a setting value "2.4 Vp" using the tenkeys.




3. Press the **VALUE2** button and enter an another value "2.8Vp".
   The settable range is within start and stop values (START/STOP) set in step (1).

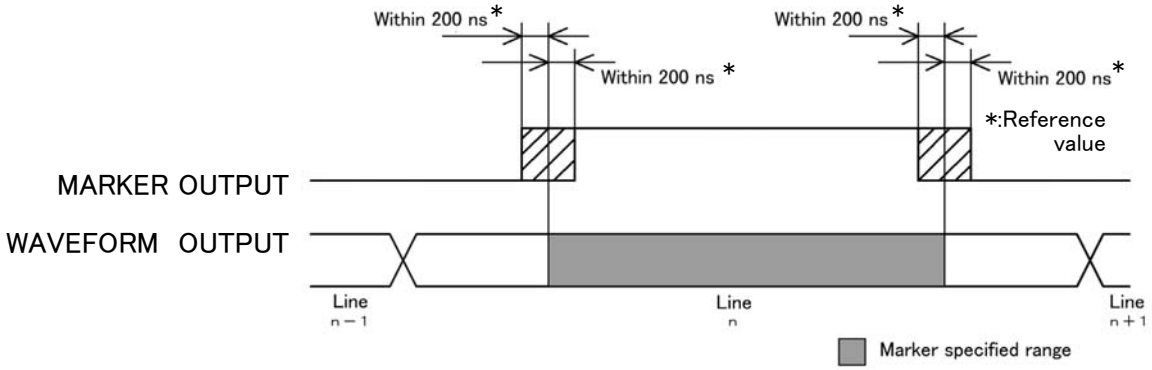



4. Press the **BACK** button to return to the SWEEP Editor screen.
5. Press the **OK** button to update.

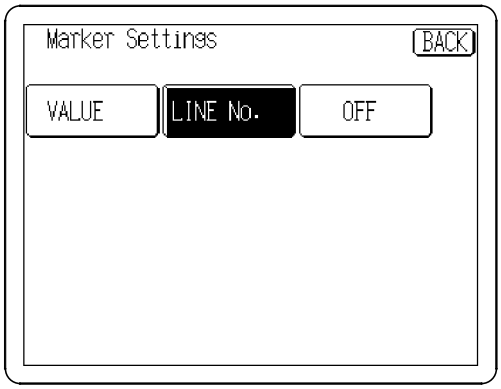
**NOTE**

- The output marker is effective after the sweep data is updated.
- Only one line can be selected for output marking.
- It does not matter which of Setting 1 or Setting 2 is higher.
- When the item for output marking is frequency and if the setting value is entered in period format, the value is converted to the frequency which is made as close as possible to the entered value.
- When the item for output marking is amplitude and if the setting value is entered in units, the value is converted to the amplitude value (Vp) which is made as close as possible to the entered value.

### (5) Output marker timing

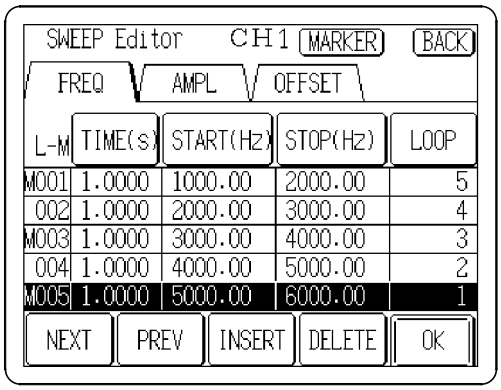


## 3.8.3 Setting the Line Marker




Press the **LINE No.** button on the Marker Settings screen so that it displays in reverse.

The line number marker can be set for all lines simultaneously.




**(1) Setting the output line (output line)**

Select the line to be output.

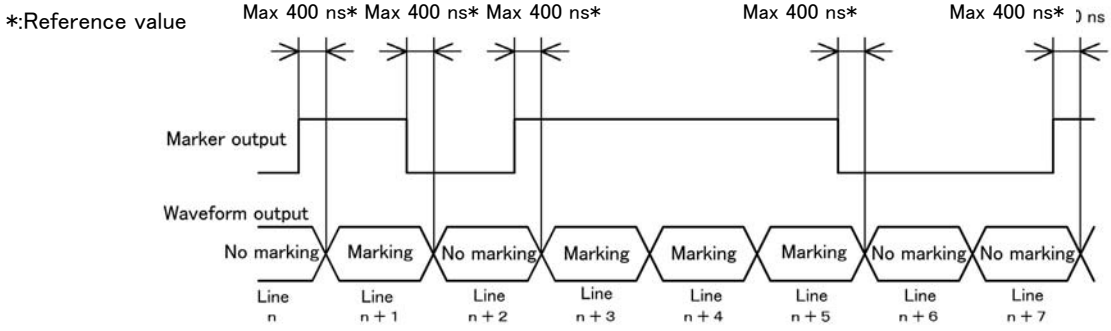
1. Press the **LINE No.** button on the Marker Settings screen so that it in reverse.
2. Press the **BACK** button to return to the SWEEP Editor screen.
3. Selecting from the lines in Sections 3.7.8 through 3.7.14, move the cursor to the number of the line you wish to output.
4. Press the number of line, an "M" mark will appear to the left of the number to indicate that the marker applies to this line number. (To erase the mark, press the line number again.)
5. Make sure that all lines you wish to output are marked with "M." Then press the **OK** button. The 7075 creates sweep data including information on the marked lines.

**NOTE**

The line number marker becomes effective only when sweep data is created. See Section 3.7.15, "Creating Sweep Data."
The line number marker is output during sweeping of the line, regardless of whether the loop is effective or not.

**(2) Output timing**

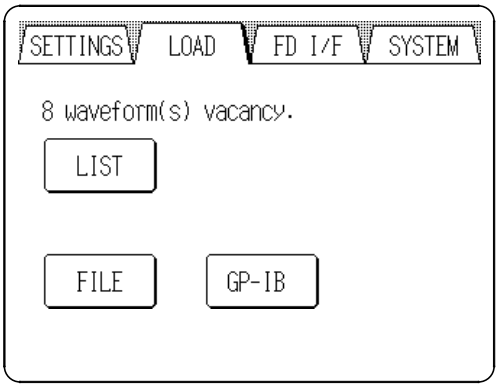
Indicates the output timing for line numbers.



# Chapter 4
# Waveform Input Screen

Arbitrary waveform settings are entered on this screen.

## 4.1 Selecting the Waveform Input Screen



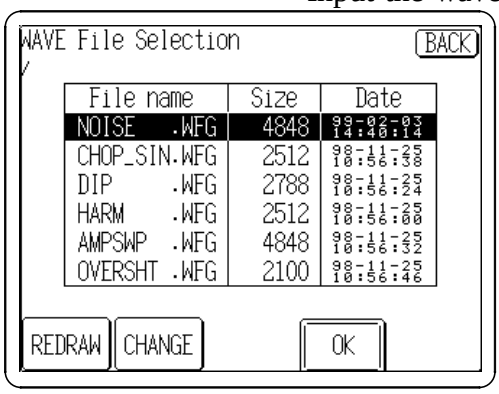

Pressing the "**LOAD**" tab at the upper left of the screen causes the Waveform Input screen to appear.

If the tabs are not visible at the top of the screen, a lower level screen is currently displayed. Press the **BACK** button to return to a higher level, and then perform the above step.

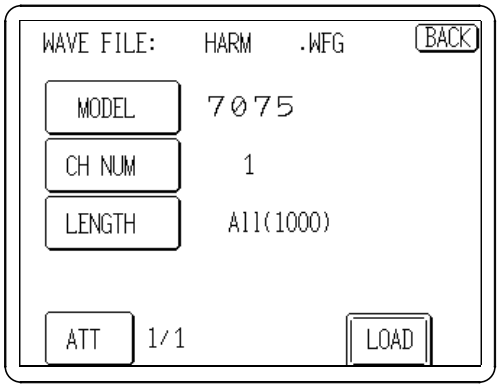
# 4.2 Waveform Input

## 4.2.1 Using the Floppy Disk

Input the waveform data saved on a floppy disk to the unit.




1. Press the **FILE** button to display the file list of the floppy disk.
2. Rotate the Jog dial, or press the file name to select the file. To change the current directory, press the **CHANGE** button.




3. Press the **OK** button to display the screen on which to select the source device [*1] and amount of data (number of words) to be loaded.
4. When finished making the settings, press the **LOAD** button.
5. If changing the waveform name, enter the new name and press the **OK** button. If not changing the waveform name, just press the **OK** button to load the waveform.

**MODEL** *1 **Source Device Models**

The device model is selected automatically, but can also be specified manually.

| | |
|---|---|
| HIOKI WAVEFORM GENERATOR data | 7070/7075/7075-01 |
| Waveform Creation Software data | 7990 |
| Binary data of the HIOKI MEMORY HiCORDER | 8806/8806-01/8807-01/8807-51<br>8808-01/8808-51/8825/8826/8835<br>8835-01/8840/8841/8842/8852<br>8853/8855 |
| Text file in CSV format *2 | TEXT1/TEXT2 (reserved) |

*2 Text file: Files with the extensions .TXT, .CSV and .PRN are all recognized as text files. Non-numeric data at the head of a line causes that line to be treated as a header, and not processed.
Strings separated by a comma and a space are recognized as separate channels. Up to 32 data lines can be specified.

**CH NUM** **Channel Number**

When binary data is loaded from the MEMORY HiCORDER, the channel number of the MEMORY HiCORDER is specified. The default channel to be loaded is the lowest-numbered channel. A line is specified for the text.

**LENGTH** **Words to be read**

The number of words to load is specified.

**ATT** **Damping Ratio**

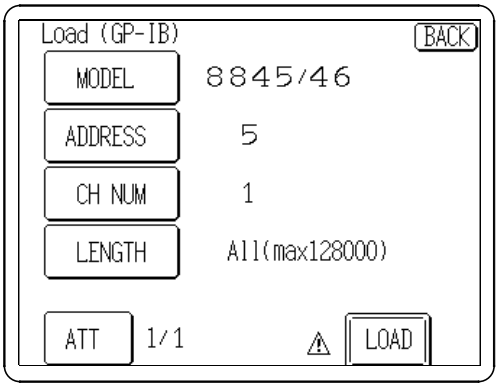
The voltage damping ratio is specified. For example, if a 1/10 ratio is specified, 5 V data is read as 0.5 V.

## 4.2.2 Using the GP-IB Interface

Waveforms stored in the MEMORY HiCORDER's memory can be input directly through the GP-IB cable connector.

**⚠ CAUTION** The GP-IB connection cable should be used only with this controller model.

**NOTE** Set the MEMORY HiCORDER to send GP-IB data. This is normally when data has been stored with the MEMORY function, and it is in the STOP state.




1. Press the **GP-IB** button to display the screen on which to select the source device [*1] and amount of data (number of words) to be loaded.
2. Enter a waveform name and press the **OK** button. You can either specify a name for the waveform, or leave the entry blank, in which case a default name (WAVE_1 to WAVE_8) is assigned when you press the **OK** button.
3. Confirm your settings, and press the **LOAD** button.

**MODEL** ***1 Compatible Models**
Select the model to read from the following.
8845, 8846, 8841, 8842, 8835, 8826, 8840, 8852, 8853, 8825, 8830

**ADDRESS** Specify the GP-IB address.

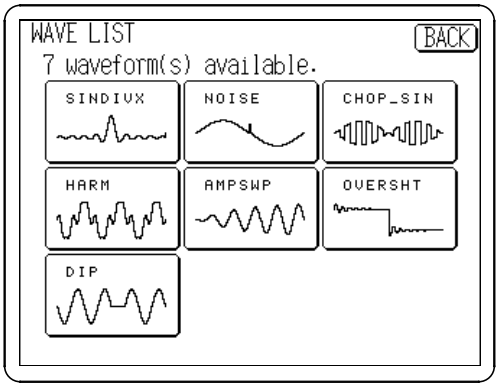
**CH NUM** **Channel number**
Specify the channel number of the Memory HiCorder.

**LENGTH** **Words to be read**
The number of words to load is specified.

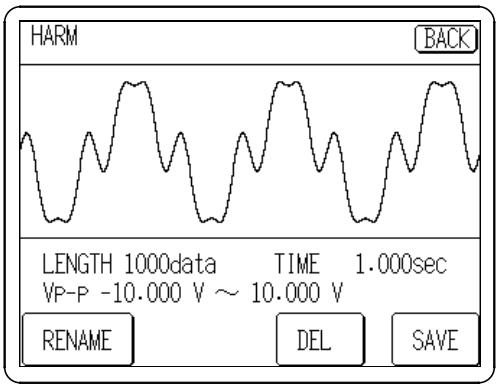
**ATT** **Damping Ratio**
The voltage damping ratio is specified. For example, if a 1/10 ratio is specified, 5 V data is read as 0.5 V.

# 4.3 Input Waveform List Display

Waveforms read into the unit are displayed in a list, and can be saved to floppy disk. The waveforms can be renamed and deleted from the list.




1. Press the **LIST** button, and the input waveform list is displayed.
2. To display the detailed waveform information, press the Waveform button.




The selected waveform is displayed.

### (1) Saving

Waveforms read into the unit can be saved to floppy disk.

1. Confirm that the floppy disk is inserted. Move the current directory to the directory to be saved. For details see Section 5.2.3 (1) "Moving the current directory."
2. Press the button of the waveform to be saved on the Waveform list screen.
3. Press the **SAVE** button.
4. Enter a file name (the extension is fixed as '.WFG'). If the file name is cleared, the file is automatically named TEMPDATA.WFG. Press the **OK** button to save the waveform in the specified file.

### (2) Deleting

The specified input waveform can be deleted.

1. Press the button of the waveform to be deleted.
2. Press the **DEL** button.

### (3) Renaming

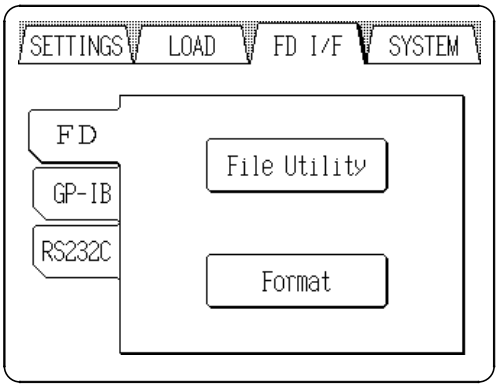
The name of specified input waveform can be changed.

1. Press the button of the waveform name to be changed.
2. Press the **RENAME** button.
3. Input the waveform name to rename. Pressing the **OK** button renames.

# Chapter 5
# FD I/F Screen

From this screen you can load and save floppy disk data, and make settings for the GP-IB and RS-232C interfaces.

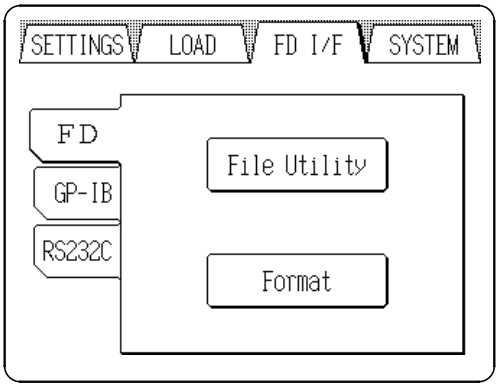
## 5.1 Selecting to the FD I/F Screen




Pressing the **FD I/F** tab at the upper right of the screen causes the FD I/F screen to appear.

If the tabs are not visible at the top of the screen, a lower level screen is currently displayed. Press the **BACK** button to return to a higher level, and then perform the above step.

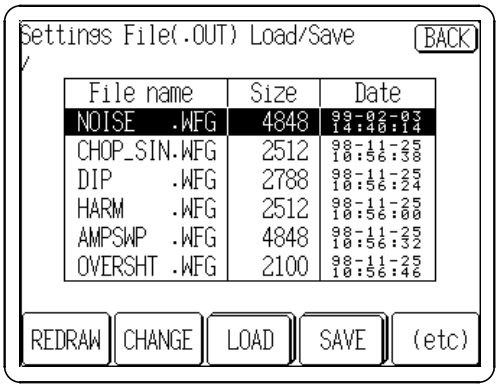
# 5.2 Floppy Disk



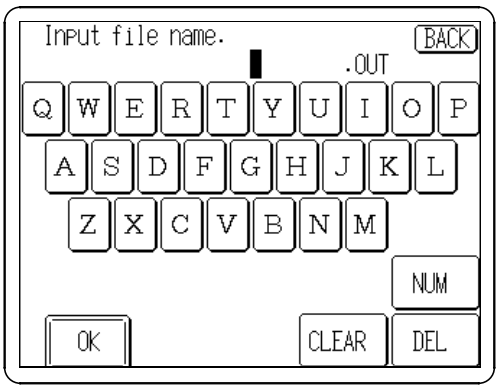

Settings can be saved to and later reloaded from a floppy disk. Files can also be deleted and directories created. The floppy drive uses MS-DOS* formatting.

*MS-DOS is a registered trademark of Microsoft Corporation.

## 5.2.1 Saving the Settings




1. Insert the floppy disk and press the **File Utility** button on the FD I/F screen.
2. Press the **SAVE** button. If the button is not displayed, press the **(etc)** button to display the **SAVE** button.




3. Enter a file name and after that press the **OK** button.

**NOTE**

- Before inserting the floppy disk, release the write-protect of the floppy to save the settings.
- When there is no entry or when the **OK** button is pressed after pressing CLEAR, the file is automatically named TEMPDATA.OUT.

### Setting Contents

Setting contents are stored as follows.

**(1) Waveform File**

The data for an arbitrary waveform specified for output can be saved.

NOTE

- Sweep settings for the arbitrary waveform data are also saved.
- Waveforms not currently in use are not saved. They can be saved, however, from the Waveform Input screen.

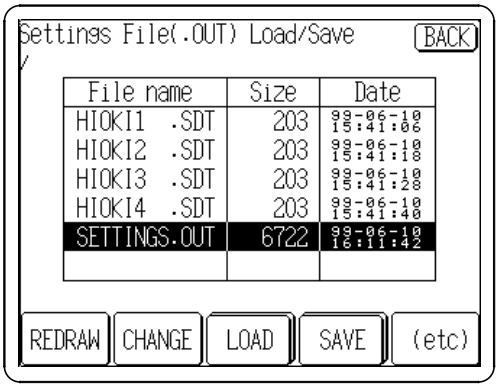
**(2) Tracking Settings**

Tracking setting selections are saved, if enabled.

**(3) Status Settings**

The following settings affecting output status are saved for all channels: Output waveform, arbitrary waveform, sweep on/off, sweep waveform, range, selecting frequency and period, frequency of arbitrary waveform, selecting clock, selecting Hz/r/min, frequency, selecting amplitude and offset, selecting upper limit and lower limit, phase, delay, duty, filter, custom sweep waveform name, selecting sweep frequency/period, sweep frequency, selecting frequency, sweep duty, sweep amplitude, sweep offset, sweep item, sweep data.

## 5.2.2 Reading the Settings




1. Insert the floppy disk and press "File Utility" on the FD I/F screen. If the **LOAD** button is not displayed, press (etc) to display the **LOAD** button.
2. Move the cursor to select a file by using the Jog control or touching directly the file name on the screen.
3. Press the **LOAD** button to read the settings of the specified file.

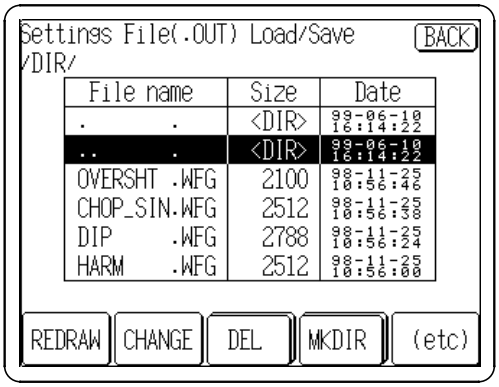
NOTE

If the file other than settings is specified, an error occurs.

## 5.2.3 Other Operations

On the FD I/F screen, it is also possible to move the current directory, delete files, create directories.

### (1) Moving the current directory




1. Insert the floppy disk and press "File Utility" on the FD I/F screen.
2. Move the cursor to select the directory by using the Jog control or touching directly the file name on the screen.
3. Press the **CHANGE** button.

".." moves up one directory

### (2) Deleting files

1. Insert the floppy disk and press "File Utility" on the FD I/F screen.
2. Move the cursor to select a file by using the Jog control or touching directly the file name on the screen.
3. Press the **DEL** button to delete the specified file. If the **DEL** button is not displayed, press **(etc)** to display the **DEL** button.
   The directory can be deleted. First delete all of the contents of the directory, and then delete it.

**NOTE** Before inserting a floppy disk, release a write-protect. To delete a file, write protection on the floppy disk must be disabled before inserting it.

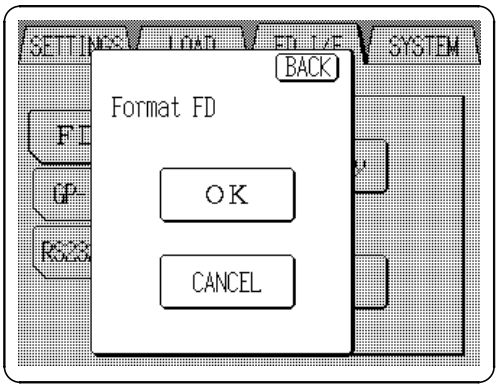
### (3) Creating directories

1. Insert the floppy disk and press **File Utility** on the FD I/F screen.
2. Press the **MKDIR** button. If the button is not displayed, press **(etc)** to display the **MKDIR** button.
3. Enter the directory name and after that press the **OK** button to create a directory.

**NOTE** Before creating directories, release a write-protect. To delete a file, write protection on the floppy disk must be disabled before inserting it.

## 5.2.4 Formatting the Floppy Disk

The floppy disk is formatted in MS-DOS* format. A formatted 2HD disk has 1.44 MB of space, and a 2DD disk has 720 KB.




1. Insert the floppy disk and press **Format** on the FD I/F screen.
2. Press the **OK** button to format a disk.

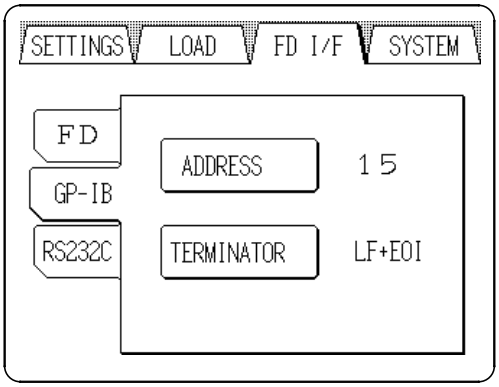
**NOTE**

- When formatting, all contents on the floppy disk are erased.
- Wait for a few minutes for formatting to finish.
- Formatting cannot be interrupted in progress.

*MS-DOS is a registered trademark of Microsoft Corporation.

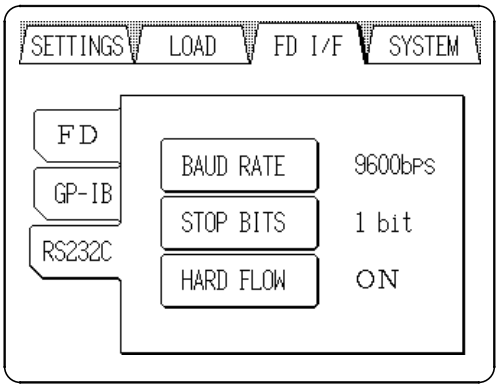
# 5.3 Interfaces

## 5.3.1 Setting the GP-IB Interface




The GP-IB setting is used when the 7075 is to be controlled remotely by GP-IB.

## 5.3.2 Setting the RS-232C Interface



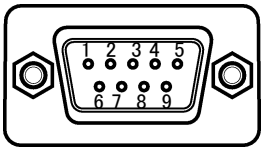

The RS-232C setting is used to transfer waveform data from the 7990 WAVEFORM CREATION SOFTWARE via the RS-232C interface.

## Connecting to the Personal Computer

**⚠ WARNING** **To avoid electrocution, turn off the power to all devices before pluggingor unplugging any of the interface connectors.**

**⚠ CAUTION** To avoid damage to the product, do not short-circuit the output terminal and do not input voltage to the output terminal.

Connect the RS-232C connector on the unit to the serial port on the PC with an RS-232C cable. The RS-232C connector on the 7075 is configured as a data terminal (DTE) device.



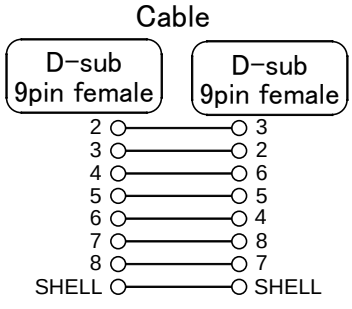
Unit side

| Connector (Dsub) Pin number | Signals | | Function |
|---|---|---|---|
| | RS-232C | CCITT | |
| 1 | | | Unused |
| 2 | BB(RxD) | 104 | Reception data |
| 3 | BA(TxD) | 103 | Transmission data |
| 4 | CD(DTR) | 108/2 | Data terminal ready |
| 5 | AB(GND) | 102 | Signal ground |
| 6 | | | Unused |
| 7 | CA(RTS) | 105 | Ready to send |
| 8 | CB(CTS) | 106 | Clear to send |
| 9 | | | Unused |

### (1) Required cable wiring

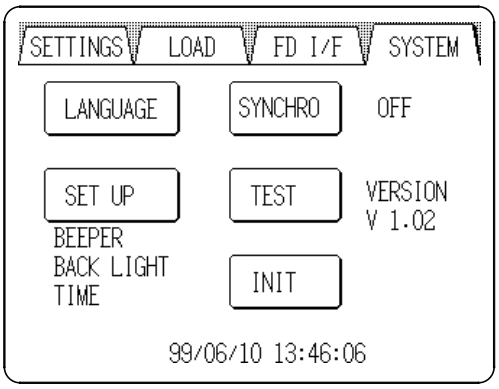
Connection lines: reverse type (straight-through wiring)
Cable wiring is as shown.

### (2) Connection with PC/AT compatible computers.



# Chapter 6
# System Screen

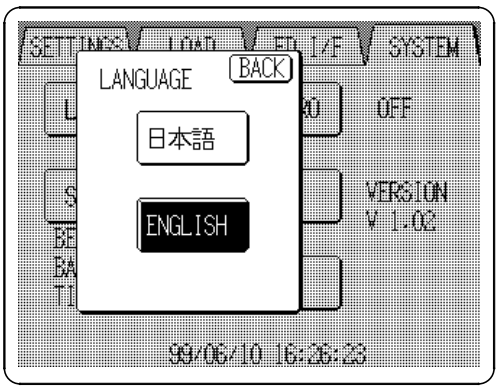
## 6.1 Selecting to the System Screen




Pressing the **SYSTEM** tab at the upper right of the screen causes the SYSTEM screen to appear.

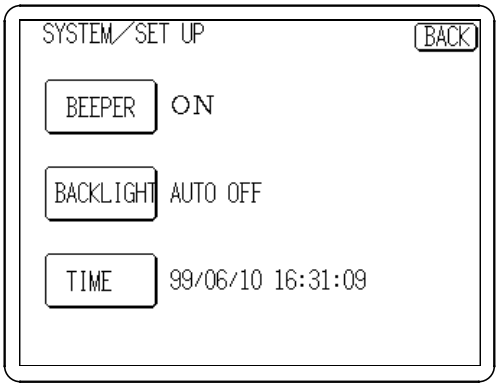
If the tabs are not visible at the top of the screen, a lower level screen is currently displayed. Press the **BACK** button to return to a higher level, and then perform the above step.

## 6.2 Setting the Display Language (LANGUAGE)

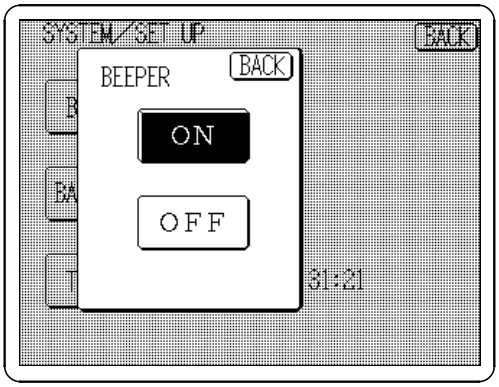



This window is used for changing the display language. Either English or Japanese can be selected.

# 6.3 Miscellaneous Settings (SET UP)

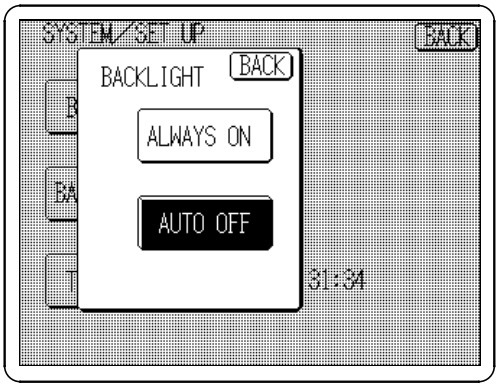



This screen is for miscellaneous settings. The beeper, automatic backlight off and time can be set.



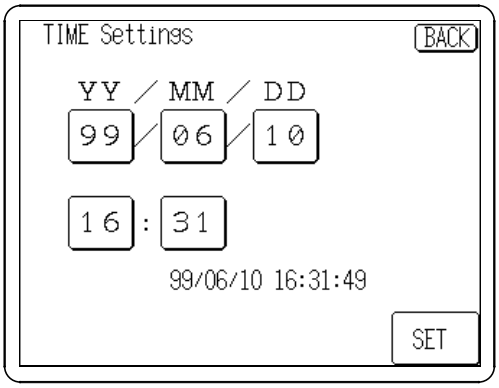

### Beeper

The beeper is set from this window. Select whether the beeper should sound when a key is pressed.




### Backlight

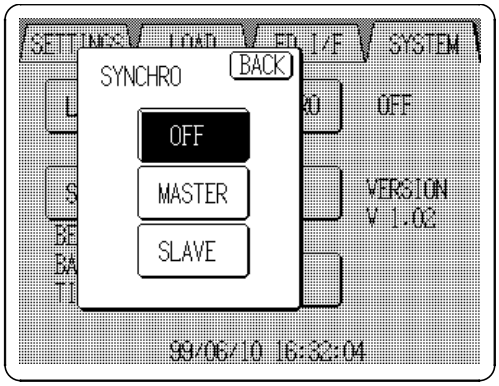
Automatic backlight off is selected from this window. Select **ALWAYS ON** to have the backlight always lit, or select **AUTO OFF** to have the backlight automatically turn off if there is no key input for more than 3 minutes, which saves power and extends the life of the backlight.




### Clock

The internal clock is set from this screen. Press the **SET** button to change its contents, then press the **SET** button to accept the new settings.

## 6.4 Setting the Synchronized Operation (SYNCHRO)



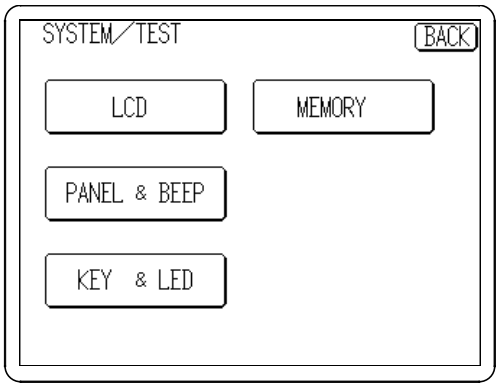

These settings control synchronized drive operation.
For details, see Chapter 7.

**OFF** Disables synchronized drive. There is no output from the synchronized drive terminal of the external interface.

**MASTER** Set this unit to be the master device for synchronized drive.

**SLAVE** Set this unit to be a slave device for synchronized drive.

## 6.5 Self Testing (TEST)




Activates main unit self testing.

**LCD** Tests the LCD screen.

**PANEL&BEEP** Tests the touch panel and beeper.

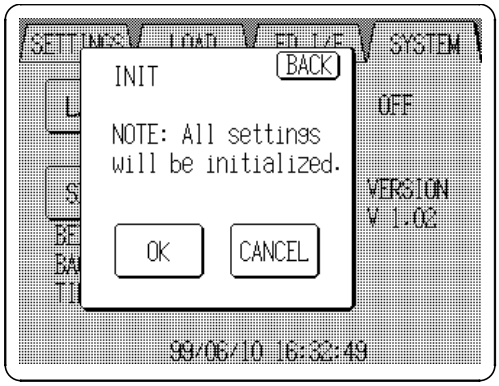
**KEY&LED** Tests other keys and LED lighting.

**MEMORY** Tests internal memory.

**NOTE**

If the MEMORY is pressed, the settings of the unit are initialized.

# 6.6 Initialization (INIT)




The unit is initialized with the following default settings. Press the **OK** button.

RUN/STOP key ..... STOP
CH1 to CH4 ON/OFF key ..... OFF

**Output settings (applied to all channels)**
Waveform ..... Sine wave
Sweep ..... OFF
Sweep waveform ..... Sine wave
Units of frequency ..... Hz
Frequency ..... 1 kHz
Amplitude and offset/upper and lower limits Amplitude&offset
Voltage setting ..... Peak voltage
Amplitude ..... 1 V
Offset ..... 0 V
Phase angle ..... 0 deg
Delay ..... 0
Duty ..... 50%
Filter ..... Pass
Range ..... 10 V
Sweep frequency ..... 1 kHz
Sweep amplitude ..... 1 V
Sweep offset ..... 0 V
Sweep phase ..... 0 deg
Sweep delay ..... 0
Sweep duty ..... 50%
Sweep item ..... Frequency, amplitude, offset
Sweep data ..... None
Marker Output ..... OFF
Simultaneous setting ..... All OFF
Synchronized operation ..... OFF
Custom waveform data ..... None
BEEP ..... ON
LCD backlight auto-off ..... Auto off

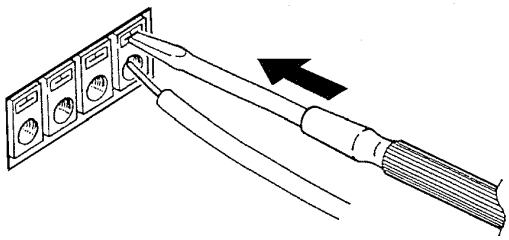
**RS-232C**
Baud rate ..... 9600 bps
Stop bit ..... 1 bit
Hard flow ..... ON

**Waveform input**
Input model ..... 8845/46
Reading GP-IB address ..... 5

**GP-IB**
Address ..... 15
Terminator ..... LF+EOI

# Chapter 7
# External Input/Output

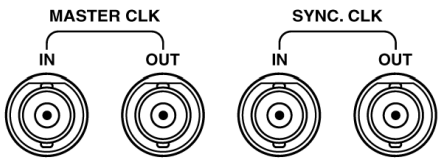
## Connecting to the terminals

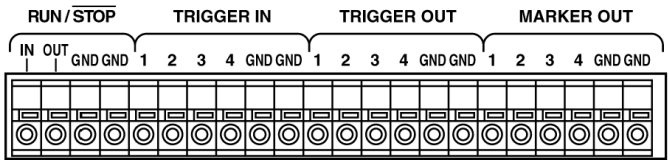


1. Use suitable wires bared at their ends for a length of about 10 mm.
2. Depress the knob on the terminal with a screwdriver, and push the end of the wire into the connection hole as shown in the figure on the left.
3. Release the screwdriver, and the wires will be locked into place.
4. Use the same procedure to remove the wires.

Recommended wire
Single strand: 1.2 mm dia. (AWG #16)
Multi-strand: 1.25 $mm^2$ (AWG #16)
Usable limits
Single strand: 0.4 to 1.2 mm dia. (AWG #26 to #16)
Multi-strand: 0.3 to 1.25 $mm^2$ (AWG #22 to #16)
Strand diameter: minimum 0.18 mm
Standard insulation stripping length: 11 mm
Length: Within 1 m

## External input teminal



# 7.1 Output Terminals and Functions

## 7.1.1 MASTER CLK OUT

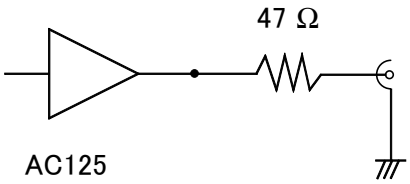
### (1) Function

During synchronized drive operation, this clock signal is output to synchronize waveform data.

NOTE

- This clock signal is not output when synchronized drive is not enabled.
- When set as a slave unit, this signal is output only if there is a signal at the MASTER CLK IN terminal.

### (2) Output format




Logic level
(4.0 V $\leq V_H \leq$ 5.0 V,
0 V $\leq V_L \leq$ 0.8 V,
with no loading)
Output impedance: 47 Ω

## 7.1.2 SYNC CLK OUT

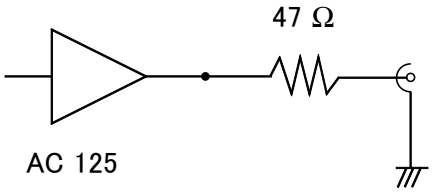
### (1) Function

During synchronized drive operation, this clock signal is output to synchronize multiple 7075 units.

NOTE

- This clock signal is not output when synchronized drive is not enabled.
- When set as a slave unit, this signal is output only if there is a signal at the MASTER CLK IN terminal.

### (2) Output format




Logic level
(4.0 V $\leq V_H \leq$ 5.0 V,
0 V $\leq V_L \leq$ 0.8 V,
with no loading)
Output impedance: 47 Ω

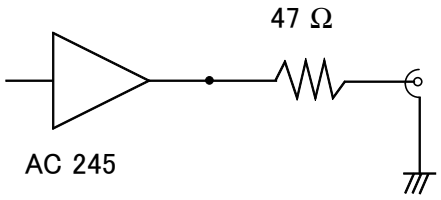
## 7.1.3 RUN/STOP OUT

### (1) Function

Outputs the RUN/STOP state. (H: RUN/ L: STOP)

This output is high when either the **RUN/STOP** key or the RUN/STOP IN input is in the RUN state.

### (2) Output format



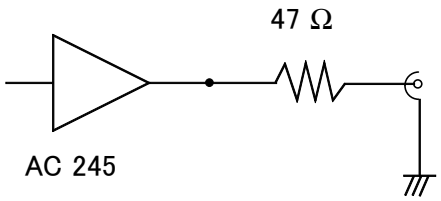

Logic level
(4.0 V $\leq V_H \leq$ 5.0 V,
0 V $\leq V_L \leq$ 0.8 V,
with no loading)
Output impedance: 47 Ω

## 7.1.4 TRIGGER OUT

### (1) Function

Outputs the trigger signal state.
This output is the logical sum of the front panel trigger key and the TRIGGER IN input.

### (2) Output format



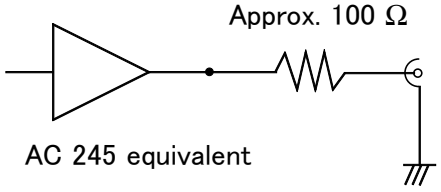

Logic level
(4.0 V $\leq V_H \leq$ 5.0 V,
0 V $\leq V_L \leq$ 0.8 V,
with no loading)
Output impedance: 47 Ω

## 7.1.5 MARKER OUT

### (1) Function

Outputs the marker signal.

### (2) Output format




Logic level
(4.0 V $\leq V_H \leq$ 5.0 V,
0 V $\leq V_L \leq$ 0.8 V,
with no loading)
Output impedance: 100 Ω

# 7.2 Input Terminals and Functions

## 7.2.1 MASTER CLOCK IN

### (1) Function

The clock signal input here controls waveform data output during externally controlled synchronized drive operation.

### (2) Input format

Logic level (4.0 V $\leq V_H \leq$ 5.0 V, 0 V $\leq V_L \leq$ 0.8 V, with no loading)
Input impedance: 47 kΩ
Synchronized drive requires that this terminal be connected to the MASTER CLK OUT terminal of another 7075.

NOTE

- With the slave setting, no waveform is output unless a clock signal is input.
- Even with no clock input, the RUN/STOP indicator on the front panel lights red.
- Improper operation may occur if input is supplied from a source other than the MASTER CLK OUT terminal of a 7075.

## 7.2.2 SYNC CLOCK IN

### (1) Function

This clock input is for synchronization with the master unit during synchronized drive operation.

### (2) Input format

Logic level (4.0 V $\leq V_H \leq$ 5.0 V, 0 V $\leq V_L \leq$ 0.8 V, with no loading)
Input impedance: 47 kΩ
Synchronized drive requires that this terminal be connected to the SYNC CLOCK OUT terminal of another 7075.

NOTE

- With the slave setting, no waveform is output unless a clock signal is input.
- Even with no clock input, the RUN/STOP indicator on the front panel lights red.
- Improper operation may occur if input is supplied from a source other than the MASTER CLK OUT terminal of a 7075.

## 7.2.3 RUN/STOP IN

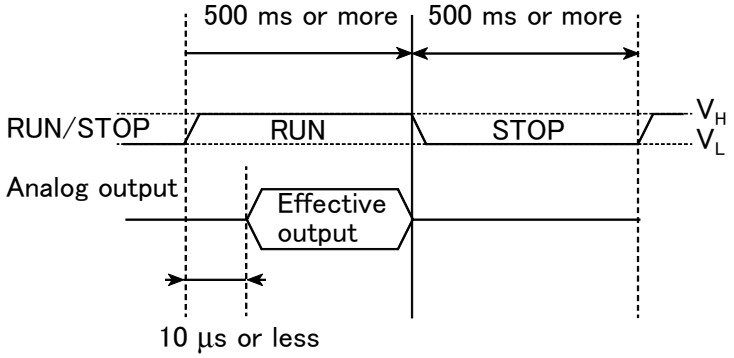
### (1) Function

This input terminal allows external RUN/STOP control.
($V_H$: RUN/ $V_L$: STOP)
Operation duplicates that of the **RUN/STOP** key on the front panel.

### (2) Input format

Logic level (4.0 V $\leq V_H \leq$ 5.0 V, 0 V $\leq V_L \leq$ 0.8 V, with no loading)
Input impedance: 47 kΩ

### (3) Operation Timing




NOTE

- Waveforms are output when either the front panel **RUN/STOP** key or the RUN/STOP input is in the RUN state. Both the **RUN/STOP** key and the RUN/STOP input must be in the STOP state for waveform output to be disabled.
- Waveforms cannot be changed when RUN is active.

## 7.2.4 TRIGGER IN

### (1) Function

This is the input terminal for a trigger signal to control sweep output. It functions in the same way as the front panel **TRIG** key. When the TRIG indicator on the front panel is lit, trigger input is enabled.
Triggering is valid only when the loop time is infinite or the HOLD function is enabled in the sweep settings.

### (2) Trigger Precautions

The trigger indicator shows the logical sum of each channel, so it lights when the trigger condition is satisfied on any channel. The input is ignored if no channel satisfies the trigger receiving condition.

### (3) Input format

Logic level (4.0 V $\leq V_H \leq$ 5.0 V, 0 V $\leq V_L \leq$ 0.8 V, with no loading)
Input impedance: 47 kΩ
Minimum pulse width: 1 µs (rising edge)
Minimum input pulse interval: 5 µs

NOTE

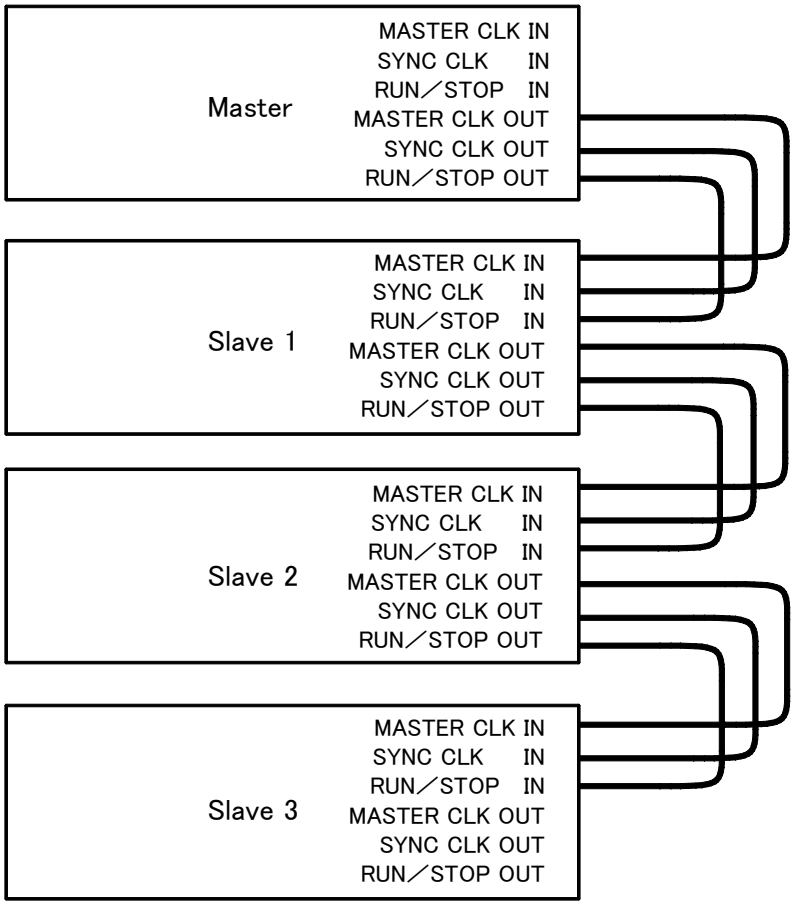
The input is invalid when the **TRIG** key on the front panel is pressed.

# 7.3 Description of Synchronized Operation

Up to four units can be connected via their external control terminals to operate synchronously (as a master and three slaves). For synchronized operation, the 7075s are connected in cascade so that all slaves are governed by the following control signals from the master unit: RUN/STOP, MASTER CLK and SYNC CLK.

## 7.3.1 Connection

One master unit and up to three slave units can be used in synchronized drive. The control signal connections are shown here.




**NOTE**

Never turn on any slave unit before turning on the master unit. If this occurs, the slave unit may not output the proper waveforms.
With the connections above, if the system stops at a setting made according to "3.7.17 Setting the Total Number of Loops," the following events occur:

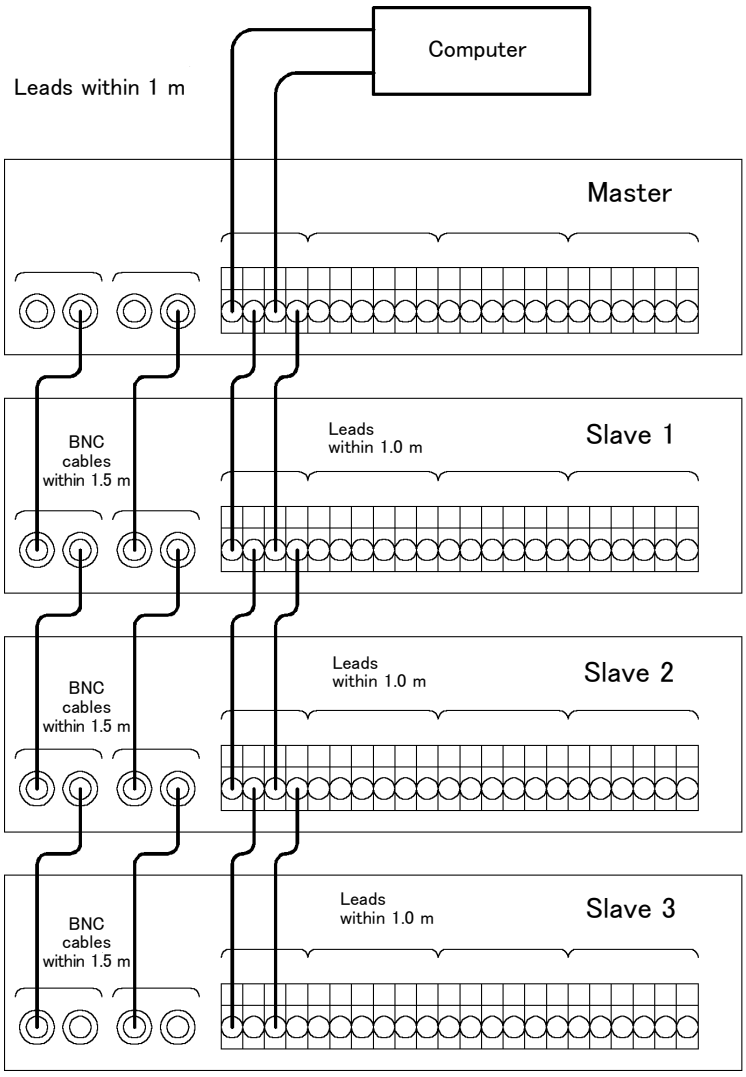
- When the master unit is stopped:
  All slave units stop. (For the offset value, the last data continues to be output.)
- When a slave unit is stopped:
  Only the involved slave unit stops. No other units are affected. The RUN/STOP key on the stopped slave unit remains lit until the master unit stops. (For the offset value, the last data continues to be output.)

## 7.3.2 Connecting the Cables

**⚠ CAUTION**

The input logic level is 0 to 5 V. To avoid damage to the product, do not apply voltage other than this level.

Example of connecting
The MASTER CLK, SYNC CLK and RUN/STOP signals are each connected by daisy chaining the units together.



## 7.3.3 Synchronized Operation Settings

Master/Slave Selection

Synchronized drive settings are made on the System screen.

**SYNC OFF**

Select this setting to disable synchronized drive.
The MASTER CLK and SYNC CLK signals will not be output, and signals at the MASTER CLK IN and SYNC CLK IN will be ignored.

**SYNC Master**

Set the 7075 to Master.
The MASTER CLK and SYNC CLK signals will be output, and signals at the MASTER CLK IN and SYNC CLK IN will be ignored.

**SYNC Slave**

Set the 7075 to Slave.
Clock signals input at the MASTER CLK IN and SYNC CLK IN terminals substitute for the internal clock.
The clock signals input at the MASTER CLK IN and SYNC CLK IN terminals are passed through to the MASTER CLK OUT and SYNC CLK OUT terminals.

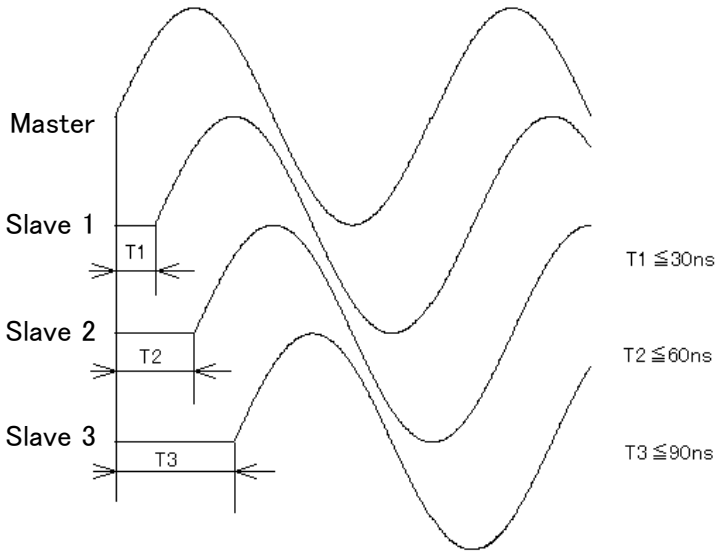
## 7.3.4 Precautions for Using Synchronized Operation

The total skew when using synchronized drive is as follows.

(1) Synchronized operation with 2 Units
T1 (inter-unit skew) less than ±25 ns (from inter-channel skew)

(2) Synchronized operation with 3 Units
T2 (inter-unit skew) less than ±25 ns (from inter-channel skew)

(3) Synchronized operation with 4 Units
T3 (inter-unit skew) less than ±25 ns (from inter-channel skew)
* T1≤ 30 ns, T2≤ 60 ns, T3≤ 90 ns



# Chapter 8
# GP-IB/RS-232C Interface Implementation

## 8.1 Overview

### (1) Compliance and reference standards

The 7075 includes the GP-IB interface as a standard feature.
Compliance standard: IEEE Standard 488.1-1987
Reference standard: IEEE Standard 488.2-1987

### (2) Codes used for device-dependent messages

The following are the codes used for device-dependent messages.
ASCII codes are used.

### (3) Interface function sub-set

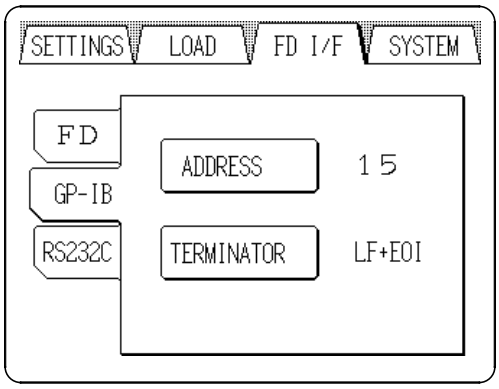
| | |
|---|---|
| SH1 | All source handshake functions |
| AH1 | All acceptor handshake functions |
| T6 | Basic talk functions<br>Serial poll function<br>The talker cancellation function with MLA (My Listen Address) is provided |
| TE0 | Extension talker function is not provided. |
| L4 | Basic listener functions<br>The listener cancellation function with MTA (My Talk Address) is provided. |
| LE0 | Extension listener function is not provided. |
| SR 1 | All service request functions |
| RL 1 | All remote/local functions |
| PP0 | Parallel polling is not provided. |
| DC 1 | All device clear functions |
| DT0 | Device trigger functions are not provided. |
| C 1 | System controller |
| C 2 | IFC transfer, controller, in-charge |
| C 3 | REN transmit |
| C 28 | Do not transfer interface, message sending and control |

# 8.2 Operations

**⚠ WARNING**

**Never connect another device to operate as controller when the unit's control function is in use, as this could cause malfunctions and, in the worst case, damage to the unit.**

## 8.2.1 Settings of the GP-IB Interface

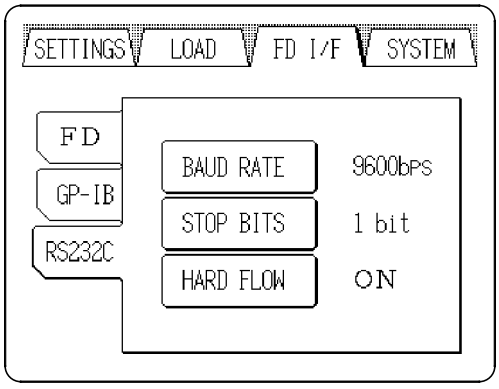



Set the function, address, transmit terminator on the GP-IB screen.
Select GP-IB on the FD I/F screen.

**(1) Address**
Set the GP-IB device address. (0 to 30: Address number)
The device address is set to 15 when shipped from the factory, and when the device is reset.

**(2) Terminator**
Select the appropriate delimiter sequence for the plotter being used. (LF+EOI / CR+LF+EOI)

## 8.2.2 Settings of the RS-232C Interface




Set the baud rate, stop bit, and hardflow on the RS232C screen.
Select RS232C on the FD I/F screen.

**(1) Baud rate**
Set the baud rate of the RS-232C interface.
(4800 bps/ 9600 bps/ 19200 bps)
The baud rate is set to 9600 bps when shipped from the factory, and when the device is reset.

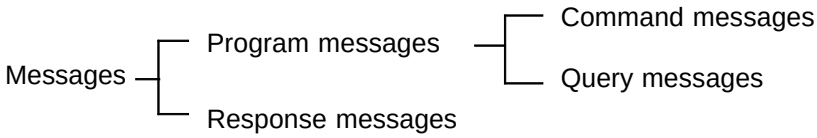
**(2) Stop bit**
Set the stop bit of the RS-232C interface. (1 bit / 2 bits)

**(3) Hardflow**
Set the flow control of the RS-232C interface. (ON/ OFF)

## 8.2.3 Receive and Send Protocols

**Messages**

Data received or sent by the GP-IB interface is called a message. The following are the message types:




Of these, program messages are those received by the unit from the controller, while response messages are those sent from the unit to the controller. During addressable, program messages are those received by the unit from the external controller, while response messages are those sent from the unit to the controller.

### (1) Program messages

Program messages can be divided into either command messages or query messages.

#### Command program messages

Orders for control of the device, such as for making settings for output or waveform output/stop or the like.

Example: When sending the messages from the personal computer to the 7075.

```
:OSET:AMPL 1,10.000
```

This message sets the amplitude of channel 1 of the 7075 to 10.000 V.

#### Query program messages

Orders for responses relating to the results of operation, results of self-test, or the state of device settings.

These commands are identified by "?" at the end of their comments in "8.4 GP-IB Command Summary."

### (2) Response messages

Sent in response to query program messages. After a query message sent from the external controller has been received, a response message is produced the moment that its syntax has been checked.

## Command syntax

When no ambiguity would arise, the term "command" is henceforth used to refer to both command and query program messages.
The 7075 accepts commands without distinction between lower case and upper case letters. It generates response messages in the long form (when headers are enabled) and in upper case letters.
The names of commands for the 7075 is as far as possible mnemonic. Furthermore, all commands have a long form, and an abbreviated short form. In command references in this manual, the short form is written in upper case letters, and then this is continued in lower case letters so as to constitute the long form. (Either of these forms will be accepted during operation, but intermediate forms will not be accepted. Further, during operation both lower case letters and upper case letters will be accepted without distinction.)

NOTE

If a command consists of more than four characters it can be truncated to the first four characters, unless the fourth character is a vowel, in which case the proper truncated form consists of only the first three characters.

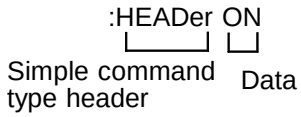
Example
For "FILTer", either "FILTER" (the long form) or "FILT" (the short form) will be accepted. However, any one of "FILTE", "FIL", or "FI" is wrong and will generate an error.
For "MEMory", either "MEMORY" (the long form) or "MEM" (the short form) will be accepted. However, any one of "MEMOR", "MEMO", or "ME" is wrong and will generate an error.

## Command program headers

Commands must have a header, which identifies the command in question. There are three kinds of header: simple command type, compound command type, and common command type.

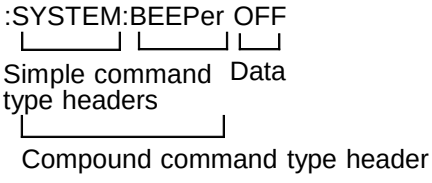
### Simple command type header

The first word constitute the header.




### Compound command type header

A header made up from a plurality of simple command type headers marked off by colons.




### Common command type header

A command beginning with an asterisk (*) and stipulated by IEEE 488.2

```
*RST
```

### Query program headers

These are for commands used for interrogating the unit about the result of an operation or about a setting.
These can be recognized as queries by a question mark appearing after the program header. The structure of the header is identical to that of a command program header, with "?" always being affixed to the last command. There are queries possible in each of the three previously described types of command form.

```
:HEADer?
└──────┘
Query program header
```

### Response messages

Response messages relating to queries are made up from header portions (which also may be absent due to header disablement) and data portions identical to those of program messages, and as a general rule are sent in an identical format to the format of the program message corresponding to their originating query.

### Terminators and separators

#### Message terminator

A terminator is used in order to separate the transmission of one message from another, and this terminator is not itself included in the message. On the unit, LF, EOI (GP-IB only), or LF+EOI (GP-IB only) is used as the message terminator. LF+EOI or CR+LF+EOI is used as the response message terminator. (Select on the GP-IB setting screen or set by the :COM:TERM command for RS-232C interface)

#### Message unit separator

A semicolon ";" is used as a message unit separator when it is desired to set out several messages on a single line.

```
:SYSTEM:BEEPER ON;:SYSTEM:TIME 10,20,30
                 ↑
Message unit separator
```

#### Header separator

With a message which has both a header and data, a space " " is used as a header separator to separate the header from the data. The space " " is used by way of explanation, but it does not appear on the actual program.

```
:SYSTEM:BEEPER ON
              ↑
Header separator
```

#### Data separator

Commas are used as data separators for separating several data items from one another.

```
:SYST:TIME 10,20,30
           ↑  ↑
Data separator
```

**Command tree**

When multiple compound command messages are sent to the 7075, if there is no colon (:) in the header following the semi-colon (;) separator, the header of the latter command is considered to be the same as that before the previous colon. (As this construction is similar to the concept of the current directory in Unix and MS-DOS directory structures, we call the previous header the current path.)

```
:SYST:TIME 10,20,30;:SYST:BEEPER ON
:SYST:TIME 10,20,30;BEEPER ON
```

Both examples set the internal clock to 10:20'30" and then enable the beeper. In the first case, a colon follows the semicolon, so the current path is from the root, and the command search in the 7075 begins at the root. In the second case, the current path of "SYS:TIME 10,20,30" is ":SYST", so the following ":BEEPER" command can omit ":SYST".

**Data format**

The 7075 uses character data, decimal data and character string data.

**Character data**

The first character must be alphabetic. The characters after the first character can only be alphabetic characters, numerals, or underline characters (_). As alphabetic characters, during sending only upper case letters are used, but during receiving both upper case and lower case letters are permitted.

**Decimal data**

Decimal data values are represented in what is termed NR format.
There are three types of NR format from NR1 to NR3, and each of these can appear as either a signed number or an unsigned number. Unsigned numbers are taken as positive.
Further, if the accuracy of a numerical value exceeds the range with which the 7075 can deal, it is rounded off. (5 and above is rounded up; 4 and below is rounded down.)

NR1 format: integer data
(Examples) +15, -20, 25

NR2 format: fixed point numbers
(Examples) +1.23, -4.56, 7.89

NR3 format: floating point numbers
(Examples) +1.0E-3, -2.3E+3

} NRf format

The term "NRf format" includes all these three formats.
When the 7075 is receiving it accepts NRf format, but when it is sending it utilizes whichever one of the formats NR1 to NR3 is indicated in the particular command.

**Character string data**

The data is composed of 7 bit ASCII characters and character string data is enclosed within quotation marks. When the 7075 is sending, only the double quotation mark (") is used as a quotation mark, but when receiving both this double quotation mark and also the single quotation mark (') are accepted. Characters which cannot be handled by the 7075 are replaced by spaces.

## 8.2.4 Usable Message Bytes (GP-IB)

Message bytes usable by the unit are as follows.

### (1) Address command group

GTL ( Go To Local ): Enables local operation of the 7075.
SDC ( Selected Device Clear ): Sets the 7075 to initialized state.

### (2) Universal command group

LLO ( Local Lock-Out ): Disables local operation of the 7075.
DCL ( Device Clear ): Sets the 7075 to initialized state.

## 8.2.5 LOCK (LCL) Key and Indicator (GP-IB)

### (1) Status Indicator Display

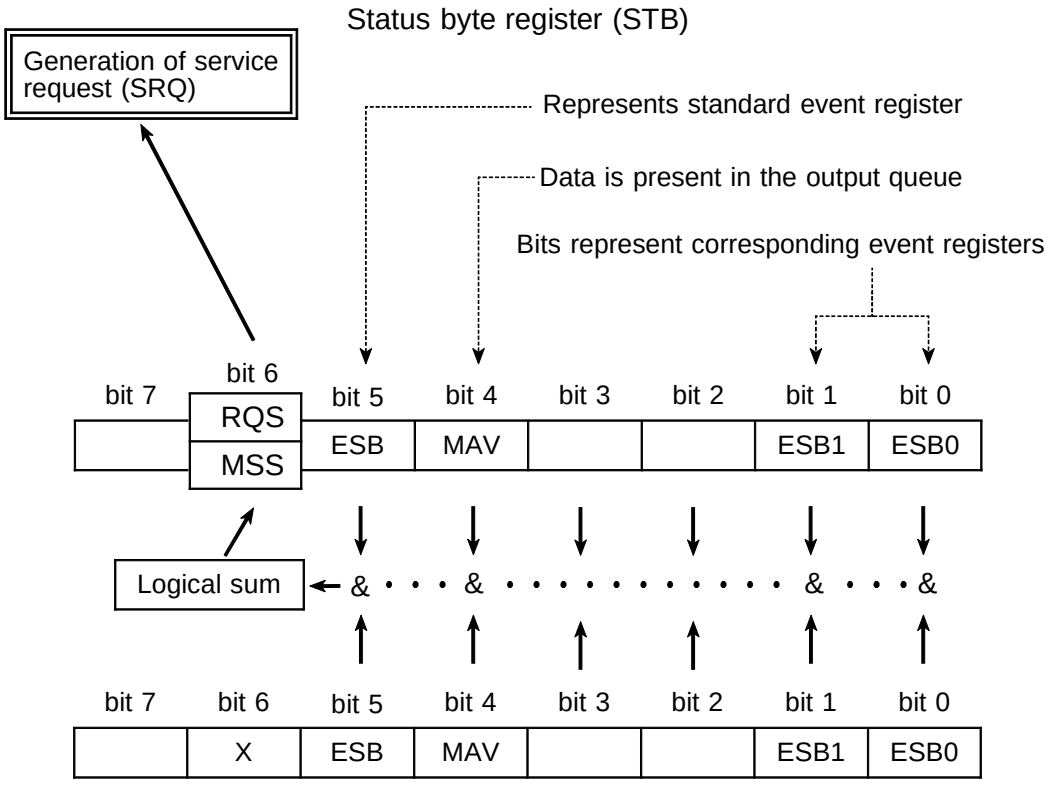
The LOCK(LCL) key at the front panel lights red to indicate that the unit is under remote control by an external device.

### (2) LOCK (LCL) key

This key cancels remote control by GP-IB and actives local operation. However, if the Local Lock-Out state has been set by the GP-IB, this key is disabled.

## 8.2.6 Status Model

In its implementation of the serial polling function using service requests, the 7075 employs the status model specified by IEEE 488.2.
The term "event" refers to any phenomenon which generates a service request.




The status byte register holds information relating to the event registers and the output queue. It is further possible to use the service request enable register as a mask to select the items required. If any of the bits selected by the mask becomes 1, bit 6 (the master summary status or MSS bit) is also set to 1, an RQS message is generated, and this generates a service request.

## 8.2.7 Status Byte Register

Each bit of the status byte is a summary (logical OR) of the event register corresponding to that bit. Further, the status byte and each event register has an enable register corresponding to it, and according to the setting of this enable register (which starts off at zero when the power is turned on) it is possible to mask the service requests originating from each event.

Status byte register bit assignments

| | |
|---|---|
| Bit 7 | Unused |
| Bit 6<br>RQS | Set to 1 when a service request is dispatched. |
| MSS | Logical sum of the other bits of the status byte register |
| Bit 5<br>ESB | Standard event summary (logical sum) bit<br>Shows a logical sum of the standard event status register. |
| Bit 4<br>MAV | Message available<br>Indicates that there is at least one message in the output queue. |
| Bit 3 | Unused |
| Bit 2 | Unused |
| Bit 1 | Unused |
| Bit 0<br>ESB0 | Event summary bit 0<br>Bitwise logical sum of event status register 0 |

The following commands are used for reading the status byte, and for setting the service request enable register and for reading it.

| | |
|---|---|
| Reading the status byte | *STB? |
| Setting the service request enable register | *SRE |
| Reading the service request enable register | *SRE? |

## 8.2.8 Event Registers

The summary of this register is set in bit 5 of the status byte.
Each bit is masked by setting the standard event status enable register (which starts off at zero when the power is turned on).
The circumstances when the contents of the standard event status register are cleared are as listed below.
1. When the *CLS command is received.
2. When the contents have been read by an *ESR? query.
3. When the power is turned off and turned on again.

Standard event status register (SESR) bit assignments

| | |
|---|---|
| Bit 7<br>PON | Power on flag. |
| Bit 6<br>URQ | User request.<br>Not used by the 7075. |
| Bit 5<br>CME | Command error.<br>When a command which has been received contains a syntactic or semantic error, this bit is set to 1.<br>• When a command is received that is not in the 7075 command set<br>• There is a mistake in a program header.<br>• The number of data parameters is wrong.<br>• The format of the parameters is wrong. |
| Bit 4<br>EXE | Execution error.<br>When for some reason a command which has been received cannot be executed, this bit is set to 1.<br>• The designated data value is outside the set range.<br>• The designated data value is not acceptable. |
| Bit 3<br>DDE | Device dependent error.<br>When a command cannot be executed due to some cause other than a command error, a query error, or an execution error, this bit is set to 1.<br>• Execution is impossible due to an abnormality inside the 7075.<br>• Some other function is being performed (during holding and integrating). |
| Bit 2<br>QYE | Query error.<br>This bit is set to 1 when a query error is detected by the output queue control.<br>• When an attempt has been made to read the output queue when it is empty.<br>• When the data overflows the output queue.<br>• When data in the output queue has been lost.<br>• When a query is detected after an *IDN query within the same line. |
| Bit 1<br>RQC | Request for controller authority.<br>Not used by the 7075. |
| Bit 0<br>OPC | Operation terminated.<br>This bit is set to 1 when an ∗OPC command is executed, when the operation of all the messages up to the ∗OPC command has been completed. |

The following commands are used to read the standard event status register, and to set or read the standard event status enable register.

| | |
|---|---|
| Read the standard event status register | *ESR? |
| Set the standard event status enable register | *ESE |
| Read the standard event status enable register | *ESE? |

The bits of event status register 0

| | | |
|---|---|---|
| Bit 7 | EOFO | End Of File Operation |
| Bit 6 | EOWL | End Of Waveform Input Loading |
| Bit 5 | EOSL | End Of Sweep File Loading |
| Bit 4 | EORO | End Of Reset Operation |
| Bit 3 | | |
| Bit 2 | | |
| Bit 1 | | |
| Bit 0 | | |

The following commands are used for reading the event status register 0, and for setting the event status enable register 0 and for reading it.

Reading event status register 0 :ESR0?
Setting event status enable register 0 :ESE0
Reading event status enable register 0 :ESE0?

## 8.2.9 The Input Buffer and the Output Queue

### (1) Input buffer

The 7075 has an input buffer of 256 bytes capacity. Messages which are received are put into this buffer and executed in order.

When more than 256 bytes of data are sent so the buffer becomes full, the GP-IB bus enters the waiting state until buffer space becomes available.

### (2) Output queue

The 7075 has an output queue of 256 bytes capacity.
Response messages are accumulated in this queue and are read out from the controller.
The circumstances when the output queue is cleared are as listed below:

1. When a device clear is issued.
2. When the power is turned off and turned on again.

When 256 bytes of response messages have been queued, the next response message is held in a waiting state until space becomes available. In this condition, if data in the input buffer also exceeds 256 bytes, a query error occurs and the output queue is cleared.

# 8.3 Command Reference

### (1) Command Execution

Commands are loaded into the input buffer and executed in order.

### (2) Response to Query

In response messages to queries, only the data portion is returned if headers are turned off. If headers are turned on, the data is returned with a header. In response messages, numeric data is returned in the format (NR1 to NR3) that was used for the parameter of the specific command table.

### (3) Command Reference Description

The command reference lists common commands first, followed by 7075-specific commands. The 7075-specific commands are categorized in the following order: environment & miscellaneous settings, environment settings and self diagnostics, output settings, disk modes and others. Within each category, related commands are listed together.
Command descriptions are structured as follows.

:Command

■ Indicates functions of message reference

**Syntax** : Indicates the command syntax.

**< >** : (Data portion)
Indicates the data format for a command that includes data.

**Response syntax** : Indicated only for commands for which a response message is returned.

**Example** : Shows a simple example illustrating the usage of the command. All transmissions are indicated in "short form."

**Function** : Describes the function of the command.

**Note** : Describes points that require special attention when using the command.

**Error** : Indicates the what kinds of errors might occur.

**NOTE**
" " in the syntax indicates a space.
"< >" mark should not be input.

## 8.3.1 Standard Command

### *IDN?

■ Queries device ID (manufacturer's name, model name, software version).

**Syntax** *IDN?

**Response syntax**
(Header: ON)
*IDN HIOKI,7075,0,V1.00

| | |
|---|---|
| First field | Manufacturer's name |
| Second field | Model name |
| Third field | "0" fixed |
| Fourth field | Software version |

**Example**
Transmission *IDN?
Response
(Header: ON)
*IDN HIOKI,7075,0,V1.00
(Header: ON)
HIOKI,7075,0,V1.00

**Function** Queries device ID (manufacturer's name, model name, software version).

**Notes**
- The "*IDN?" query is the last query message in the program messages. Accordingly, if another query is detected after this query, a query error is generated, and no response message after the "*IDN?" query is produced.
- With this query, if any error occurs, no response message is produced.

### *RST

■ Initializes the settings.

**Syntax** *RST

**Example**
Transmission *RST

**Function**
- Resets the 7075 unit. The parameters which are reset are initialized by the reset function of the unit.
- The following settings are not initialized. GP-IB address, input buffer, output que, transmit terminater, event register, enable registers
- Processing time: approx. 5 seconds
- Upon normal finish, EORO in Event Status Register 0 is set.

### *TST?

■ Requests execution of, and queries the result of, the self test.

**Syntax** *TST?

**Response syntax**
(Header ON)
*TST <0/1>
(Header ON)
<0/1>
0: no error
1: error occurs

**Example**
Transmission *TST?
Response
(Header ON)
TST 0
(Header OFF)
0
Memory is normal.

**Function** Causes the 7075 to perform the self test, and returns the result thereof as a numerical data value in NR1 format (0 or 1).

**Notes**
- With this query, if any error occurs, no response message is produced.
- Processing time: approx. 2 seconds.

**Errors** (Execution error)
The test cannot be executed in the following conditions. Initialization should be performed before executing this command.
- With the RUN state active
- If an arbitrary waveform is present
- If sweep is active on a channel

## *OPC

■ After all action has been completed during execution, performs an SRQ request.

**Syntax** *OPC

**Example** *RST;:SYST:BEEP ON;*OPC;:HEAD OFF
The specified bit is set to 1 after *RST;:SYST:BEEP ON executes.

**Function** When multiple commands are issued on the same line, after the command in front of the *OPC command finishes, Standard Event Status Register (SESR) bit0 is set to 1.

## *OPC?

■ Queries whether all action has been completed.

**Syntax** *OPC?

**Response syntax** (Header ON)
*OPC 1
(Header OFF)
1

**Function** Returns "1" as the response message instead of setting bit0 (the OPC bit) of the Standard Event Status Register (SESR) to 1.

**Note** With this query, if any error occurs, no response message is produced.

## *WAI (GP-IB only)

■ Waits until sampling is fully completed.

**Syntax** *WAI

**Function** Forces the unit to wait until all previous commands have executed.

**Note** All 7075-specific commands are sequential type, so the WAI command has no effect. However, it is included for compliance with the IEEE-488.2 1987 standard.

## *CLS

■ Clears the status byte register and the event registers.

**Syntax** *CLS

**Function** Clears all event registers corresponding to each bit of the status byte register.

**Note** This has no effect upon the output queue, the various enable registers, or bit 4 (the MAV bit) of the status byte register.

## *ESE (GP-IB only)

■ Sets the standard event status enable register.

**Syntax** *ESE <NR1>
<NR1> = 0 to 255

**Example**
Transmission *ESE 36
Bits 5 and 2 of SESER are set to 1.

**Function**
- Loads the effective format of the Standard Event Status Register (SESR) into the Standard Event Status Enable Register (SESER).
- Decimals are rounded off.

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| PON | URQ | CME | EXE | DDE | QYE | RQC | OPC |

**Note** When the power is turned on, the data is reinitialized to 0.

**Error** (Command error)
When <NR1> was not in NRf format.

## *ESE? (GP-IB only)

■ Queries the standard event status enable register (SESER).

**Syntax** *ESE?

**Response syntax**

| (Headers: ON) | (Headers: OFF) |
|---|---|
| *ESE <NR1> | <NR1> |

**Example**
Transmission *ESE?
Response 36

**Function** The contents of SESER as set by the *ESE command are returned as a NR1 value (0 to 255).

**Note** If any error occurs, no response message to this query is produced.

**Error** With this query, if any error occurs, no response message is produced.

## *ESR?

■ Queries out and clears the contents of the standard event status register (SESR).

**Syntax** *ESR?

**Response syntax**

| (Headers: ON) | (Headers: OFF) |
|---|---|
| *ESR <NR1> | <NR1> |

**Example**
Transmission *ESR?
Response 32
Indicates command error occurs.
(bit5 corresponds to CME.)

**Function** The contents of SESR are returned as NR1 value (0 to 255).

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| PON | URQ | CME | EXE | DDE | QYE | RQC | OPC |

**Error** With this query, if any error occurs, no response message is produced.

## *SRE (GP-IB only)

■ Sets the service request enable register (SRER).

**Syntax** *SRE <NR1>
<NR1> = 0 to 255

**Example**
Transmission *SRE 33
Bits 0 and 5 of SRER are set to 1.

**Function**
- Loads the effective format of the Status Byte Register (STB) into the Service Request Enable Register (SRER).
- Decimals are rounded off.

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| Unused | - | ESB | MAV | - | - | - | ESB0 |

**Notes**
- When the power is turned on, the data is reinitialized to 0.
- The setting of unused bit (bit 7, 3, 2, and 1) and the setting of bit 6 are ignored.

**Error** (Command error)
When <NR1> was not in NRf format.

## *SRE? (GP-IB only)

■ Queries the service request enable register (SRER).

**Syntax** *SRE?

**Response syntax**

| (Header ON) | (Header OFF) |
|---|---|
| *SRE <0-255> | <0-255> |

**Example**

| | (Header ON) | (Header OFF) |
|---|---|---|
| Transmission | *SRE? | |
| Response | 33 | |

**Function** Returns the value of the service request enable register (SRER) set by the *SRE command as a numerical data value in NR1 format (0 to 255)

**Note** With this query, if any error occurs, no response message is produced.

## *STB? (GP-IB only)

■ Queries the status byte register.

**Syntax** *STB?

**Response syntax**

| (Header ON/OFF) | |
|---|---|
| *STB <NR1> | <NR1> |

**Example**

| | (Header ON) | (Header OFF) |
|---|---|---|
| Transmission | *STB? | |
| Response | 32 | |

An event occurred at Status Register (ESB) bit 5.

**Function** Returns the set contents of the status byte register (STB) as a numerical data value in NR1 format (0 to 255).

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| Unused | MSS | ESB | MAV | Unused | Unused | Unused | ESB0 |

**Notes**
- Bit 6 is the MSS bit.
- Even if service requests are cleared by serial polling, the MSS bit is not cleared.

## 8.3.2 Specific Commands for Environment/Miscellaneous Settings

### :SYSTem:BEEPer

■ Enables and disables beep sound.

**Syntax** :SYSTem:BEEPer <ON/OFF>

**Example** :SYST:BEEP OFF
Disables the beep sound.

**Function** Enables or disables the beep sound.

**Error** (Command error)
When the setting data contains characters other than ON or OFF.

### :SYSTem:BEEPer?

■ Queries the beep sound setting.

**Syntax** :SYSTem:BEEPer?

**Response syntax** (Header ON)
:SYSTEM:BEEPER <NR1>
(Header OFF)
<NR1>

**Example**
Transmission :SYST:BEEP?
Response (Header ON)
:SYSTEM:BEEPER OFF
(Header ON)
OFF

**Function** Queries the current setting of beep sound enablement.

**Note** With this query, if any error occurs, no response message is produced.

### :SYSTem:CRToff

■ Enables and disables the automatic LCD backlight off

**Syntax** :SYSTem:CRToff <ON/OFF>
ON The backlight automatically turns off after a specific idle time.
OFF The backlight remains lit.

**Example**
Transmission :SYST:CRT OFF
Disables the auto backlight off function so the backlight remains lit.

**Function** Enables and disables the automatic LCD backlight off

**Error** (Command error)
When the setting data contains characters other than ON or OFF.

## :SYSTem:CRToff?

■ Queries the automatic LCD backlight off setting.

**Syntax** :SYSTem:CRToff?

**Response syntax**
(Header ON)
:SYSTEM:BEEPER <ON/OFF>
(Header OFF)
<ON/OFF>

**Example**
Transmission :SYST:CRT?
Response OFF

**Function** Queries the current setting for automatic LCD backlight off.

**Note** With this query, if any error occurs, no response message is produced.

## :SYSTem:DATE

■ Sets the date.

**Syntax** :SYSTem:DATE <year>,<month>,<day>
<year>= 0 to 99
<month>= 1 to 12
<day>= 1 to 31
(NR1 numerical data)

**Example**
Transmission :SYST:DATE 99,3,17
Sets the date to 3/17/99.

**Function** Sets the date.

**Note** <year>, <month> and <day> can be in NRf format, in which case extra digits are rounded off.

**Errors**
(Command error)
When <year>, <month>, <day> was not in NRf format.
(Execution error)
When attempting to set an out-of-range value.

## :SYSTem:DATE?

■ Queries the internal calender

**Syntax** :SYSTem:DATE?

**Response syntax**
(Header ON)
:SYSTEM:DATE <year>,<month>,<day>
(Header OFF)
<year>,<month>,<day>

**Example**
Transmission :SYST:DATE?
Response
(Header ON)
:SYSTEM:DATE 99,3,17
(Header OFF)
99,3,17

**Function** Returns the internal calender settings as NR1 numerical format (<year>, <month>, <day>).

**Note** With this query, if any error occurs, no response message is produced.

## :SYSTem:TIME

■ Sets the time of the internal clock.

**Syntax** :SYSTem:TIME <hour>,<min>, <sec>
<hour>= 0 to 23
<min>= 0 to 59
<sec>= 0 to 59
(All NR1 numerical data)

**Example**
Transmission :SYST:TIME 12,34,56
Sets the internal clock to 12:34:56

**Function** Sets the time of the internal clock.

**Note** <hour>, <min>, and <sec>can be in NRf format, in which case extra digits are rounded off.

**Errors** (Command error)
When <hour>, <min>, and <sec> was not in NRf format.
(Execution error)
When attempting to set an out-of-range value.

## :SYSTem:TIME?

■ Requests the time.

**Syntax** :SYSTem:TIME?

**Response syntax** (Header ON)
:SYSTEM:TIME <hour>,<min>, <sec>
(Header OFF)
<hour>,<min>,<sec>

**Example**
Transmission :SYST:TIME?
Response (Header ON)
:SYSTEM:TIME 12,34,56
(Header OFF)
12,34,56

**Function** Returns the time on the internal clock in NR1 format (<hour>, <min>, <sec>).

**Note** With this query, if any error occurs, no response message is produced.

## :SYSTem:SYNChro

■ Sets synchronized drive operation.

**Syntax** :SYSTem:SYNChro <OFF/MASTer/SLAVe>

| | |
|---|---|
| OFF | Disables synchronized drive. |
| MASTer | Enables synchronized drive with this unit as master. |
| SLAVe | Enables synchronized drive with this unit as slave. |

**Example**
Transmission :SYST:SYNC MAST
Enables synchronized drive with this unit as master.

**Function** Sets synchronized drive operation.

**Error** (Command error)
When characters are specified other than those at the left.

## :SYSTem:SYNChro?

■ Queries the synchronized drive.

**Syntax** :SYSTem:SYNChro?

**Response syntax**
(Header ON)
:SYSTEM:SYNCHRO <OFF/MASTer/SLAVe>
(Header OFF)
<OFF/MASTer/SLAVe>

**Example**
Transmission :SYST:SYNC?
Response
(Header ON)
:SYSTEM:SYNCHRO MASTER
(Header OFF)
MASTER

**Function** Returns a string describing the status of synchronized drive.

## :SYSTem:LANGuage

■ Sets the display language.

**Syntax** :SYSTem:LANGuage <ENGLish/JAPanese>
ENGLish Displays in English.
JAPanese Displays in Japanese.

**Example**
Transmission :SYST:LANG ENGL
Sets the display in English.

**Function** Sets the display language.

**Error** (Command error)
When characters are specified other than those at the left.

## :SYSTem:LANGuage?

■ Queries the display language.

**Syntax** :SYSTem:LANGuage?

**Response syntax**
(Header ON)
:SYSTem:LANGuage <ENGLish/JAPanese>
(Header OFF)
<ENGLish/JAPanese>

**Example**
Transmission :SYST:LANG?
Response
(Header ON)
:SYSTEM:LANGUAGE ENGLISH
(Header OFF)
ENGLISH

**Function** Queries the display language.
ENGLish Displays in English.
JAPanese Displays in Japanese.

# 8.3.3 Specific Commands for Output Settings

## :OSET:AMPLitude

■ Sets the amplitude voltage.

**Syntax** :OSET:AMPLitude <ch>,<voltage>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<voltage> Output voltage value (V)
= 0 to 10.000 V (10 V range)
0 to 1.0000 V (1 V range)
0 to 100.00 mV (0.1 V range)

**Example**

Transmission :OSET:AMPL 1,5

Sets the amplitude voltage of the output waveform for channel 1 to 5 V.

**Function** Sets the amplitude voltage.

**Note** The sum of the offset and amplitude is limited. For details, see Section 3.4.2.

**Errors** (Execution error)

- When the specified value cannot be set
- When DC is selected as the waveform type
- When sweep is on

## :OSET:AMPLitude?

■ Queries the amplitude setting.

**Syntax** :OSET:AMPLitude? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax** (Header ON)
:OSET:AMPLITUDE <ch>, <voltage>
(Header OFF)
<ch>,<voltage>

**Example**

Transmission :OSET:AMPL? 1
Response (Header ON)
:OSET:AMPLITUDE 1,8.345
(Header OFF)
1,8.34500

**Function** Returns the amplitude voltage for the specified channel as NR2 numerical data. Units: V

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)

- When DC is selected as the waveform type
- When sweep is on

## :OSET:OFFSet

■ Sets the offset voltage.

**Syntax** :OSET:OFFSet <ch>,<voltage>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<voltage> Offset voltage value (V)

**Example**

Transmission :OSET:OFFS 1,5

Sets the offset voltage of output waveform for channel 1 to 5 V.

**Function** Sets the offset voltage value.

**Note** The sum of the offset and amplitude is limited. For details, see Section 3.4.2.

**Errors** (Execution error)

- When the specified value cannot be set
- When sweep is on

## :OSET:OFFSet?

■ Queries the offset voltage value.

**Syntax** :OSET:OFFSet? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:OFFSET <ch>,<voltage>
(Header OFF)
<ch>,<voltage>

**Example**
Transmission :OSET:OFFS? 1
Response
(Header ON)
:OSET:OFFSET 1,8.34500
(Header OFF)
1,8.34500

**Function** Returns the offset voltage for the specified channel as NR2 numerical data. Units: V

**Note** With this query, if any error occurs, no response message is produced.

**Error** (Execution error)
When sweep is on

## :OSET:UPLow

■ Sets the upper limit and lower limit of the output voltage.

**Syntax** :OSET:UPLow <ch>,<up>,<low>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<up>
Upper limit of the output voltage (V)
<low>
Lower limit of the output voltage (V)

**Example**
Transmission :OSET:UPL 1,5,-2.3
Sets the output voltage range of the output waveform for channel 1 to from 5 to -2.3.

**Function** Sets the upper limit value of the output voltage.

**Note** The difference between the upper limit value and the lower limit value of the output voltage is limited.
For details, see Section 3.4.2.

**Errors** (Execution error)
- When the specified value cannot be set
- When DC is selected as the waveform type
- When sweep is on

## :OSET:UPLow?

■ Queries the upper limit and lower limit of the output voltage.

**Syntax** :OSET:UPLow? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:UPLOW <ch>,<up>,<low>
(Header OFF)
<ch>,<up>,<low>

**Example**
Transmission :OSET:UPL? 1
Response
(Header ON)
:OSET:UPLOW 1,2.38000,-2.38000
(Header OFF)
1,2.38000,-2.38000

**Function** Returns the offset voltage for the specified channel as NR2 numerical data (<up>, low>). Units: V

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)
- When DC is selected as the waveform type
- When sweep is on

## :OSET:PHASe

■ Sets the phase angle.

**Syntax** :OSET:PHASe <ch>,<phase>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<phase> Phase (°)

**Example**
Transmission :OSET:PHAS 1,180.00
Sets the phase angle of the output waveform for channel 1 to 180.

**Function** Sets the phase angle.

**Note** The setting range is between -360.00 to 360.00.

**Errors** (Execution error)
- When the specified value cannot be set
- When DC, noize, or arbitrary waveform is selected as the waveform type
- When sweep is on

## :OSET:PHASe?

■ Queries the phase angle.

**Syntax** :OSET:PHASe? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax** (Header ON)
:OSET:PHAS <ch>,<data>
(Header OFF)
<ch>,<data>

**Example**
Transmission :OSET:PHAS? 1
Response (Header ON)
:OSET:PHASE 1,90.00
(Header OFF)
1,90.00

**Function** Returns the phase angle for the specified channel as NR2 numerical data. Units: °

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)
- When DC, noize, or arbitrary waveform is selected as the waveform type
- When sweep is on

## :OSET:DELay

■ Sets the delay.

**Syntax** :OSET:DELay <ch>,<data>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<data> Delay (number of points)
=-128000 to 128000

**Example**
Transmission :OSET:DEL 1,128000
Sets the delay for channel 1 to 128000.

**Function** Sets the delay

**Errors** (Execution error)
- When the specified value cannot be set
- When the specified waveform is not an arbitrary waveform
- When sweep is on

## :OSET:DELay?

■ Queries the delay.

**Syntax** :OSET:DELay? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:DELAY <ch>,<data>
(Header OFF)
<ch>,<data>

**Example**
Transmission :OSET:DEL? 1
Response
(Header ON)
:OSET:DEL 1,128000
(Header OFF)
1,128000

**Function** Returns the delay for the specified channel as NR1 numerical data (number of points).

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)
- When the specified waveform is not an arbitrary waveform
- When sweep is on

## :OSET:FILTer

■ Sets the filter.

**Syntax** :OSET:FILTer <ch>,<data>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<data> Frequency of filter
= PASS

| | |
|---|---|
| F1MHZ | 1 MHz |
| F500KHZ | 500 kHz |
| F200KHZ | 200 kHz |
| F100KHZ | 100 kHz |
| F50KHZ | 50 kHz |
| F20KHZ | 20 kHz |
| F10KHZ | 10 kHz |
| F5KHZ | 5 kHz |
| F2KHZ | 2 kHz |
| F1KHZ | 1 kHz |
| F500HZ | 500 Hz |
| F200HZ | 200 Hz |
| F100HZ | 100 Hz |
| F50HZ | 50 Hz |

**Example**
Transmission :OSET:FILT 1,F100KHZ
Sets the filter for channel 1 to 100 kHz.

**Function** Sets the filter.

**Errors** (Command error)
When characters are specified other than those at the left.
(Execution error)
When the specified waveform is a sine or square wave, or DC

## :OSET:FILTer?

■ Queries the filter.

**Syntax** :OSET:FILTer? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Example**

Transmission :OSET:FILT? 1

Response (Header ON)
:OSET:FILTER 1,F100KHZ
(Header OFF)
1,F100KHZ

**Function** Returns the filter for the specified channel as a character data.

**Note** With this query, if any error occurs, no response message is produced.

**Error** (Execution error)
When the specified waveform is a sine or square wave, or DC

## :OSET:FREQuency

■ Sets the frequency.

**Syntax** :OSET:FREQuency <ch>,<freq>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<freq>
(Frequency of SIN and rectangular waveforms)
= 0 to 10000000 [Hz]
(Clock frequency of arbitrary waveform)
= 0 to 10000000 [Hz]
(Frequency of other waveforms)
= 0 to 200000 [Hz]

**Example**

Transmission :OSET:FREQ 1,100000

Sets the frequency for channel 1 to 100 kHz.

**Function** Sets the frequency of a basic waveform, or the clock frequency of a arbitrary waveform.

**Errors** (Execution error)

- When the specified value cannot be set
- When DC or noize is selected as the waveform type
- When sweep is on

## :OSET:FREQuency?

■ Queries the frequency.

**Syntax** :OSET:FREQuency? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:FREQ <ch>,<frequency>
(Header OFF)
<ch>,<frequency>

**Example**
Transmission :OSET:FREQ? 1
Response
(Header ON)
:OSET:FREQUENCY 1,100000.00
(Header OFF)
1,100000.00

**Function** Returns the frequency for the specified channel as NR2 numerical data.

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)
- When DC or noize is selected as the waveform type
- When sweep is on

## :OSET:PERiod

■ Sets the period.

**Syntax** :OSET:PERiod <ch>,<period>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<period>
Period of SIN and rectangular waveforms
= 100 to 0.0000001 (seconds)
Clock period of an arbitrary waveform
= 100 to 0.0000001 (seconds)
Period of waveform other than custom
= 100 to 0.000005 (seconds)

**Example**
Transmission :OSET:PER 1,1e-6
Sets the frequency for channel 1 to 1 MHz.

**Function** Sets the frequency of a basic waveform, or the clock frequency of a arbitrary waveform.

**Errors** (Execution error)
- When the specified value cannot be set
- When DC or noize is selected as the waveform type
- When sweep is on

## :OSET:PERiod?

■ Queries the period.

**Syntax** :OSET:PERiod? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:PER <ch>,<period>
(Header OFF)
<ch>,<period>

**Example**
Transmission :OSET:PER? 1
Response
(Header ON)
:OSET:PERIOD 1,0.0000001
(Header OFF)
1,0.0000001

**Function** Returns the period for the specified channel as NR2 numerical data.

**Note** With this query, if any error occurs, no response message is produced.

**Error** (Execution error)
When DC or noize is selected as the waveform type

## :OSET:RANGe

■ Sets the range.

**Syntax** :OSET:RANGe <ch>,<range>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<range>
= R10V (10 V range)
= R1V (1 V range)
= R0_1V (0.1 V range)

**Example**
Transmission :OSET:RANG 1,R1V
Sets the range for channel 1 to 1 V.

**Function** Sets the range.

**Error** (Command error)
When characters are specified other than those at the left.
(Execution error)
When RUN is active.

## :OSET:RANGe?

■ Queries the range.

**Syntax** :OSET:RANGe? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:RANGE <ch>,<range>
(Header OFF)
<ch>,<range>

**Example**
Transmission :OSET:RANG? 1
Response
(Header ON)
:OSET:RANGE 1,R1V
(Header OFF)
1,R1V

**Function** Returns the range for the specified channel as a character data.

**Note** With this query, if any error occurs, no response message is produced.

## :OSET:DUTY

■ Sets the duty.

**Syntax** :OSET:DUTY <ch>,<duty>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<duty> = 1.0 to 99.0 %

**Example**
Transmission :OSET:DUTY 1,50
Sets the duty for channel 1 to 50%.

**Function** Sets the duty cycle of a pulse waveform.

**Errors** (Execution error)
- When the specified value cannot be set
- When the specified waveform is not a pulse waveform
- When sweep is on

## :OSET:DUTY?

■ Queries the duty.

**Syntax** :OSET:DUTY? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:DUTY <ch>,<duty>
(Header OFF)
<ch>,<duty>

**Example**
Transmission :OSET:DUTY? 1
Response
(Header ON)
:OSET:DUTY 1,50.0
(Header OFF)
1,50.0

**Function** Returns the duty for the specified channel as NR2 numerical data.

**Note** With this query, if any error occurs, no response message is produced.

**Errors** (Execution error)
- When the specified waveform is not a pulse waveform
- When sweep is on

## :OSET:TRACking

■ Perform simultaneous settings.

**Syntax** :OSET:TRACking <chno>,<item>

<chno> Channels to be set
= OFF
= CH1_2 (Simultaneous settings for channels 1 and 2)
= CH1_3 (Simultaneous settings for channels 1 to 3)
= CH1_4 (Simultaneous settings for channels 1 to 4)

<item> Item to be set simltaneously.
= WAVE (The waveforms are set)
= FREQuency (The frequency is set)
= AMPLitude (The amplitude is set)
= FILTer (The filter is set)
= DUTY (The duty is set)

**Example**

Transmission :OSET:TRAC CH1 2,AMPL

The amplitude of channels 1 and 2 is set simultaneously.

**Function** Perform simultaneous settings.

**Note** CH1_3/CH1_4 cannot be specified on the 7075-01.

**Errors** (Command error)

- When characters are specified other than those at the left.

(Execution error)

- When <chno> is set to CH1_3/ CH1_4 with using the 7075-01
- When sweep is on for the channel to be set simultaneously.
- When the waveforms are set simltaneously during RUN is active.

## :OSET:SWEep

■ Sets the sweep function.

**Syntax** :OSET:SWEep <ch>,<ON/OFF>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<ON/OFF>
ON: Enables the sweep function.
OFF: Disables the sweep function.

**Example**

Transmission :OSET:SWE 1,ON

Enables the sweep function for channel 1.

**Function** Enables or disables the sweep function.

**Note** Upon normal finish, EOSL in Event Status Register 0 is set.

**Errors** (Command error)

When the setting data contains characters other than ON or OFF.

(Execution error)

- If a sweep setting, such as editing in the sweep table, has not be done at least once.
- When RUN is active.

## :OSET:SWEep?

■ Queries the sweep setting.

**Syntax** :OSET:SWEep? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:SWEEP <ch>,<ON/OFF>
(Header OFF)
<ch>,<ON/OFF>

**Example**
Transmission :OSET:SWE? 1
Response
(Header ON)
:OSET:SWEEP 1,ON
(Header OFF)
1,ON

**Function** Returns the sweep setting for the specified channel as a character data.

**Note** With this query, if any error occurs, no response message is produced.

## :OSET:WAVE

■ Selects a basic waveform.

**Syntax** :OSET:WAVE <ch>,<wave>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

<wave>

| | |
|---|---|
| = SINe | Sine waveform |
| = SQUare | Square waveform |
| = PULSe | Pulse waveform |
| = TRIangle | Triangle waveform |
| = RAMP1 | Ramp-up |
| = RAMP2 | Ramp-down |
| = NOISe | Noize |
| = DC | DC |
| = AWG | Arbitrary waveform |

**Example**

Transmission :OSET:WAVE 1,SIN

Sets the waveform for channel 1 to SIN wave.

**Function** Selects a basic waveform.

**Notes**
- Frequency, amplitude and offset settings may be limited depending on the specified waveform.
- When an arbitrary waveform is specified, the waveform is the previously specified arbitrary waveform. If no arbitrary waveform has been previously specified, an arbitrary waveform cannot be specified here.
- Upon normal finish, EOWL in Event Status Register 0 is set.

**Errors** (Command error)
- When characters are specified other than those at the left.

(Execution error)
- When sweep is on
- When arbitrary waveform is specified without an arbitrary waveform having been previously specified.
- When RUN is active.

## :OSET:WAVE?

■ Queries the basic waveform

**Syntax** :OSET:WAVE? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OSET:WAVE <ch>,<wave>
(Header OFF)
<ch>,<wave>

**Example**

Transmission :OSET:WAVE? 1

Response
(Header ON)
:OSET:WAVE 1,SINE
(Header OFF)
1,SINE

**Function** Returns the waveform for the specified channel as a character data.

**Note** With this query, if any error occurs, no response message is produced.

**Error** (Execution error)
When sweep is on

## :OSET:AWG

■ Sets the name of the arbitrary waveform.

**Syntax** :OSET:AWG <ch>, "<name>"

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

"<name>" Name of the arbitrary waveform

**Example**

Transmission :OSET:AWG 1,'WAVE(1)'

Sets the name of the arbitrary waveform for channel 1 to WAVE(1).

**Function** Sets the name of the arbitrary waveform.

**Notes**

- The waveform name must be surrounded by single (' ') or double (" ") quotes.
- Waveform names are case sensitive.
- Although an arbitrary waveform can be given the name of a basic waveform, the arbitrary waveform will not be output when selected.
- Upon normal finish, EOWL in Event Status Register 0 is set.

**Errors** (Command error)

- When a waveform name is not surrounded by single (' ') or double (" ") quotes

(Execution error)

- When the specified arbitrary waveform is not present
- When RUN is active.

## :OSET:AWG?

■ Queires the name of the arbitrary waveform.

**Syntax** :OSET:AWG? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**

(Header ON)
:OSET:AWG <ch>,"<name>"
(Header OFF)
<ch>,"<name>"

**Example**

Transmission :OSET:AWG? 1
Response (Header ON)
:OSET:AWG 1,"WAVE(1) "
(Header OFF)
1,"WAVE(1) "

**Function** Returns the name of the arbitrary waveform waveform name for the specified channel as a character data ("name")

**Notes**

- With this query, if any error occurs, no response message is produced.
- Waveform names are displayed as up to eight characters, padded on the right with spaces.

**Error** (Execution error)

If the name of the arbitrary waveform is not specified

## :OSET:AWG:SIZE?

■ Queries the size of the specified arbitrary waveform.

**Syntax** :OSET:AWG:SIZE? "<name>"

"<name>" Name of the arbitrary waveform

**Response syntax**
(Header ON)
:OSET:AWG:SIZE "<name>",<size>
(Header OFF)
"<name>",<size>

**Example**
Transmission :OSET:AWG:SIZE? 'WAVE(1)'
Response
(Header ON)
:OSET:AWG:SIZE "WAVE(1) ",1000
(Header OFF)
"WAVE(1) ",1000

**Function** Returns the size of the specified arbitrary waveform as NR1 numerical data.

**Notes**
- With this query, if any error occurs, no response message is produced.
- The waveform name must be surrounded by single (' ') or double (" ") quotes.
- Waveform names are case sensitive.
- Waveform names of response syntax are displayed as up to eight characters, padded on the right with spaces.

**Errors**
(Command error)
- When a waveform name is not surrounded by single (' ') or double (" ") quotes.

(Execution error)
- When the specified arbitrary waveform is not present.
- When the waveform name is not specified.

## :OSET:AWG:NUMBer?

■ Queries the number of arbitrary waveform.

**Syntax** :OSET:AWG:NUMBer?

**Response syntax**
(Header ON)
:OSET:AWG:NUMBER <NR1>
(Header OFF)
<NR1>

**Example**
Transmission :OSET:AWG:NUMB?
Response
(Header ON)
:OSET:AWG:NUMBER 3
(Header OFF)
3

**Function** Returns the number of arbitrary waveforms as NR1 numerical data.

**Note** With this query, if any error occurs, no response message is produced.

## :OSET:AWG:LIST?

■ Queries the list of arbitrary waveform names.

**Syntax** :OSET:AWG:LIST?

**Response syntax**
(Header ON)
:OSET:AWG:LIST
"<name1>","<name2>",...
(Header OFF)
"<name1>","<name2>",...

**Example**
Transmission
:OSET:AWG:LIST?
Response
(Header ON)
:OSET:AWG:LIST "WAVE(1) ",
"WAVE(2) ","WAVE(3) "
(Header OFF)
"WAVE(1) " ,"WAVE(2) ","WAVE(3) "

**Function** Returns a list of arbitrary waveform names as a series of strings "<name1>, <name2>, ...."

**Notes**
- With this query, if any error occurs, no response message is produced.
- Waveform names of response syntax are displayed as up to eight characters, padded on the right with spaces.

**Error** (Execution error)
No waveform is present

## :OSET:AWG:CLEar

■ Deletes all arbitrary waveforms.

**Syntax** :OSET:AWG:CLEar

**Example**
Transmission
:OSET:AWG:CLE

**Function** Deletes all arbitrary waveforms.

**Notes**
- If an arbitrary waveform is assigned to a channel, it cannot be deleted.
- Regardless of sweep on/off setting, if an arbitrary waveform is assigned to a channel, it cannot be deleted.

**Errors** (Execution error)
- If an arbitrary waveform is assigned to a channel
- Regardless of sweep on/off setting, if an arbitrary waveform is assigned to a channel

## :OUT

■ Sets the output relay.

**Syntax** :OUT <ch>,<ON/OFF>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)
<ON/OFF>
ON: Enables the output relay.
OFF: Disables the output relay.

**Example**
Transmission
:OUT 1,ON
Enables the output relay for channel 1.

**Function** Enables and disables the output relay.

**Error** (Command error)
When characters are specified other than those at the left.

## :OUT?

■ Queries the output relay setting.

**Syntax** :OUT? <ch>
<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:OUT <ch>,<ON/OFF>
(Header OFF)
<ch>,<ON/OFF>

**Example**
Transmission :OUT? 1
Response
(Header ON)
:OUT 1,ON
(Header OFF)
1,ON

**Function** Returns the relay setting for the specified channel as a character data.

**Note** With this query, if any error occurs, no response message is produced.

## :RUN

■ Starts output.

**Syntax** :RUN

**Example**
Transmission :RUN

**Function** Starts output.

**Note** Output cannot be started during a system memory test.

**Error** (Execution error)
During a system memory test.

## :RUN?

■ Query the output status

**Syntax** :RUN?

**Response syntax**
(Header ON)
:RUN <0/1>
(Header OFF)
<0/1>

**Example**
Transmission :RUN?
Response
(Header ON)
:RUN 1
(Header OFF)
1

**Function** Returns the output setting as NR1 numerical data.
0: stop
1: output

**Note** With this query, if any error occurs, no response message is produced.

## :STOP

■ Stops the output.

**Syntax** :STOP

**Example**
Transmission :STOP

**Function** Stops the output.

## :TRIG

■ Execute trigger

**Syntax** :TRIG

**Example**
Transmission :TRIG

**Function** Execute trigger

**Notes**
- The TRIG key is lit when the trigger is enabled.
- Executing when the trigger is disabled does not cause an error.

# :LOAD:LOAD

■ Load waveform

**Syntax**

:LOAD:LOAD "<name>",<model>,<ch>,<word>,<atn>

"<name>" File name

<model> Model number of originating device

= 0 Auto detect model number
= 1 8852
= 2 8853
= 3 8806, 8806-01
= 4 Text (CSV)
= 5 8835, 8835-01
= 6 8841, 8842
= 7 8826
= 8 8840, 8825
= 9 7990
= 10 7075, 7075-01
= 11 7070
= 12 Text
= 13 8807-01,8807-51,8808-01,8808-51
= 14 8855

<ch> Reading the channel number

<word> Reading the number of data

<atn> Damping ratio

= AUTO
Determine damping ratio automatically

=**A**1
Fix the damping ratio as 1

=**A**0_1
Fix the damping ratio as 1/10.

=**A**0_01
Fix the damping ratio as 1/100

**Example**

Transmission

:LOAD:LOAD 'WAVE.MEM',0,1,1000,AUTO

Automatically determine the model on which the WAVE.MEM file was created, and load 1000 data words for channel 1 with automatic damping ratio determination.

**Function**

Loads the specified waveform data file, such as a waveform data file created by a Memory HiCorder, from the floppy disk.

**Notes**

- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.
- Channel numbers can be confirmed by the ":LOAD:LOAD?" query. Unavailable channel numbers cannot be specified as channel numbers to load. Numbers other than 1 to 32 are treated as channel 1.
- The maximum loadable data size is 128000 words.
- File load data size can be confirmed by the ":LOAD:LOAD?" query.
- A maximum of 8 waveforms can be loaded.
- When the load finishes normally, EOWL in Event Status Register 0 is set.
- When using the text data, set <word> to 128000 to read the maximum number of data.

**Errors**

(Command error)

- When a waveform name is not surrounded by single (' ') or double (" ") quotes
- When a string other than those at the left is specified for the damping ratio

(Execution error)

- When the specified file does not exist
- When the specified file is not a data file
- When an unavailable channel is specified as the channel to be loaded
- When the specified load data size exceeds the size of the file data
- When 8 waveforms have already been loaded
- When RUN is active.

# :LOAD:LOAD?

■ Query waveform file information

**Syntax** :LOAD:LOAD? "<name>"

"<name>" File name

**Response syntax**

(Header ON)
:LOAD:LOAD "<name>",<model>,"<ch>",<data>

(Header OFF)
"<name>",<model>,"<ch>",<data>

**Example**

Transmission
:LOAD:LOAD? 'WAVE.MEM'

Response
(Header ON)
:LOAD:LOAD "WAVE.MEM",1,"0100",1000

(Header OFF)
"WAVE.MEM",1,"0100",1000

The examples shows that the waveform file is named WAVE.MEM, the source model name is 8852, and the channel 2 data is 1000 words in length.

**Function** Loads waveform information about the specified file.

<model>

The default originating model number is returned in NR1 format.

1 8852
2 8853
3 8806, 8806-01
4 Text (CSV)
5 8835, 8835-01
6 8841, 8842
7 8826
8 8840, 8825
9 7990 (WAVEFORM CREATION SOFTWARE)
10 7075, 7075-01
11 7070
12 Text
13 8807-01, 8807-51, 8808-01, 8808-51
14 8855

<ch>

Available channel information is returned as a string of four digits, signifying channels 1 to 4:

'1': indicates a available channel

'0': indicates an unavailable channel

Example:

"1010" indicates available channel data for channels 1 and 3, but none for channels 2 and 4.

<data>

The size of data available for loading is returned in NR1 numeric format.

**Notes**

- With this query, if any error occurs, no response message is produced.
- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.
- When the load finishes normally, EOWL in Event Status Register 0 is set.

**Errors**

(Command error)

- When a waveform name is not surrounded by single (' ') or double (" ") quotes

(Execution error)

- When the specified file does not exist
- When the specified file is not a data file

# :LOAD:SWEep

■ Load sweep file

**Syntax** :LOAD:SWEep "<name>",<ch>

"<name>" Sweep file name

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Example**

Transmission :LOAD:SWE 'SWEEP.SDT',1

Reads the sweep data of the SWEEP.SDT file into channel 1.

**Function** Loads a sweep data file from the floppy disk, and converts to sweep data for the specified channel.

**Notes**

- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.
- Turn on the sweep setting to enable the sweep function.
- To load the sweep file of an arbitrary waveform, confirm that the waveform is present. If the waveform is not present, the sweep status cannot be loaded.
- When the load finishes normally, EOSL in Event Status Register 0 is set.

**Errors**

(Command error)

When a waveform name is not surrounded by single (' ') or double (" ") quotes

(Execution error)

- When the specified arbitrary waveform as sweep waveform is not present.
- When the sweep data is not converted such as RUN active.

## 8.3.4 Specific Commands for Floppy Disk

### :FILE:SAVE

■ Writes to the floppy disk as the status settings file

**Syntax** :FILE:SAVE "<file>"

"<file>" Name of status settings file

**Example**

Transmission :FILE:SAVE 'OUTSET.OUT'

Creates and saves output status settings in the OUTSET.OUT setting file.

**Function** Current settings are written to the floppy disk as the status settings file with the specified file name.

**Notes**

- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.
- When the load finishes normally, EOFO in Event Status Register 0 is set.
- The file name may consist of capital letters and ! # % $ - ^ and _ characters. The name must conform to the "8.3" MS-DOS file naming format. Lower-case letters are converted to capitals.

  Example

  OUTSET.OUT, 123FILE, F-01.FIL

**Errors** (Command error)

When a waveform name is not surrounded by single (' ') or double (" ") quotes

(Execution error)

- Writing is inhibited by the write-protect tab on the media.
- When already existing file is specified.

## :FILE:LOAD

■ Loads the status settings contained in the file.

**Syntax** :FILE:LOAD "<file>"
"<file>" Name of status setting file

**Example**
Transmission :FILE:LOAD 'OUTSET.OUT'
Reads the OUTSET.OUT file.

**Function** Loads the status settings contained in the file with the specified name from the floppy disk.

**Notes**
- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.
- When an arbitrary waveform file is specified for loading the status of a channel, the arbitrary waveform that has been entered is deleted.
- When the load finishes normally, EOFO in Event Status Register 0 is set.

**Errors** (Command error)
When a file name is not surrounded by single (' ') or double (" ") quotes
(Execution error)
While RUN is active

## :FILE:DELete

■ Deletes files.

**Syntax** :FILE:DELete "<file>"
"<file>"= File name

**Example**
Transmission :FILE:DEL 'OUTSET.OUT'
Deletes the OUTSET.OUT file.

**Function** Deletes the specified file or directory from the floppy disk.

**Notes**
- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Deleting can be done only from the current directory.
- When the load finishes normally, EOFO in Event Status Register 0 is set.

**Errors** (Command error)
When a waveform name is not surrounded by single (' ') or double (" ") quotes
(Execution error)
When deletion fails due to write protection

## :FILE:FORMat

■ Formats the floppy disk.

**Syntax** :FILE:FORMat

**Example**
Transmission :FILE:FORMAT
Formats a disk.

**Function** Formats (initializes) the floppy disk in MS-DOS format.

**Notes**
- All contents of the floppy disk are deleted.
- A 2HD disk formats to 1.44 MB, and a 2DD disk formats to 720 KB.
- When the load finishes normally, EOFO in Event Status Register 0 is set.

**Error** (Execution error)
When deletion fails due to write protection

## :FILE:CHDir

■ Changes the current directory

**Syntax** :FILE:CHDir "<dir>"
"<dir>" Directory name

**Example**
Transmission :FILE:CHD 'DIR1'
Moves the current directory to DIR1.

**Function** Changes the current directory to the specified directory.

**Notes**
- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. Directory names are case sensitive.
- Multiple directories cannot be specified simultaneously. Move to the relative path from the current directory. The absolute path cannot be specified.
- When the load finishes normally, EOFO in Event Status Register 0 is set.

**Errors** (Command error)
When a waveform name is not surrounded by single (' ') or double (" ") quotes
(Execution error)
Specifying a non-existent directory results in an execution error.

## :FILE:DIR?

■ Queries the current directory.

**Syntax** :FILE:DIR?

**Example**
Transmission :FILE:DIR?
Response (Header ON)
:FILE:DIR "/DIR1/DIR2/DIR3/"
(Header OFF)
"/DIR1/DIR2/DIR3/"
The current directory is /DIR1/DIR2/DIR3/.

**Function** Returns the current directory as character data.
"/dir 1/dir 2/.../"
Returns the absolute path from the root. The separator symbol is displayed as '/'.

**Notes**
- The longest directory name that can be returned is 48 characters.
- When the load finishes normally, EOFO in Event Status Register 0 is set.

**Error** If the floppy disk is not inserted, an execution error occurs.

## :FILE:FILE?

■ Queries the number of files in current directory.

**Syntax** :FILE:FILE?

**Response syntax**
(Header ON)
:FILE:FILE <NR1>
(Header OFF)
<NR1>

**Example**
Transmission :FILE:FILE?
Response (Header ON)
:FILE:FILE 3
(Header OFF)
3
The current directory contains three files and directories.

**Function** Returns the number of files in current directory as NR1 numerical data including directories.

**Notes**
- When the load finishes normally, EOFO in Event Status Register 0 is set.
- The directories names "." and ".." are included in the count for all directories except the root. So the minimum <data> value is 0 for the root directory, and 2 for all other directories.

**Error** If the floppy disk is not inserted, an execution error occurs.

## :FILE:LIST?

■ Query a file list of the current directory

**Syntax** :FILE:LIST?

**Response syntax**
(Header ON)
:FILE:LIST "<file1>","<file2>",...
(Header OFF)
"<file1>","<file2>",...

**Example**
Transmission :FILE:LIST?
Response
(Header ON)
:FILE:LIST"FILE1.DAT","FILE2.DAT"
(Header OFF)
"FILE1.DAT","FILE2.DAT"
The current directory contains FILE1.DAT and FILE2.DAT files.

**Function** The names of the files and directories in the current directory are returned as character strings.
"<file1>","<file2>", ...

**Notes**
- When the load finishes normally, EOFO in Event Status Register 0 is set.
- All file and directory names are displayed in "8.3" MS-DOS file name format.

**Error** (Execution error)
- If the floppy disk is not inserted
- When there is no file in the root directory.

## :FILE:INFor?

■ Query the file type

**Syntax** :FILE:INFor? "<name>"
"<name>" File name

**Response syntax**
(Header ON)
:FILE:INFOR "<name>",<type>
(Header OFF)
"<name>",<type>
<type> = FILE/ DIRECTORY

**Example**
Transmission :FILE:INF? "FILE1.DAT"
Response
(Header ON)
:FILE:INFOR "FILE1.DAT",FILE
(Header OFF)
"FILE1.DAT",FILE
"FILE1.DAT" shows a file.

**Function** Returns a string indicating the type of file: either FILE or DIRECTORY.

**Notes**
- When the load finishes normally, EOFO in Event Status Register 0 is set.
- With this query, if any error occurs, no response message is produced.
- The file name must be surrounded by single (' ') or double (" ") quotes.
- Long file names cannot be used. File names are case sensitive.
- A file name cannot include a directory. Loading can be done only from the current directory.

**Error** (Execution error)
- If the floppy disk is not inserted
- When the specified file does not exist

# 8.3.5 Specific Commands for Data Input

## :MEMory:WAVE:RECeive? (GP-IB only)

■ Outputs the arbitrary waveform data.

**Syntax** :MEMory:WAVE:RECeive? "<name>"

"<name>" Waveform name

**Response syntax**

(Header ON)
:MEMORY:WAVE:RECEIVE
"<name>",<range>,<freq>,<amp>,
<offset>,<no.>,#0<binary1u>
<binary1l><binary2u><binary2l>...
<binaryNu><binaryNl>[NL]

(Header OFF)
"<name>",<range>,<freq>,<amp>,
<offset>,<words>,#0<binary1u>
<binary1l><binary2u><binary2l>...
<binaryNu><binaryNl>[NL]

**Example**

Transmission :MEM:WAVE:REC? 'WAVE1'

Response
(Header ON)
:MEMORY:WAVE:RECEIVE "WAVE1",
R10V,10000000.00,10.00000,0.00000,
5,#000007D007D0083008300[NL]

(Header OFF)
"WAVE1",R10V,10000000.00,
10.00000,0.00000,5,#000007D007D00
83008300[NL]

Reads the data of the waveform named WAVE1. The range is 10 V, clock frequency is 10 MHz, amplitude is 10 V, offset is 0 V and there are five data points: 0 V, 10 V, 10 V, -10 V and -10 V.

**Reference**

0 V = $0000_D$ = $0000_H$

10 V = $32000_D$ = $7D00_H$

-10 V = $-32000_D$ = $8300_H$

**Function**

<range>
Returns the range as character.
=R10 V (10 V range)
=R1 V (1 V range)
=R0_1 V (0.1 V range)

<freq>
Returns the clock frequency as NRf numerical data. Unit: Hz

<amp>
Returns the amplitude as NRf numerical data. Unit: V

<offset>
Returns the offset as NRf numerical data. Unit: V

<no.>
Returns the number of data as NRf numerical data. Unit: V

#0<binary>[NL]*1 (see below)
Returns the waveform data as binary data.
The head of the binary data is prefixed by "#0" (23h, 30h), and the data is terminated by (0Ah) + (EOF) to signify [NL].

**Note** Waveform names are case sensitive.

**Error** (Execution error)
If the specified waveform does not exist.

***1:**
<binary> format
<binary1u><binary1l><binary2u><binary2l>...<binaryNu><binaryNl>
<binary1u> The upper byte of the first waveform data word
<binary1l> The lower byte of the first waveform data word
<binaryNu> The upper byte of the Nth waveform data word
<binaryNl> The lower byte of the Nth waveform data word
Each data word consists of two bytes. The maximum amplitude is indicated by 32000 to -32000. (10 V to -10V). See Appendix 1.

## :MEMory:WAVE:ADATa

**Syntax**

:MEMory:WAVE:ADATa "<name>",<range>,<freq>,<amp>,<offset>,<no.>,<wave1>,<wave2>...<waveN>

"<name>" Waveform name

<range> Character string
=R10V (10 V range)
=R1V (1 V range)
=R0_1V (0.1 V range)

<freq> Clock frequency is specified in NRf data format
=10e+6 to 0 (Units: Hz)

<amp> Amplitude value is specified in NRf data format (Units: V)

<offset> Offset value is specified in NRf data format (Units: V)
The sum of the offset and the amplitude must not exceed the voltage range.

<no.> The number of data is specified in NRf data format.
= up to 128000

<wave1> to <waveN>
Waveform data is specified in NRf data format (Units: V)
Output voltage = (waveform data x amplitude/range)+offset
When amplitude = range (10/1/0.1) and offset =0, output voltage = waveform data
The amplitude and offset values must not exceed specified range.

**Example**

Transmission

:MEM:WAVE:ADATA 'WAVE1',R10V,10e6,10,0,5,0,10,10,-10,-10

Writes the data of the waveform named WAVE1. The range is 10 V, clock frequency is 10 MHz, amplitude is 10 V, offset is 0 V and there are five data points: 0 V, 10 V, 10 V, -10 V and -10 V.

**Function**

A set of arbitrary waveform data items is input.

**Notes**

- Lower-case characters are converted to upper case.
- If a waveform with the same name already exists, its data is overwritten.
- The file name must be surrounded by single (' ') or double (" ") quotes.
- A maximum of 8 waveforms can be input.
- The waveform name may consist of capital letters and ! # % $ - ^ and _ characters. The name must conform to the "8.3" MS-DOS file naming format. Lower-case letters are converted to capitals.
- DBCS characters cannot be used.

Example
WAVE1, 123WAVE,WAVE-01

**Errors**

(Execution error)

- When 8 waveforms are already present

When frequency, amplitude, offset or data values are out of range

- When RUN is active.

(Command error)

- When the range is specified by an improper string

# :MEMory:WAVE:SEND (GP-IB only)

■ Input arbitrary waveform data

**Syntax**

:MEMory:WAVE:SEND "<name>", <range>, <freq>, <amp>, <offset>, <no.>,#0<binary1u><binary1l> <binary2u><binary2l>...<binaryNu> <binaryNl>[NL]

"<name>" Waveform name

<range> Character string
=R10V (10 V range)
=R1V (1 V range)
=R0_1V (0.1 V range)

<freq> Clock frequency is specified in NRf data format
=10e+6 to 0 (Units: Hz)

<amp> Amplitude value is specified in NRf data format (Units: V)

<offset> Offset value is specified in NRf data format (Units: V)
The sum of the offset and the amplitude must not exceed the voltage range.

<no.> The number of data is specified in NRf data format.
= up to 128000

#0<binary>[NL]*1
Sets the waveform data as binary data.
The head of the binary data is prefixed by "#0" (23h, 30h), and the data is terminated by (0Ah) + (EOF) to signify [NL].

**Example**

Transmission

:MEMORY:WAVE:SEND 'WAVE1', R10V,10e6,10,0,5,#000007D007D0083 008300[NL]

Writes the data of the waveform named WAVE1. The range is 10 V, clock frequency is 10 MHz, amplitude is 10 V, offset is 0 V and there are five data points: 0 V, 10 V, 10 V, -10 V and -10 V.

**Reference**

0 V = $0000_D$ = $0000_H$

10 V = $32000_D$ = $7D00_H$

-10 V = $-32000_D$ = $8300_H$

**Function**

A set of arbitrary waveform data items is input using the specified formats.

**Notes**

- Lower-case characters are converted to upper case.
- If a waveform with the same name already exists, its data is overwritten.
- A maximum of 8 waveforms can be input.
- The file name must be surrounded by single (' ') or double (" ") quotes.
- The waveform name may consist of capital letters and ! # % $ - ^ and _ characters. The name must conform to the "8.3" MS-DOS file naming format. Lower-case letters are converted to capitals.
- DBCS characters cannot be used.

Example

WAVE1, 123WAVE,WAVE-01

- Upon normal finish, EOWL in Event Status Register 0 is set.
- Several seconds will be required if there is a large amount of waveform data to be written.

**Errors**

(Execution error)

- When 8 waveforms are already present
- When frequency, amplitude, offset or data values are out of range
- When the sweep data is not converted such as RUN active.

(Command error)

- When the range is specified by an improper string

***1:**

<binary> format
<binary1u><binary1l><binary2u><binary2l>...<binaryNu><binaryNl>
<binary1u> The upper byte of the first waveform data word
<binary1l> The lower byte of the first waveform data word
<binaryNu> The upper byte of the Nth waveform data word
<binaryNl> The lower byte of the Nth waveform data word
Each data word consists of two bytes. The maximum amplitude is indicated by 32000 to -32000. (10 V to -10V). See Appendix 1.

## :MEMory:SWEep:RECeive? (GP-IB only)

■ Outputs the sweep data.

**Syntax** :MEMory:SWEep:RECeive? <ch>

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

**Response syntax**
(Header ON)
:MEMORY:SWEEP:RECEIVE
#0<binary>[NL]
(Header OFF)
#0<binary>[NL]

**Function** Returns the sweep data in binary format through the GP-IB to be stored on the PC.
#0<binary>[NL]
Returns the sweep data in binary format.
The head of the binary data is prefixed by "#0" (23h, 30h), and the data is terminated by (0Ah) + (EOF) to signify [NL].

**Notes**
- This sweep data is in a special format for storage on the PC. The contents of the data cannot be determined in this format.
- To restore the loaded sweep data, use the :MEMORY:SWEEP:SEND command.

**Error** (Execution error)
When no sweep data exists

## :MEMory:SWEep:SEND (GP-IB only)

■ Input sweep data

**Syntax** :MEMory:SWEep:SEND
<ch>,#0<binary>[NL]

<ch> Channel number
= 1 to 4 (1 to 2 for the 7075-01)

#0<binary>[NL]
Input loaded sweep data by the :MEMORY:SWEEP:RECEIVE? query.
The head of the binary data is prefixed by "#0" (23h, 30h), and the data is terminated by (0Ah) + (EOF) to signify [NL].

**Example**
Transmission :MEMORY:WAVE:SEND 1,#0<binary> [NL]
Enter the sweep data to channel 1.

**Function** Input loaded sweep data by the :MEMORY:SWEEP:RECEIVE? query.

**Notes**
- The sweep data to be input should be the same as the contents loaded by the :MEMORY:SWEEP:RECEIVE? query. If the contents are changed, the operation cannot be guaranteed.
- Upon normal finish, EOSL in Event Status Register 0 is set.
- The sweep will not be output merely by inputting the sweep data with this command. Set the sweep setting on.

**Error** (Execution error)
When sweep data is abnormal

# 8.3.6 Specific Commands for Others

## :HEADer

■ Enables and disables the headers.

**Syntax** :HEADer <ON/OFF>

**Example**
Transmission :HEAD OFF
Disables the header.

**Function** Enables or disables the headers of the response message from the unit.

**Error** (Command error)
When the setting data contains characters other than ON or OFF.

## :HEADer?

■ Queries the headers enablement.

**Syntax** :HEADer?

**Response syntax**
(Header ON)
:HEADER <ON/OFF>
(Header OFF)
<ON/OFF>

**Example**
Transmission :HEAD?
Response (Header ON)
:HEADER ON
(Header OFF)
OFF

**Function** Returns the current setting of headers.

**Note** With this query, if any error occurs, no response message is produced.

## :ESE0 (GP-IB only)

■ Sets the event status enable register 0.

**Syntax** :ESE0 <NR1>
<NR1>= 0 to 255
(NR1 numerical data)

**Example**
Transmission :ESE0 128
Enables ESER0 bit7.

**Function**
- Loads the effective format of the Event Status Register (ESR0) into the Event Status Enable Register (ESER0).
- Decimals are rounded off.

| 128 bit 7 | 64 bit 6 | 32 bit 5 | 16 bit 4 | 8 bit 3 | 4 bit 2 | 2 bit 1 | 1 bit 0 |
|---|---|---|---|---|---|---|---|
| EOFL | EOWL | EOSL | EORO | Reserved | | | |

**Note** When the power is turned on, the data is reinitialized to 0.

**Errors** (Execution error)
When the value is outside of the setting range
(Command error)
When <NR1> was not in NRf format.

## :ESE0? (GP-IB only)

■ Queries the event status enable register 0.

**Syntax** :ESE0?

**Response syntax**
(Header ON)
ESE0 <0-255>
(Header OFF)
<0-255>

**Example**
Transmission :ESE0?
Response
(Header ON)
:ESE0 128
(Header OFF)
128

**Function** Returns the contents of the event status enable register 0 (ESER0) as a NR1 value (0 to 255).

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| EOFL | EOWL | EOSL | EORO | Reserved | | | |

**Notes** With this query, if any error occurs, no response message is produced.

## :ESR0?

■ Queries the event status register.

**Syntax** :ESR0?

**Response syntax**
(Header ON)
ESR0 <0-255>
(Header OFF)
<0-255>

**Example**
Transmission :ESR0?
Response
(Header ON)
:ESR0 128
(Header OFF)
128
Terminates the reading out of the file.

**Function** Returns the contents of SESR as NR1 value (0 to 255), and clears the data.

| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| EOFL | EOWL | EOSL | EORO | Reserved | | | |

**Notes** With this query, if any error occurs, no response message is produced.

## :COM:TERMinator (RS-232C only)

■ Sets the terminator of response message.

**Syntax** :COM:TERMinator <0/1/2>
<0>: LF
<1>: CR+LF
<2>: CR (when powering on)

**Example**
Transmission :COM:TERM 1
Set the terminator of response message to CR+LF.

**Function** Sets the response message terminator of RS-232C inerface.

## :COM:TERMinator? (RS-232C only)

■ Queries the response message terminator setting.

**Syntax** :COM:TERMinator?

**Response syntax**
(Header ON)
:COM:TERM <0/1/2>
(Header OFF)
<0/1/2>

**Example**
Transmission :COM:TERM?
Response
(Header ON)
:COM:TERM 1
(Header OFF)
1

**Function** Returns the current setting of terminator as NR1 numerical data.

**Note** With this query, if any error occurs, no response message is produced.

## :COM:ERRor (RS-232C only)

■ Sets the command error display.

**Syntax** :COM:ERRor <ON/OFF>

**Example**
Transmission :COM:ERROR ON
Displays the command error display.

**Function** Enables or disables the command error display of the RS-232C interface.

**Error**
(Command error)
When the character data other than ON or OFF is set.

## :COM:ERRor? (RS-232C only)

■ Queries the command error display setting.

**Syntax** :COM:ERRor?

**Response syntax**
(Header ON)
:COM:ERROR <ON/OFF>
(Header OFF)
<ON/OFF>

**Example**
Transmission :COM:ERROR?
Response
(Header ON)
:COM:ERROR ON
(Header OFF)
ON

**Function** Returns the current setting of command error display as character data (ON/OFF).

# 8.4 GP-IB Command Summary

## 8.4.1 Standard Commands

| Commands | Explanation |
|---|---|
| **System data queries** | |
| *IDN? | Queries device ID. |
| **Internal operation commands and queries** | |
| *RST | Device initial setting. |
| *TST? | Queries the result of the self-test. |
| **Synchronized drive commands and queries** | |
| *OPC | Sets the LSB (bit0) of SESR after all action has been completed. |
| *OPC? | Queries whether all action has been completed. ASCII [1] is the response. |
| *WAI | Finishes executing all previous commands before executing subsequent commands |
| **Status and event control commands and queries** | |
| *CLS | Clear STATUS BYTE and related queue (flush the output queue) |
| *ESE | Writes SESER. |
| *ESE? | Reads SESER. |
| *ESR? | Reads and clears SESR. |
| *SRE | Writes SRSE. |
| *SRE? | Reads SRER. |
| *STB? | Reads the STB and MSS bits, without performing serial polling. |

## 8.4.2 Specific Commands

**Environment Settings**

| :SYSTem | Miscellaneous settings | | | |
|---|---|---|---|---|
| Commands | Parameters <ch>=channel no. | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :SYSTem:BEEPer | ON/OFF | | | Sets the beep sound. |
| :SYSTem:BEEPer? | | ON/OFF | | Query |
| :SYSTem:CRT | ON/OFF | | | Sets LCD backlight auto off |
| :SYSTem:CRT? | | ON/OFF | | Query |
| :SYSTem:DATE | <year>,<month>,<day> | | <year>=0 to 90 (NR1)<br><month>=1 to 12 (NR1)<br><day>=1 to 31 (NR1) | Sets the date. |
| :SYSTem:DATE? | | <year>,<month>, <day> | | Query |
| :SYSTem:TIME | <hour>,<min>,<sec> | | <hour>= 0 to 23(NR1)<br><min>= 0 to 59 (NR1)<br><sec>= 0 to 59 (NR1) | Sets the internal clock. |
| :SYSTem:TIME? | | <hour>,<min>,<sec> | | Query |
| :SYSTem:SYNChro | OFF/MASTer/SLAVe | | | Selects master or slave operation |
| :SYSTem:SYNChro? | | OFF/MASTER/SLAVE | | Query |
| :SYSTem:LANGuage | JAPanese/ENGLish | | | Sets the display language. |
| :SYSTem:LANGuage? | | JAPANESE/ENGLISH | | Query |

**Output settings**

| :OSET | Switches to Output Setting Screen | | | |
|---|---|---|---|---|
| Commands | Parameters <ch>=channel no. | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :OSET:AMPLitude | <ch>,<amp> | | <amp>=output voltage value (NRf) [Unit: V] | Sets the amplitude. |
| :OSET:AMPLitude? | <ch> | <ch>,<amp> | | Query |
| :OSET:OFFSet | <ch>,<offset> | | <offset>=offset voltage value (NRf) [Unit: V] | Sets the offset voltage. |
| :OSET:OFFSet? | <ch> | <ch>,<offset> | | Query |
| :OSET:UPLow | <ch>,<up>,<low> | | NRf [Unit: V] | Sets the upper/lower limit value of the output voltage. |
| :OSET:UPLow? | <ch> | <ch>,<up>,<low> | | Query |
| :OSET:PHASe | <ch>,<phase> | | NRf [Unit: deg] | Sets the phase. |

| :OSET | Switches to Output Setting Screen | | | |
|---|---|---|---|---|
| Commands | Parameters <ch>=channel no. | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :OSET:PHASe? | <ch> | <ch>,<phase> | | Query |
| :OSET:DELay | <ch>,<delay> | | NRf (number of data) | Sets the delay. |
| :OSET:DELay? | <ch> | <ch>,<delay> | | Query |
| :OSET:FILTer | <ch>,<freq> | | <freq>=PASS/F1MHZ/ F500KHZ/ F200KHZ/ F100KHZ/ F50KHZ/ F20KHZ/ F10KHZ/ F5KHZ/ F2KHZ/ F1KHZ/ F500HZ/ F200HZ/ F100HZ/ F50HZ | Sets the filter. |
| :OSET:FILTer? | <ch> | <ch>,<freq> | | Query |
| :OSET:FREQuency | <ch>,<freq> | | <freq>=NRf [Unit: Hz] | Sets the frequency. |
| :OSET:FREQuency? | <ch> | <ch>,<freq> | | Query |
| :OSET:PERiod | <ch>,<period> | | <period>=NRf [Unit:s] | Sets the period. |
| :OSET:PERiod? | <ch> | <ch>,<period> | | Query |
| :OSET:RANGe | <ch>,<range> | | <range>=R10V/R1V/ R0_1V | Sets the range. |
| :OSET:RANGe? | <ch> | <ch>,<range> | Query | Query |
| :OSET:DUTY | <ch>,<duty> | | <duty>=NRf [Unit:%] | Sets the duty. |
| :OSET:DUTY? | <ch> | <ch>,<duty> | | Query |
| :OSET:TRACking | <ch>,<item> | | <ch>=OFF/CH1_2/ CH1_3/ CH1_4 <item>=WAVE/ FREQuency/ AMPLitude/ FILTer/ DUTY | Selects simultaneous settings |
| :OSET:SWEep | <ch>,ON/OFF | | | Enables sweep |
| :OSET:SWEep? | <ch> | <ch>,ON/OFF | | Query |
| :OSET:WAVE | <ch>,<wave> | | <ch>=1 to 4 <wave>=SINe/SQUare/ PULSe/TRIangle/ RAMP1/RAMP2/ NOISe/DC/AWG | Selects a basic waveform |
| :OSET:WAVE? | <ch> | <ch>,<wave> | | Query |
| :OSET:AWG | <ch>,"<wave>" | | "<wave>"= waveform name | Selects an arbitrary waveform |
| :OSET:AWG? | <ch> | <ch>,"<wave>" | | Query |
| :OSET:AWG:SIZE? | "<wave>" | "<wave>",<size> | <size>=NR2 (number of data) | Query |
| :OSET:AWG: NUMBer? | <number> | | <number>=NR2 (Readable waveform number) | Query |

| :OSET | Switches to Output Setting Screen | | | |
|---|---|---|---|---|
| Commands | Parameters <ch>=channel no. | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :OSET:AWG:LIST? | | "<wave1>",<br>"<wave2>",... | <waveN>= Readable waveform name list (character) | Query |
| :OSET:CLEar | | | | Deletes all waveform. |
| :OUT | <ch>,ON/OFF | | | Sets the output. |
| :OUT? | <ch> | <ch>,ON/OFF | | Query |
| :RUN | | | | Start the output. |
| :RUN? | | 0/1 | 0 (during stop)<br>1 (during output) | Query |
| :STOP | | | | Stops the output. |
| :TRIG | | | | Trigger |

**Waveform input**

| :LOAD | | | | |
|---|---|---|---|---|
| Commands | Parameters | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :LOAD:LOAD | "<file>",<model>,<ch>,<br><word>,<atn> | | "<file>"= File name<br><model>=0 to 11 (NRf)<br><word>= number of words to load (NRf)<br><atn>= attenuation A1/A0_1/A0_01/AUTO | Reads the waveform file. (Information of the waveform file) |
| :LOAD:LOAD? | "<file>" | "<file>",<model>,<br>"<ch>", <word> | "<ch>"=0(none)/<br>1(present) | Query |
| :LOAD:SWEep | "<file>",<ch> | | | Reads the sweep file. |

**Disk**

| :FILE | | | | |
|---|---|---|---|---|
| Commands | Parameters | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :FILE:SAVE | "<file>" | | | Saves the setting file. |
| :FILE:LOAD | "<file>" | | | Loads the setting file. |
| :FILE:DELete | "<file>"/"<dir>" | | "<dir>"= directory name | Deletes the file or directroy. |
| :FILE:FORMat | | | | Formats a disk. |
| :FILE:CHDir | "<dir>" | | | Changes the current directory. |
| :FILE:DIR? | | "<dir>" | | Queries the current directory name. |
| :FILE:FILE? | | <no.> | <no.>=Number of files (NR1) | Queries the number of files in the current directory. |
| :FILE:LIST? | "<file1>","<file2>",... | | | Queries the list of file name in the current directory. |
| :FILE:INFor? | "<file>" | "<file>",FILE/DIRECTORY | | Queries whether a file or directory |

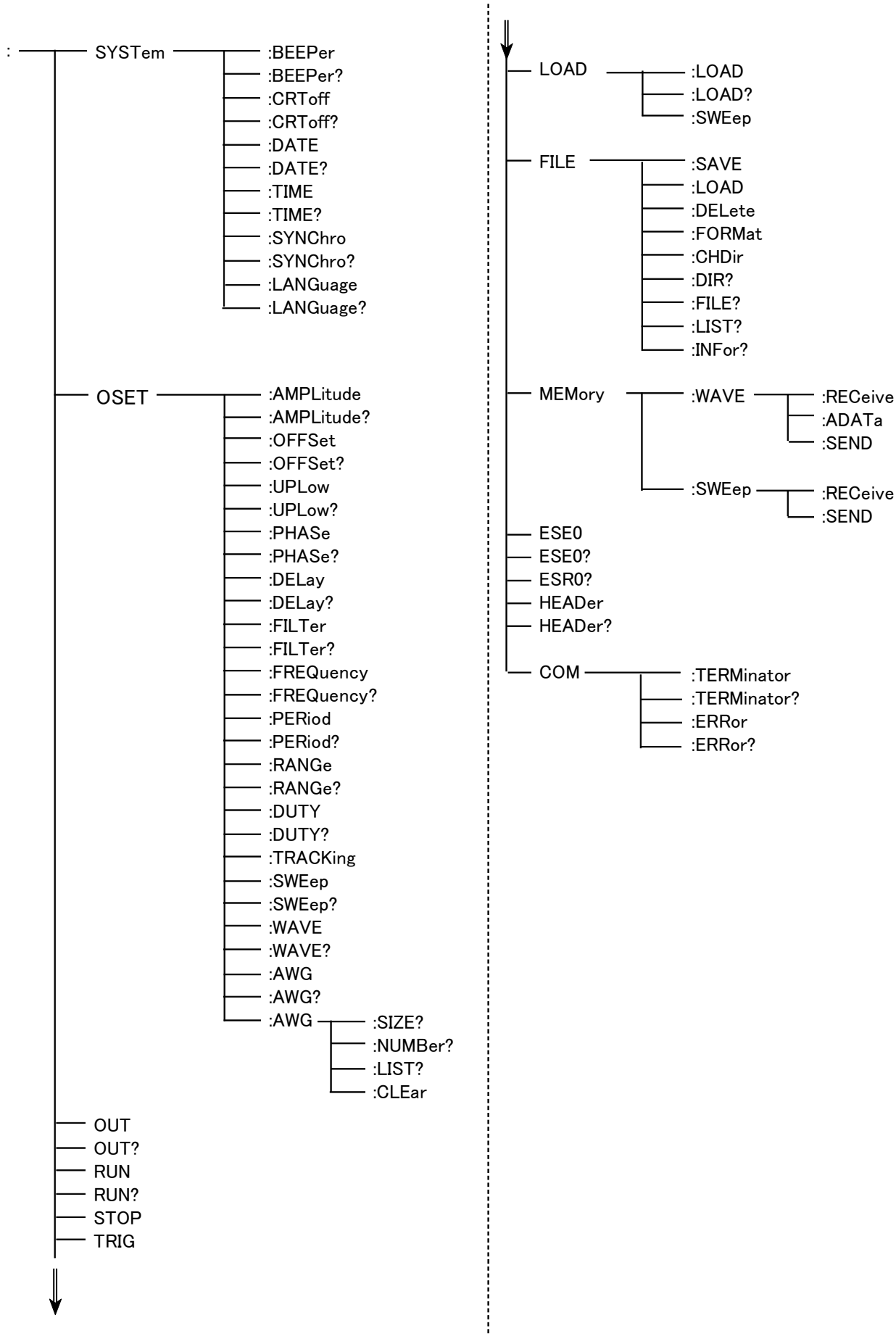
**Data input**

| :MEMory | | | | |
|---|---|---|---|---|
| Commands | Parameters | | | Explanation |
| | Transmission | Response | Parameter explanation | |
| :MEMory:WAVE: RECeive? | "<name>" | "<name>"<range>, <freq>,<amp>, <offset>,<no.>, #0<binary>[NL] | "<name>"=waveform name<br><range>=R10V/R1V/ R0_1V<br><freq>=clock frequency (NRf)<br><amp>=amplitude (NRf) Unit:V<br><offset>=offset (NRf)<br><no.>= data count NR1[words]<br>#0<binary>[NL]= waveform data (binary format) | Outputs the waveform data. |
| :MEMory:WAVE: ADATa | "<name>"<range>,<freq>,<amp>, <offset>,<no.><wave> | | <wave>=waveform data | Enters the waveform data. |
| :MEMory:WAVE: SEND | "<name>"<range>,<freq>,<amp>, <offset>,<no.>,#0<binary>[NL] | | | Enters the waveform data. |
| :MEMory:SWEep: RECeive? | <ch> | <ch>,#0<binary> [NL] | <binary>=Sweep data (binary format) | Outputs the sweep data. |
| :MEMory:SWEep: SEND | <ch>,#0<binary>[NL] | | <binary>=Sweep data (binary format) | Enters the sweep data. |

**Others**

| Commands | Parameters | | Explanation |
|---|---|---|---|
| | Transmission | Response | |
| :ESE0 | <0 to 255> | | Writes ESERO. (NRf) |
| :ESE0? | | <0 to 255> | Queries ESERO. |
| :ESR0? | | <0 to 255> | Queries ESRO. |
| :HEADer | ON/OFF | | Enables and disables the headers. |
| :HEADer? | | ON/OFF | Query |
| :COM:ERRor | ON/OFF | | Enables and disables the command error display. |
| :COM:ERRor? | | ON/OFF | Query |
| :COM:TERMinator | 0/1/2 | | Queries the terminator setting of response message. |
| :COM:TERMinator? | | 0/1/2 | Query |

## 8.4.3 Specific Command Tree



# Chapter 9
# 7990 WAVEFORM CREATION SOFTWARE

## 9.1 Notes on Use

Please note the following conditions before using the software:

- The 7990 WAVEFORM CREATION SOFTWARE is the property of HIOKI E.E. Corporation. Reproduction, copying or modifying part or all of this software is prohibited by law, except for the purpose of creating waveform data for the arbitrary waveform generator.
- The 7990 may be modified and upgraded without notice in the interest of improving operation.
- Excepts from the 7990 in publications may be allowed with our permission. However, use of the HIOKI trademark is not permitted.
- Liability for the results of customers' use of the 7990 rests solely with the customer, and is not the responsibility of HIOKI.

### CD-R

**⚠ CAUTION**

- Always hold the disc by the edges, so as not to make fingerprints on the disc or scratch the printing.
- Never touch the recorded side of the disc. Do not place the disc directly on anything hard.
- Do not wet the disc with volatile alcohol or water, as there is a possibility of the label printing disappearing.
- To write on the disc label surface, use a spirit-based felt pen. Do not use a ball-point pen or hard-tipped pen, because there is a danger of scratching the surface and corrupting the data. Do not use adhesive labels.
- Do not expose the disc directly to the sun's rays, or keep it in conditions of high temperature or humidity, as there is a danger of warping, with consequent loss of data.
- To remove dirt, dust, or fingerprints from the disc, wipe with a dry cloth, or use a CD cleaner. Always wipe radially from the inside to the outside, and do no wipe with circular movements. Never use abrasives or solvent cleaners.
- Hioki shall not be held liable for any problems with a computer system that arises from the use of this CD-R, or for any problem related to the purchase of a Hioki product.

### About registered trademarks

- Windows and Internet Explorer are a registered trademark of Microsoft Corporation, U.S.A.
- i486DX4 and Pentium are registered trademarks of Intel Corporation, U.S.A.
- Other product names are trademarks or registered trademarks of their companies.



### Overview

The 7990 WAVEFORM CREATION SOFTWARE is an application program to create arbitrary waveforms for the 7075 on a PC.

# 9.2 Specifications

## 9.2.1 General Specifications

Media: One CD-R
Compatible Equipment: HIOKI Arbitrary Waveform Generator

### (1) Operating Environment

| | |
|---|---|
| Computer | A PC with at least an i486DX4 CPU and Windows98 /Me/NT4.0/2000/XP installed<br>You need Internet Explorer 4.01 and Service Pack 1. |
| Memory | 16 MB or more |
| Display | 800 X 600 dot resolution with at least 256 colors |
| Hard Disk | At least 4 MB empty space |

### (2) Recommended Operating Environment

| | |
|---|---|
| Computer | A PC with at least a pentium 133MHz CPU and Windows98/Me/NT4.0/2000/XP installed<br>You need Internet Explorer 4.01 and Service Pack 1. |
| Memory | 32 MB or more |
| Display | 800 X 600 dot resolution with at least 65536 colors |
| Hard Disk | At least 4 MB empty space |

## 9.2.2 Function Specifications

| | |
|---|---|
| Input waveforms | • Waveform entry by function input<br>(14 function types, 7 control word types)<br>• Basic waveform inputs<br>(Sine, square, triangle, ramp, sin(x)/x, exp, noise and DC waveforms)<br>• Waveform entry by unlimited curves and straight lines |
| Editing entered waveforms | Cut, copy, paste, clear |
| Modifying entered waveforms | Time, amplitude, offset, cycle waveform, phase |
| Calculations with entered waveforms | Add, subtract, multiply, normalize, scale, absolute value, reverse and mirror |
| Modifying entered waveforms | Magnification, compression, scroll, TIME/DIV display, point display (time axis) V/DIV display, point display, % display (time axis) |
| Save and load created waveforms | 7075 and 7990 format/ 7070 format/ text format (saving only) |
| Print created waveforms | |
| Data transfer (RS-232C) | Communications parameters<br>Baud rate: select from 4800/ 9600/ 19200bps<br>Parity: non<br>Data bit: 8bit<br>Stop bit: select 1 or 2 bit<br>Xon/Xoff: unused<br>Hardware flow control: select ON or OFF |

Refer to "5.3.2 Setting the RS-232C Interface" for details of connections between the PC and the unit.

# 9.3 Installation

⚠ CAUTION

If the power to the computer or the computer power switch is turned off while setup.exe is running, hard disk contents may be destroyed.

1. Confirm that the operating environment conditions of "11.2.1 General Specifications" are satisfied, then insert 7990 CD-R into the CD drive.
2. Double click \English\setup.exe on the disk to run it.
3. Follow the on-screen instructions to install the 7990 WAVEFORM CREATION SOFTWARE.
4. Confirm that the software installed correctly.

# 9.4 Loading the Program

If installed in the Start menu, click the Start button, select Hioki, and then Waveform Software.
If not installed in the Start menu, execute wavesoft.exe in the folder where the 7990 WAVEFORM CREATION SOFTWARE is installed.

# 9.5 Operation

Refer to the on-line help for operating procedures with the program running.

### If problems occur with data transfer

Check the following items if problems occur with data transfer:

- Confirm that the settings in the File - Interface Settings menu of the 7990 WAVEFORM CREATION SOFTWARE match the RS-232C settings in the 7075 ("5.3.2 Setting the RS-232C Interface").
- Confirm that the connections with the PC are correct.
- Confirm that the same waveform name is not already present on the 7075. If it is, the waveform data cannot be sent. Change the name of the waveform in the File - Properties menu.

NOTE

Data cannot be sent when the 7075 is in the following states:

- When a waveform with the same name already exists on the 7075.
- When there are already 8 waveforms stored in the 7075.
- When using Save As, if the arbitrary waveform is given the same name as a waveform already specified for arbitrary waveform output on the 7075.
- When using Save As, if the arbitrary waveform is given the same name as a waveform already specified for sweep arbitrary waveform output on the 7075.

# Chapter 10
# Specifications

## 10.1 General Specifications

| | | |
|---|---|---|
| Number of channels | | 4 channels (7075)<br>2 channels (7075-01) |
| Output function | | Function generator and arbitrary waveform generator (settable for each channel) |
| Display | | 5.7-inch LCD (with touch panel) |
| Languages | | English/ Japanese |
| External data storage device | | 3.5-inch floppy disk drive |
| | Capacity | 1.44 MB, 1.2 MB, 720 KB formats supported<br>(1.2 MB format not supported) |
| | Data | MS-DOS format (MS-DOS is a registered trademark of Microsoft Corporation.) |
| | Recordable data | Output status, sweep data |
| Interfaces | | GP-IB: IEEE 488.1 compliance, IEEE 488.2 reference<br>RS-232C: Dsub9-pin connector, Transfer speed 19200, 9600, 4800 bps |
| Temperature and humidity ranges for operation | | 10 to 40℃ (50℉ to 104℉) , 85%RH or less (with no condensation) |
| Temperature and humidity ranges for storage | | -10 to 50℃ (14℉ to 122℉) , 85%RH or less (with no condensation) |
| Operating temperature and humidity for guaranteed accuracy | | 23℃±5℃ (73℉±41℉) , 85%RH or less (with no condensation)<br>*30 minutes after power-on. |
| Period of guaranteed accuracy | | 1 year |
| Location for use | | Indoors, altitude up to 2000 m (6562 feet) |
| Dielectric strength | | 1.5 kV AC/min (Threshold level 25 mA) Power (1 pulse) on cabinet |
| Power | | 100/120/200/230 V AC (Voltage fluctuations of ±10% from the rated supply voltage are taken into account.), 50/60 Hz |
| Maximum rated power | | 120 VA |
| Backup battery and lifetime | | approx. 3 years |
| Dimensions | | approx. 345 W X 130 H X 286 D mm (13.59" X 5.12" X 11.26")<br>(excluding protrusion) |

| | | |
|---|---|---|
| Mass | approx. 7.8 kg (275.1 oz.) (7075)<br>approx. 7.5 kg (264.6 oz.) (7075-01) | |
| Accessories | 7990 WAVEFORM CREATION SOFTWARE<br>Power cord: 1<br>Instruction manual: 1 | |
| Options | 9165 CONNECTION CORD (BNC-BNC)<br>9166 CONNECTION CORD (BNC-clip)<br>9151-02 GP-IB CONNECTOR CABLE (2 m)<br>9151-04 GP-IB CONNECTOR CABLE (4 m) | |
| Standards Applying | EMC | EN61326, Class A<br>EN61000-3-2<br>EN61000-3-3 |
| | Safety | EN61010<br>Pollution Degree 2 |

# 10.2 Function Specifications

## ■ Analog Output (common to both function generator and arbitrary waveform outputs)

| | |
|---|---|
| Maximum output voltage | Maximum ±10 V (RL= ∞ ) |
| Amplitude setting range | 10 V range 0 to 10 V, open-circuited (resolution 1 mV)<br>1 V range 0 to 1 V, open-circuited (resolution 0.1 mV)<br>0.1 V range 0 to 0.1 V, open-circuited (resolution 0.01 mV) |
| DC offset setting range | 10 V range -10 to 10 V, open-circuited (resolution 1 mV)<br>1 V range -1 to 1 V, open-circuited (resolution 0.1 mV)<br>0.1 V range -0.1 to 0.1 V, open-circuited (resolution 0.01 mV) |
| Minimum load impedance | 40 Ω |
| Output impedance | 50 Ω±2% (DC) |
| Square wave rise and fall times | Within 45 ns (10 to 90% of maximum amplitude, when the setting of LPF "pass", RL=50 Ω) |
| Square wave overshoot | Less than ±5% of set amplitude (P-P value, with LPF bypassed, RL=50 Ω |
| Inter-Channel Skew | Within 25 ns (measured with the same waveform selected)<br>Except during sweeping the frequency. |
| Output range accuracy | 1 V range Add 0.2% of the range to the accuracy of the 10 V range<br>0.1 V range Add 0.4% of the range to the accuracy of the 10 V range<br>For specification of 10 V, see ■ FG Function, and ■ Arbitrary waveform generator function. |

## ■ FG Function (Accuracy measured in the 10 V range)

| | |
|---|---|
| Type of waveform | Sine, square (constant duty), triangle, ramp-up, ramp-down and pulse waveforms, noise and DC |
| Frequency range | Sine, square: 0 to 10 MHz (resolution 10 mHz)<br>Triangle, ramp, pulse: 0 to 200 kHz (resolution 10 mHz) |
| Frequency accuracy | Within±(50 ppm of setting value + 50 μHz) |
| DC offset accuracy | Within±(0.5% of setting value + 25 mV) |
| DC offset stability | Within±(DC offset accuracy X 0.1)/℃ |
| Amplitude accuracy | Within±(2% of setting value + 20 mVrms) at 1 kHz, sine wave |
| Amplitude stability | ±(amplitude accuracy X 0.1)/℃ |
| Phase difference | -360.00 to 360.00 deg (resolution 0.01 deg) |
| Jitter (triangle, ramp and pulse waveforms) | Within 100 ns p-p |
| Square wave duty cycle | 40 to 60% fixed |
| Pulse wave duty cycle adjustable range | 1 to 99% (setting resolution: the larger of 0.1% or 100 ns) valid for pulse widths greater than 100 ns |

## ■ Arbitrary waveform generator function (Accuracy measured in the 10 V range)

| | |
|---|---|
| Amplitude resolution | 16-bit equivalent (64000 count) |
| Waveform memory capacity | 128000 words/channel |
| Filter | Second-order LPF, 50 Hz to 1 MHz (14 steps with 1-, 2- and 5-multiple system series) |
| Waveform input method | Loadable from floppy disk, GP-IB or RS-232C (can be downloaded directly from Memory HiCorder) |
| DC output accuracy | Within±(2% of setting value + 25 mVrms) |
| DC output stability | Within±(DC output accuracy X 0.1)/℃ |
| Amplitude accuracy | Within±(2% of setting value + 20 mVrms) at size 10000, sine wave of 10 MHz clock |
| Delay | Settable within ±128000 range in 1-clock units |
| Clock for arbitrary waveform | Number of channels: 4 channels max. (same as the number of waveform output channels)<br>Frequency range:0 to 10 MHz (resolution 10 mHz)<br>Frequency accuracy: Within±(50 ppm of setting value + 50 μHz)<br>Jitter: Within the larger of 800 ps-rms or 0.05% of set period |
| Number of loops | 1 to 65535 or ∞ |

## ■ Sweep Function

| | |
|---|---|
| Sweep waveform | Function generator, arbitrary waveform |
| Sweep form | Linear (inside of element) |
| Sweep object | Function generator:<br>Frequency, amplitude, offset, duty (pulse wave only)<br>(frequency, amplitude and offset can be swept simultaneously )<br>Arbitrary waveform:<br>Frequency, amplitude, offset |
| Sequence function<br>Sequence length | Outputs the sweep elements combined.<br>128 elements max<br>Loop: outputs the element or group the specified number of times<br>Hold: continually outputs the last data element |
| Loop repetitions | 1024 times max or ∞ |
| Trigger | Cancel infinite loop and hold to move to the next element |
| Total number of loops | Maximum 65535 times or ∞ |
| Monitor function<br>Monitor display<br>Monitor channel<br>Display update interval | The number of loops to repeat sweep<br>Only the channel displayed can be monitored. The display channel can be switched during output.<br>Approx. 200 ms |
| Maker function<br>Line number marker<br>Output value marker | Output for specified element number.<br>Settings: Specify sequence element number<br>Number of elements that can be set: Setting is possible for all elements (multiple element setting is possible).<br>Output when sweep output data lies between two values set.<br>Settings: Element number, number of element loops, output values (X2)<br>Number of output values that can be set: Only one pair per sequence. |

## Input/Output Controls

| | |
|---|---|
| TRIG IN<br>TRIG OUT<br>MARKER OUT | Logic level 0 to 5 V (channels 1 to 4 independently controllable) |
| RUN/STOP IN<br>RUN/STOP OUT<br>SYNC.CLK IN<br>SYNC.CLK OUT<br>MASTER CLK IN<br>MASTER CLK OUT | Logic level 0 to 5 V |

## Others

| | |
|---|---|
| Changing the setting format | Frequency - Period<br>Amplitude - Upper limit value<br>Offset - Lower limit value |
| Selecting units | Hz - r/min<br>Vpeak - Vrms |
| Save output conditions | Waveform conditions and waveform at power off are retained by memory backup |
| Synchronized operation | 4 units max (16 channels) |
| Waveforms stored in internal memory | 8 |

# Chapter 11
# Maintenance and Service

## 11.1 Maintenance and Inspection

**To ensure the safe operation of this unit, perform maintenance regularly.**

- If damage is suspected, check the "Troubleshooting" section before contacting your dealer or Hioki representative.
- If the unit has been subject to moisture, or if oil and dust have accumulated in the unit interior, the danger of electrical shock or fires resulting from the deterioration of insulation increases greatly. If the unit is ever subject to excessive moisture, oil, or dust, cease use immediately, and return the unit to us for maintenance.
- Periodic calibration is necessary to verify and maintain accuracy. If calibration becomes necessary, return the unit to us for maintenance.
- This product uses a lithium battery to back up its memory. As the battery power is consumed, it's ability to store measurement conditions diminishes. In the event that measurement conditions can no longer be stored, please contact the manufacturer for repair service.

### Cleaning the Unit

- To clean the product, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- Wipe the LCD display gently with a dry, soft cloth.

# 11.2 Shipment

⚠ CAUTION

Do not use excessive force on the touch panel, and do not use sharp objects that could damage the touch screen.

If reshipping the unit, preferably use the original packing.
Always remove the floppy disk before shipping.
If the original packing materials are not available, package the unit as follows:

1. Wrap the unit with plastic film.
2. Wrap the unit with at least 100 mm of cushioning material, and place it in a cardboard box that is at least 7 mm thick.
3. Place the accessories in the box and fill remaining space with cushioning material. Then close and tape the box, and if necessary, tie with package strapping.

# 11.3 Troubleshooting

If the unit is not functioning properly, check the list below. If a problem is found, contact your dealer or HIOKI representative.
When sending the unit for repair, to prevent damage in transit pack well. Insert cushioning material so that the 7075 cannot move within the package. Be sure to include details of the problem. HIOKI cannot bear any responsibility for damage that occurs during shipment.

| Problem | Check | Countermeasure |
|---|---|---|
| The screen remains blank when power is switched on | Is the power cord connected? | Connect the power cord properly. |
| | Is the LCD Contrast set too light? | Adjust the Contrast |
| The keys are dead and do not respond. | Has the unit been put into the key lock condition? | Press the LOCK key for more than 2 seconds to clear the key lock condition. |
| | Is the unit being remotely controlled, if the GP-IB interface is being used? | Set the GP-IB to Local |

If none of the above conditions apply, and the cause of the problem is not understood, try performing a system reset. All settings will revert to the factory settings.

### System reset

1. Press the SYSTEM tab to enter the SYSTEM screen.
2. Press the Initialize button, and the window opens.
3. Press the OK button.

NOTE It takes about 10 seconds to complete initializing.

# 11.4 Disposing of the Unit

**⚠ WARNING**

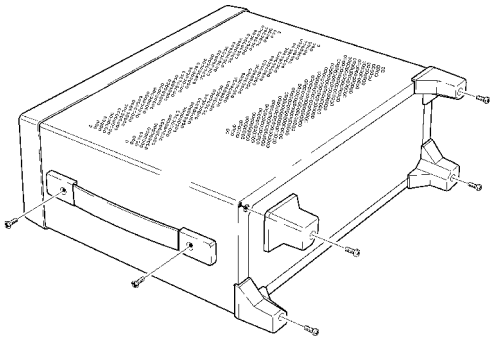
- **To avoid electrocution, turn off the power switch and disconnect the power cord and measurement cables before removing the lithium battery.**
- **Handle and dispose of batteries in accordance with local regulations.**

The unit uses a lithium battery to store output conditions and waveform data. When disposing of the unit, disassemble it as follows to remove the lithium battery for disposal by the appropriate method.

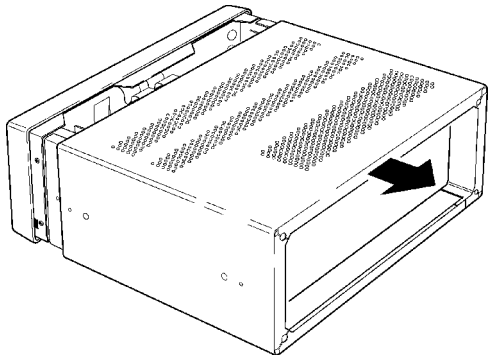
### Tools required for disassembly

One Phillips screwdriver
One pair of wire cutters

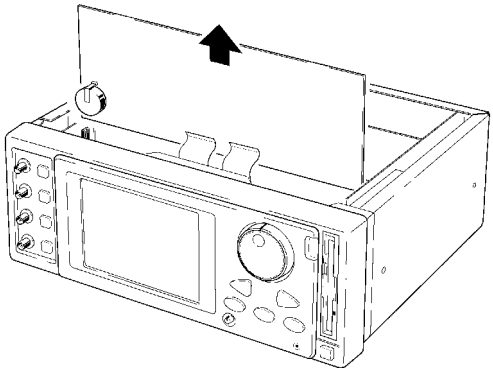
### Disassembly



1. Remove the screws in the four support feet on the rear of the unit.
2. Remove the two screws in the handle on the side of the unit.



3. Pull the case toward the back to remove it.



4. Remove the front-most board (MPU board), on which the lithium battery is installed.
5. Pull up on the battery, and cut the (+) terminal off with wire cutters.
6. Pull the battery up further.
7. Cut the (-) terminal that is hidden under the battery with wire cutters.

CALIFORNIA, USA ONLY

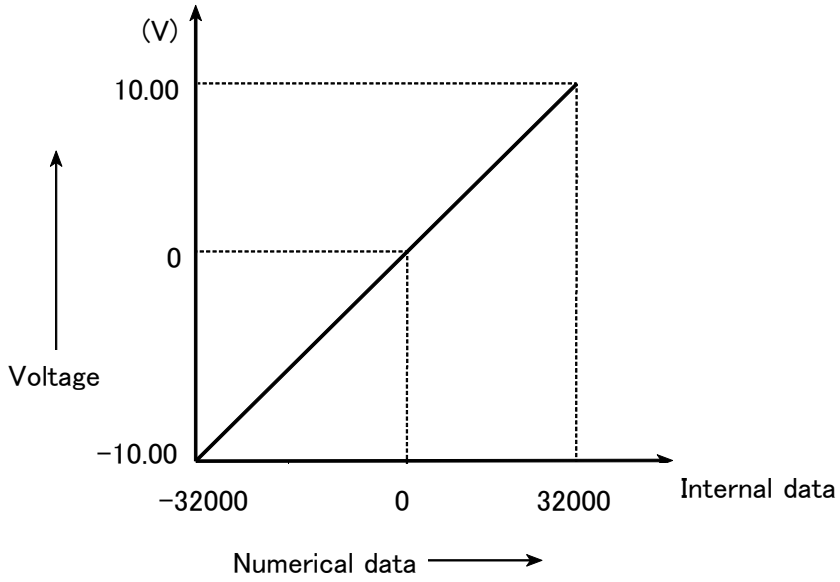
This product contains a CR Coin Lithium Battery which contains Perchlorate Material - special handling may apply.

See www.dtsc.ca.gov/hazardouswaste/perchlorate

# Appendix

## Appendix 1 Relationship Between Internal Data and Voltage Level

The correspondence between internal data values and output voltage levels is shown in the following figure.
Voltage resolution is 16 bits.



# Appendix 2 Error Message List

| Error No. | Message | Description |
|---|---|---|
| **Output Setting Errors** | | |
| 201 | Cannot change RANGE while running. | Press STOP, then change range. |
| 202 | Cannot change WAVE while running. | Press STOP, then change waveform. |
| 203 | Cannot set frequency of another channel. | Cancel simultaneous setting of frequency, or cancel simultaneous setting. |
| **Sweep Related Errors** | | |
| 301 | Value out of range. | The time setting value is out of range. |
| 302 | Value out of range. | The number of loop time is out of range. |
| 303 | Value out of range. | The frequency is out of range. |
| 304 | Value out of range. | The duty is out of range. |
| 305 | Value out of range. | The amplitude value is out of range. |
| 306 | Value out of range. | The offset value is out of range. |
| 307 | No data. | Create data and try the operation again. |
| 308 | Not a data file. | The file does not contain (sweep) data. |
| 309 | Cannot read data. | (Sweep) data cannot be read correctly. |
| 310 | Cannot convert. | (Sweep) data cannot be converted. |
| 311 | Cannot convert while running. | Data cannot be converted during RUN operation. |
| 312 | Cannot change while running. | The data cannot be executed during RUN operation. |
| 313 | No ARB wave. | There is no waveform (arbitrary waveform specified in the file). |
| **Output Status File Errors** | | |
| 351 | Value out of range. | The time setting value is out of range. |
| 352 | Value out of range. | The number of loop time is out of range. |
| 353 | Value out of range. | The frequency is out of range. |
| 354 | Value out of range. | The duty is out of range. |
| 355 | Value out of range. | The amplitude value is out of range. |
| 356 | Value out of range. | The offset value is out of range. |
| 357 | No data. | Create data and try the operation again. |
| 358 | Not a data file. | The file does not contain (output settings) data. |
| 359 | Cannot read data. | (output settings) data cannot be read correctly. |
| 360 | Cannot load while running. | The data cannot be loaded during RUN operation. |

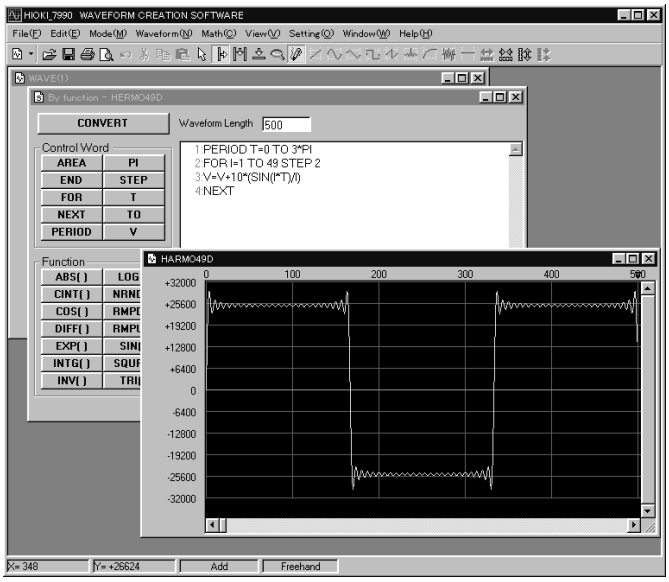
| Error No. | Message | Description |
|---|---|---|
| **Waveform Loading Errors** | | |
| 401 | Model not specified. | The (loading) model is not specified. |
| 402 | Not a data file. | The file does not contain data. |
| 403 | Incorrect channel number. | Check the channel number setting. |
| 404 | Different file. | The model is different from that selected. Check the model settings. |
| 405 | Wrong length. | The (specified) data count is incorrect. |
| 406 | FD has been changed. | The media was changed while setting. |
| 410 | Wave space is full. | There is no more waveform space. Delete unneeded waveforms. |
| 411 | Duplicate name. | An existing waveform has the same name. Use a different name. |
| 420 to 434 | Wave used for CHx. Cannot delete or change. | Cannot delete or change a name specified for a arbitrary waveform. Cancel the arbitrary waveform setting and repeat the operation. This is the same when specifying a arbitrary waveform for the sweep settings. |
| 435 | Waveforms are currently input. | Waveforms are being read by other means. Waveform input is not possible. |
| 436 | Alteration is impossible during RUN. | Waveforms currently being output cannot be input. |
| **Floppy Disk Errors** | | |
| 501 to 510 | Hardware error. | The unit is in need of repair. |
| 511 | Drive not ready. | Confirm that the disk is inserted correctly. |
| 512 | Write protected. | Disable the write protection on the disk and repeat the operation. |
| 513 | Unknown error. | An unspecified error occurred. |
| 514 | Directory not empty. | The directory to be deleted is not empty. |
| 515 | Unreadable media.<br>Please insert FD again. | The format of the media is not recognized, or the floppy disk may not be inserted correctly. Reinsert the disk and try again. |
| 516 | FD has been changed. | The disk was pulled out. Undo the operation. |
| 517 | Media full. | Delete files or insert another disk. |
| 520 | Directory name already exists. | Use a different name. |
| 580 | There is no VERSIONUP file. | No version update file is present. |
| 581 | Version update failed. | No version update occurred. |
| **Download-Related** | | |
| 601 | Syntax error. Please check settings. | Download data is corrupt. |
| 602 | Command error. Please check settings. | Download data is corrupt. |
| 603 | Invalid channel. | The specified channel is invalid. |
| 604 | The machine is not ready. | The machine is not ready. |

| Error No. | Message | Description |
|---|---|---|
| **GP-IB Related** | | |
| 701 | The address must be up to 30. | Specify an address between 0 and 30. |
| **SYSTEM Related** | | |
| 750 | Invalid date. | The date is incorrect. |

# Appendix 3 Sample Program List

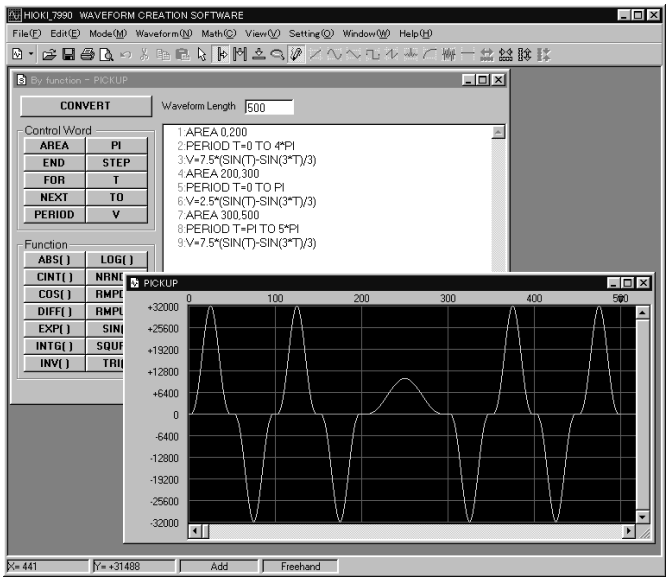
The following examples show function input with the 7990 WAVEFORM CREATION SOFTWARE.

## HARMO49D (49th harmonic waveform)




Waveform size: 500
1:PERIOD T=0 TO 3*PI ↓
2:FOR I=1 TO 49 STEP 2 ↓
3:V=V+10*(SIN(I*T)/I) ↓
4:NEXT ↓

## PICKUP (Electromagnetic pickup waveform)




Waveform size: 500
1:AREA 0,200 ↓
2:PERIOD T=0 TO 4*PI ↓
3:V=7.5*(SIN(T)-SIN(3*T)/3) ↓
4:AREA 200,300 ↓
5:PERIOD T=0 TO PI ↓
6:V=2.5*(SIN(T)-SIN(3*T)/3) ↓
7:AREA 300,500 ↓
8:PERIOD T=PI TO 5*PI ↓
9:V=7.5*(SIN(T)-SIN(3*T)/3) ↓

HIOKI

# DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: WAVEFORM GENERATOR

Model Number: 7075, 7075-01

Product Options: 9165 CONNECTION CORD
9166 CONNECTION CORD

Separately Available Accessories:
9151-02 GP-IB CONNECTOR CABLE
9151-04 GP-IB CONNECTOR CABLE

The above mentioned products conform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326-1:2006
Class A equipment
Basic immunity test requirement
EN61000-3-2:2006
EN61000-3-3:1995+A1:2001+A2:2005

Supplementary Information:
The products herewith comply with the requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC.

HIOKI E.E. CORPORATION

12 December 2008

Atsushi Mizuno
Director of Quality Assurance

7075A999-04

HIOKI

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Technical Support Section

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- In the interests of product development, the contents of this manual are subject to revision without prior notice.
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