

# **INSTRUCTION MANUAL**

VIBRATION ANALYZER

**VA-11**



3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan



## Organization of this manual

This manual describes the features and operation principles of the Vibration Analyzer VA-11. This manual contains the following sections.

### **Outline**

Gives basic information on the unit.

### **Controls and Features**

Briefly identifies and explains all parts of the unit.

### **Preparations**

Describes how to make connections, insert batteries, and prepare the unit for use.

### **Display Explanation**

Describes symbols and other information appearing on the display. Menu screens are also explained in this section.

### **Trigger Functions**

Explains the use of trigger signals.

### **Processing Principles**

Explains the relation between the various measurement functions and the trigger function.

### **Measurement**

Describes the basic steps and procedures for measurement.

### **Recall Mode**

Describes how to redisplay data stored in the memory of the unit.

### **Printing**

Describes the basic print functions.

## Compact Flash Card

Describes how to use the separately available compact flash cards for data storage.

## Default Settings

Lists the default settings of the unit (the condition in which it is shipped from the factory).

## Specifications

Lists the technical specifications of the unit.



The product described in this manual is in conformity with the following European standards;

EN50081-1:1992

EN50082-2:1995

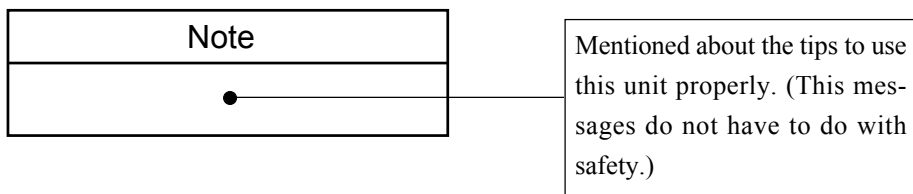
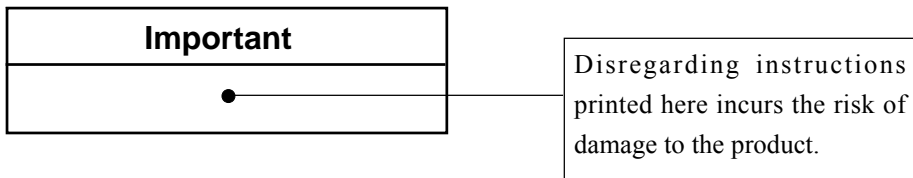
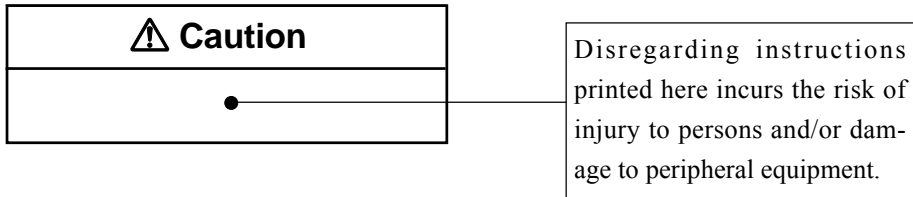
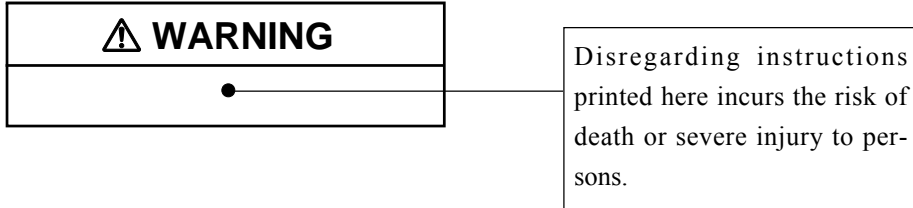
Note: CE requirements are met provided that a core filter is fitted to every cable.

To conform to the EU requirement of the Directive 2002/96/EC on Waste Electrical and Electronic Equipment, the symbol mark on the right is shown on the instrument.



## FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of death or injury to persons and severe damage to the unit or peripheral equipment, make sure that all instructions are fully understood and observed.





## **WARNING**

- When making measurements on exposed rotating parts or power train parts of machinery, proceed with utmost care to ensure that the accelerometer or accelerometer cable do not get caught in the machine.
- When making measurements on exposed rotating parts or power train parts of machinery, do not use the shoulder belt or carrying strap.

# PRECAUTIONS

- Operate the unit only as described in this manual.
- Do not touch any parts of the unit other than necessary for operation.
- Do not drop the unit. Protect it from shocks and vibration.
- The permissible ambient temperature range for operation of the unit is 0 to +40°C. Relative humidity must be between 20% and 90%.  
Do not use or store the unit in locations which may be subject to water, direct sunlight, high temperatures or humidity. Also protect the unit from air with high salt or sulphur content, gases or the influence of chemicals.
- Do not forget to turn the unit off after use. Remove the batteries if the unit is not to be used for some time.
- When disconnecting cables, always hold the plug and do not pull the cable.
- To clean the unit, use only a dry cloth or a cloth lightly moistened with water. Do not use chemical cleaning cloths, solvents or alcohol-based cleaners to prevent the possibility of deformation and discoloring.
- Do not insert any objects such as pins, metal scraps, conducting plastic etc. into any opening on the unit.
- Do not disassemble the unit or attempt internal alterations.
- In case of malfunction, do not attempt any repairs. Note the condition of the unit clearly and contact the supplier.

# Contents

Organization of this manual .....	i
FOR SAFETY .....	iii
<b>⚠</b> WARNING .....	iv
PRECAUTIONS .....	v
Outline .....	1
Controls and Features .....	3
Front Panel .....	3
Side Panel .....	6
Top Panel .....	7
Bottom Panel .....	8
Preparations .....	9
Power Supply .....	9
Connecting the Accelerometer PV-55 .....	14
Trigger Input .....	15
Printer and Computer Connections .....	16
Setting the Date and Time .....	19
Using the shoulder belt .....	20
Display Explanation .....	21
Display Layout .....	21
Measurement Screens .....	22
Menu Screens .....	32
Menu Operation on Measurement Screen .....	44
Trigger Functions .....	45
Processing Principles .....	48
Mass Memory .....	50



Measurement .....	54
Use As a Vibration Meter .....	54
Use As a Spectrum Analyzer .....	56
Spectrum List Display .....	57
Time Waveform Display .....	58
Cursor Control .....	60
Recall Mode .....	61
Recalling Transient Store Data .....	62
Recalling Manual Store Data .....	66
Frequency Zoom Display Examples .....	68
Y Axis Zoom Display Examples .....	70
Printing .....	71
Compact Flash Card .....	72
Inserting a Card .....	72
Card Contents .....	79
Default Settings .....	88
Specifications .....	90



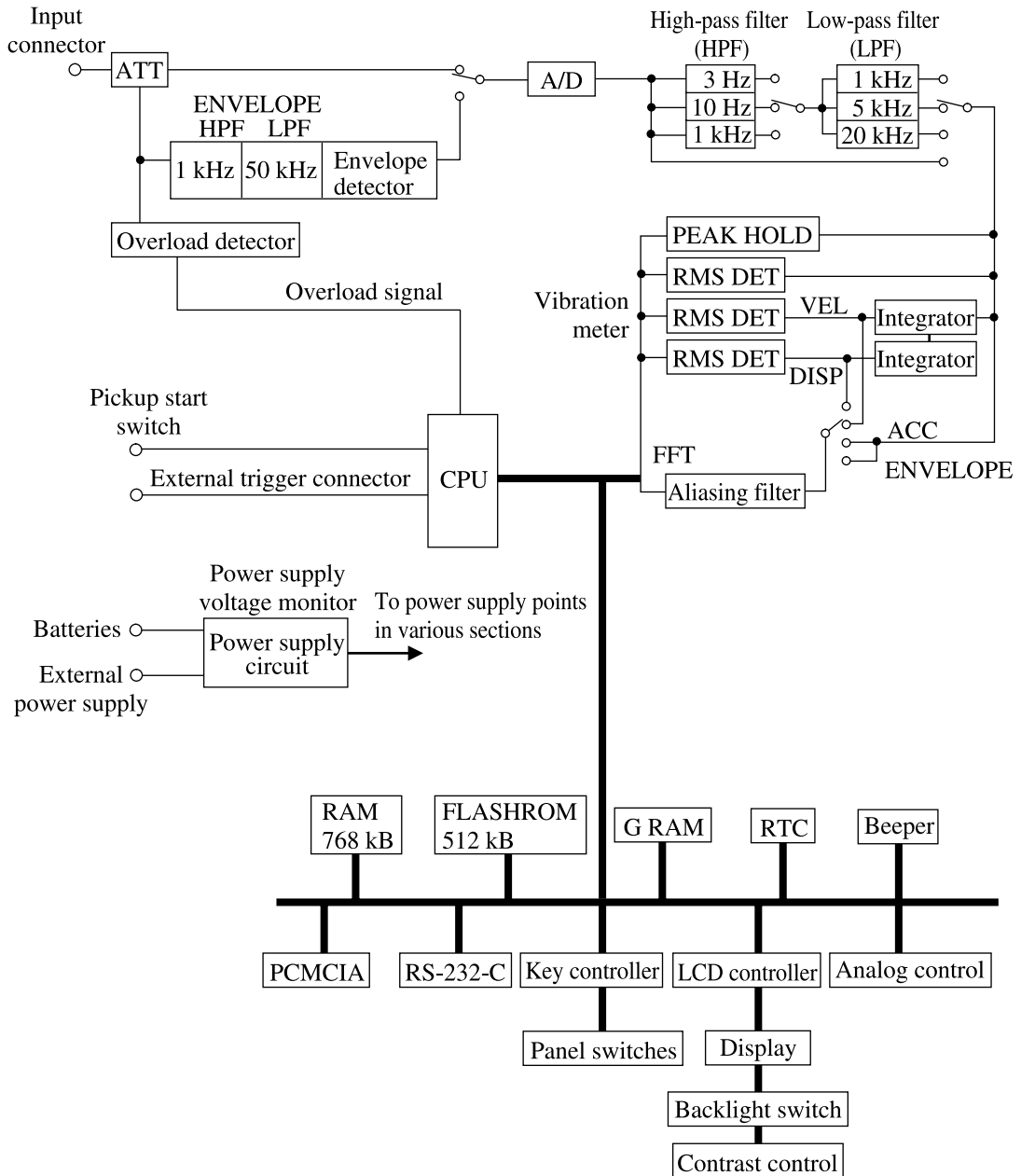
# Outline

The VA-11 is a portable analyzer designed for examining machinery vibrations and performing diagnostic routines on various kinds of equipment. It has a basic but highly useful array of functions. Except for envelope processing, all processing functions are carried out in the digital domain. The built-in compact flash card slot allows easy storage and export of data to a computer. The unit has a vibration meter mode and an analyzer mode for FFT analysis. In vibration meter mode, simultaneous measurement of acceleration, velocity, and displacement is carried out. Velocity rms value, peak value, and crest factor can also be displayed simultaneously. In analyzer mode, FFT analysis is used to determine the power spectrum and vibration waveform. The capability to perform envelope processing before FFT analysis is highly useful for equipment diagnostics.

## Features

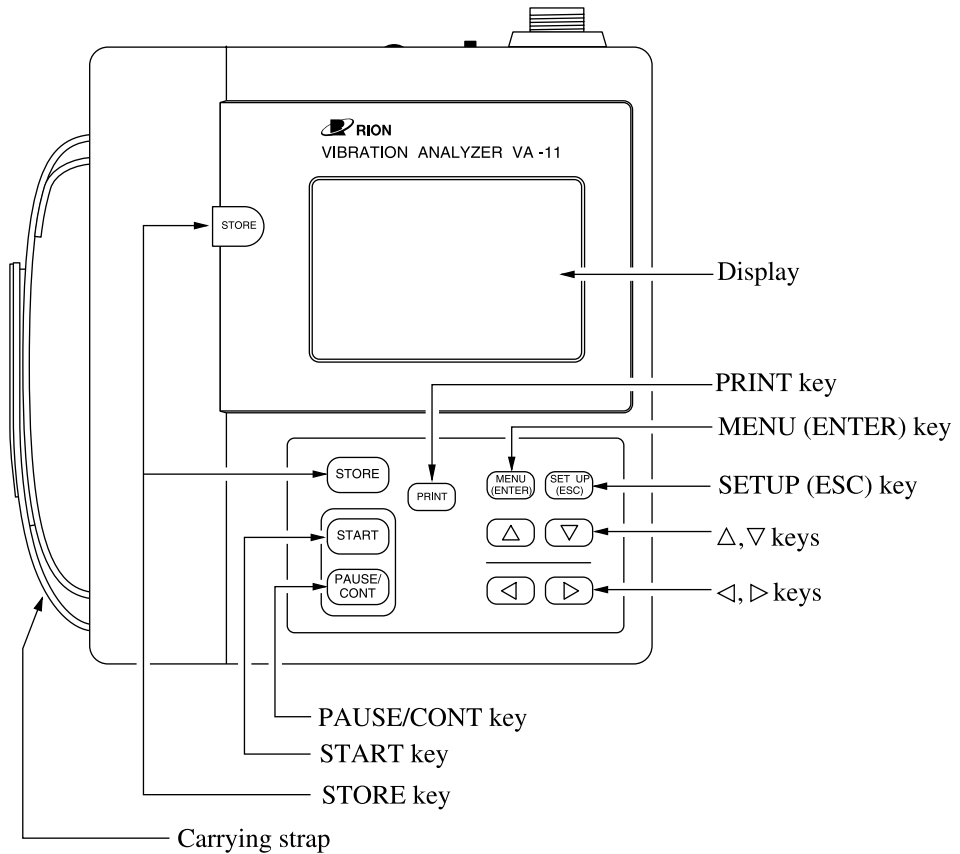
- DSP chip performs digital processing of integral value and rms value
- Simultaneous display of acceleration, velocity, displacement
- 16-bit A/D converter achieves 80 dB dynamic range for FFT analysis
- Simple operation with only 10 controls
- Internal memory holds up to 500 data sets of any type
- Timer allows automatic storing of data at preset intervals
- 10 sets of unit control settings can also be stored
- Capability to record and re-analyze time waveform data
- High-speed serial data transfer at up to 38400 bps
- Built-in compact flash card slot
- Large LCD panel with EL backlight and 192 × 128 dot resolution

## Block diagram of vibration analyzer VA-11



# Controls and Features

## Front Panel



### Display

Measured waveforms, menus, and other data are shown here.

### PRINT key

Pressing this key causes the currently displayed measurement screen or data stored in memory to be printed out.

Do not press the PRINT key when a computer is connected to the I/O connector. Otherwise communication will be impaired.

### **MENU (ENTER) key**

Allows changing the measurement parameters using the menus.

### **SETUP (ESC) key**

Allows changing the measurement parameters directly on the measurement screen.

### **△, ▽ keys**

Used to select setting items when changing the measurement parameters.

### **◀, ▶ keys**

Used for cursor movement and for changing measurement parameters.

### **START key**

Used to start the measurement.

### **PAUSE/CONT key**

Used to pause and restart the measurement.

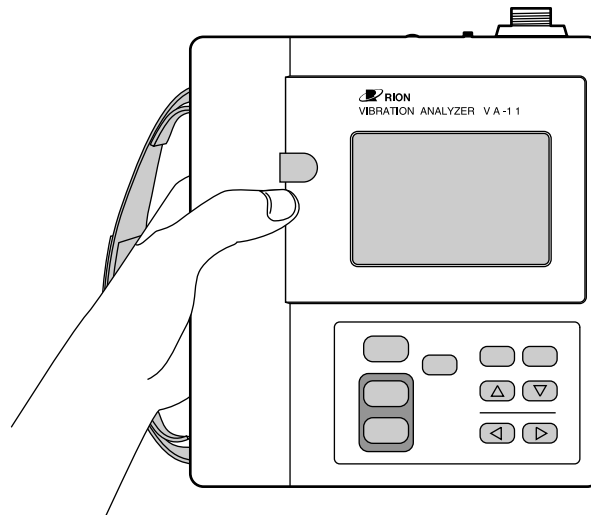
### **STORE key**

Used to store data in the memory.

There are two keys labelled STORE. You can press either key.

## Carrying strap

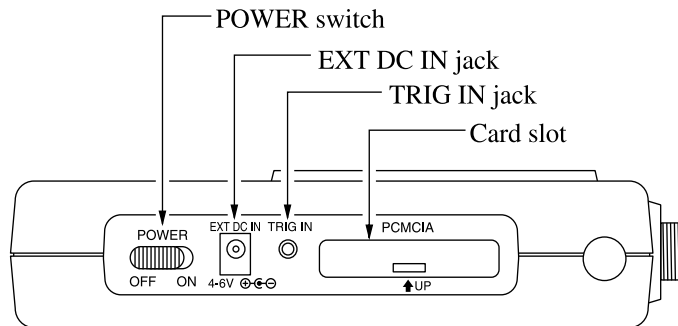
For carrying, hold the unit as shown below.



### **⚠ WARNING**

When making measurements on exposed rotating parts or power train parts of machinery, proceed with utmost care to ensure that the pickup or pickup cable do not get caught in the machine.

## Side Panel



### POWER switch

Turns the unit OFF and ON.

### EXT DC IN jack

The optional AC adapter NC-94A can be connected here for operation on AC power.

#### **Important**

Use only the optional AC adapter NC-94A to prevent the possibility of damage.

### TRIG IN jack

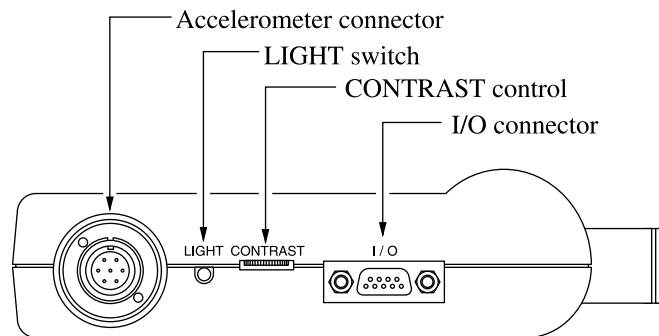
Allows controlling the measurement with a trigger signal.

### Card slot

Optional compact flash cards can be inserted here to store measurement data and transfer them to a computer for further processing (see page 72).



## Top Panel



### Accelerometer connector

The supplied accelerometer PV-55 is connected here. (Other compatible accelerometers: PV-57, VP-26C)

### LIGHT switch

Pressing this switch turns on the display backlight, and pressing the switch again turns it off. The backlight also turns itself off automatically after three minutes of inactivity.

When the unit is operated on batteries and the battery indicator shows less than three segments, the backlight will not come on even if the switch is pressed. Only three short beeps will be heard.

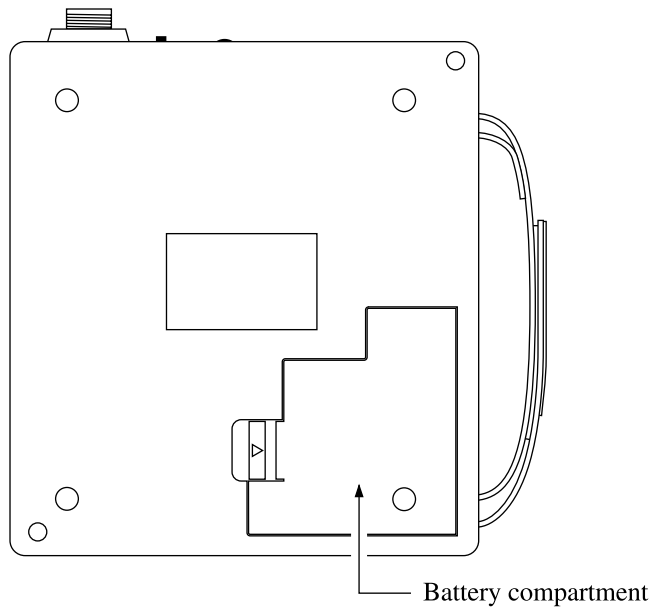
### CONTRAST control

Serves to adjust the display contrast.

### I/O connector

Serial interface connector for connection of the separately available printer DPU-414, CP-11 or a computer.

## Bottom Panel



### Battery compartment

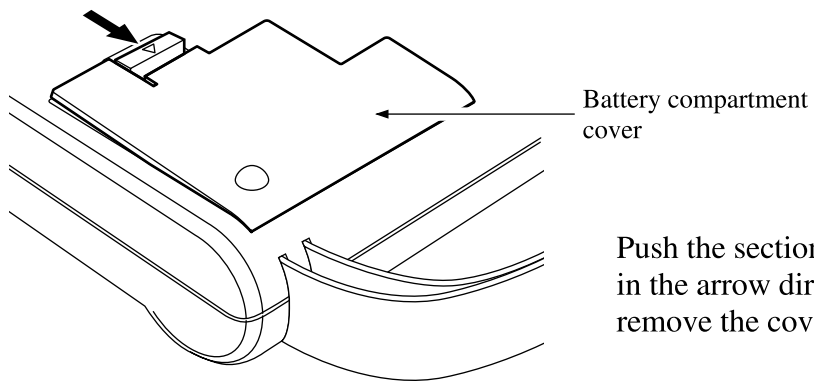
Four IEC R14 (size C) batteries and one lithium battery are inserted here.

# Preparations

## Power Supply

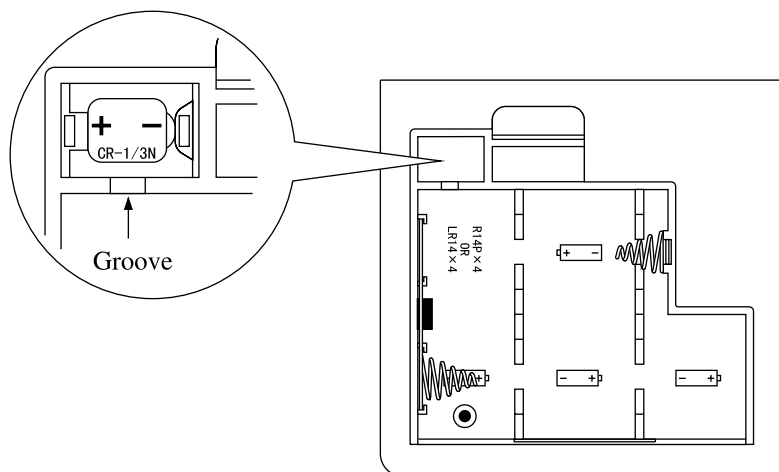
### Inserting the batteries

1. Set the POWER switch to OFF.
2. Open the cover of the battery compartment.

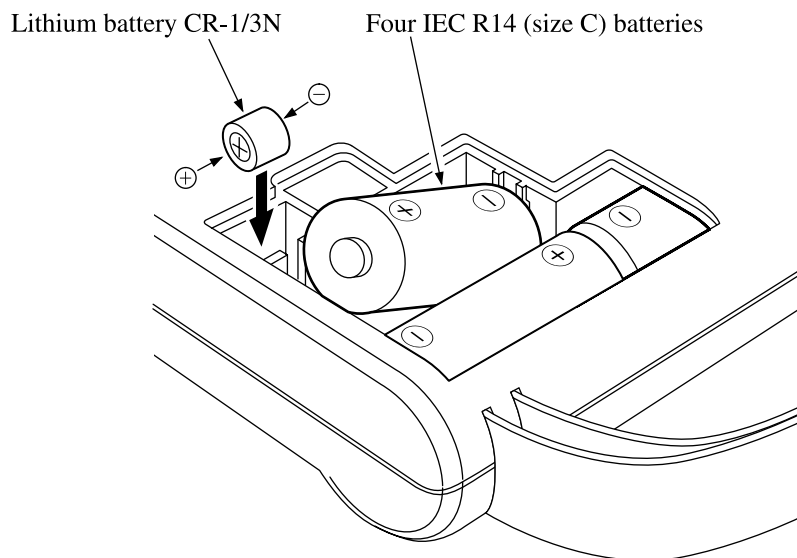


Push the section marked ▽ in the arrow direction and remove the cover.

The illustration below shows the unit with the cover removed. Pay attention to correct polarity.



3. Insert four IEC R14 (size C) batteries with correct polarity, as shown in the illustration below.
4. Insert the lithium battery with correct polarity.
5. Replace the battery compartment cover.



### Important

- Take care not to mix up [+] and [-] polarity when inserting the batteries.  
Replace all four batteries at the same time, and do not mix battery types.  
When not in use, remove the batteries from the unit.
- The lithium battery serves for backup of the built-in calendar/clock IC. It has a life of about 2 years, but there is no means of checking the remaining battery capacity. To be on the safe side, you should replace the battery every 1 to 1-1/2 years.

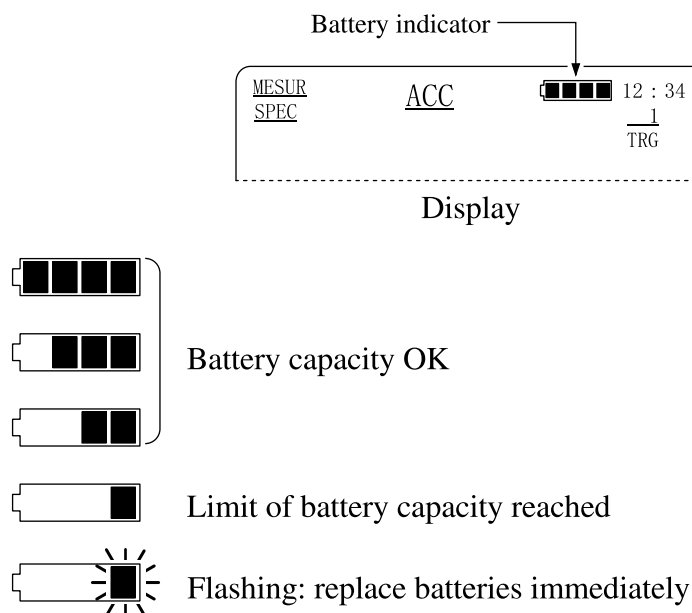
## When to replace the batteries

The battery indicator at the top right of the display gives an indication of battery status. The number of lit segments decreases as the batteries are depleted. When only one segment is shown, you should replace the batteries.

When using alkaline batteries, the approximate battery life is 22 hours of continuous operation. With manganese batteries, the approximate battery life is 10 hours (at approx. 20°C, in spectrum mode, ACC, without using backlight and compact flash card, other settings at default).

### Note

Battery life will vary, depending on the usage environment, and the battery brand and type.



### Battery indicator function

When the batteries are almost exhausted, the last segment will flash for about 30 seconds and a continuous beep is heard (if the buzzer setting is ON; see page 42). The unit then performs automatic shutdown. (When using a flash card, also see page 74.)

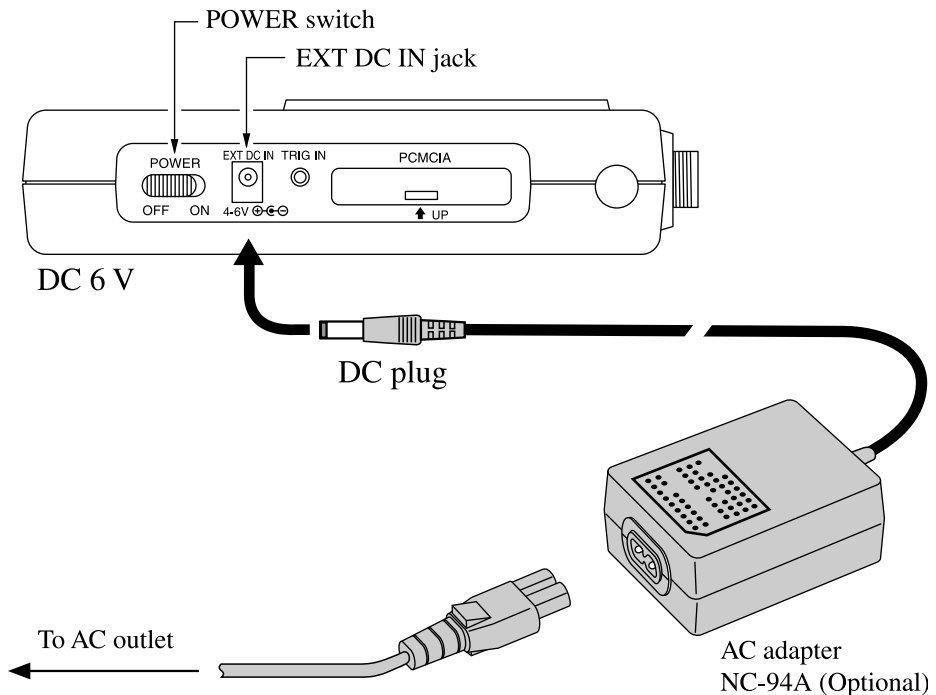
After automatic shutdown, the display will be off and the keys of the unit have no effect. Set the POWER switch to OFF and replace the batteries as described on pages 9 to 10.

When the POWER switch is turned on, the Rion logo will normally be shown on the display for five seconds, and then the measurement screen appears. If the battery capacity is low, the logo screen stays on the display. In such a case, set the POWER switch to OFF and replace the batteries as described on pages 9 to 10.

When compact flash cards are used, the battery life will be shorter. See the "Note" on page 74.

## AC adapter

To use the optional AC adapter, connect it to the unit as shown below.



**Important**

Use only the supplied AC adapter NC-94A to prevent the possibility of damage.

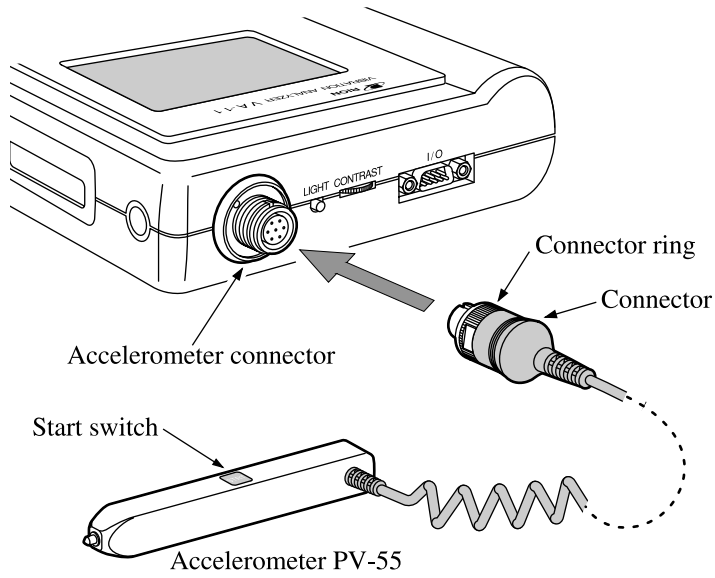
**Important**

Do not coil or twist the power cord of the AC adapter.

Do not cover the AC adapter or the power cord with cloth, paper or any other object, to prevent the possibility of heat buildup.

## Connecting the Accelerometer PV-55

Connect the acceleration accelerometer PV-55 as shown below.



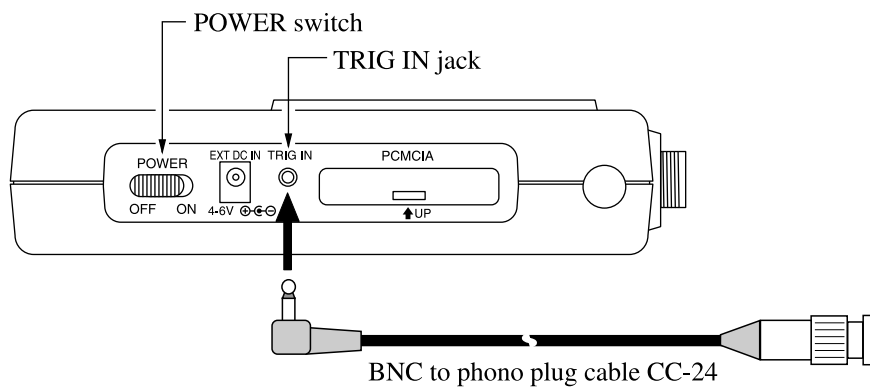
After inserting the plug into the connector, rotate the connector ring clockwise to firmly lock the plug.

The start switch on the accelerometer operates in the same way as the START key on the unit.



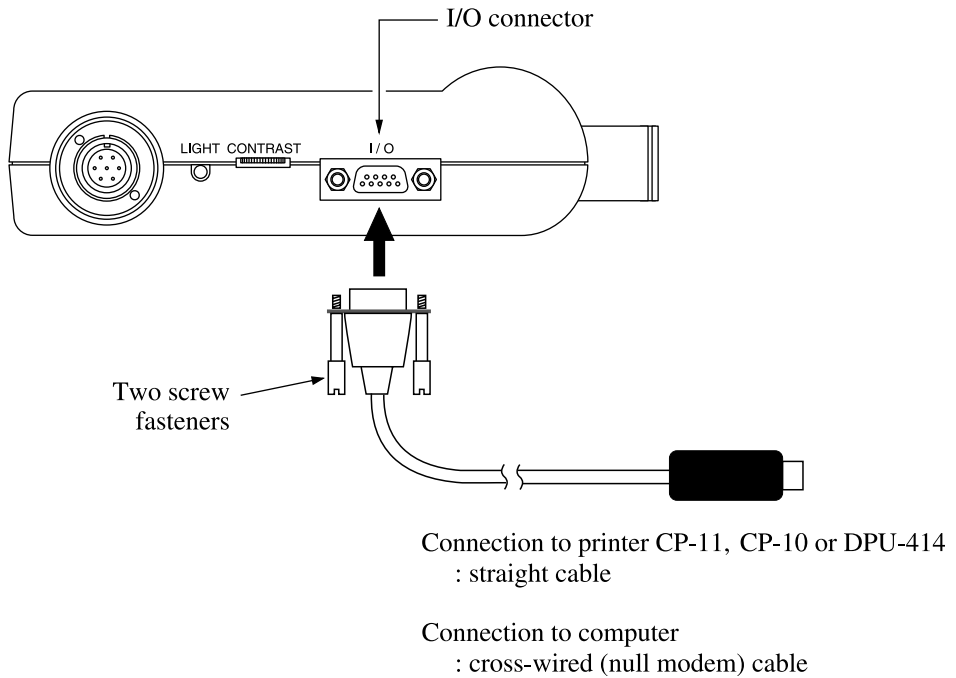
## Trigger Input

The trigger function (see page 45) can be used to control the measurement.



## Printer and Computer Connections

To connect the printer DPU-414, CP-11 or CP-10 (option) to the I/O connector on the VA-11, use a commercially available RS-232-C interface cable (straight cable). To connect a computer to the I/O connector on the VA-11, use a commercially available RS-232-C interface cable (cross-wired or null modem cable).



## DIP switch setting on printer DPU-414

Set the DIP switches of the printer as shown below.

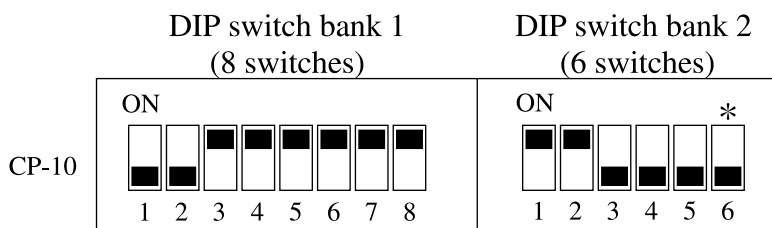
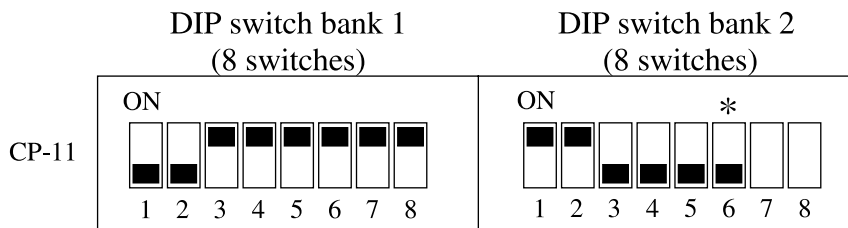
For details, please refer to the instruction manual of the DPU-414.

(9600 bps fixed)

SW-1	1	OFF
	2	ON
	3	ON
	4	OFF
	5	ON
	6	OFF
	7	ON
	8	ON
SW-2	1	ON
	2	ON
	3	ON
	4	ON
	5	ON
	6	ON
	7	ON
	8	ON
SW-3	1	ON
	2	ON
	3	OFF
	4	ON
	5	OFF
	6	ON
	7	ON
	8	ON

## DIP switch setting on printer CP-11 or CP-10

Set the DIP switches of the printer as follows.



### Note

The switch marked with an asterisk (switch 6 of DIP switch bank 2) serves for setting the data transfer speed. The ON position means 4800 bps and the OFF position 9600 bps.

For the VA-11, use the 9600 bps setting.

Switches 7 and 8 of DIP switch bank 2 of printer CP-11 are set at the factory and should not be changed. Otherwise, correct printing may not be possible.

## Setting the Date and Time

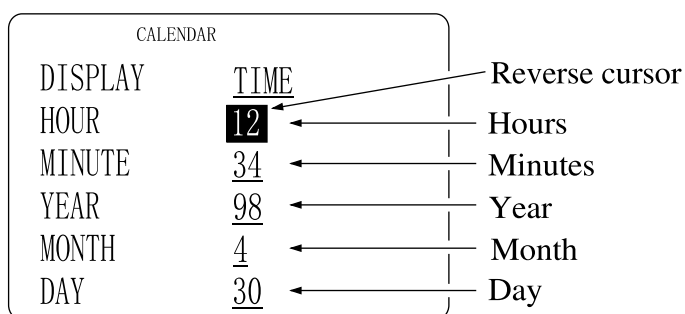
Before using the unit, you must set the date and time for the built-in calendar/clock.

(The calendar/clock is not set at the factory before shipping.)

1. Set the POWER switch to ON.
2. After the measurement screen has appeared, press the MENU (ENTER) key once to call up the MAIN MENU screen.
3. Use the  $\triangle$ ,  $\nabla$  keys to move the reverse cursor to the CALENDAR item.
4. Press the MENU (ENTER) key once more. The CALENDAR menu screen appears.
5. Use the  $\triangle$ ,  $\nabla$  keys to move the reverse cursor to the item you want to set.
6. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the numerical value. (Each brief push of the key changes the value by one increment. Keeping the key depressed results in a continuous change.)
7. Press the SETUP (ESC) key twice to return to the measurement screen.

### Note

The calendar/clock IC has an accuracy of  $\pm 25$  ppm. The time will be off by about one minute in one month. Before making an important measurement, be sure to check the time and set the clock if required.



CALENDAR menu screen

**Note**

The built-in calendar displays years as follows:

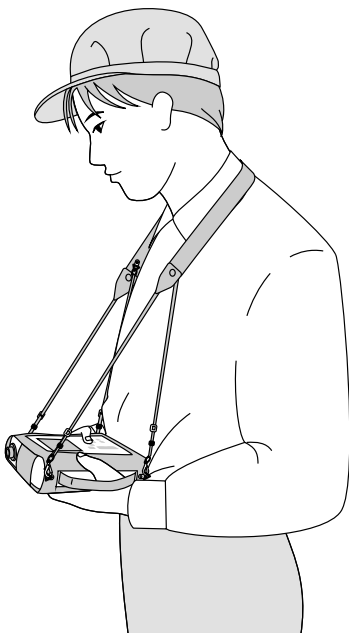
... 98 → 99 → 0 → 1 → ... → 9 → 10 → ...

The years from 2000 to 2009 are indicated as a single digit. However, when data stored internally in the unit are written to a memory card, the year information will be in four digits, as shown below.

VA-11 data	Data on memory card
0 to 89	2000 to 2089
90 to 99	1990 to 1999

**Using the shoulder belt**

The supplied shoulder belt can be used to support the unit during a measurement. Hook the straps of the belt into the metal fittings on the soft carrying case, as shown in the illustration.

**⚠ WARNING**

When making measurements on exposed rotating parts or power train parts of machinery, do not use the shoulder belt to prevent the possibility of the belt getting caught in the machine.

# Display Explanation

## Display Layout

Information appearing on the display screen can be divided into two main categories:

- Current measurement data (MESUR) or recalled measurement data (RECLL)
- Measurement parameter settings (MENU)

Details of these are explained below.

## Current measurement data (MESUR) or recalled measurement data (RECLL)

		See page	See page
		Display	Measurement
		Explanation	
MESUR See page 22	VM (Vibration meter)	22 to 23	54 to 55
	SPEC (Spectrum graph) (Spectrum list)	24 to 26 26 to 27	56 57
	TIME (Time waveform graph)	28 to 29	58 to 59
RECLL Transient store data recall See page 62	SPEC (Spectrum graph) (Spectrum list)		
	TIME (Time waveform graph)		
RECLL Manual store data recall See page 66	VM (Vibration meter)		
	SPEC (Spectrum graph) (Spectrum list)		
	TIME (Time waveform graph)		

## Measurement parameters (MENU)

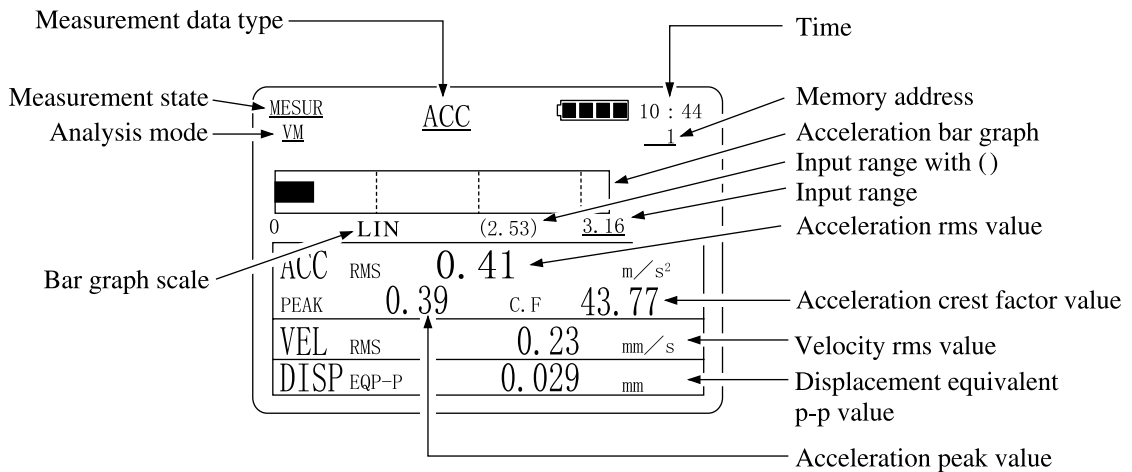
	See page
MAIN MENU — UNIT	33
— TRIGGER	34
— MASS MEMORY	35
— PCMCIA CARD	36 to 37
— INPUT	38
— SPECTRUM	40
— SETUP MEMORY	41
— OTHERS	42
— CALENDAR	19, 43

## Measurement Screens

The actual display may differ from the screen samples shown here.

### Vibration meter display

Items which are underlined on screen can be changed on the measurement screen by pressing the SETUP (ESC) key.



#### Measurement data type

ACC: Acceleration      VEL: Velocity      DISP: Displacement

#### Measurement state

MESUR: Measurement      RECLL: Recall

#### Analysis mode

VM: Vibration meter      SPEC: Spectrum      TIME: Time waveform

#### Time (date) display

Current time (date) is shown.

(Use CALENDAR menu to switch between time and date display.)

#### Memory address

1 to 500



Input range with ( )

Full-scale value when accelerometer with different sensitivity than PV-55 is used (normally not shown).

Input range

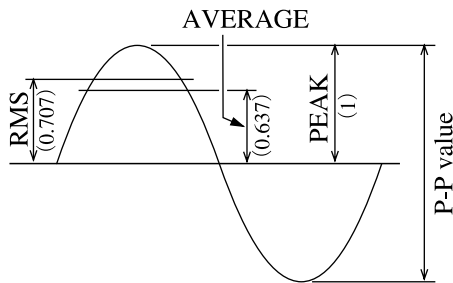
Determined by combination of vibration quantity and unit, as shown below.

Acceleration	1	3.16	10	31.6	100	316	m/s <sup>2</sup> (RMS)
	0.1	0.316	1	3.16	10	31.6	G (RMS)
Velocity	3.16	10	31.6	100	316	1000	mm/s (RMS)
	0.125	0.394	1.25	3.94	12.5	39.4	inch/s (RMS)
Displacement	0.089	0.283	0.894	2.83	8.94	28.3	mm (EQp-p)
	3.52	11.1	35.2	111	352	1114	mils (EQp-p)

Bar graph scale

LIN: Linear scale

LOG: Log scale



rms value

Root mean square of instantaneous value

Equivalent p-p value

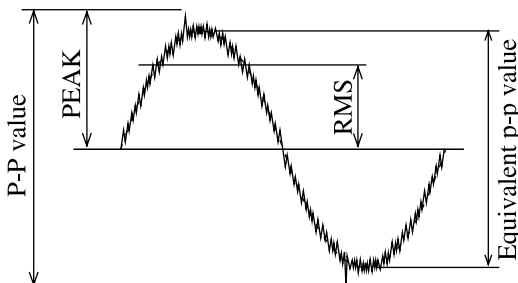
$$\text{rms value} \times 2\sqrt{2}$$

Peak value

Maximum of single-amplitude

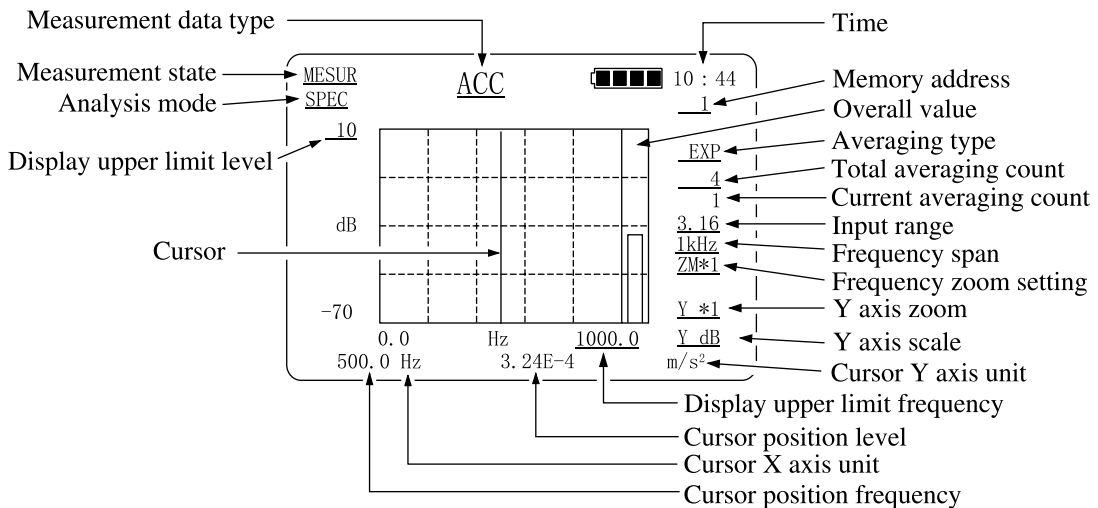
Crest factor

$$\text{Peak value} / \text{rms value}$$



## Spectrum display

Items which are underlined on screen can be changed on the measurement screen by pressing the SETUP (ESC) key.



### Measurement data type

ACC: Acceleration      VEL: Velocity      DISP: Displacement  
 ACCe: Envelope curve

### Measurement state

MESUR: Measurement      RECLL: Recall

### Analysis mode

VM: Vibration meter      SPEC: Spectrum      TIME: Time waveform

### Time (date) display

Current time (date) is shown.

(Use CALENDAR menu to switch between time and date display.)

### Memory address

1 to 500

### Averaging type

INST: Instantaneous value      LIN: Linear averaging  
 EXP: Exponential averaging      MAX: Maximum value

## Total averaging count

1 to 1023

Shows the selected number for exponential averaging, linear averaging, and maximum value.

## Input range

Acceleration	1	3.16	10	31.6	100	316	m/s <sup>2</sup> (RMS)
	0.1	0.316	1	3.16	10	31.6	G (RMS)
Velocity	3.16	10	31.6	100	316	1000	mm/s (RMS)
	0.125	0.394	1.25	3.94	12.5	39.4	inch/s (RMS)
Displacement	0.089	0.283	0.894	2.83	8.94	28.3	mm (EQp-p)
	3.52	11.1	35.2	111	352	1114	mils (EQp-p)

## Frequency span

100, 200, 500, 1 k, 2 k, 5 k, 10 k, 20 kHz

## Frequency zoom setting

Zoom ratio  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$ 

## Y axis zoom

Y dB:  $\times 1 = 80$  dB display     $\times 2 = 40$  dB display     $\times 4 = 20$  dB displayLIN: Full scale /  $2^N$      $N = 0$  to 10

## Y axis scale

dB    LIN

## Display upper limit level

Can be changed for Y axis dB display and Y axis zoom factor of 2 or above

## Display upper limit frequency

Highest frequency of graph shown on display

Can be changed for frequency zoom factor of 2 or above

## Cursor

When no reverse menu item is shown, the cursor moves left and right with the  $\triangleleft$ ,  $\triangleright$  keys. Keeping a key depressed moves the cursor continuously.

**Cursor Y axis unit**

Can be switched between dB and LINEAR with SPECTRUM menu.  
Set separately from Y axis scale.

**Cursor X axis unit**

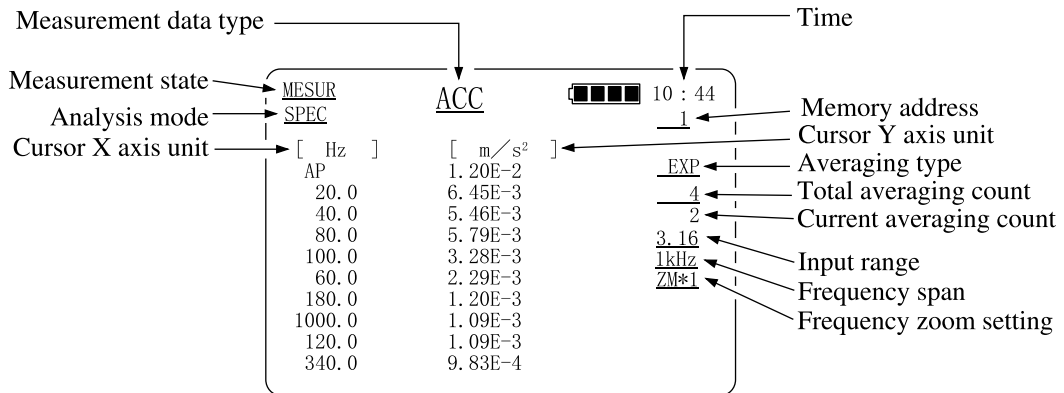
Can be switched between Hz, KCPM, and ORDER with SPECTRUM menu.

**Overall value**

Full power spectrum value excluding DC component. Cursor position frequency display shows "AP".

**Spectrum list display**

Items which are underlined on screen can be changed on the measurement screen by pressing the SETUP (ESC) key.



**Measurement data type**

ACC: Acceleration      VEL: Velocity      DISP: Displacement  
ACCe: Envelope curve

**Measurement state**

MESUR: Measurement      RECLL: Recall

**Analysis mode**

VM: Vibration meter      SPEC: Spectrum      TIME: Time waveform

**Time (date) display**

Current time (date) is shown.

(Use CALENDAR menu to switch between time and date display.)

## Memory address

1 to 500

## Averaging type

INST: Instantaneous value

LIN: Linear averaging

EXP: Exponential averaging

MAX: Maximum value

## Total averaging count

1 to 1023

## Input range

Acceleration	1	3.16	10	31.6	100	316	m/s <sup>2</sup> (RMS)
	0.1	0.316	1	3.16	10	31.6	G (RMS)
Velocity	3.16	10	31.6	100	316	1000	mm/s (RMS)
	0.125	0.394	1.25	3.94	12.5	39.4	inch/s (RMS)
Displacement	0.089	0.283	0.894	2.83	8.94	28.3	mm (EQp-p)
	3.52	11.1	35.2	111	352	1114	mils (EQp-p)

## Frequency span

100, 200, 500, 1 k, 2 k, 5 k, 10 k, 20 kHz

## Frequency zoom setting

Zoom ratio  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$ 

## Cursor Y axis unit

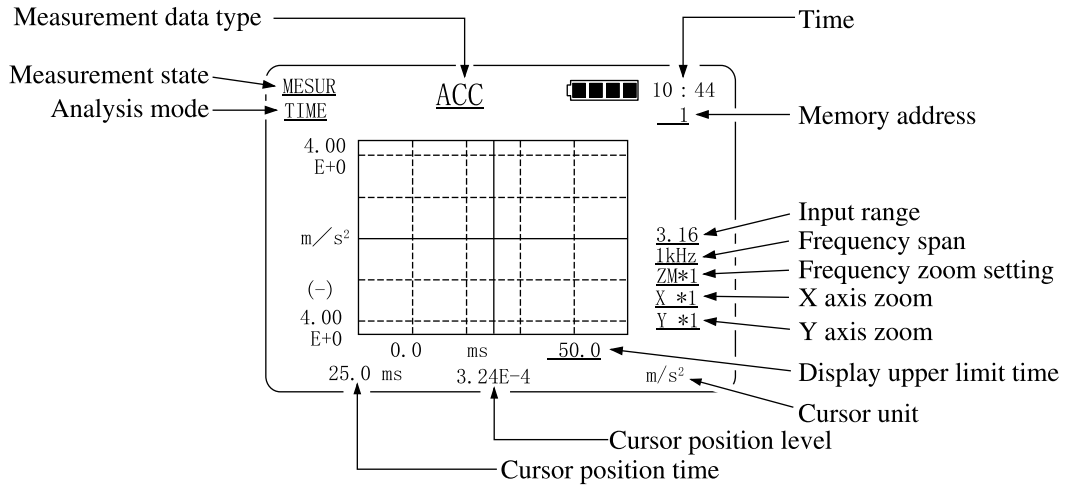
Can be switched between dB and LINEAR with SPECTRUM menu. Set separately from Y axis scale.

## Cursor X axis unit

Can be switched between Hz, KCPM, and ORDER with SPECTRUM menu.

## Time waveform display

Items which are underlined on screen can be changed on the measurement screen by pressing the SETUP (ESC) key.



### Measurement data type

ACC: Acceleration      VEL: Velocity      DISP: Displacement  
 ACCe: Envelope curve

### Measurement state

MESUR: Measurement      RECLL: Recall

### Analysis mode

VM: Vibration meter      SPEC: Spectrum      TIME: Time waveform

### Time (date) display

Current time (date) is shown.

(Use CALENDAR menu to switch between time and date display.)

### Memory address

1 to 500

## Input range

Acceleration	1	3.16	10	31.6	100	316	m/s <sup>2</sup> (RMS)
	0.1	0.316	1	3.16	10	31.6	G (RMS)
Velocity	3.16	10	31.6	100	316	1000	mm/s (RMS)
	0.125	0.394	1.25	3.94	12.5	39.4	inch/s (RMS)
Displacement	0.089	0.283	0.894	2.83	8.94	28.3	mm (EQp-p)
	3.52	11.1	35.2	111	352	1114	mils (EQp-p)

## Frequency span

100, 200, 500, 1 k, 2 k, 5 k, 10 k, 20 kHz

## Frequency zoom setting

Zoom ratio  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$

X axis zoom (can be changed for frequency zoom factor of 2 or above)

X  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$  (up to frequency zoom ratio)

## Y axis zoom

Y  $\times 1$ ,  $\times 2$ ,  $\times 4$ ,  $\times 8$ ,  $\times 16$ , .....,  $\times 1024$

## Display upper limit time

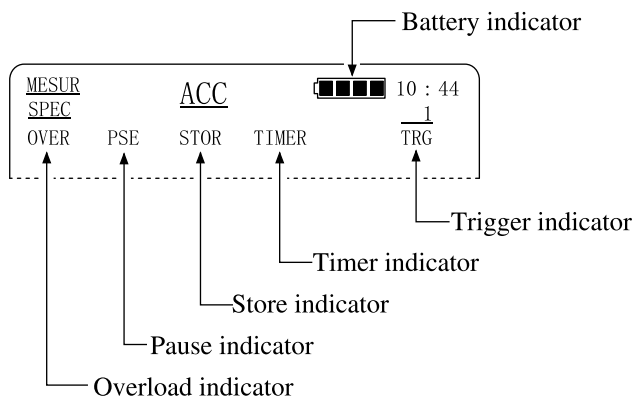
Highest time value of graph shown on display

Can be changed for X axis zoom factor of 2 or above

## Cursor

When no reverse menu item is shown, the cursor moves left and right with the  $\triangleleft$ ,  $\triangleright$  keys. Keeping a key depressed moves the cursor continuously.

## Operation status indicators



### Battery indicator

Shows the remaining capacity of the dry-cell batteries in the unit (see page 11).

### Trigger indicator (only in analyzer mode)

In free-run mode, nothing is displayed here. In other modes, "TRG" is shown. When the unit is waiting for trigger activation, the reverse indication [WAIT] flashes in 0.5 second intervals. When the trigger is generated, "WAIT" changes to "TRG".

### Timer indicator

When the timer is ON, the indication "TIMER" appears here. When the unit is waiting for timer activation, the reverse indication [TIMER] flashes in 0.5 second intervals. When store is completed, the reverse indication changes to "TIMER".

### Store indicator

This indication appears during store in timer measurement and transient measurement. When store is completed, the indication disappears. When a store state has occurred, the reverse indication [STOR] flashes in 0.5 second intervals.

### Pause indicator

The indication "PSE" appears while the unit is in the pause mode during analysis. At other times, the indication is off.

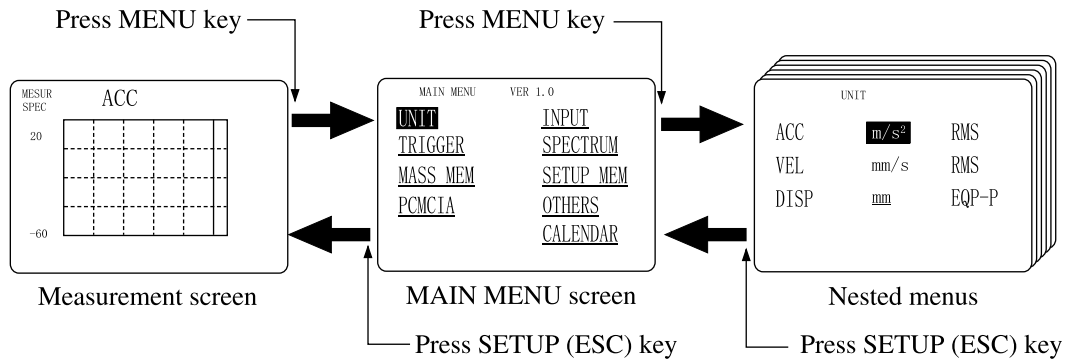


### Overload indicator

The indication "OVER" appears if an acceleration signal has exceeded the input range by 0.5 dB or more.

## Menu Screens

Pressing the MENU (ENTER) key brings up the MAIN MENU screen. This screen allows the user to select measurement parameters to be changed. Pressing the MENU (ENTER) key again brings up the selected menu.

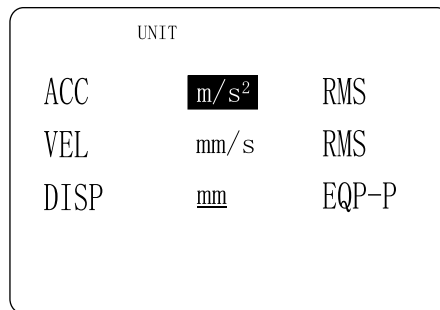


### MAIN MENU items

UNIT:	Measurement units
TRIGGER:	Trigger details
MASS MEM:	Memory details
PCMCIA CARD:	Compact flash card operation items
INPUT:	Input settings (sensitivity setting, analog filter)
SPECTRUM:	Spectrum display details (window, cursor read value, list display)
SETUP MEM:	Measurement parameter memory operation
OTHERS:	Other settings (printer, baud rate, buzzer)
CALENDAR:	Date and time setting

1. Use the  $\triangle$ ,  $\nabla$  keys to select the menu item.
2. Press the MENU (ENTER) key to open the selected menu.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the settings.

## UNIT menu screen



UNIT menu screen

### UNIT menu screen items

ACC: Acceleration unit	m/s <sup>2</sup>	G	Unit: RMS
VEL: Velocity unit	mm/s	inch/s	Unit: RMS
DISP: Displacement unit	mm	mils	Unit: EQp-p

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Not available during recall.

## TRIGGER menu screen

TRIGGER	
MODE	<b>FREE</b>
SOURCE	<u>LEVEL</u>
TRIG POINT	<u>255</u>
PRE/POST	<u>OFF</u>
LEVEL	<u>6/8</u>
SLOPE	<u>+</u>

TRIGGER menu screen

### TRIGGER menu screen items

MODE:	Trigger operation mode
FREE:	Free-run trigger
REPEAT:	Repeat trigger
SINGLE:	Single trigger
SOURCE:	Trigger source
LEVEL:	Level trigger
EXTERNAL:	External trigger
TRIG POINT:	Trigger point (settable in 16 steps)
Zoom	×1 0 to 240      ×2 0 to 496
	×4 0 to 1008    ×8 0 to 2032
PRE/POST:	Pre/post trigger function
OFF:	Not used
PRE:	Pre-trigger
POST:	Post-trigger
LEVEL:	Trigger setting level
	7/8 to -7/8 in 1-unit steps
SLOPE:	Trigger slope +/-

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Not available during recall.

## MASS MEMORY menu screen

MASS MEMORY	
TYPE	<b>MANUAL</b>
TIMER	<u>OFF</u>
HOUR	<u>0</u>
MINUTE	<u>0</u>
DURATION	<u>10</u> M
COUNT	<u>500</u>

MASS MEMORY menu screen

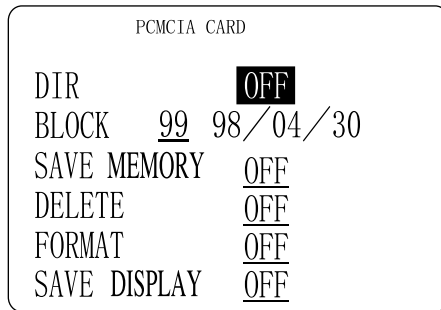
### MASS MEMORY menu screen items

TYPE:	Memory store type
MANUAL:	Manual store
TRANSIENT:	Transient store
TIMER:	Timer operation
ON:	Timer operates
OFF:	Timer is off
HOUR:	0 to 23 in 1-hour steps (timer start time)
MINUTE:	0 to 59 in 1-minute steps (timer start time)
DURATION:	1 to 60 in 1-minute steps (store interval)
COUNT:	1 to 500 in 1-count steps (store count)

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Not available during recall.

## PCMCIA CARD menu screen



PCMCIA CARD menu screen

### PCMCIA CARD menu screen items

- DIR:** Select directory display  
 Use ◀, ▶ keys to change "OFF" to "EXEC".  
**EXEC:** Press MENU (ENTER) key to execute.

PCMCIA CARD DIRECTORY			
BLK	DATE	BLK	DATE
1	98/01/06	2	98/01/07
3	98/01/09	4	98/02/02
5	98/02/05	6	98/02/06
7	98/02/07	8	98/02/08
9	98/03/03	10	98/03/15

Directory display example

One screen shows up to 10 blocks with the respective store date. When there are more blocks, the ▲, ▼ keys can be used to scroll the display. Use the SETUP (ESC) key to return to the PCMCIA CARD menu screen.

- BLOCK:** Specifies a block of data on the card, along with the store date.
- \*.\*:** Block number (1 to 99)  
 Use ◀, ▶ keys to specify
- DATE:** Store date of block.  
 Eight asterisks are shown if no data are present.

**SAVE MOMERY:**

Select save

EXEC: Press MENU (ENTER) key to execute.

**DELETE:**

Select delete

EXEC: Press MENU (ENTER) key to execute.

**FORMAT:**

Select format

EXEC: Press MENU (ENTER) key to execute.

Formats a card to create directory structure and key file.

**SAVE DISPLAY:**

Controls the direct card write function that allows writing data directly to the card. To activate the actual write operation, the STORE key is used.

**ON:**

Direct card write function is enabled.

When STORE key is pressed in measurement mode, all data including data outside the current display range are stored directly on the card.

**OFF:**

Direct card write function is disabled.

When STORE key is pressed in measurement mode, only the currently displayed data are stored in the internal memory.

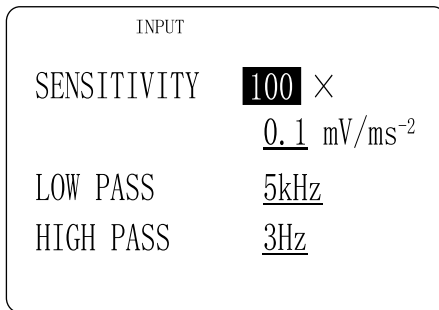
<b>Note</b>
For example, when the unit is in analyzer mode and the ZOOM ratio is set to 2x, the total amount of data will be 202 lines. With SAVE DISPLAY set to ON, data for all 202 lines are written directly to the card. With SAVE DISPLAY set to OFF, only the displayed 102 lines are stored in the internal memory.

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Error message Meaning

- "NO CARD": No card is inserted.
- "BAD CARD": Type of inserted card does not match the unit.
- "READ/WRITE ERROR":  
Read or write cannot be performed.
- "NO SPACE": There is not enough empty space on the card.

**INPUT menu screen**



INPUT menu screen

INPUT menu screen items

**SENSITIVITY:** Enter sensitivity of accelerometer in use  
 Numeral (accelerometer sensitivity) × multiplication factor

Numeral: 100 to 999 mV/ms<sup>-2</sup>

Factor: 0.1      0.01      0.001

Sensitivity of supplied accelerometer PV-55 is 510 × 0.01 mV/ms<sup>-2</sup>

**LOW PASS:** Select low-pass filter  
 1 kHz      5 kHz      20 kHz

**HIGH PASS:** Select high-pass filter  
 3 Hz      10 Hz      1 kHz

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Not available during recall.



## Setting the accelerometer sensitivity

(When using a different accelerometer)

The sensitivity of the supplied Vibration accelerometer PV-55 is 5.1 mV/m/s<sup>2</sup>. When using a different accelerometer, change the setting at the VA-11 so that it matches the sensitivity of the accelerometer. (The sensitivity is indicated in the calibration chart that comes with the accelerometer.)

1. Cause the accelerometer sensitivity item to flash (see previous page).
2. Use the numerical setting buttons [ △ ] [ ▽ ] to change the value. Pressing the [ △ ] key increases the value and pressing the [ ▽ ] key decreases it. Keeping a key depressed for 2 seconds or more causes the value to change rapidly. The display range is 0.10 to 99, with the resolution as indicated below.

Display resolution	0.10 to 1.0	"0.01" steps
	1.0 to 10	"0.1" steps
	10 to 99	"1" steps

圧電式加速度ピックアップ校正表 Calibration Certificate	
型式 Model	PV- 85
製造番号 Serial no.	XXXXX
電荷感度 (80Hz) Charge sensitivity	5.90 pC/ms <sup>-2</sup>
ピックアップ静電容量 Capacitance	705 pF
横感度比 (30Hz) Transverse sensitivity	1 %
測定温度 Temperature	21 °C
測定年月 Date	00.01
測定者 Measured by	蓮見
検査責任者 Inspected by	河野
<b>リオン株式会社</b> RION CO.,LTD.	

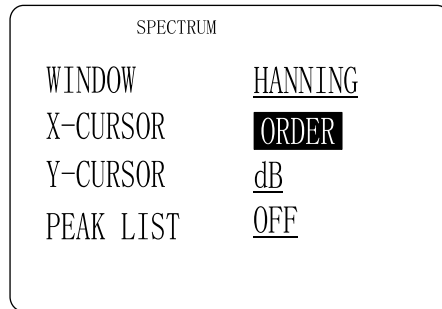
← Charge sensitivity

Example:

When using the preamplifier VP-26C, set the charge sensitivity. In the example shown here, the required setting is "5.9". This means that the preamplifier converts 1 pC of electrical charge into 1 mV.

$$5.9 \text{ pC} / \text{m} / \text{s}^2 \times \underbrace{1 \text{ mV} / \text{pC}}_{\text{VP-26C}} = \underbrace{5.9 \text{ mV} / \text{m} / \text{s}^2}_{\text{Value entered in VA-11}}$$

## SPECTRUM menu screen



SPECTRUM menu screen

### SPECTRUM menu screen items

WINDOW: Time window type (cannot be set while recalling)

RECTANGLE:

Rectangular window

HANNING: Hanning type window

FLATTOP: Flat-top type window

X-CURSOR: Cursor X axis unit: Hz, KCPM, ORDER

When ORDER is selected, the current cursor position becomes the fundamental frequency.

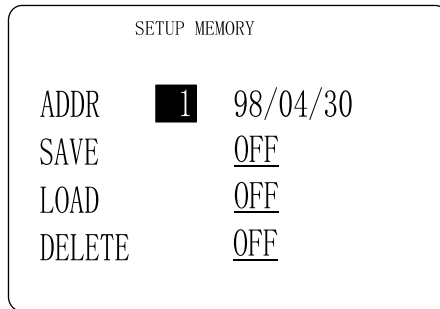
KCPM: Kilocycles per minute

Y-CURSOR: Cursor Y axis unit: dB, LINEAR

PEAK LIST: Display of ten highest levels ON/OFF

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

## SETUP MEMORY menu screen



SETUP MEMORY menu screen

### SETUP MEMORY menu screen items

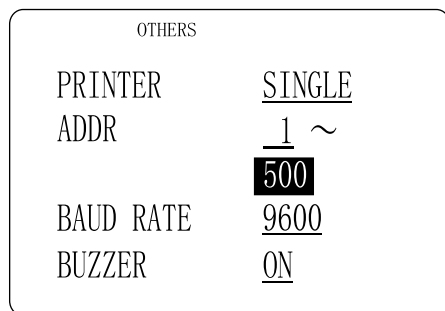
- ADDR:** Address and store date display  
 Address: 0 to 10  
 Store date: Eight asterisks are shown if no setting data are present.
- SAVE:** Save setting data in specified address.  
 Use  $\Delta$ ,  $\nabla$  keys to change "OFF" to "EXEC".  
 EXEC: Press MENU (ENTER) key to execute.
- LOAD:** Load setting data from specified address.  
 Use  $\Delta$ ,  $\nabla$  keys to change "OFF" to "EXEC".  
 EXEC: Press MENU (ENTER) key to execute.  
 Not available during recall.
- DELETE:** Delete setting data from specified address.  
 Use  $\Delta$ ,  $\nabla$  keys to change "OFF" to "EXEC".  
 EXEC: Press MENU (ENTER) key to execute.  
 Not available during recall.

1. Use  $\Delta$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

Address 0 contains the default setting data. LOAD is possible, but not SAVE or DELETE.

After loading default setting data, the measurement screen appears immediately.

## OTHERS menu screen



OTHERS menu screen

### OTHERS menu screen items

**PRINTER:** Printer output type

**SINGLE:** Only the displayed screen is printed.

**SUCCESSIVE:**

Data stored in the memory are printed successively.

(Possible only for manual store data)

To execute printing, return to the measurement screen and press the PRINT key. If the PRINT key is pressed while the menu screen is shown, the menu screen will be printed.

**ADDR:** Address range for continuous printing  
Start address (1 to 500) to end address (1 to 500)

**BAUD RATE:** Baud rate for connection to computer  
9600      19200      38400

**BUZZER:** Enable beep tones (ON) / disable beep tones (OFF)  
Key press confirmation:      1 beep  
Error:                              3 beeps

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

## CALENDAR menu screen

CALENDAR	
DISPLAY	<u>TIME</u>
HOUR	<b>12</b>
MINUTE	<u>34</u>
YEAR	<u>98</u>
MONTH	<u>4</u>
DAY	<u>30</u>

CALENDAR menu screen

### CALENDAR menu screen items

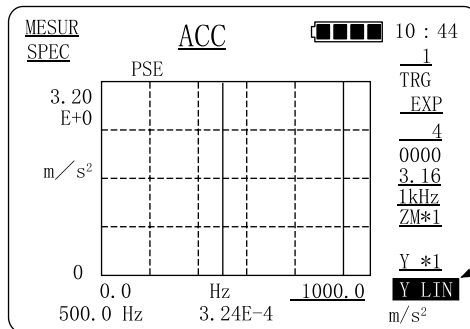
DISPLAY:	Select item to be shown at top right of measurement screen
DATE:	Show date
TIME:	Show time
OFF:	Show nothing
HOUR:	Set hours (0 to 23)
MINUTE:	Set minutes (0 to 59)
YEAR:	Set year (0 to 99)
MONTH:	Set month (1 to 12)
DAY:	Set day (1 to 31)

1. Use  $\triangle$ ,  $\nabla$  keys to select menu item.
2. Use  $\triangleleft$ ,  $\triangleright$  keys to change settings.

## Menu Operation on Measurement Screen

Measurement parameters can also be changed while the measurement screen is displayed. To do this, proceed as follows.

1. Press the SETUP (ESC) key to display the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor.  
Items that can be changed are shown with an underline.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the settings.
4. When the setting is terminated, press the SETUP (ESC) key again to turn the reverse cursor off.



Reverse cursor  
Move with  $\Delta$ ,  $\nabla$  keys  
Change setting with  $\triangleleft$ ,  $\triangleright$  keys

# Trigger Functions

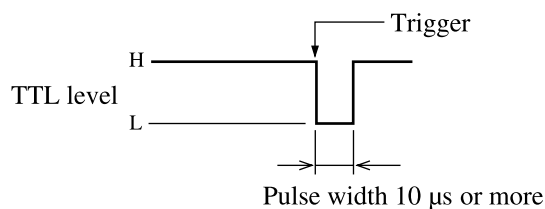
The trigger functions of the VA-11 are available only in analyzer mode. By pressing the START key on the pickup or the main unit, the trigger standby condition is activated. Time waveform sampling as well as FFT processing and averaging then will start automatically when the trigger condition is met. To enable the trigger function, the MODE item on the TRIGGER menu must be set to REPEAT or SINGLE.

Storing with the trigger is valid only for transient store.

## Trigger source

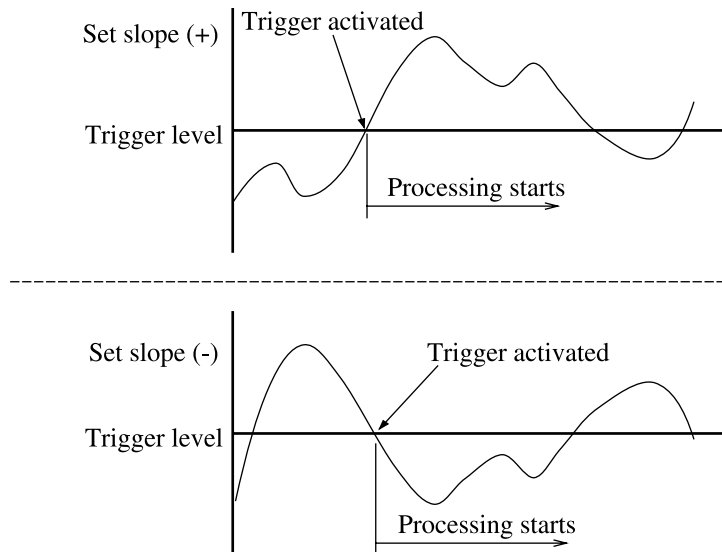
External signal: Set the SOURCE item on the TRIGGER menu to EXTERNAL.

Trigger is activated at the falling edge of a TTL signal input to the TRIG IN jack, or when the TRIG IN jack terminals are shorted.



Input level: Set the SOURCE item on the TRIGGER menu to LEVEL.

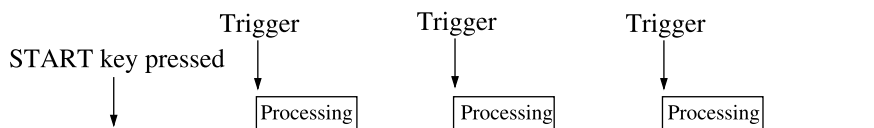
Trigger is activated when the time waveform crosses the set level. The level can be set in steps of 1/8 of the full-scale unilateral amplitude, and the slope can also be selected, to determine whether triggering occurs when the waveform crosses the level from above or below.



### Trigger operation

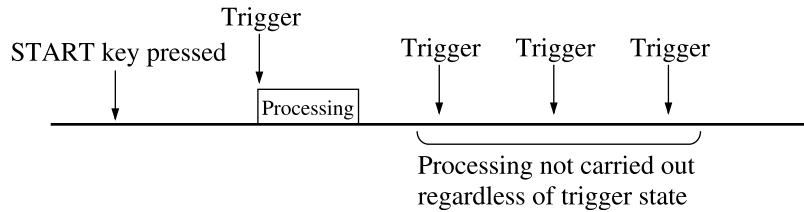
Free-run: Processing continues regardless of trigger state.

Repeat: Processing is carried out for each trigger occurrence.





Single: When trigger occurs, processing is carried out once. Subsequent trigger occurrences are ignored until START key is pressed again.

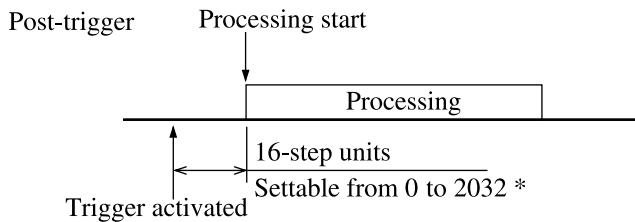
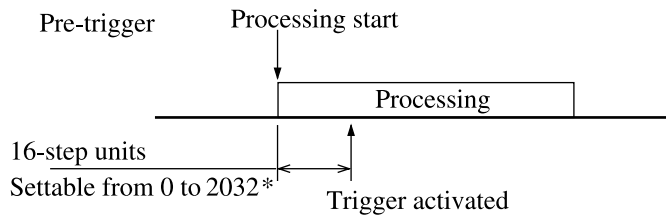


Pre-trigger and post-trigger functions

Pre-trigger: Processing starts from a specified number of data before trigger occurrence.

Post-trigger: Processing starts from a specified number of data after trigger occurrence.

Set with the TRIG POINT item on the TRIGGER menu. Setting can be made in 16-steps units, up to -16 from the sampling point.



- \* ZOOM ×1: 0 to 240
- ×2: 0 to 496
- ×4: 0 to 1008
- ×8: 0 to 2032

# Processing Principles

## Processing operation

Processing starts when the START key is pressed or when one of the measurement parameters listed below is changed.

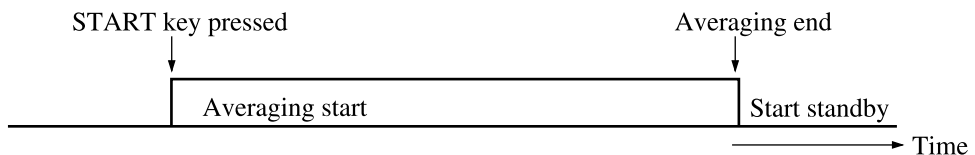
Measurement parameters that cause processing start:

- Measurement state
- Analysis mode
- Measurement data
- Averaging type
- Averaging count
- Input range
- Frequency span
- Frequency zoom
- UNIT menu item
- INPUT menu item (sensitivity, high-pass filter, low-pass filter)
- SPECTRUM menu item (window)

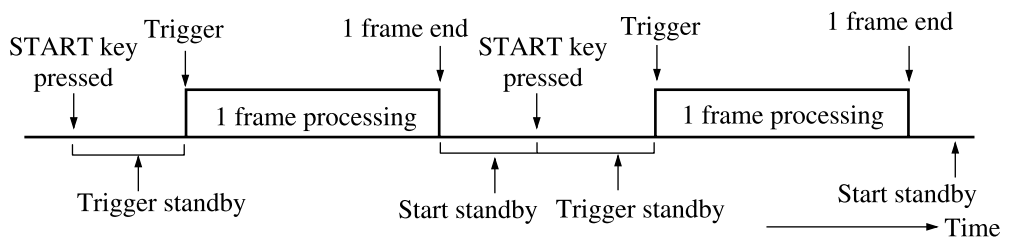
The processing operation depends on the combination of trigger settings and averaging type settings.

## Linear averaging, peak hold

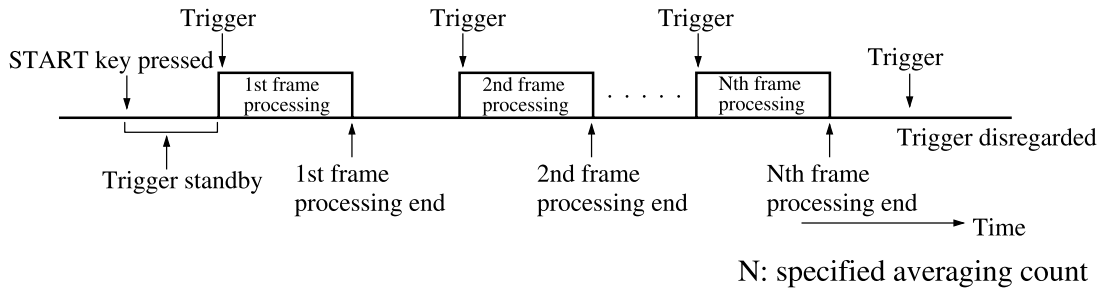
Free-run



Single

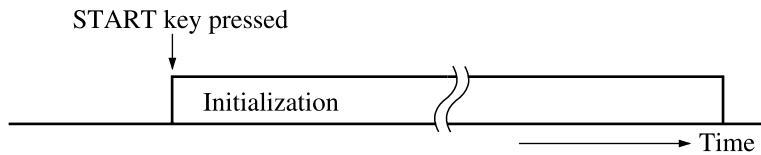


### Repeat

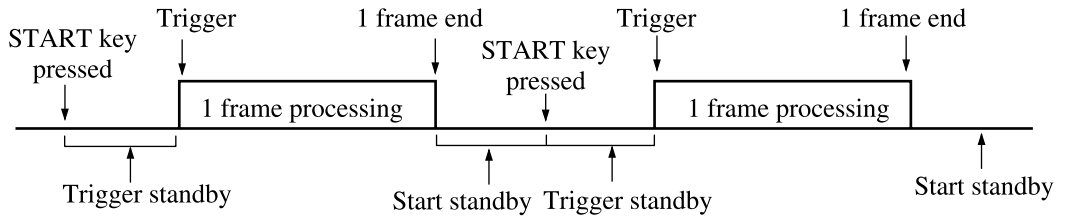


### Instantaneous value, exponential averaging

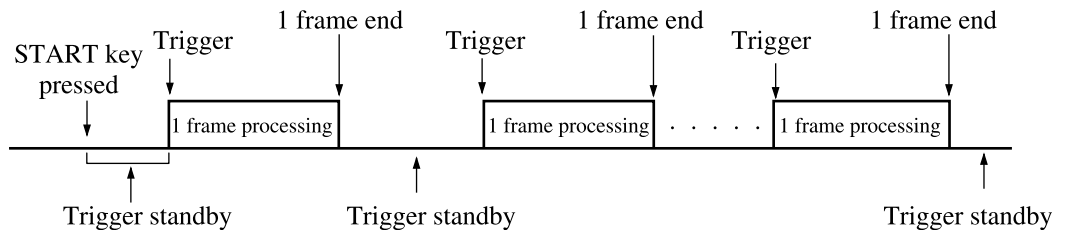
#### Free-run



#### Single



#### Repeat



## FFT processing cycle (1 frame processing time)

The FFT processing cycle depends on the zoom (ZM) setting, as listed below.

	100 Hz	200 Hz	500 Hz
Zoom × 1	250 msec	125 msec	50 msec
Zoom × 2	500 msec	250 msec	100 msec
Zoom × 4	1 sec	500 msec	200 msec
Zoom × 8	2 sec	1 sec	400 msec

The cycle for 1 kHz and above is the same as for 500 Hz.

The data of 2 kHz and below are available for real time analysis.

## Mass Memory

The VA-11 incorporates a memory for storing measurement results and measurement parameters for the vibration meter mode and analyzer mode.

The number of memory slots is 500, identified by a memory address.

<b>Important</b>
If you hold down the STORE key on the sheet switch panel while turning on the power, all data in the mass memory will be cleared.

## Data store

There are two types of functions for data storing: manual store and transient store. These are selected by setting the TYPE item in the MEMORY menu to MANUAL or TRANSIENT.

When the store type was changed, all previous data will be cleared at the point when the first store operation is carried out.

### Manual store

Pressing the STORE key causes the currently displayed measurement results and measurement parameters to be stored in the specified address. This applies also if the unit is currently in pause mode or if averaging is in progress. After storing, the address number is automatically incremented by 1. After address number 500 is reached, number 1 is selected again. If the specified address already contains data, these will be overwritten.

### Transient store

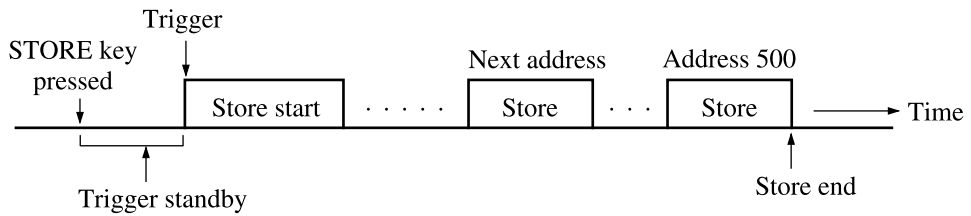
This store function is available only in analyzer mode. It stores the time waveform continuously at a cycle that is 2.56 times the frequency span.

$$\text{Store time: } (256 \times 500) / (\text{frequency span} \times 2.56)$$

When the STORE key is pressed, transient store starts. After data for 500 addresses (256 data per address) have been stored, the store process is terminated automatically. Storing always starts from address 1.

If the STORE key is pressed again while storing is in progress, store is terminated at that point.

If the trigger function is enabled, continuous store starts when the trigger is activated. Repeat is not performed.



- If the POWER switch is set to OFF during transient store, store continues until address 500, and the unit then turns itself off after 10 seconds.
- For 10 seconds after transient store has ended, recall cannot be carried out.

### Timer store

It is also possible to carry out storing under timer control, by specifying a start time, repeat interval, and store count. The level trigger or external trigger cannot be used.

Set the TIMER item on the MEMORY menu to ON.

If the STORE key is pressed again while storing is in progress, store is terminated at that point.

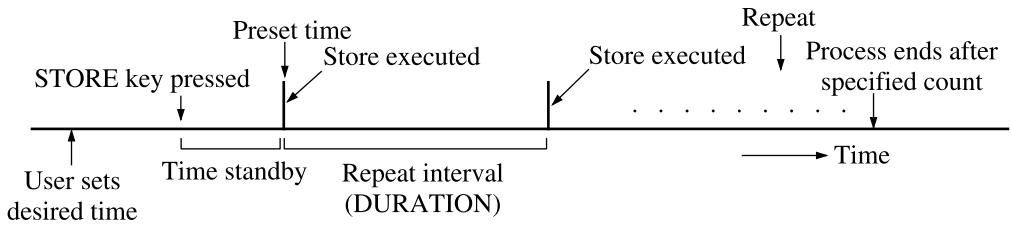
### Manual store

The store start address is the currently specified memory address.

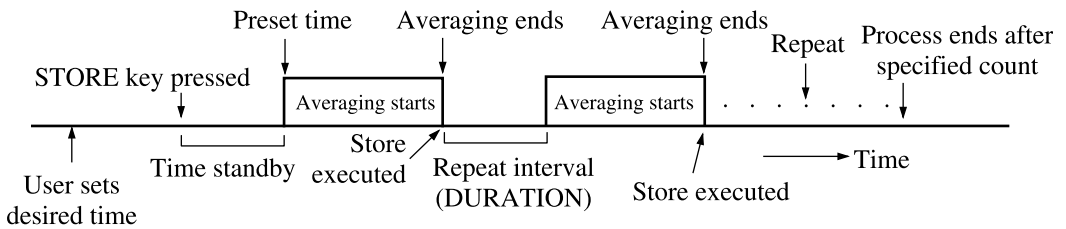
Example: Storing starts at address 490. When address 500 is reached, it continues from address 1.

When linear averaging and peak hold are selected, averaging begins at the start time and store is carried out when averaging ends.

### Instantaneous value, exponential averaging, vibration meter mode



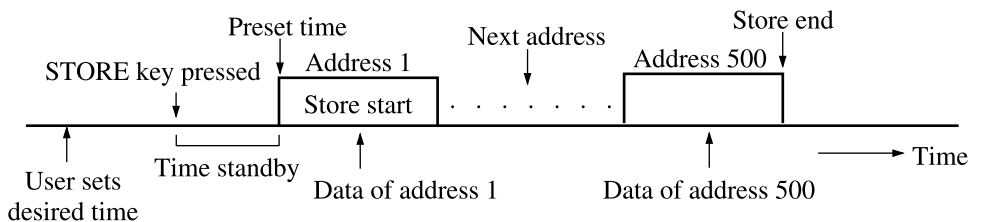
### Linear averaging, peak hold



If the averaging end time is later than the next averaging start time, store is not carried out.

### Transient store

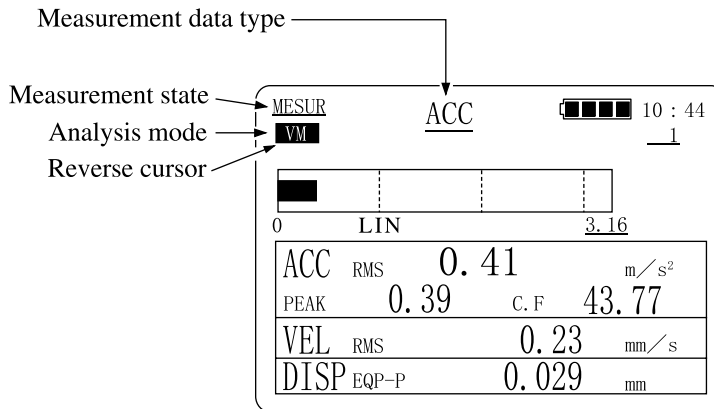
When the start time is reached, storing begins from address 1 and continues to address 500. The repeat interval (DURATION) setting is disregarded.



# Measurement

Before starting the measurement, be sure to set the date and time as described on pages 19 and 43.

## Use As a Vibration Meter



1. Press the SETUP (ESC) key to call up the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor to the "measurement state" field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "MESUR".
4. In the same way, set the analysis mode to "VM".
5. In the same way, select the measurement data type.  
ACC: Acceleration    VEL: Velocity    DISP: Displacement
6. Press the SETUP (ESC) key to turn the reverse cursor off.
7. Set the accelerometer sensitivity on the INPUT menu (page 38).
8. Set the desired unit on the UNIT menu (page 33).
9. Make any other required settings (such as filter etc.) with the menu screens (pages 32 to 43).
10. Press the SETUP (ESC) key to return to the measurement screen.

In vibration meter mode, the trigger function is not active. Operation is either timer-controlled or free-run.

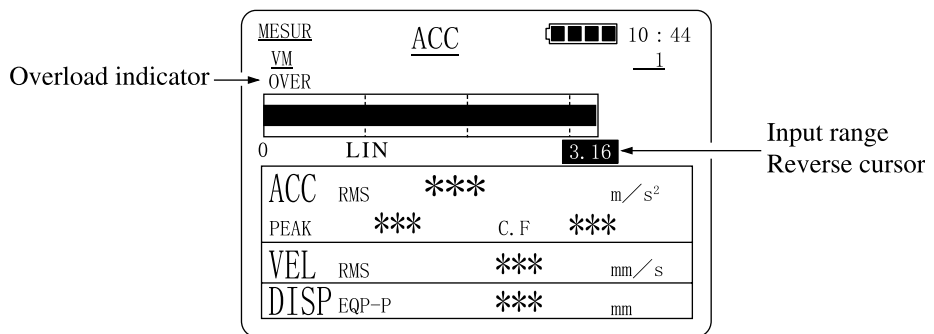


## Measurement

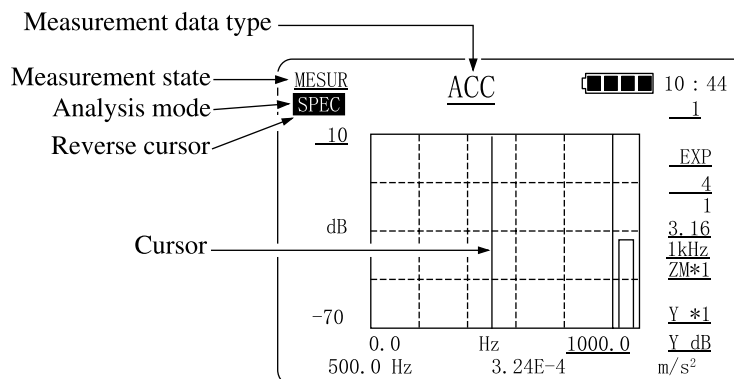
Carry out the measurement by pushing the tip of the accelerometer PV-55 at a right angle against the measurement object. Application pressure should be between 0.5 and 2 kgf.

If an excess signal is input, the overload indication appears, as shown below, and the numerical reading becomes \*\*\*.

Use the reverse cursor to select the input range field and choose a higher range.



## Use As a Spectrum Analyzer



1. Press the SETUP (ESC) key to call up the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor to the "measurement state" field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "MESUR".
4. In the same way, set the analysis mode to "SPEC".
5. In the same way, select the measurement data type.
  - ACC: Acceleration      VEL: Velocity
  - DISP: Displacement      ACCe: Envelope

When ACCe is selected, the 1 kHz high-pass filter and 50 kHz low-pass filter is activated, regardless of the selected filter setting.
6. Press the SETUP (ESC) key to turn the reverse cursor off.
7. Set the accelerometer sensitivity on the INPUT menu (page 38).
8. Set the desired unit on the UNIT menu (page 33).
9. Make any other required settings (such as filter etc.) with the menu screens (pages 32 to 43).
10. Press the SETUP (ESC) key to return to the measurement screen.

## Measurement

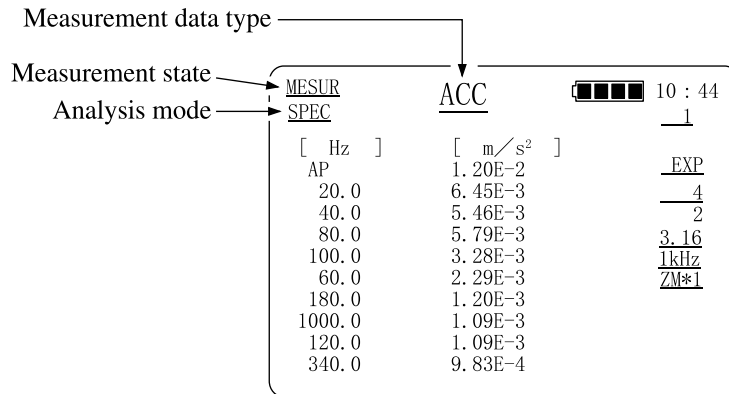
Carry out the measurement by pushing the tip of the accelerometer PV-55 at a right angle against the measurement object. Application pressure should be between 0.5 and 2 kgf.

Use the START key and STORE key to control the measurement.

## Spectrum List Display

The spectrum list display shows the ten highest level data out of the graph display range.

To use this function, set the PEAK LIST item in the SPECTRUM menu to ON.



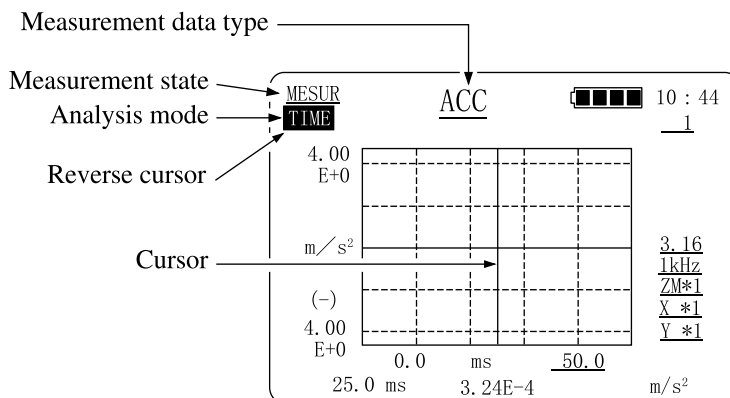
1. Press the SETUP (ESC) key to call up the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor to the "measurement state" field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "MESUR".
4. In the same way, set the analysis mode to "SPEC".
5. In the same way, select the measurement data type.  
 ACC: Acceleration      VEL: Velocity  
 DISP: Displacement      ACCe: Envelope
6. Press the SETUP (ESC) key to turn the reverse cursor off.
7. Set the accelerometer sensitivity on the INPUT menu (page 38).
8. Set the desired unit on the UNIT menu (page 33).
9. Set the PEAK LIST item in the SPECTRUM menu to ON.
10. Make any other required settings (such as filter etc.) with the menu screens (pages 32 to 43).
11. Press the SETUP (ESC) key to return to the measurement screen.

## Measurement

Carry out the measurement by pushing the tip of the accelerometer PV-55 at a right angle against the measurement object. Application pressure should be between 0.5 and 2 kgf.

Use the START key and STORE key to control the measurement.

## Time Waveform Display



1. Press the SETUP (ESC) key to call up the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor to the "measurement state" field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "MESUR".
4. In the same way, set the analysis mode to "TIME".
5. In the same way, select the measurement data type.  
 ACC: Acceleration      VEL: Velocity  
 DISP: Displacement      ACCe: Envelope
6. Press the SETUP (ESC) key to turn the reverse cursor off.
7. Set the accelerometer sensitivity on the INPUT menu (page 38).
8. Set the desired unit on the UNIT menu (page 33).
9. Make any other required settings (such as filter etc.) with the menu screens (pages 32 to 43).
10. Press the SETUP (ESC) key to return to the measurement screen.

## Measurement

Carry out the measurement by pushing the tip of the accelerometer PV-55 at a right angle against the measurement object. Application pressure should be between 0.5 and 2 kgf.

Use the START key and STORE key to control the measurement.

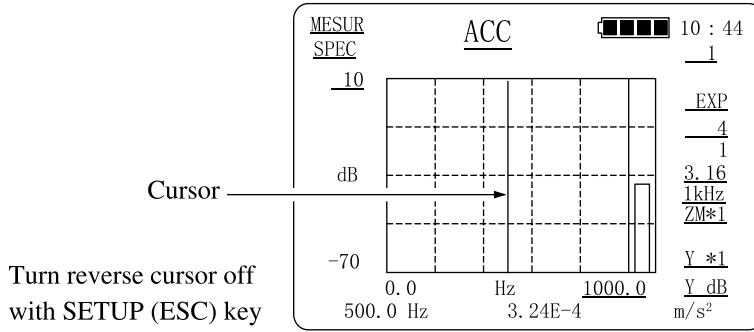
In time waveform display, only the first 128 data out of the sampled data are shown. If required, these are compressed for display. When the zoom factor is 1, 256 data are sampled but only 128 data are displayed. When the zoom factor is 2, 512 data are sampled, and the first 256 data are compressed and displayed as 128 data. By setting the X axis zoom factor to 2, the compressed part can be enlarged for display.

### Overflow indication

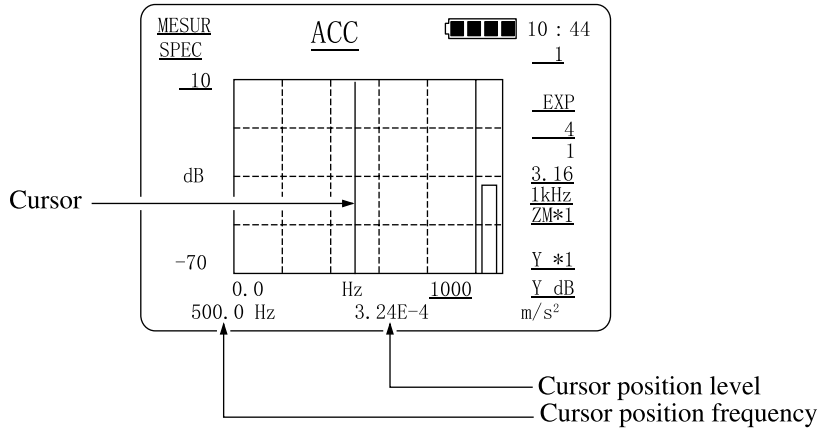
Because only the first half of the sampled data is displayed, it is possible that the overload indicator appears although the waveform shown on the display does not exhibit overload. This means that overload has occurred in the second half of the sampled data.

## Cursor Control

To move the cursor on the spectrum display and time waveform display during measurement, and on the recall display, use the SETUP (ESC) key to turn the reverse cursor off and then use the  $\triangleleft$ ,  $\triangleright$  keys to move the cursor.



The frequency and level at the cursor are displayed as follows.



Spectrum display example

Cursor position level

3.24E-4 stands for  $3.24 \times 10^{-4}$

Cursor position frequency

Numerals are in Hz. DC indicates direct current, and AP all-pass (overall) value.

# Recall Mode

When recall mode is selected, stored measurement results are displayed, along with the measurement parameters that were active at the time when the data were stored.

Recall is carried out for each address individually.

## Activating the recall screen

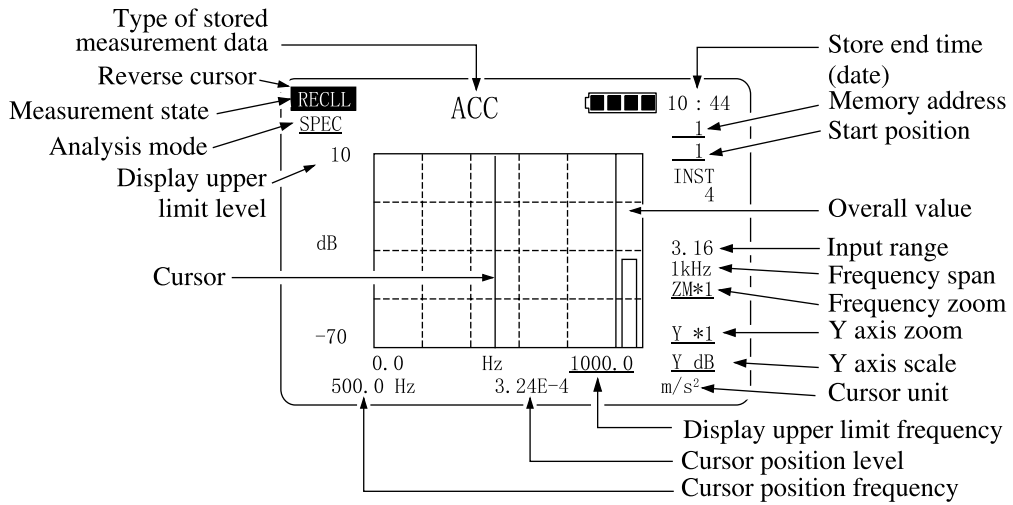
1. Press the SETUP (ESC) key to call up the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the reverse cursor to the "measurement state" field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "RECLL" (RECALL).

Note
When switching from the measurement screen to the recall screen, key presses are not registered for about 10 seconds after transient store is completed.

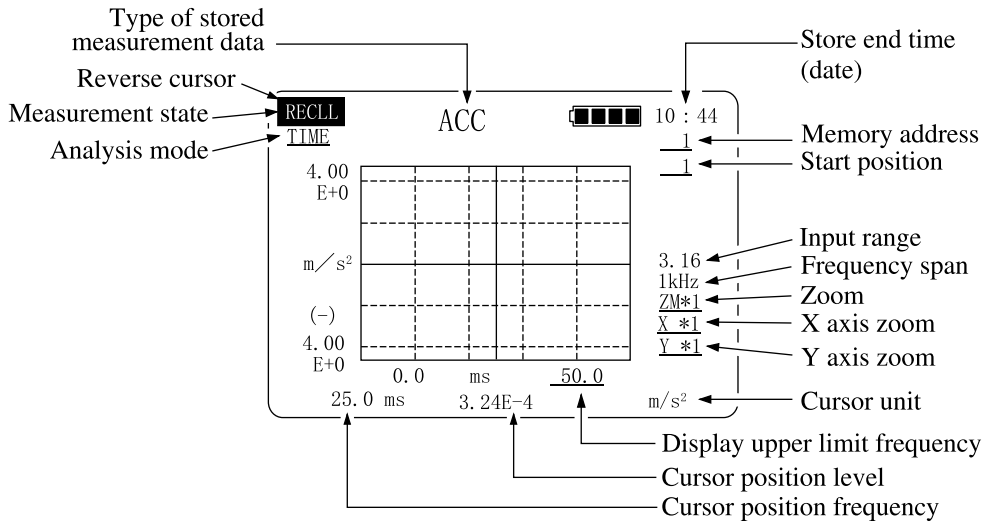
## Changing the memory address

1. Press the SETUP (ESC) key to activate the reverse cursor.
2. Use the  $\Delta$ ,  $\nabla$  keys to move the cursor to the memory address field.
3. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the address.

## Recalling Transient Store Data



Spectrum display recall example

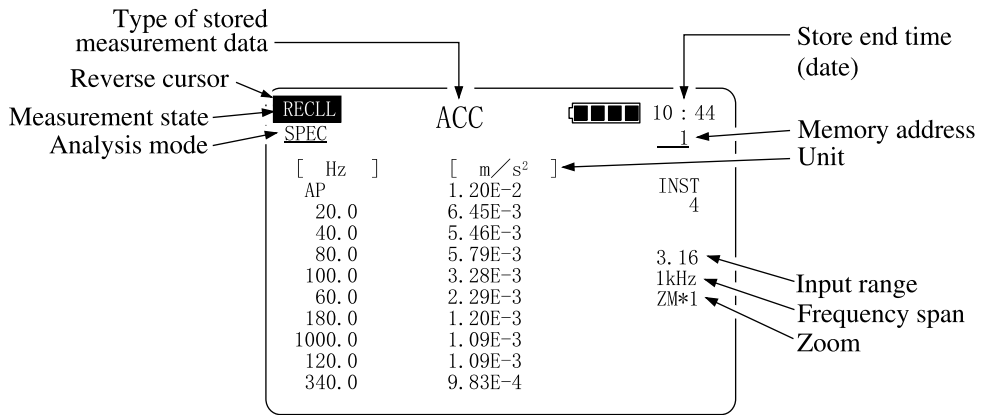


Time display recall example

## Cursor control

1. Press the SETUP (ESC) key to turn off the reverse cursor.
2. Use the ◀, ▶ keys to move the cursor.



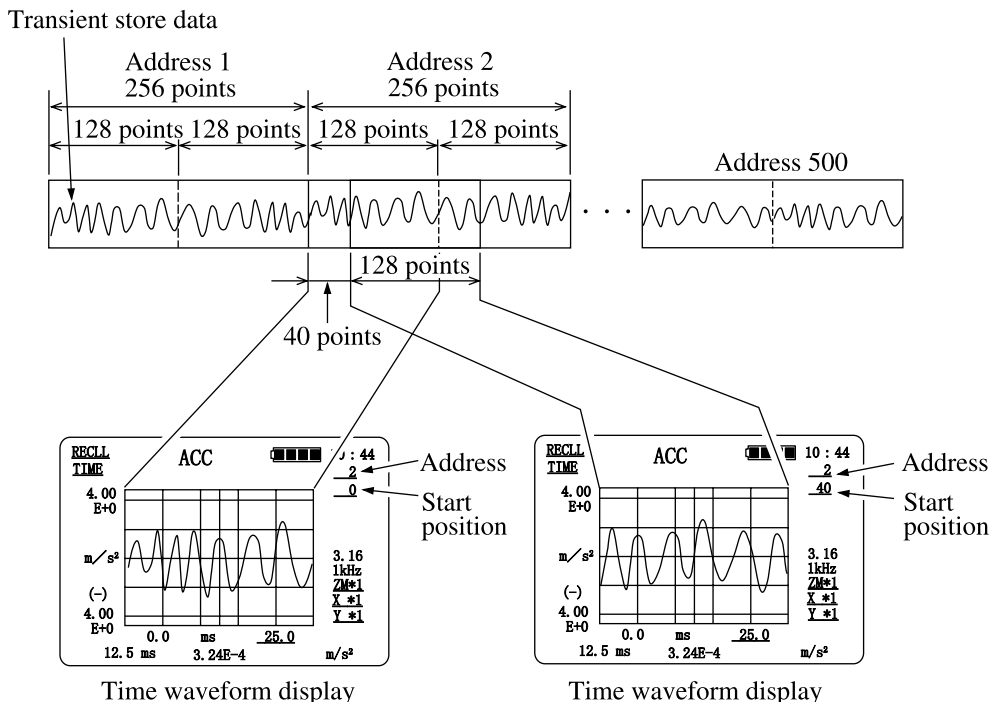


Spectrum list display recall example

## Time waveform re-analysis function

Time waveform data stored with the transient store function can be re-analyzed. To use this function, store data in analyzer mode using transient store. When recalling these data, the data in a specified address range can be analyzed again. The address range is specified in units of 1 address (256 data). Re-analyzing can start from any specified data position in the specified address. In vibration meter mode, re-analysis is not available.

1. Carry out transient store.  
(Use a suitable frequency span and input range.)
2. Activate recall mode. The re-analysis function is automatically activated at this time. The screen shows the time waveform display if the stored data are time waveform data, and the spectrum display if the stored data are spectrum data.
3. Select the part you want to analyze.  
Set the display to time waveform.  
When the address number is changed, the display position changes in 256-point intervals.  
When the start position is changed, the display position changes in 1-point intervals.  
When the analysis mode is set to spectrum, re-analysis is carried out automatically.



Zoom factor 1: data of 1 address  
 Zoom factor 2: data of 2 addresses  
 Zoom factor 4: data of 4 addresses  
 Zoom factor 8: data of 8 addresses

} are used for analysis

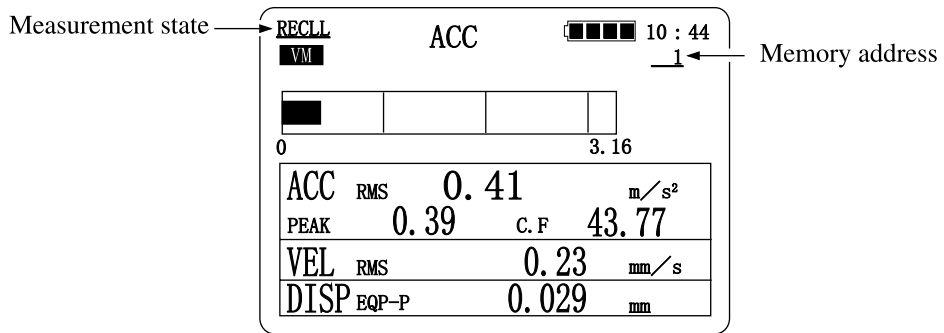
Time waveform display

- Zoom factor 1: maximum number of recall addresses is 500
- Zoom factor 2: maximum number of recall addresses is 500
- Zoom factor 4: maximum number of recall addresses is 499
- Zoom factor 8: maximum number of recall addresses is 497

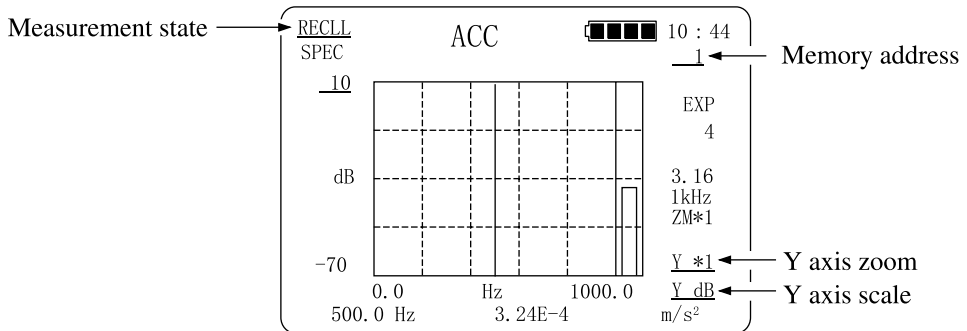
Spectrum display

- Zoom factor 1: maximum number of recall addresses is 500
- Zoom factor 2: maximum number of recall addresses is 499
- Zoom factor 4: maximum number of recall addresses is 497
- Zoom factor 8: maximum number of recall addresses is 493

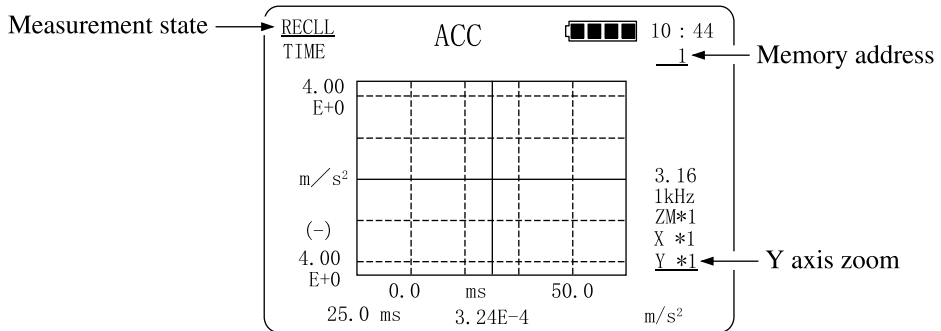
## Recalling Manual Store Data



Vibration meter display recall example



Spectrum display recall example



Time waveform display recall example

The settings that can be changed are different from transient store.

## Manual store data when using frequency zoom

The number of data per address is fixed. For spectrum display, it is 102 and for time waveform display 128 data.

When a frequency zoom ratio of 2 or higher is used, the number of data increases accordingly, but not all data can be stored. The principle shown below is applied.

Spectrum: 102 data (as shown on display)  
 Time waveform: leftmost 128 data of data shown on display  
 Regardless of X axis zoom setting during store, X axis zoom is set to maximum during recall.

Example:	Measurement screen	Recall screen
	Frequency zoom ( $ZM \times 4$ )	$ZM \times 4$
	X axis zoom ( $ZM \times 2$ )	$X \times 4$

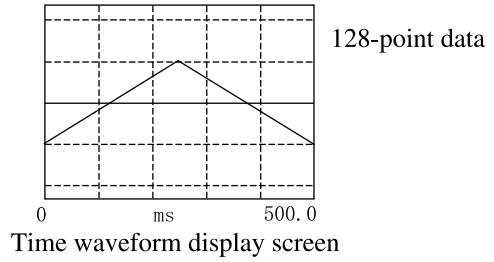
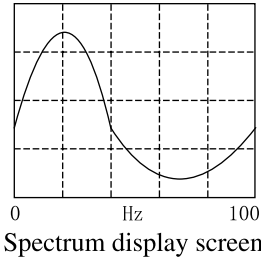
## Cursor control

1. Press the SETUP (ESC) key to turn off the reverse cursor.
2. Use the  $\triangleleft$ ,  $\triangleright$  keys to move the cursor.

## Frequency Zoom Display Examples

### Zoom $\times 1$ display screens

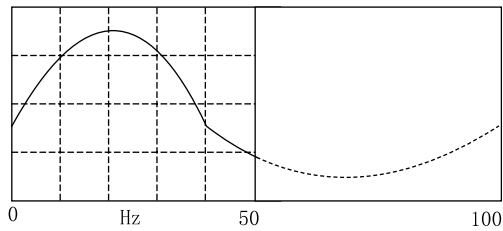
The screens of Measurement and recall are the same.



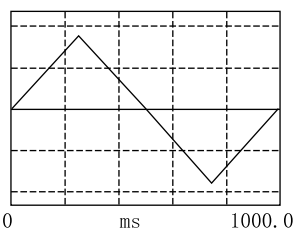
#### Note

When recalling data from transient store, each address holds 256 data, but only the first 128 data are shown, as in the above time waveform display example. To view the remaining half of the data, use the re-analysis function or use frequency zoom and X axis zoom.

## Zoom $\times 2$ display screens

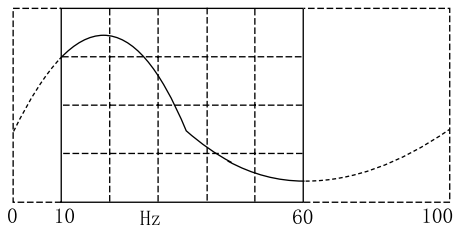


Spectrum display screen



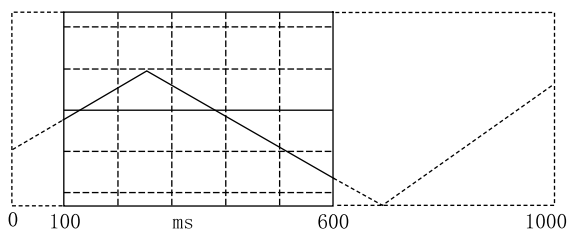
Time waveform display screen

(X axis zoom  $\times 1$ )  
256-point data are compressed and shown as 128-point data



Spectrum display screen

By changing the display upper limit frequency, the display can be shifted.



Time waveform display screen

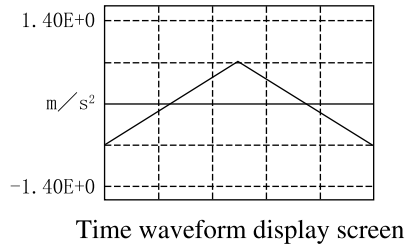
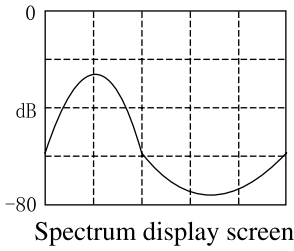
(X axis zoom  $\times 2$ )  
No compression  
Display screen can be shifted.

Using a zoom ratio of  $\times 4$  or  $\times 8$  results in more detailed display.

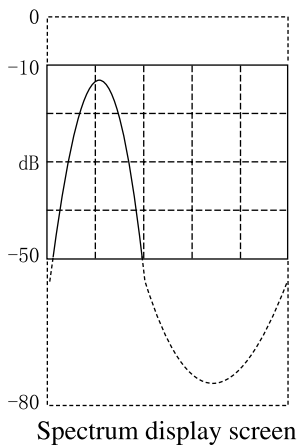
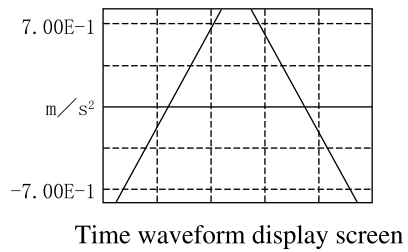
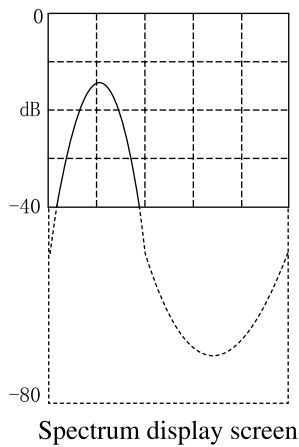
# Y Axis Zoom Display Examples

The screens of Measurement and recall are the same.

## Zoom ×1 display screens



## Zoom ×2 display screens



By changing the display upper limit frequency, the display can be shifted.

Using a Y axis zoom ratio of ×4 to ×1024 results in more detailed display.



# Printing

To use a printer, proceed as follows.

1. Select SINGLE (print current screen only) or SUCCESSIVE (continuous print) from the OTHERS menu (page 42).
2. Return to the measurement screen and press the SETUP (ESC) key to display the reverse cursor.

To perform continuous printing

3. Use the  $\Delta$ ,  $\nabla$  keys to move the cursor to the measurement state field.
4. Use the  $\triangleleft$ ,  $\triangleright$  keys to select "RECLL".
5. Press the PRINT key to activate printout.

Continuous printing is possible only with data collected with manual store.

When the reverse cursor is shown on the display, it will also be visible in the printout. When wishing to prevent this, turn the reverse cursor off by pressing the SETUP (ESC) key before starting the printout.

The single print function is useful to print only the current measurement screen, a menu screen, or list display.

OTHERS	
PRINTER	<u>SINGLE</u>
ADDR	<u>1</u> ~
	<b>500</b>
BAUD RATE	<u>9600</u>
BUZZER	<u>ON</u>

OTHERS menu screen

# Compact Flash Card

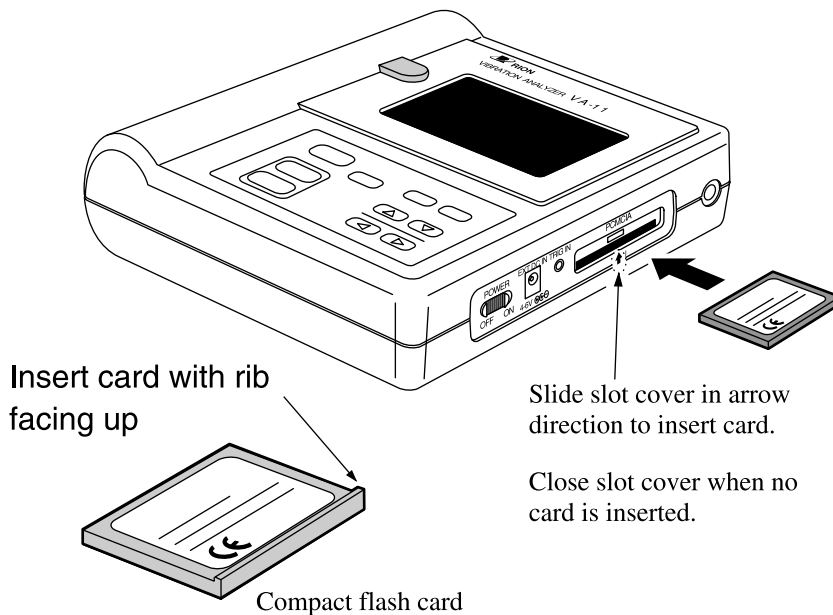
## Inserting a Card

The data in the mass memory or the data from the current measurement can be written to a compact flash card (option), for later transfer to a computer. If the SAVE DISPLAY item on the PCMCIA card menu is set to ON, the data of the current measurement will be written directly as a file to the compact flash card (direct card write function). If the item is set to OFF, all data in the mass memory will be written as a single file.

### Note

Turn power to the VA-11 off before inserting a compact flash card.

Insert the compact flash card firmly all the way into the slot.



<b>Important</b>
<ul style="list-style-type: none"> <li>● If a card is removed while the VA-11 is turned on, data on the card may be lost.</li> <li>● To prevent the possibility of damage, do not use any cards other than the type specified.</li> <li>● Observe the precautions printed on the rear of the card.</li> </ul>



## Writing mass memory data

The entire contents of the mass memory are written to the card as one MS-DOS format ASCII file. The size of the file depends on the type and amount of data contained in the memory of the VA-11. The following figures are given as an approximate reference.

Transient data, 500 addresses:	approx. 1.56 megabytes
Spectrum data, 500 addresses:	approx. 0.5 megabytes
Time display data:	approx. 1710 bytes per address
Spectrum dB data:	approx. 1016 bytes per address
Spectrum linear data:	approx. 1242 bytes per address

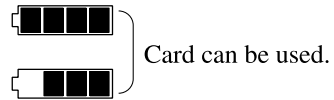
1. Insert a compact flash card in the slot, as described on the previous page.
2. Call up the PCMCIA CARD menu.
3. Use the  $\Delta$ ,  $\nabla$  keys to select BLOCK.
4. Use the  $\triangleleft$ ,  $\triangleright$  keys to specify the block number.  
If the specified block contains data, the store date is displayed. If the specified block contains no data, only "\*\*\*\*\*" is displayed.
5. Use the  $\Delta$ ,  $\nabla$  keys to select SAVE.
6. Use the  $\triangleleft$ ,  $\triangleright$  keys to select EXEC.
7. Press the MENU (ENTER) key.

The data in the memory are written to the card.

<b>Note</b>
Data can only be written on cards that were formatted with the FORMAT command of the VA-11. If another card is inserted, the error message BAD CARD appears.

**Note**

When using a compact flash card, pay close attention to the battery indicator. If the remaining battery capacity is insufficient, the write process may not be completed correctly.



When using compact flash cards, it is recommended to power the VA-11 from the optional AC adapter NC-94A.

## Displaying the mass memory data directory of a card

You can view a display showing the block numbers and store date of data contained on a compact flash card.

1. Insert a compact flash card in the slot, as described above.
2. Call up the PCMCIA CARD menu.
3. Use the  $\triangle$ ,  $\nabla$  keys to select DIR "OFF".
4. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the setting to "EXEC".
5. Press the MENU (ENTER) key.

PCMCIA CARD	
DIR	<b>OFF</b>
BLOCK	<u>19</u> 98/04/30
SAVE	<u>OFF</u>
DELETE	<u>OFF</u>
FORMAT	<u>OFF</u>
SAVE DISPLAY	<u>OFF</u>

PCMCIA CARD menu screen

PCMCIA CARD DIRECTORY			
BLK	DATE	BLK	DATE
1	98/01/06	2	98/01/07
3	98/01/09	4	98/02/02
5	98/02/05	6	98/02/06
7	98/02/07	8	98/02/08
9	98/03/03	10	98/03/15

Directory display example

A directory of the data on the card is shown. One screen shows up to 10 blocks with the respective store date. When there are more blocks, the  $\triangle$ ,  $\nabla$  keys can be used to scroll the display.

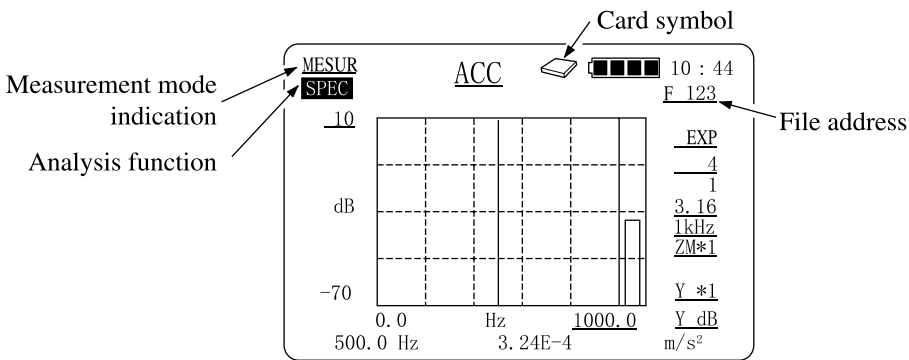
Use the SETUP (ESC) key to return to the PCMCIA CARD menu screen.

## Direct Card Write Function

When the SAVE DISPLAY item on the PCMCIA card menu is set to ON, pressing the STORE key in the measurement mode causes all data including data outside of the current display range to be stored directly on the card (direct card write function).

For example, when the unit is in analyzer mode and the ZOOM ratio is set to 2×, the total amount of data will be 202 lines, but only 102 lines are displayed. With regular mass memory store, only the data for the displayed 102 lines will be written to the card. With the direct card write function, the data for all 202 lines are written to the card. In this case, an "F" is shown in front of the address indication.

Address indication example: F 123

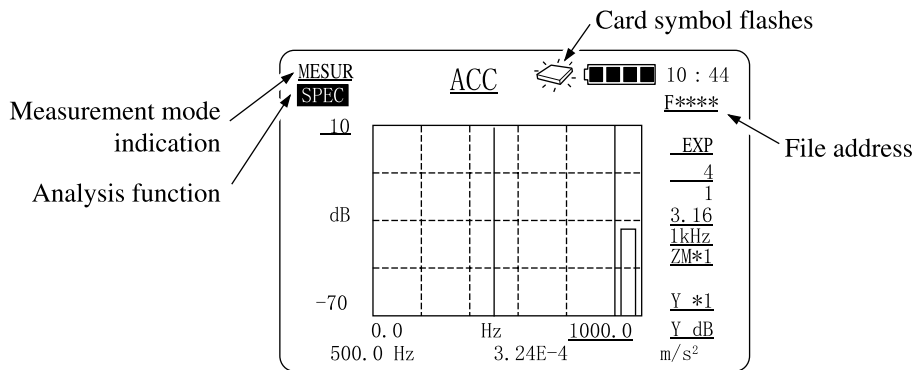


**Note**

When the direct card write function is ON, a data writing operation corresponding to transient store is not possible.

When the direct card write function is ON, the mass memory recall operation is not possible.

When a card related error has occurred, the card symbol on the display flashes. If no card is inserted, the card symbol flashes and the address indication shows "F\*\*\*\*".



## Deleting a File From the Card

The VA-11 has no function for deleting files directly written to the compact flash card. To erase a file that is no longer needed, insert the card into the card slot of a computer and proceed as follows.

1. Insert the card into the card slot of the computer.
2. Right-click the Start button on the Windows taskbar. On the menu that appears, left-click on "Explorer".
3. In Explorer, left-click on the drive assigned to the card to show a list of files on the card.
4. Left-click on the name of the file you want to delete and press the [Delete] key on the keyboard.

## Deleting data from a card (mass memory data)

Data can be deleted from a compact flash card in block units.

1. Insert a compact flash card in the slot, as described above.
2. Call up the PCMCIA CARD menu.
3. Use the  $\triangle$ ,  $\nabla$  keys to select "BLOCK".
4. Use the  $\triangleleft$ ,  $\triangleright$  keys to select the number of the block you want to delete.
5. Use the  $\triangle$ ,  $\nabla$  keys to select "DELETE".
6. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the setting to "EXEC".
7. Press the MENU (ENTER) key.

All data in the specified block are deleted.

## Formatting a card

1. Insert a compact flash card in the slot, as described above.
2. Call up the PCMCIA CARD menu.
3. Use the  $\triangle$ ,  $\nabla$  keys to select "FORMAT".
4. Use the  $\triangleleft$ ,  $\triangleright$  keys to change the setting to "EXEC".
5. Press the MENU (ENTER) key.

The card is formatted to create the directory structure and key file.

<b>Note</b>
Before using a card for the first time, it must be formatted.

## Error indication

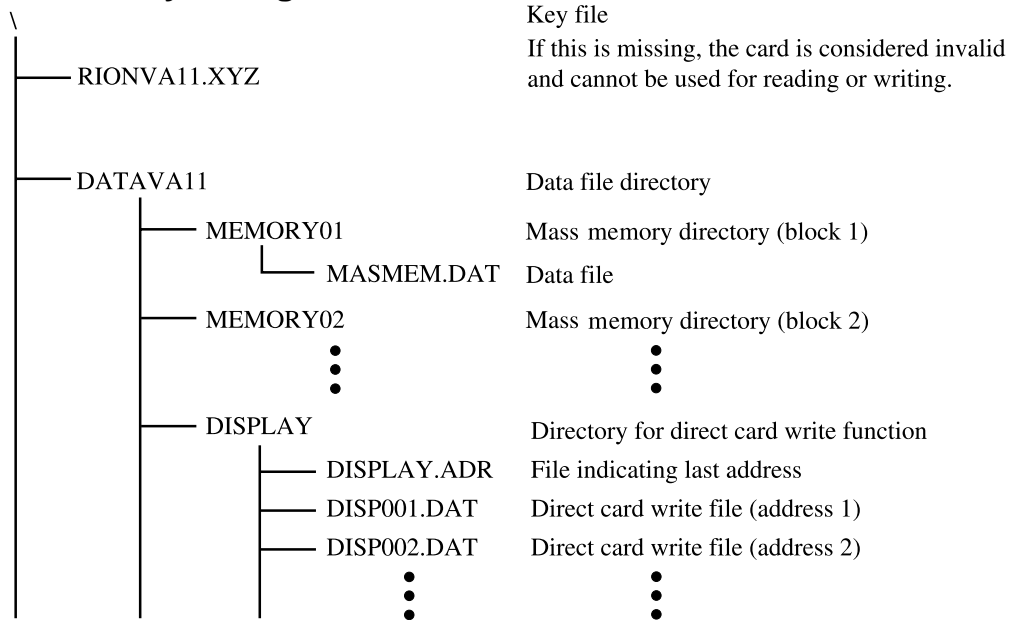
If there is a problem with the card, one of the following error messages appears.

Error message	Meaning
NO CARD	No card is inserted.
BAD CARD	Type of inserted card does not match the unit.
READ/WRITE ERROR	Read or write cannot be performed.
NO SPACE	There is not enough empty space on the card.



## Card Contents

### Directory configuration



(Directory names and file names are fixed.)

### Data file contents (1) (Data file for mass memory)

[Position]	[Sample data]	[Description]	[Bytes]
0000	"001"	Address (001 to 500)	3
0003	", "	Comma	1
0004	"VA-11"	Keyword	5
0009	", "	Comma	1
0010	"Ver1.00"	Version number	8
0018	", "	Comma	1
0019	"01"	File type *	2
0021	", "	Comma	1
0022	"YYYY:MM:DD"	Measurement date	10
0032	", "	Comma	1
0033	"HH:MM"	Time	5
0038	", "	Comma	1
0039	Measurement parameters	Measurement parameters **	255
0294	", "	Comma	1
0295	"*****"	Number of measurement data bytes	5
0300	", "	Comma	1

[Position]	[Sample data]	[Description]	[Bytes]
0301	Analysis result	Measurement data ***	L
0301+L	<CR><LF>		2
0303+L			

Subsequently, 0000 to 0303 + L are repeated for each address.

### Data file contents (2) (Data file for direct writing)

[Position]	[Sample data]	[Description]	[Bytes]
0000	" "	Space	3
0003	", "	Comma	1
0004	"VA-11"	Keyword	5
0009	", "	Comma	1
0010	"Ver1.00"	Version number	8
0018	", "	Comma	1
0019	"05"	File type *	2
0021	", "	Comma	1
0022	"YYYY:MM:DD"	Measurement date	10
0032	", "	Comma	1
0033	"HH:MM"	Time	5
0038	", "	Comma	1
0039	Measurement parameters	Measurement parameters **	255
0294	", "	Comma	1
0295	"*****"	Number of measurement data bytes	5
0300	", "	Comma	1
0301	Analysis result	Measurement data ***	L
0301+L	<CR><LF>		2

\* See 2.1

\*\* See 2.2

\*\*\* See 2.3

## 2.1 File type

- 00: Not used
- 01: Standard memory (manual store)
- 02: Standard memory (timer measurement)
- 03: Transient store
- 05: Direct card write file

## 2.2 Measurement parameters

[Common settings for vibration meter and analyzer]

Measurement data type

- Measurement data type 0: Acceleration, 1: Velocity, 2: Displacement, 3: Envelope
- Acceleration unit 0: m/s<sup>2</sup>, 1: G
- Velocity unit 0: mm/s, 1: inch/s
- Displacement unit 0: mm, 1: mils
- Analysis mode 0: Vibration meter, 1: Spectrum, 2: Time waveform
- Input range 0: minimum to, 5: maximum
- Pickup sensitivity mV/ms<sup>-2</sup> (numeral, multiplication factor)
- Numeral \*\*\*: 100 to 999
- Multiplication factor 100: 0.1, 010: 0.01, 001: 0.001
- High-pass filter 0: 3 Hz, 1: 10 Hz, 2: 1 kHz
- Low-pass filter 0: 1 kHz, 1: 5 kHz, 2: 20 kHz
- Timer store 0: OFF, 1: ON
- Time HH:MM in 24-hour notation
- Store interval MM in minutes (2 digits)
- Store count \*\*\*: 001 to 500

## [Analyzer settings]

Zoom ratio	0: 1, 1: 2, 2: 4, 3:8
Time window	0: Rectangular, 1: Hanning, 2: Flat-top
Frequency span	0 to 7: 100 Hz to 20 kHz
Trigger operation	0: Free-run, 1: Repeat, 2: Single
Trigger source	0: Level trigger, 1: External trigger
Trigger position	±****: ± four-digit numeral
Level trigger position	-7 to +7: -7/8 to +7/8
Level trigger slope	0: -, 1: +
Averaging type	0: Instantaneous value, 1: Linear averaging 2: Exponential averaging, 3: Maximum value
Averaging count	****: 0001 to 1023

## Spectrum display conditions

X axis shift count	**:	00 to 35
	00:	when zoom ratio is 1
	00 to 05:	when zoom ratio is 2
	00 to 15:	when zoom ratio is 4
	00 to 35:	when zoom ratio is 8
Y axis scale	0: dB, 1: Linear	
Y axis zoom (dB)	0: 1, 1: 2, 2: 4	
Y axis level shift (dB)	**:	00 to 80
Y axis zoom (Linear)	**:	00 to 10
Cursor X axis position	0: Hz, 1: KCPM, 2: ORDER	
Cursor Y axis position	0: dB, 1: Linear	
Top ten peak list display	0: OFF, 1: ON	
Cursor position, from left	***:	000 to 101

## Time waveform display conditions

X axis zoom	0: $\times 1$ , 1: $\times 2$ , 2: $\times 4$ , 3: $\times 8$
X axis shift count	** : 00 to 35
	00: when X axis zoom ratio is 1
	00 to 05: when X axis zoom ratio is 2
	00 to 15: when X axis zoom ratio is 4
	00 to 35: when X axis zoom ratio is 8
Y axis zoom	** : 00 to 10
Cursor position, from left	*** : 000 to 127
Overload information	0: No overload, 1: Overload
Vibration meter bar graph scale	0: Log, 1: Linear

[Position]	[Sample data]	[Description]	[Bytes]
Common settings for vibration meter and analyzer			
0000	"0"	Measurement data type	1
0001	", "	Comma	1
0002	"0"	Acceleration unit	1
0003	", "	Comma	1
0004	"1"	Velocity unit	1
0005	", "	Comma	1
0006	"1"	Displacement unit	1
0007	", "	Comma	1
0008	"1"	Analysis mode	1
0009	", "	Comma	1
0010	"3"	Input range	1
0011	", "	Comma	1
0012	"510. 010"	Accelerometer sensitivity	7
0019	", "	Comma	1
0020	"0"	High-pass filter	1
0021	", "	Comma	1
0022	"2"	Low-pass filter	1
0023	", "	Comma	1
0024	"1"	Timer store	1
0025	", "	Comma	1
0026	"13:52"	Timer store time	5
0031	", "	Comma	1
0032	"15"	Timer store interval	2
0034	", "	Comma	1
0035	"135"	Timer store count	3
0038	", "	Comma	1
0039	" "	Extra space	12
0051	", "	Comma	1
Analyzer settings			
0052	"0"	Zoom ratio	1
0053	", "	Comma	1
0054	"1"	Time window	1

---

0055	", "	Comma	1
0056	"7"	Frequency span	1
0057	", "	Comma	1
0058	"0"	Trigger operation	1
0059	", "	Comma	1
0060	"0"	Trigger source	1
0061	", "	Comma	1
0062	"-0012"	Trigger position	5
0067	", "	Comma	1
0068	"-5"	Level trigger position	2
0070	", "	Comma	1
0071	"1"	Level trigger slope	1
0072	", "	Comma	1
0073	"1"	Averaging type	1
0074	", "	Comma	1
0075	"0102"	Averaging count	4
0079	", "	Comma	1
0080	"24"	Spectrum X axis shift count	2
0082	", "	Comma	1
0083	"1"	Spectrum Y axis scale	1
0084	", "	Comma	1
0085	"2"	Spectrum Y axis zoom (dB)	1
0086	", "	Comma	1
0087	"05"	Spectrum Y axis zoom (Linear)	2

0089	", "	Comma	1
0090	"24"	Spectrum Y axis shift (dB)	2
0092	", "	Comma	1
0093	"0"	Spectrum cursor X axis unit	1
0094	", "	Comma	1
0095	"0"	Spectrum cursor Y axis unit	1
0096	", "	Comma	1
0097	"0"	Spectrum list display	1
0098	", "	Comma	1
0099	"025"	Spectrum cursor position	3
0102	", "	Comma	1
0103	"4"	Time waveform X axis zoom	1
0104	", "	Comma	1
0105	"17"	Time waveform X axis shift count	2
0107	", "	Comma	1
0108	"09"	Time waveform Y axis zoom	2
0110	", "	Comma	1
0111	"105"	Time waveform cursor position	3
0114	", "	Comma	1
0115	" "	Reserved space	1
0116	", "	Comma	1
0117	" "	Reserved space	3
0120	", "	Comma	1
0121	" "	Extra space	16
0137	", "	Comma	1
0138	"1"	Overload information	1
0139	", "	Comma	1
0140	"1"	Vibration meter bar graph scale	1
0141	", "	Comma	1
0142	" "	Overall extra space	114



## 2.3 Measurement data

Measurement data are written in ASCII format, using commas as delimiters.

### Vibration meter mode

Number of data: 5  
 Data sequence: Acceleration rms value, acceleration peak value, acceleration crest factor, velocity rms value, displacement equivalent P-P value

Data structure of rms, peak, equivalent P-P value:

+ A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>E ± A<sub>5</sub>A<sub>6</sub> (10 bytes)

+ A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>: mantissa, ± A<sub>5</sub>A<sub>6</sub>: exponent; given as (mantissa × 10<sup>exponent</sup>)

Crest factor data structure:

A<sub>1</sub>A<sub>2</sub>.A<sub>3</sub>A<sub>4</sub> (5 bytes)

### FFT analyzer mode

Number of data: 102

Data sequence: Ordered from left side of display.  
 DC value, minimum frequency, ..., maximum frequency, AP value

Linear data structure: + A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>E ± A<sub>5</sub>A<sub>6</sub> (10 bytes)

+ A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>: mantissa, ± A<sub>5</sub>A<sub>6</sub>: exponent; given as (mantissa × 10<sup>exponent</sup>)

dB data structure: Data structure of crest factor

± A<sub>1</sub>A<sub>2</sub>A<sub>3</sub>.A<sub>4</sub> (6 bytes)

given as ( ± A<sub>1</sub>A<sub>2</sub>A<sub>3</sub>.A<sub>4</sub>) dB

Linear data or dB data are selected depending on the Y axis setting at the store point.

### Time waveform mode

Number of data: Manual store 128

Transient store 256

Data sequence: Time based

Data structure: ± A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>E ± A<sub>5</sub>A<sub>6</sub> (10 bytes)

+ A<sub>1</sub>.A<sub>2</sub>A<sub>3</sub>A<sub>4</sub>: mantissa, ± A<sub>5</sub>A<sub>6</sub>: exponent; given as (mantissa × 10<sup>exponent</sup>)

# Default Settings

The default settings of the unit established at the time of shipping are listed below.

Menu screen	Default setting
UNIT menu	
ACC (acceleration unit)	m/s <sup>2</sup>
VEL (velocity unit)	mm/s
DISP (displacement unit)	mm
TRIGGER menu	
MODE	FREE
SOURCE	LEVEL
TRIG POINT	0
PRE/POST	OFF
LEVEL	N = +2
SLOPE	+
MEMORY menu	
TYPE	MANUAL
TIMER	OFF
HOUR	0
MINUTE	0
DURATION	10
COUNT	500
PCMCIA menu	
DIR	OFF
BLOCK	1 *****
SAVE MEMORY	OFF
DELETE	OFF
FORMAT	OFF
SAVE DISPLAY	OFF

## INPUT menu

SENSITIVITY	510 × 0.01
LOW PASS	20 kHz
HIGH PASS	3 Hz

## SPECTRUM menu

WINDOW	HANNING
X-CURSOR	Hz
Y-CURSOR	LINEAR
PEAK LIST	OFF

## SETUP MEM menu

ADDR	1	*****
SAVE	OFF	
LOAD	OFF	
DELETE	OFF	

## OTHERS menu

PRINTER	SINGLE
ADDR	1 to 1
BAUD RATE	9600
BUZZER	OFF

## CALENDAR menu

DISPLAY	TIME
HOUR	Undefined
MINUTE	Undefined
YEAR	Undefined
MONTH	Undefined
DAY	Undefined

These default settings can be established by loading the address number 0 in the SETUP MEM menu.

# Specifications

## Input section

Number of input channels	1
Input connector	Standard accelerometer connector (Standard accelerometer is PV-55)

### Vibration measurement quantities

Acceleration:	signal from accelerometer
Acceleration envelope:	1 kHz to 50 kHz acceleration envelope signal (in analyzer mode only)
Velocity:	integrated from acceleration signal
Displacement:	double-integrated from acceleration signal

### Units

Acceleration:	m/s <sup>2</sup> , G
Velocity:	mm/s, inch/s
Displacement:	mm, mils

### Input range

Acceleration:	1, 3.16, 10, 31.6, 100, 316 m/s <sup>2</sup> (rms)
Acceleration envelope:	1, 3.16, 10, 31.6, 100, 316 m/s <sup>2</sup> (rms)
Velocity:	3.16, 10, 31.6, 100, 316, 1000 mm/s (rms)
Displacement:	0.089, 0.283, 0.894, 2.83, 8.94, 28.3 mm (EQp-p)

### Measurement frequency range (electrical)

Acceleration:	3 Hz to 20 kHz
Acceleration envelope:	1 kHz to 50 kHz
Velocity:	3 Hz to 3 kHz
Displacement:	3 Hz to 500 Hz

### Measurement level range

Acceleration:	0.02 to 316 m/s <sup>2</sup> (rms)
Velocity:	0.1 to 1000 mm/s (rms)
Displacement:	0.003 to 28.3 mm (EQp-p)

**Pre-stage filters**

High-pass filter: 3 Hz, 10 Hz, 1 kHz (-10% point),  
attenuation -18 dB/oct

Low-pass filter: 1 kHz, 5 kHz, 20 kHz (-10% point),  
attenuation -18 dB/oct

**Acceleration envelope filters**

High-pass filter: 1 kHz (-10% point),  
attenuation -18 dB/oct

Low-pass filter: 50 kHz (-10% point),  
attenuation -12 dB/oct

**A/D conversion**

16-bit, delta sigma principle, 51.2 kHz sampling

**Vibration meter mode**

Detection characteristics rms, peak

**Processing items**

Simultaneous processing of following items (digital)

Acceleration: rms, peak, crest factor

Velocity: rms

Displacement: equivalent p-p value

Sampling cycle 51.2 kHz

rms time constant 1 s

Peak value updated every second

Crest factor updated every second

**Analyzer mode****Processing items**

Time waveform: from sampled time-based data

Spectrum: power spectrum derived by FFT processing  
of above time waveform

Sampling cycle Frequency span  $\times$  2.56

Number of samples 256, 512, 1024, 2048

Normally 256; with frequency zoom ratio  $\times$ 2: 512  
 $\times$ 4: 1024  
 $\times$ 8: 2048

Time window function	Rectangular, Hanning, flat-top
Frequency span	100, 200, 500, 1 k, 2 k, 5 k, 10 k, 20 kHz
Anti-aliasing filter	100, 200, 500, 1 k, 2 k, 5 k, 10 k, 20 kHz 14th-order anti-aliasing filter
Attenuation:	-85 dB at frequency span $\times$ 1.56 frequency point
Frequency zoom	$\times 2$ , $\times 4$ , $\times 8$

### Average processing

Time waveform	Instantaneous value
Spectrum	
Instantaneous value:	FFT processing result without averaging, continuous processing without end point
Exponential averaging:	Exponential average value $Y_n = Y_{n-1} - (Y_{n-1} - X_n) / N$ $Y_n:$ current averaging value $Y_{n-1}:$ previous (frame) averaging value $X_n:$ Processing result for each frame $N:$ Averaging count (1 to 1023) Continuous processing without end point
Linear averaging:	Linear averaging value $Y_n = \Sigma X_n / N$ $Y_n:$ current averaging value $X_n:$ Processing result for each frame $N:$ Averaging count (1 to 1023) When specified averaging count is completed, processing is carried out. No further processing until restart.
Peak hold:	Maximum value for each frequency of specified FFT processing cycles (1 to 1023) When specified averaging count is completed, processing is carried out. No further processing until restart.

Trigger source:	
External signal:	Trigger is activated at falling edge of TTL signal supplied to external trigger input
Input level:	Trigger is activated when time waveform crosses set level. Level can be set in steps of 1/8 of full-scale unilateral amplitude.
Slope:	+ / -
Trigger operation	
Free-run:	Processing is carried out regardless of trigger state
Repeat:	Processing is carried out at each trigger occurrence
Single:	Processing is carried out only once at the first trigger occurrence
Pre and post trigger functions	
Pre-trigger:	Processing starts from a specified number of data before trigger occurrence
Post-trigger:	Processing starts from a specified number of data after trigger occurrence
	Trigger position can be specified in 16 steps. (Maximum position: number of samples -16)

## Display section

Display	
LCD dot resolution:	192 × 128
Display size:	77.5 × 54 mm
Backlight:	EL backlight
Display data	
Measurement data	Processing results, cursor, measurement parameters
Status indication	Overload, trigger standby, store
Date/time indication	Date:     MM:DD Time:     HH:MM (24-hour notation)

Power supply indication: 4-segment battery status indicator

### Display data

Vibration meter display	Acceleration, velocity, displacement (bar graph and numeric indication)
Spectrum display	Graph, list
Graph display	
X axis:	102 lines (frequency spectrum 101 lines + overall value)
Y axis:	dB, LINEAR dB display range: 20, 40, 80 dB Linear zoom: 2 to 1024 (multiple integers of 2)
List display:	upper 10 levels and frequency, readout
Time waveform display	
X axis:	128 data, with frequency zoom and shift function
Y axis:	linear display Linear zoom: 2 to 1024 (multiple integers of 2)
Cursor functions	
Spectrum X axis:	Hz, KCPM, ORDER
Spectrum Y axis:	Linear (G, m/s <sup>2</sup> , mm/s, inch/s, mm, mils) dB
Time waveform X axis:	Time (ms)
Time waveform Y axis:	Amplitude (G, m/s <sup>2</sup> , mm/s, inch/s, mm, mils)



## Memory

### Data memory

#### Manual store

Measurement parameters and analysis results are stored in specified address

Capacity 500 data sets, regardless of vibration meter mode or analyzer mode

#### Transient store

Continuous store of time waveform and frequency span

(store cycle: frequency span  $\times$  2.56)

Only available in analyzer mode

Frequency	Recording time	Frequency	Recording time
100 Hz	500 s	2 kHz	25 s
200 Hz	250 s	5 kHz	10 s
500 Hz	100 s	10 kHz	5 s
1 kHz	50 s	20 kHz	2.5 s

### Timer store function

Start time, repeat interval, number of store data can be specified for storing data in data memory

Available for manual store and transient store

### Re-analysis function

Data stored in transient memory can be re-analyzed.

### Measurement settings memory

10 sets, for storing and recalling all measurement parameters

### PCMCIA card

ATA type compact flash card

Contents of entire data memory are written to the card as one ASCII file in MS-DOS format

Cards are available separately

## Inputs/outputs

### RS-232-C interface

Dual-function port:	RS-232C interface and printer output
Protocol:	yes
Baud rate:	9600, 19200, 38400 bps
Data word length:	8 bit
Stop bits:	2
Parity:	none
Function:	Control of VA-11 from computer and transfer of measurement data to computer

### Printer output

Compatible printers:	DPU-414, CP-10, CP-11 (available separately)
Baud rate:	9600 bps
Function:	Hard copy of current display screen Continuous printout of specified address range in memory
Cable type:	Commercially available straight serial cable
External trigger input:	TTL level falling edge
Beep tone:	When storing and as error warning

## Ambient conditions for operation

0 to +40°C, 20 to 90% RH (no condensation)

## Power supply

Four IEC R14 (size C) batteries or AC adapter NC-94A

## Dimensions

Approx. 156 (W) × 174 (H) × 45.7 (thickness) mm (without protruding parts)

## Weight

Approx. 770 g (including batteries)

## Supplied accessories

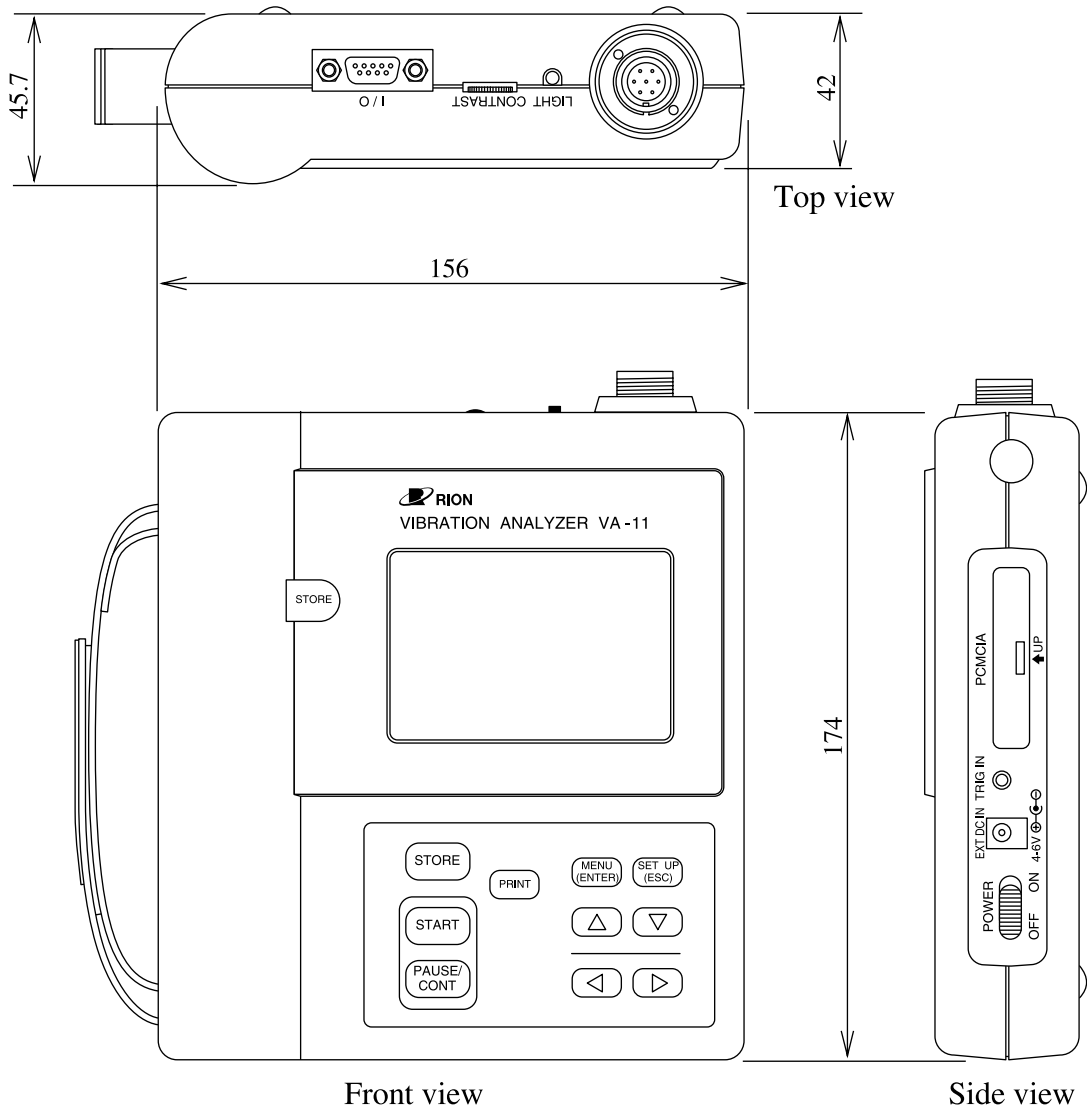
Accelerometer	PV-55	1
Soft carrying case	VA-11-014	1
Shoulder belt	VA-11-015	1
Size C battery	IEC R14	4
Lithium battery	CR-1/3N	1
Instruction manual		1
Inspection certificate		1

## Optional accessories

ATA type compact flash card		
I-O DATA DEVICE, INC.	PCCF-32M	

- \* The above memory card has been verified for compatibility with this unit. Operation with other memory cards is not assured.

Card adapter	For using compact flash card in normal PCMCIA card socket
AC adapter	NC-94A
Printer	DPU-414
Printer cable	5WCD2320
Interface cable	5WKR4030
Hard case	CF-21; also holds printer CP-11



Unit: mm

Dimensional drawing of Vibration Analyzer VA-11



