

# **INSTRUCTION MANUAL**

FFT Analysis Card

**VX-54FT**



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

<http://www.rion.co.jp/english/>



## Organization of this manual

This manual describes the features and operation of the FFT Analysis Card VX-54FT. You should also refer to the documentation for the 3-Axis Vibration Meter VM-54, Hand-Arm Vibration Card VX-54WH, Whole Body Vibration Card VX-54WB, and Marine Vibration Card VX-54WS.

### **Outline**

Gives basic information on the FFT Analysis Card VX-54FT.

### **Controls and Functions of VM-54**

Explains how to use the VM-54 when the template sheet of the Marine Vibration Card VX-54WS is installed.

### **Inserting and Removing the Card**

Explains how to mount and dismount the VX-54FT card.

### **VX-54FT Program Installation**

Explains how to install the software supplied on the card.

### **Menu Screens**

Explains basic menu screen functions.

### **Main Display**

Explains items that are shown on the main display.

### **Sub Display**

Explains items that are shown on the sub display.

### **Measurement**

Explains how to perform measurement.

### **Memory Operations**

Explains how to store, recall, and erase data.

## Printing

Explains how to print out measurement data and shows sample print-outs.

## Factory Defaults

Lists the initial settings of the unit.

## Specifications

Lists the technical specifications of the VX-54FT.

Company names and product names mentioned in this manual are usually trademarks or registered trademarks of their respective owners.

# Usage License Agreement

Important
Carefully read and observe the following agreement. Attached Excel file is not applied to this agreement.

This is a legally binding software license agreement between you as the user and Rion Co., LTD. By installing, copying, or using the software, the user agrees to all conditions of the agreement. If the user does not agree to any of the conditions of the agreement, the software must be returned immediately without using it or any other product associated with it.

The software is protected by national and international copyright laws and regulations and intellectual property laws. Rion Co., LTD. only grants the right to use the software. The software itself is not sold to the user.

## 1. License Conditions

### (1) Definition and Scope

The software covered by this agreement is the FFT Analysis Card VX-54FT including the media on which the software is supplied, and documentation that is supplied with the software either in printed form or as an electronic file. This license agreement defines the right of the user to use the software.

### (2) Usage

The user may install and use the software on the 3-Axis Vibration Meter VM-54.

## 2. Intellectual Property Rights

Rion Co., LTD. only grants the right to use the software. The software itself is not sold to the user.

Rion Co., LTD. holds the copyright to the software, and the rights to all copies revert to Rion Co., LTD. The user may not remove any copyright or trademark information attached to the software.

### **3. Limitations**

- (1) Based on this agreement, the user only acquires the right to use the software. Any other rights not covered in this agreement are not accorded to the user. The user may not copy or otherwise duplicate the software and the associated documentation by any means, in whole or in part, except for the case stated in "1. (2) Usage". The software and the associated documentation are protected by copyright laws.
- (2) The user does not have the right to give, sell, loan or otherwise make available the software and associated documentation to third parties, or to grant any usage rights to third parties.
- (3) The user does not have the right to alter, decompile, or reverse-engineer the software.
- (4) The user may not use the software to produce any products that imitate the software. Any imitation or simulation of the software is an infringement of copyright laws.

### **4. Duty of Agreement Propagation**

The user must ensure that all persons using the software are fully aware of all conditions of this agreement. Any violation will be the responsibility of the user.

### **5. Warranty**

- (1) Rion Co., LTD. guarantees that the software is supplied on media that have no substantial defect, and that the software contains the functions that are explicitly listed in the specifications. If the software does not operate according to specifications or if any problems described above that are the responsibility of Rion Co., LTD. are detected and Rion Co., LTD. is informed of this fact within 90 days from the purchase date of the software, Rion Co., LTD. will undertake to remedy the problems free of charge.
- (2) If the software does not operate according to specifications due to causes that are not the responsibility of Rion Co., LTD., Rion Co., LTD. will undertake to remedy the problems against charge.

## **6. Limitation of Warranty**

- (1) Rion Co., LTD. does not guarantee that the software is fit for any particular purpose of the user, whether stated explicitly or implicitly, or that the software is free of errors. Rion Co., LTD. does not provide any other kind of warranty except as stated in this agreement. Rion Co., LTD. does not accept responsibility for any kind of damage, whether direct or indirect, tangible or intellectual, that may arise from the use of the software or the failure of the software to perform any function.
- (2) Under no circumstances will the responsibility of Rion Co., LTD. as stated in "5. Warranty" exceed the equivalent of the price that the user paid for the software.

## **7. Duration**

This agreement is valid until terminated. The user can terminate the agreement at any time by destroying the software and associated documentation and deleting all copies from the computer where the software was installed. The agreement also terminates when the user violates any of the conditions herein. In this case, the user also must destroy the software and associated documentation and delete all copies from the computer where the software was installed.

## **8. Jurisdiction**

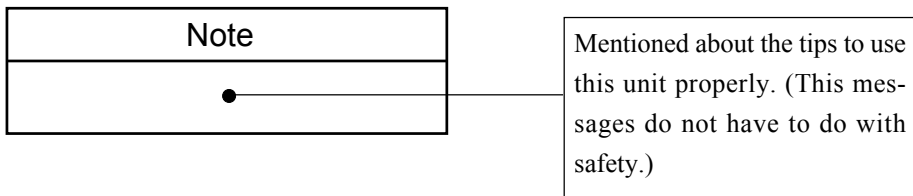
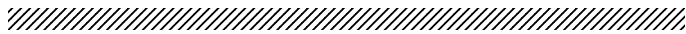
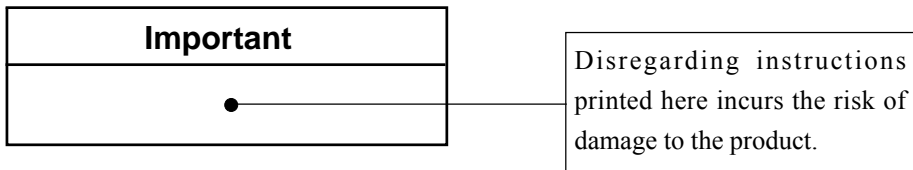
Any disputes or litigation arising from this agreement will be under the jurisdiction of the Tokyo District Court.





## FOR SAFETY

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



# Contents

FOR SAFETY .....	vii
Outline .....	1
Controls and Functions of VM-54 .....	2
Front panel .....	2
Input/output section .....	2
Display section .....	3
Control section .....	3
Right side view .....	7
Inserting and Removing the Card .....	8
Inserting and removing the card .....	8
VX-54FT Program Installation .....	9
Program installation .....	9
To turn the VX-54FT analysis function off .....	11
Checking the version .....	12
Menu Screens .....	13
Menu screen 1/6 .....	14
Menu screen 2/6 .....	16
Menu screen 3/6 .....	17
Menu screen 4/6 .....	18
Menu screen 5/6 .....	19
Menu screen 6/6 .....	21
Main Display .....	23
Reading the main display .....	23
Sub Display .....	26
FFT analysis screen .....	26
3-axis bar graph screen .....	32
3-axis measurement screen .....	34

Measurement .....	35
Measurement procedure .....	35
About measurement modes .....	35
IST mode .....	37
LIN mode (VM-54 mode only) .....	38
RMS mode (VX-54WS, VX-54WB, VX-54WH) .....	40
MAX mode .....	42
Menu screen in pause mode .....	44
Memory Operations .....	45
Data storage .....	45
Reading stored data .....	48
Clearing data .....	50
Store data format .....	51
Printing .....	54
Factory Defaults .....	56
Specifications .....	57



# Outline

The FFT Analysis Card VX-54FT is a CompactFlash™ card (subsequently called CF card) containing FFT analyzer program data. When these program data are installed in the 3-Axis Vibration Meter VM-54, the VM-54 can perform 400-line FFT analysis. This function is available also in conjunction with the functions provided by the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH. When one of these cards is used, the FFT analysis will be applied to the weighted frequency response for marine vibrations, whole-body vibrations, or hand-transmitted vibrations, respectively.

The result of the FFT analysis is shown on the LCDs panels, and measurement data can be stored on a CF card in CSV format. It is also possible to calculate the partial overall value for a specified frequency range. FFT analysis results can be printed on a dedicated printer available as an option.

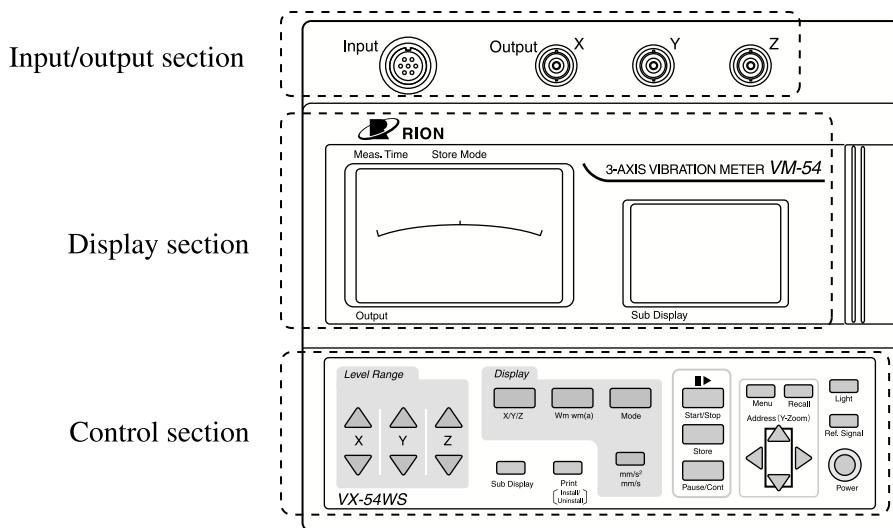
An Excel file is also included on the card. This file allows using stored measurement data for generating graph displays in Microsoft Excel on a computer.

When the FFT Analysis Card VX-54FT is not inserted in the VM-54, the FFT analysis function is not available.

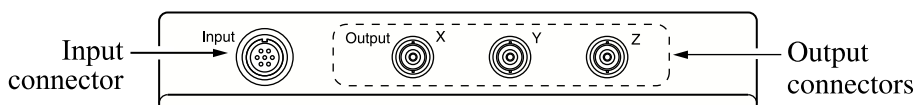
# Controls and Functions of VM-54

This section explains the controls and functions of the VM-54 when the template sheet supplied with the Marine Vibration Card VX-54WS is attached. The appearance of the panel will be different for the 3-Axis Vibration Meter VM-54, Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, and Hand-Arm Vibration Card VX-54WH.

## Front panel



## Input/output section



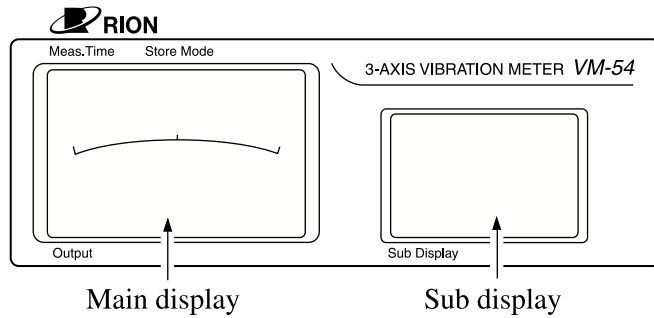
### Input connector

The signal from the accelerometer is supplied to this connector.

### Output connectors

These are BNC connectors which carry an AC output signal for the X, Y, and Z axis.

## Display section



### Main display

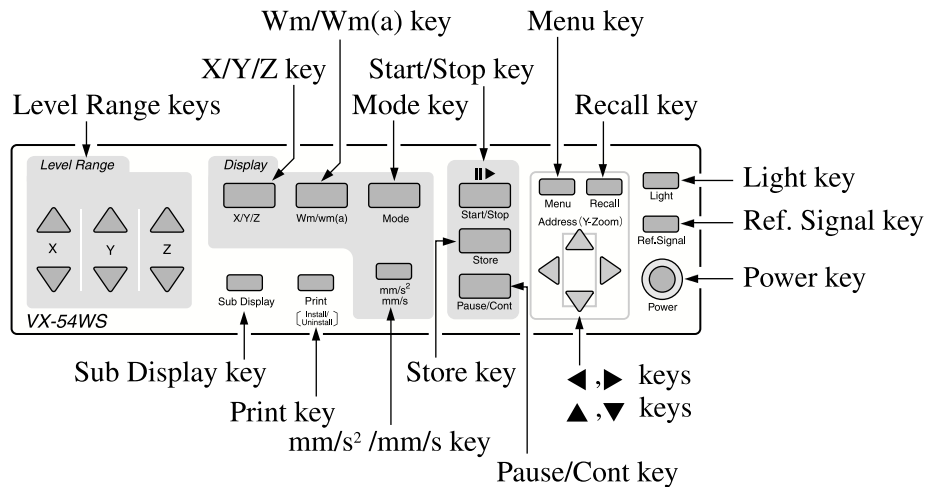
Shows the measurement value and setting information.

### Sub display

Shows the 3-axis bar graph screen, 3-axis numeric screen, FFT analysis screen, and other measurement screens, as well as menus and the recall screen.

## Control section

The explanation applies to the template sheet of the VX-54WS.



The following key explanation applies to operation of the VX-54FT.

### Level Range keys

These keys control the level range for the X, Y, Z axis.

The ▲ key switches the level range up, and the ▼ key switches the level range down.

### X/Y/Z key

Switches the vibration axis to be shown on the display.

With each press of the key, the display cycles through the settings in the order X → Y → Z → X etc.

### Wm/Wm(a) key

Serves to select the frequency weighting characteristics when the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH is operating.

FFT analysis with VX-54FT: The key has no function.

FFT analysis with VX-54WS: Wm → Wm(a) → Flat → Wm

FFT analysis with VX-54WH: Wh → Wh(a) → Wh

FFT analysis with VX-54WB: W\* → W\*(a) → Flat → W\*

W\* is selected from Wk, Wd, Wc, Wm, Wj, and Wb

### Mode key

Switches the FFT measurement mode.

Each press of the key cycles through IST → RMS (LIN) → MAX → IST...

IST: Displays the FFT analysis result for 1 frame.

Can be selected when FFT analysis is carried out in the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH mode.

RMS: Displays the rms averaged analysis result.

LIN: Displays the linear averaged analysis result.

Can be selected when FFT analysis is carried out in the 3-axis Vibration Meter VM-54 mode.

MAX: Displays the maximum value for each frequency in the measurement time.



### Start/Stop key

Serves to start and stop the processing operation. During processing, the ► symbol is shown on the display. This key is active when the FFT measurement mode is RMS, LIN, or MAX.

During recall, the key serves to change the recall data address.

### Menu key

Pressing this key brings up a menu screen on the sub display.

Each press of the key cycles through menu screens 1/6, 2/6, ... 6/6. Pressing the key again at menu screen 6/6 closes the menu display and returns to the measurement screen.

The menu can also be closed by pressing any other key except the Light key, Power key, ▲, ▼, ◀, ▶ keys, and Print key.

### Recall key

Serves to call up data stored on memory card.

### Light key

Turns the backlight for the main display and sub display on. This is convenient when using the unit in a dark location. To turn the backlight off, press the key again.

When the unit is operating on battery power, the backlight will be automatically turned off after 10 minutes. When the unit is powered from an external power supply, the backlight will not be automatically turned off.

Battery current consumption increases by a factor of about 2 when the backlight is on.

### Ref. Signal key

Serves for level matching between the unit and equipment connected to the Output connectors. The reference signal level is as shown below.

AC: 15.915 Hz 1 Vrms

The sub display shows a bar graph indication.

By pressing the Ref. Signal key immediately after power-on, while the initialization screen is still shown, the software version of the unit will be displayed.

## Power key

Serves to turn the unit on and off.

Hold down the key for at least two seconds to turn power on or off.

After switching the unit off, wait at least five seconds before turning power on again. Otherwise the unit may not start up properly.

## ▲, ▼ keys

When the sub display is showing a menu screen, the keys serve to select a menu item.

On the FFT analysis screen, the keys work as follows.

▲ : Increase Y axis display zoom factor.

▼ : Decrease Y axis display zoom factor.

## ◀, ▶ keys

When the sub display is showing a menu screen, these keys serve to change the setting of the selected item.

On the FFT analysis screen, the keys move the cursor.

## Pause/Cont key

Serves to pause and resume the measurement.

During recall, the key changes the recall data address.

## Store key

Serves to store instantaneous value data and processing result data on a memory card.

With the VX-54FT, only manual store is available.

## mm/s<sup>2</sup>/mm/s key

When the Marine Vibration Card VX-54WS is used, this key selects acceleration or velocity measurement. For detail, see the documentation of the VX-54WS.

When the Whole Body Vibration Card VX-54WB or Hand-Arm Vibration Card VX-54WH is used, the key has no effect.

## Print key

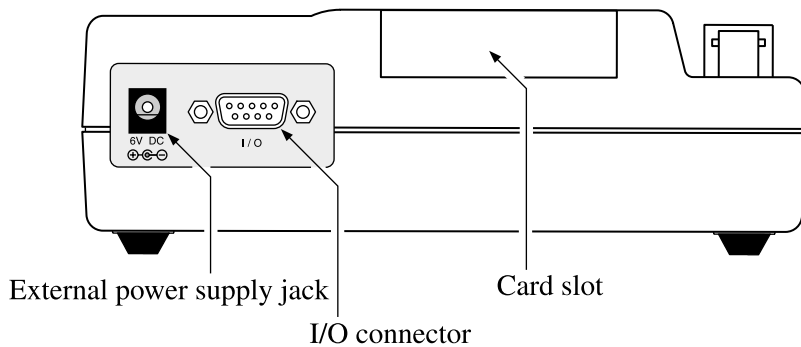
Serves for printing out measurement data and setup information on a optional printer.

## Sub Display key

Switches the function mode of the sub display.

With each press of the key, the display cycles through the bar graph screen, 3-axis measurement screen, and FFT analysis screen.

## Right side view



## External power supply jack

The AC adapter NC-98A (for 100 to 240 V AC, optional) can be connected here to power the unit from an external source.

<b>Important</b>
Do not use any other kind of AC adapter except the NC-98A. Otherwise damage may occur.

## I/O connector

The optional printer DPU-414, CP-10, or CP-11 can be connected here, using a special cable.

## Card slot

The program card VX-54FT can be inserted in this slot to activate the FFT function. When the VX-54FT is not inserted, the FFT function will not be available.

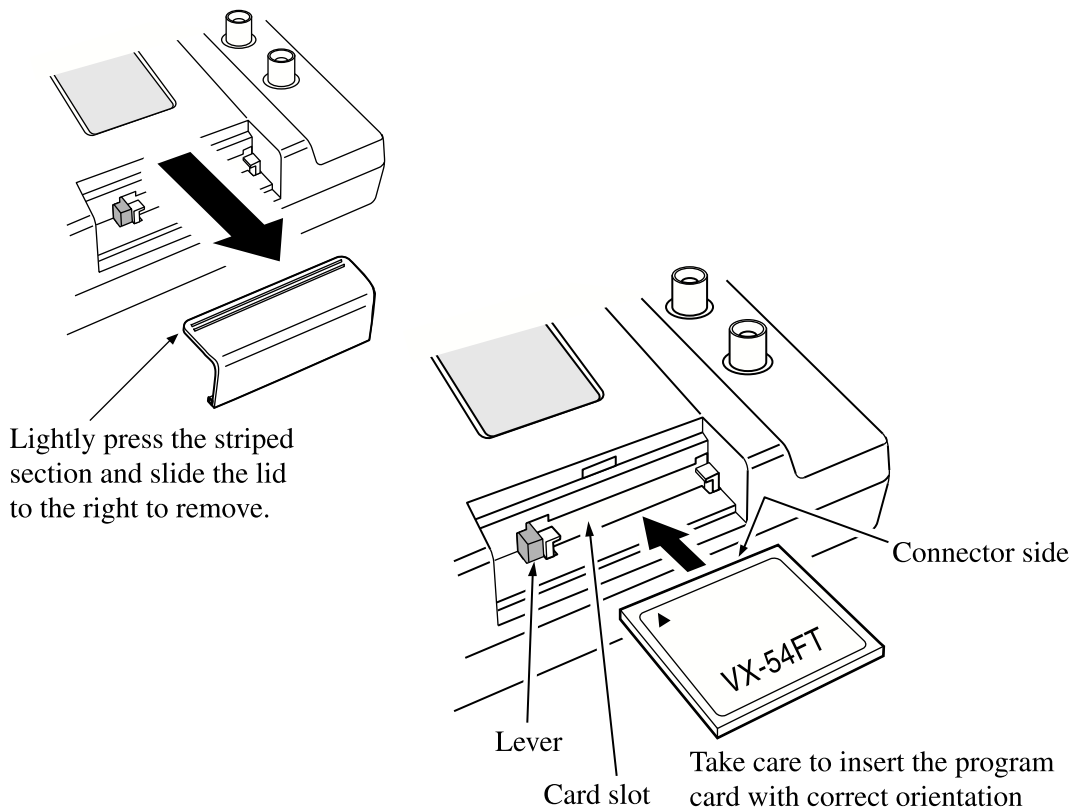
# Inserting and Removing the Card

## Inserting and removing the card

### Important

Be sure to turn power to the VM-54 off before inserting or removing the VX-54FT card.

1. Open the lid of the card slot on the VM-54.
2. Insert the VX-54FT card into the card slot.  
Make sure that the card orientation is correct, and carefully slide the card fully into the slot.  
To remove the card, push the lever at the left fully in, so that the card pops out of the card slot.

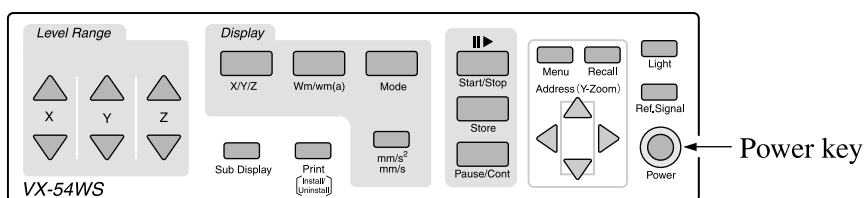


# VX-54FT Program Installation

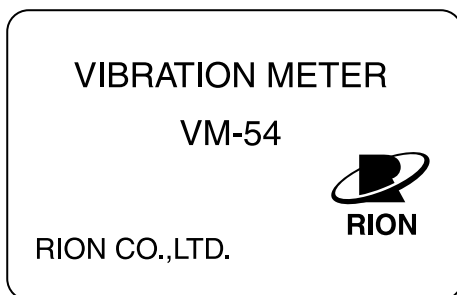
## Program installation

When you turn power to the VM-54 on while the VX-54FT card is inserted, the VX-54FT program is installed in the VM-54.

1. Insert the VX-54FT card in the card slot.
2. Hold the Power key down (more than 2 seconds) until the initial screen appears.



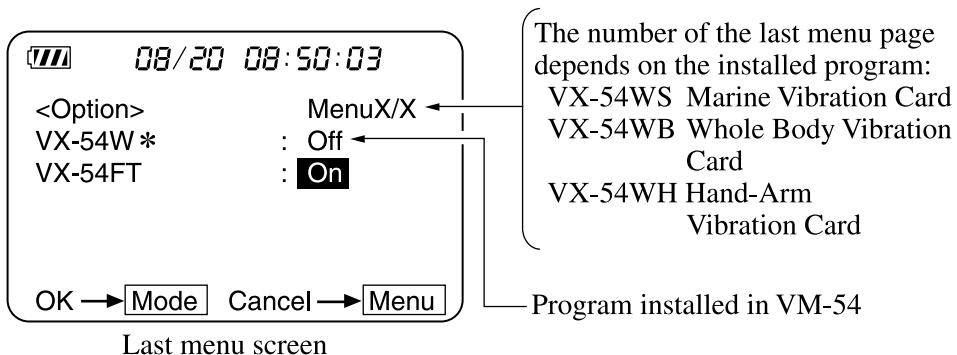
When the program is installed for the first time, the following screen appears after the program data have been downloaded.



### Important

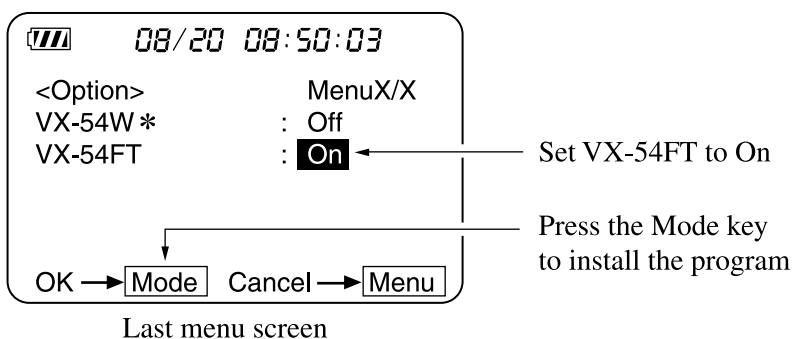
Never turn power off or remove the card while program data are being downloaded.

- When the measurement screen appears, press the Menu key and go to the last menu page.



<b>Note</b>
<p>To use the FFT function with the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH, set the respective card program (VX-54WS, VX-54WB, VX-54WH) to On to start the program. After startup, set VX-54FT to On in the respective menu.</p>

- Set the VX-54FT item to On, and press the Mode key.  
The VX-54FT program data are installed.



**Note**

When the VX-54FT card is inserted for the first time, it will take about one minute for the measurement screen to appear after you turn power on. This is due to the fact that firmware data are transferred from the VX-54FT to the VM-54. Take care not to turn power off or remove the card before the measurement screen appears.

The analysis function of the VX-54FT card is only available when the card is inserted.

**Important**

The VX-54FT card contains a Microsoft Excel file for using measurement data collected with the manual store function. Be sure to copy this file to a computer before inserting the VX-54FT in the VM-54. Do not format the VX-54FT card in a computer, because this will erase the file.

**To turn the VX-54FT analysis function off**

Turn power to the VM-54 off, remove the VX-54FT card, and then turn power to the VM-54 on again. Alternatively, change the VX-54FT item on the last menu page from On to Off. (For details, see the section "Menu Screens")

**Note**

The FFT analysis function of the VX-54FT is available only when the VX-54FT card is inserted.

When the VX-54FT card is inserted for the first time, it will take about one minute for the measurement screen to appear after you turn power on. This is due to the fact that firmware data are transferred from the VX-54FT to the VM-54. Take care not to turn power off or remove the card before the measurement screen appears.

When the VX-54FT is used the next time, the startup process will take only about 10 seconds.

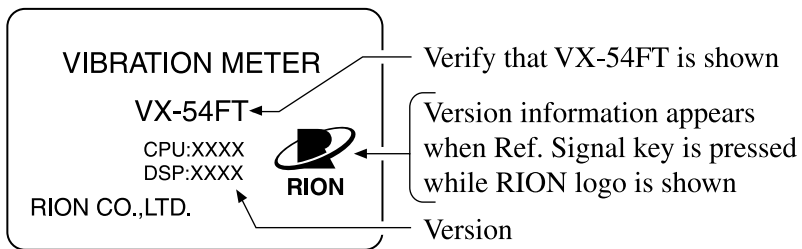
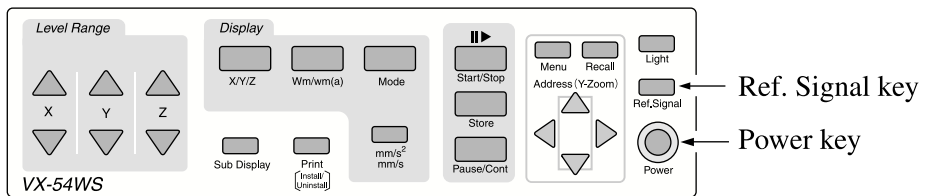
## Checking the version

You can check the current version by turning power on and pressing the Ref. Signal key when the RION logo is displayed.

## Displaying the VX-54FT version

1. Insert the VX-54FT card and start the VX-54FT program.
2. Turn power to the VM-54 off, wait at least 10 seconds, and then turn power on again.
3. While the RION logo is displayed, press the Ref. Signal key. The VX-54FT version is shown.

To turn off the version display, press the Ref. Signal key once more.



Sub display during VX-54FT power-on



# Menu Screens

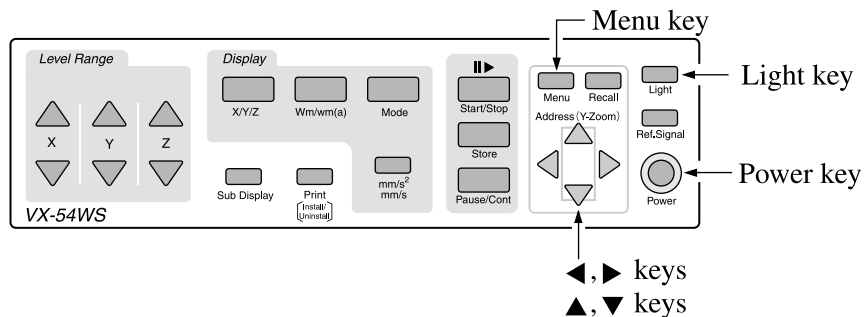
Various settings are made with menu screens which are shown on the sub display.

The menu screens are numbered 1/6 to 6/6. The Menu key serves to cycle through the screens.

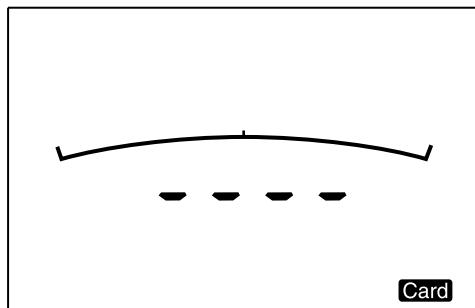
To select an item on a menu screen, you use the ▲ and ▼ keys.

To change the setting of an item, you use the ◀ and ▶ keys.

When you press any key except the Light key, Power key, ▲, ▼, ◀, ▶ keys, and Print key while a menu screen is shown, the menu screen closes and the measurement screen returns.

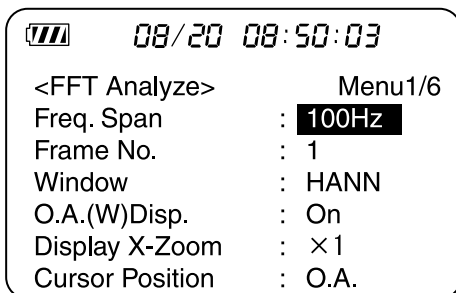


When you open a menu screen, the main display changes as follows.



Main display when a menu screen is open

## Menu screen 1/6



Menu screen 1/6

### Freq. Span (FFT frequency bandwidth)

Selects the FFT frequency analysis bandwidth.

Pressing the ◀ or ▶ key cycles through the settings as follows.

50 Hz ↔ 100 Hz ↔ 200 Hz ↔ 500 Hz ↔ 1 kHz ↔ 50 Hz...

### Frame No. (Frame number)

Sets the measurement time in number of frames. The measurement time depends on the number of FFT frames and the FFT frequency span.

The setting range is 1 to 999, in steps of 1. Use the ◀, ▶ keys to increase or decrease the value. After 999, the setting jumps back to 1. When you hold down a key, the step increment changes.

### Frequency span and sampling frequency

Frequency span	Sampling frequency	Sampling interval	Frame time	Frequency resolution
50 Hz	128 Hz	7.8125 ms	8 s	0.125 Hz
100 Hz	256 Hz	3.90625 ms	4 s	0.25 Hz
200 Hz	512 Hz	1.953125 ms	2 s	0.5 Hz
500 Hz	1.28 kHz	0.78125 ms	0.8 s	1.25 Hz
1 kHz	2.56 kHz	0.390625 ms	0.4 s	2.5 Hz

#### Note

A "frame" refers to a set of time series data or frequency range data necessary for FFT processing. The time for one frame depends on the analysis bandwidth setting.

## Window

Selects the window function.

Use the ◀, ▶ keys to switch between RECT and HANN.

RECT: Rectangular window

HANN: Hanning window

## O.A.(W) Disp (Overall value display on/off)

Turns the overall value display (leftmost bar graph) on and off. When set to Off, the O.A.(W) value is not shown on the spectrum screen.

## Display X-Zoom

Selects the X axis display zoom ratio.

Use the ◀, ▶ keys to switch between  $\times 1 \leftrightarrow \times 2 \leftrightarrow \times 4$ .

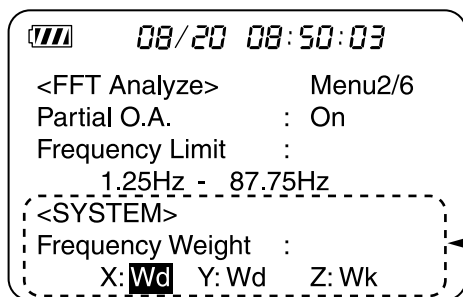
## Cursor Position

Selects whether to move the cursor position by overall value or spectrum.

Freq: Cursor can be moved over entire X axis range.

O.A.: Cursor cannot be moved to individual frequency bands.

## Menu screen 2/6



Displayed only when Whole Body Vibration Card VX-54WB program is used

Menu screen 2/6

### Partial O.A. (Off, On)

When this item is set to On, the overall value for a selected frequency range can be calculated. The range is set with the Frequency Limit item.

### Frequency Limit (Frequency range for Partial O.A.)

This setting is available only when the Partial O.A. item is On.

Frequency range	Resolution	Lower limit	Upper limit
50 Hz	0.125 Hz	0.125 Hz	50.000 Hz
100 Hz	0.25 Hz	0.25 Hz	100.00 Hz
200 Hz	0.5 Hz	0.5 Hz	200.00 Hz
500 Hz	1.25 Hz	1.25 Hz	500.00 Hz
1 kHz	2.5 Hz	2.5 Hz	1000.00 Hz

### Frequency Weight (Frequency weighting characteristics)

When FFT function is operating in 3-Axis Vibration Meter VM-54 mode:

Frequency Weight item is not displayed.

(In this case, frequency response is flat.)

When FFT function is operating in Whole Body Vibration Card VX-54WB mode:

Wk → Wd → Wc → Wm → Wj → Wb → Wk

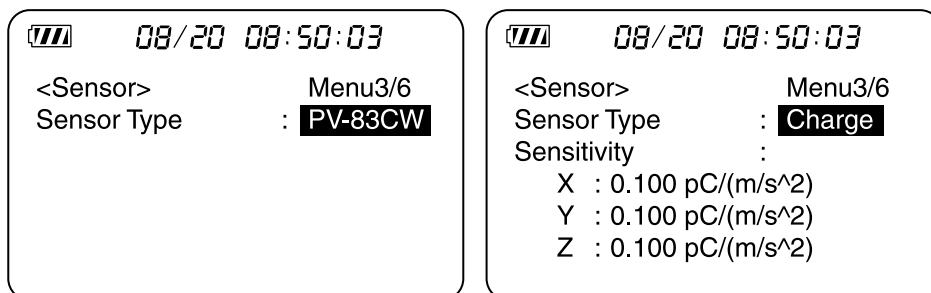
When FFT function is operating in Hand-Arm Vibration Card VX-54WH mode:

Not displayed (set to Wh)

When FFT function is operating in Marine Vibration Card VX-54WS mode:

Not displayed (set to Wm)

## Menu screen 3/6



Menu screen 3/6

When Sensor Type is PV-83CW or PV-57

When Sensor Type is Charge

### Sensor Type

PV-83CW/CCLD/Charge/PV-57(A)

The "Sensitivity" item is only displayed for setup when the Sensor Type is CCLD or Charge. Note that the sensitivity unit for each channel differs for Charge and CCLD.

CCLD:  $\text{mV}/(\text{m}/\text{s}^2)$ , accelerometer with built-in preamplifier is used

Charge:  $\text{pC}/(\text{m}/\text{s}^2)$ , piezoelectric accelerometer is used

Available sensitivity range settings are as follows.

0.0100 to 0.0999 in 0.0001 unit steps

0.100 to 0.999 in 0.001 unit steps

1.00 to 9.99 in 0.01 unit steps

10.0 to 99.9 in 0.1 unit steps

The setting is to be made for each channel individually.

Use the ▲ and ▼ keys to select the channel for X, Y, Z and use the ◀, ▶ keys to set the sensitivity. When you hold down a key, the setting changes faster.

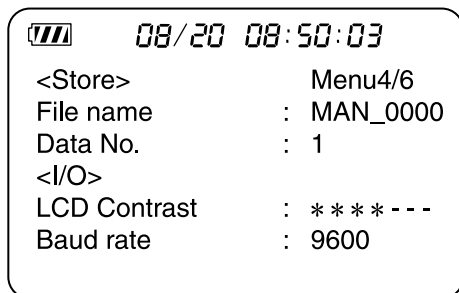
#### Note

When the 3-channel vibration input preamplifier VP-80 is used and the charge amp gain is set to  $\times 0.1$ , set the sensitivity value for all 3 channels to 1/10 of the accelerometer sensitivity.

Example

When an accelerometer rated for  $0.150 \text{ pC}/(\text{m}/\text{s}^2)$  is used and the VP-80 charge amp gain is set to  $\times 0.1$ , set sensitivity to 0.0150.

## Menu screen 4/6



Menu screen 4/6

### File name

A four-digit number can be specified as file name for storing data. Because only manual store is possible with this unit, the first part of the file name is fixed to "MAN\_".

The setting is changed two digits at a time. Use the ▲, ▼ keys to move the cursor, and use the ◀, ▶ keys to increase or decrease the value. The setting range is 00 to 99 in steps of 1. After 99, the setting jumps back to 00.

### Data No. (Address)

Allows you to specify the address for storing data. Up to 100 sets of data can be stored in one file.

Use the ◀, ▶ keys to increase or decrease the address. The setting range is 1 to 100 in steps of 1. After 100, the setting jumps back to 1.

### LCD Contrast (Sub display contrast)

The number of asterisks corresponds to the contrast setting.

Use the ◀, ▶ keys to change the setting. The contrast can be set in seven steps.

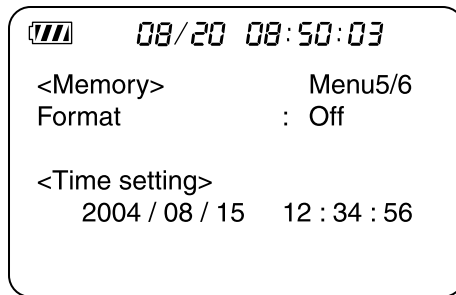
### Baud Rate (I/O transfer speed)

Sets the speed for data transfer to a printer.

Use the ◀, ▶ keys to select one of the following settings.

4800 ↔ 9600 ↔ 19200 ↔ 4800... (unit: bps)

## Menu screen 5/6



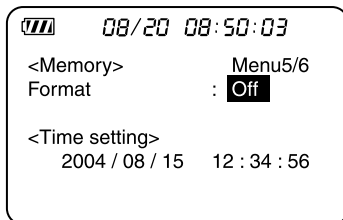
Menu screen 5/6

### Format

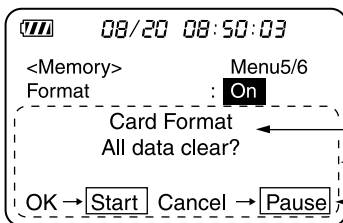
The default setting of this item is "Off".

To clear all data stored on the VX-54FT card, use the ◀, ▶ keys to change the setting to "On".

For details about clearing data, see the section on memory operations on page 45.



Menu screen 5/6

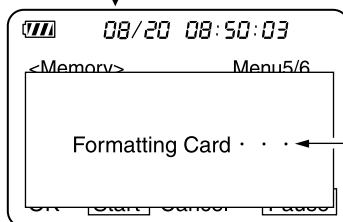


Normal/reverse display

Shown when "Format" is set to On

Press Pause key to return to above screen

Press Start key to begin the formatting process



Flashes

When formatting is complete, the topmost screen appears again.

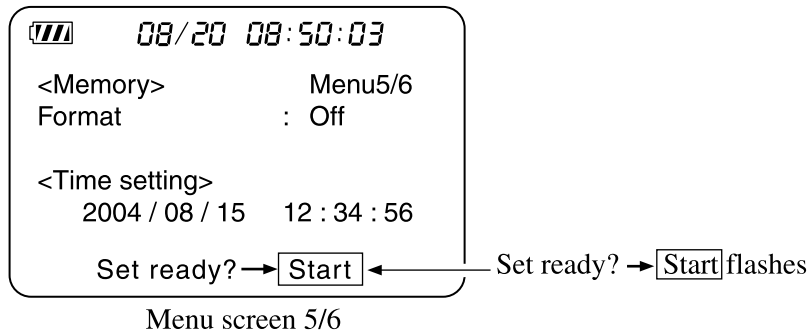
Screen during formatting

## Time setting (Calendar date/time setting)

Lets you set the year, month, day, hours, minutes, and seconds.

Use the ▲, ▼ keys to move the cursor, and use the ◀, ▶ keys to increase or decrease the value.

The indication "Set ready? → Start" flashes in the lower part of the display. When you press the Start/Stop key, the internal clock is set to the selected date and time and starts to run. To return without making a setting, press any key except the Light key or Power key.





## Menu screen 6/6

This screen lets you select whether to activate the program of the FFT Analysis Card VX-54FT or another program.

Installed programs are shown:  
 VX-54WS Marine Vibration Card  
 VX-54WB Whole Body Vibration Card  
 VX-54WH Hand-Arm Vibration Card  
 When no program is installed, nothing is shown.

Menu screen 6/6

The program for which the "On" setting is selected will be active.

### Note

When you change from the VX-54FT to the VM-54 standard program, or from the VM-54 to the VX-54FT program, the level range and other settings will be reset to the default condition.

To use the FFT function with the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH, set the respective card program (VX-54WS, VX-54WB, VX-54WH) to On to start the program. After startup, set VX-54FT to On in the respective menu.

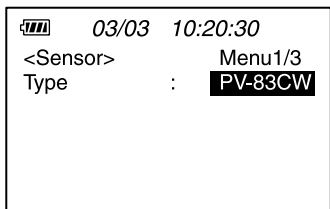
	FFT operation in VX-54W* mode	Operation in VX-54W* mode (FFT operation Off)	FFT operation in VM-54 mode	Operation in VM-54 mode (FFT operation Off)
VX-54W *	On	On	Off	Off
VX-54FT	On	Off	On	Off

VX-54W\* refers to Whole Body Vibration Card VX-54WB, Hand-Arm Vibration Card VX-54WH, or Marine Vibration Card VX-54WS.

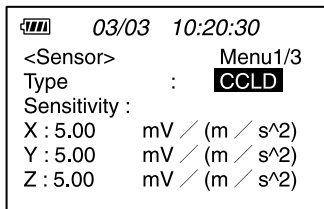
The illustration below shows the menus that appear when VX-54FT is Off, VX-54WS is Off, and the VM-54 standard program has been selected by pressing the Mode key.

If you set VX-54FT to On at menu screen 3/3 and press the Mode key, the initialization screen is shown and then the unit returns to the original VX-54FT program.

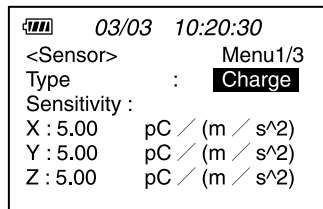
Sub display



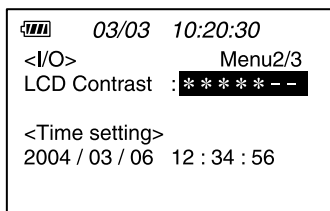
Menu screen 1/3



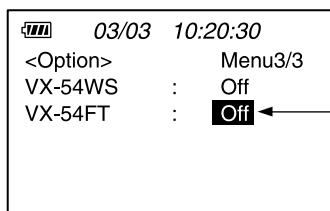
Menu screen 1/3



Menu screen 1/3



Menu screen 2/3



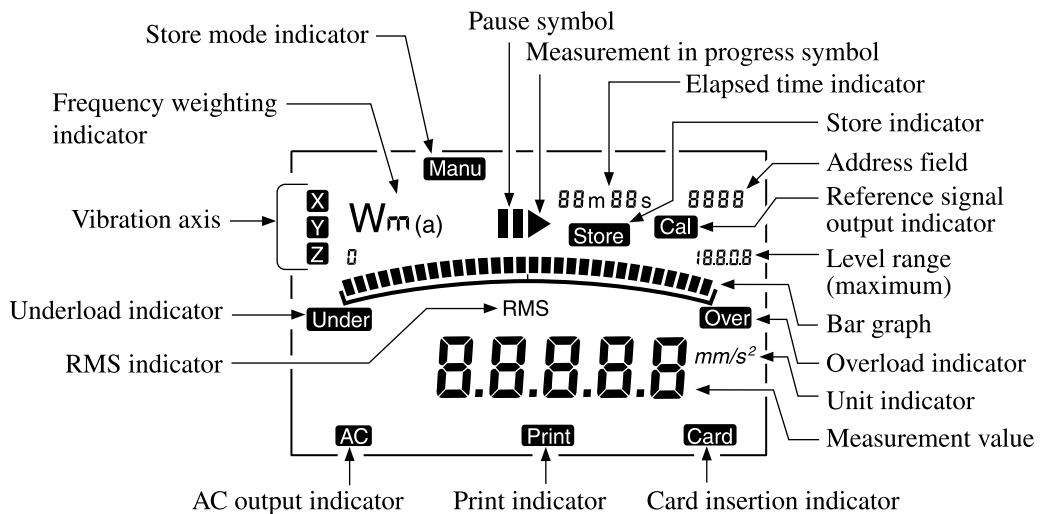
Menu screen 3/3

Set to On and press Mode key  
 to start VX-54FT program

# Main Display

## Reading the main display

The illustration below is for demonstration purposes only. In actual use, not all display elements will be visible at the same time.



### Store mode indicator

The indication **Manu** appears here, showing that manual store is used.

### Pause symbol

Appears when the unit is in pause mode.

### Measurement in progress symbol

Flashes during measurement.

### Elapsed time indicator

Shows the elapsed time during measurement.

### Store indicator

Appears when data are being stored on memory card.

### **Address field**

Shows the address.

### **Reference signal output indicator**

Appears when the Ref. Signal key (Cal key) was pressed and the reference signal is being output.

### **Level range (maximum)**

Shows the maximum (full-scale) value for the bar graph, as set with the level range keys.

When the level range setting is 30, 300, or 3000, the range full scale value is 31.624, 316.24, and 3162.4 respectively.

### **Bar graph**

A bar graph corresponding to the measurement value is shown here. The display is based on the exponential average using a time constant of 1 second, and the display update frequency is 100 ms.

### **Overload indicator**

Appears when overload in the instantaneous value was detected.

### **Unit indicator**

Shows the unit.

### **Measurement value**

The measurement result is shown here. When the VM-54 is performing FFT analysis, the rms value with a time constant of 1 s is shown. When the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH is used, the rms value with an integration time of 1 s is shown.

### **Card insertion indicator**

Appears when a card is inserted in the card slot.

### **Print indicator**

Flashes while data are being sent to the printer.

### **AC output indicator**

Shows that the outputs supply an AC signal.

## RMS indicator

Indicates that rms values are shown.

## Underload indicator

Appears when underload in the instantaneous value was detected.

## Vibration axis

Shows which vibration axis is currently selected for measurement value display.

The axis is selected with the X/Y/Z keys.

## Frequency weighting indicator

Shows the frequency weighting characteristic that is applied when the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH program is used for analysis. In 3-Axis Vibration Meter VM-54 mode, the response is flat, and this indicator does not appear.

FFT analysis operation mode	Frequency weighting characteristics
Whole Body Vibration Card VX-54WB	Wk/Wd/Wb/Wc/Wj/Wm/Flat When whole-body vibration bandwidth is limited, an "a" is appended.
Hand-Arm Vibration Card VX-54WH	Wh/Wha
Marine Vibration Card VX-54WS	Wm/Wma/Flat
3-Axis Vibration Meter VM-54	Flat

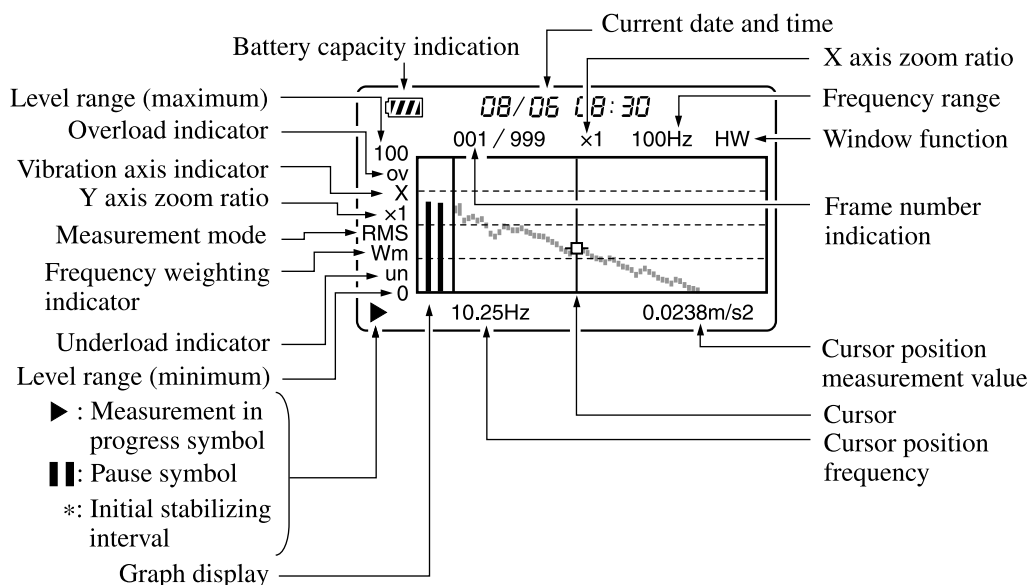
When response is flat, the frequency response upper limit is 1 kHz.

# Sub Display

The sub display can be switched between the FFT analysis screen, 3-axis bar graph, and 3-axis measurement value screen.

The illustration below is for demonstration purposes only. In actual use, not all display elements will be visible at the same time.

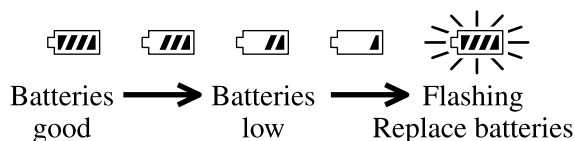
## FFT analysis screen



FFT analysis screen example

## Battery capacity indication

When the unit is operating on battery power, you should periodically check the battery capacity indicator. The number of black segments decreases as the batteries get weaker. When the display starts to flash, correct measurement is no longer possible. Replace the batteries with a fresh set.



While the unit is powered from the AC adapter, the battery capacity indication is always at maximum.

### Current date and time

Shows the month, day, hours, and minutes.

### X axis zoom ratio

Shows the X axis zoom ratio, as set with menu screen 1/6. The zoom ratio can be set to  $\times 1$ ,  $\times 2$ , or  $\times 4$ .

### Frequency range

Shows the upper limit of the measurement frequency range.

### Window function

Shows the window function, as selected on menu screen 1/6.

HW: Hanning window

RW: Rectangular window

### Frame number indication

Shows the number of frames for processing, as selected on menu screen 1/6.

### Cursor position measurement value

Shows the measurement value at the cursor position.

### Cursor position frequency

Shows the frequency at the cursor position. The cursor position can be changed with the ◀, ▶ keys. The cursor movement increment depends on the selected frequency bandwidth.

50 Hz: 0.125 Hz steps

100 Hz: 0.25 Hz steps

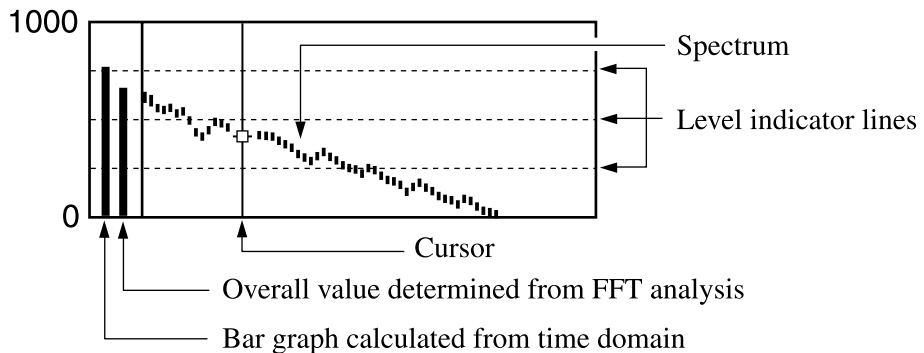
200 Hz: 0.5 Hz steps

500 Hz: 1.25 Hz steps

1 kHz: 2.5 Hz steps

## Graph display

Shows the analysis result for each band.



O.A.(W): The overall value as determined from the time domain is shown as the leftmost bar graph.

If frequency weighting is selected, this value reflects the frequency weighting characteristics.

The indication can be turned On and Off on menu screen 1/6.

When analysis is carried out with VM-54LIN, the setting is Off.

O.A. (FFT):

The overall value as determined from FFT analysis is shown as the second bar graph from the left.

If frequency weighting is selected, this value reflects the frequency weighting characteristics.

If the Partial O.A. item on menu screen 2/6 is set to On, the overall value for the selected frequency range is shown.

In this case, the indication shows "P.O.A. (FFT)".

P.O.A.(FFT):

If the Partial O.A. item on menu screen 2/6 is set to On, the overall value determined from FFT analysis for the selected frequency range is shown as the second bar graph from the left.

Spectrum: Shows the measurement value for each frequency.

Depending on the display zoom setting, the target data are searched and the coordinate position is determined.



When X axis zoom ratio setting is " $\times 1$ "

The zoom ratio for the individual X axis in the spectrum display is 1, and all data (400 data) are shown on the screen.

When X axis zoom ratio setting is " $\times 2$ "

The zoom ratio for the individual X axis in the spectrum display is 2, and all data (200 data) are shown on the screen.

When X axis zoom ratio setting is " $\times 4$ "

The zoom ratio for the individual X axis in the spectrum display is 4, and all data (100 data) are shown on the screen.

<b>Note</b>			
The display update frequency for the measurement value at each frequency and the O.A.(FFT) or P.O.A.(FFT) is as shown below.			
Frequency span	Display update frequency	Frequency span	Display update frequency
50 Hz	approx. 4 second	500 Hz	approx. 1 second
100 Hz	approx. 2 second	1 kHz	approx. 1 second
200 Hz	approx. 1 second	_____	_____

When Y axis zoom ratio setting is " $\times 1$ "

The zoom ratio for the individual Y axis in the analysis graph is 1. The display range in the Y axis direction extends from 0 to the upper limit value.

When Y axis zoom ratio setting is " $\times 4$ "

The zoom ratio for the individual Y axis in the analysis graph is 4. The display range in the Y axis direction extends from 0 to 1/4 of the upper limit value.

When Y axis zoom ratio setting is " $\times 16$ "

The zoom ratio for the individual Y axis in the analysis graph is 16. The display range in the Y axis direction extends from 0 to 1/16 of the upper limit value.

When Y axis zoom ratio setting is " $\times 64$ "

The zoom ratio for the individual Y axis in the analysis graph is 64. The display range in the Y axis direction extends from 0 to 1/64 of the upper limit value.

When Y axis zoom ratio setting is " $\times 256$ "

The zoom ratio for the individual Y axis in the analysis graph is 256. The display range in the Y axis direction extends from 0 to  $1/256$  of the upper limit value.

**\*: Initial stabilizing interval**

Flashes in the interval after power was turned on until operation has stabilized (about 30 seconds). Do not operate any controls during this interval.

**||: Pause symbol**

Appears when measurement is in the paused condition. During this interval, the measurement value will not be updated.

**►: Measurement in progress symbol**

Flashes during measurement.

**Level range (minimum)**

Indicates the lower limit of the level range for the graph display.

**Underload indicator (un)**

Appears when underload during processing was detected at least once. The indication remains on until the start of the next processing cycle.

During recall, the indicator appears when the recalled data contain underload signal information.

**Frequency weighting indicator**

Shows the selected frequency weighting characteristics.

This setting is reflected in the overall value and the spectrum indication.

**Measurement mode**

Shows the selected measurement mode. The setting is switched with the Mode key.

IST: Instantaneous value mode

LIN: Linear averaging mode

MAX: Maximum value processing mode

RMS: Effective value mode

## Y axis zoom ratio

Shows the Y axis zoom ratio.

The ▲, ▼ keys can be used to switch the zoom ratio as follows:

× 1 ↔ × 4 ↔ × 16 ↔ × 64 ↔ × 256

## Vibration axis indicator

Shows which vibration axis is currently selected for measurement value display.

## Overload indicator (ov)

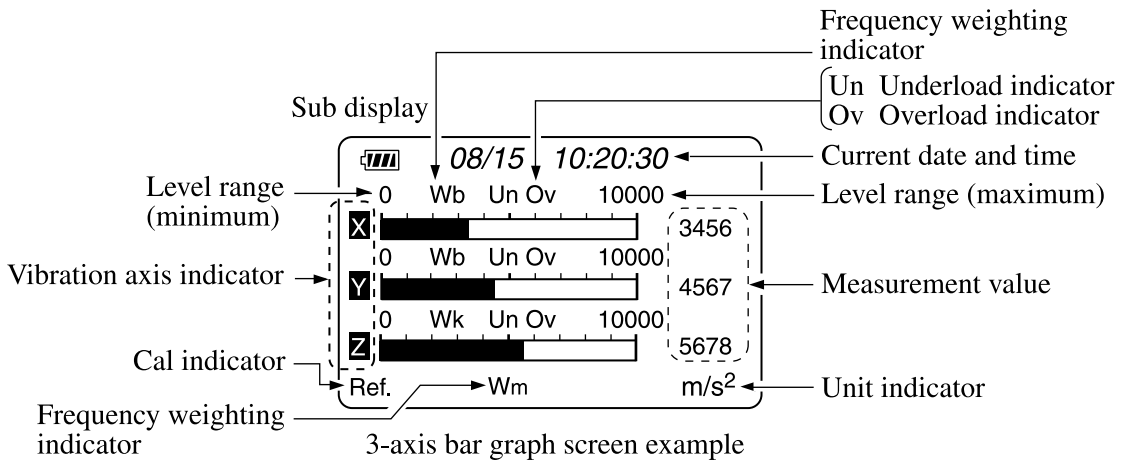
When signal overload is detected, the indication "ov" appears.

## Level range (maximum)

Indicates the upper limit of the level range for the graph display.

Note
When the level range was changed for a channel other than currently shown on the analysis screen, the sub display switches to the 3-axis bar graph display.

## 3-axis bar graph screen



### Frequency weighting characteristics

Shows the selected frequency weighting characteristics.

With the VX-54WB, the indication appears over each bar graph.

With other programs, the indication appears under the Z channel bar graph.

When frequency response is flat, no frequency weighting indication appears.

The frequency weighting setting is reflected in the overall value, the spectrum, and the AC output.

### Underload indicator (Un)

Appears when underload in the signal was detected.

### Overload indicator (Ov)

Appears when overload in the signal was detected.

### Current date and time

Shows the month, day, hours, and minutes.

### Level range (maximum)

Indicates the upper limit of the level range for the graph display.

### Measurement value

Shows the measured value as a numeric indication.

### Unit indicator

Shows the measurement unit.

**Cal indicator**

When the unit is operating as 3-Axis Vibration Meter VM-54, the "Cal" indicator is shown. When the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH is used, the "Ref" indicator is shown.

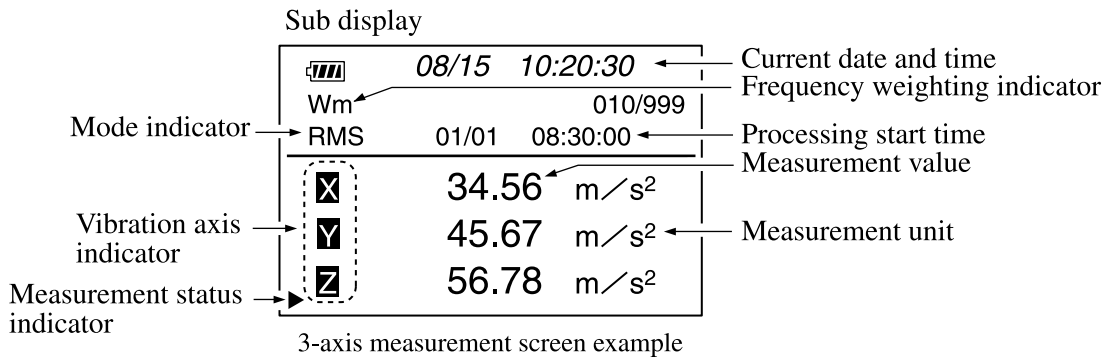
**Vibration axis indicator**

Shows the vibration axis of the measurement.

**Level range (minimum)**

Indicates the lower limit of the level range for the graph display.

### 3-axis measurement screen



#### Current date and time

Shows the month, day, hours, and minutes.

#### Frequency weighting characteristics

Shows the selected frequency weighting characteristics.

When frequency response is flat, no frequency weighting indication appears.

#### Processing start time

In RMS mode and MAX mode, the processing start time is shown. After power-on and before processing has started, the indication shows "01/01 00:00:00".

#### Measurement value

Shows the measured value as a numeric indication.

#### Measurement unit

Shows the measurement unit.

#### Measurement status indicator

During measurement, ► is shown here. During pause, ■■ is shown. After power was turned on until operation has stabilized, \* is shown.

#### Vibration axis indicator

Shows the vibration axis of the measurement.

#### Mode indicator

Shows the selected measurement mode (RMS or MAX).

# Measurement

## Measurement procedure

Note
When the unit is turned on, the settings selected before the unit was last turned off will be reestablished. Therefore the indication may not be the same every time.

### About measurement modes

When this card is used for FFT analysis in the 3-Axis Vibration Meter VM-54 and no other program is installed, the following three measurement modes are available: IST mode, LIN mode, MAX mode.

When a program of the Marine Vibration Card VX-54WS, Whole Body Vibration Card VX-54WB, or Hand-Arm Vibration Card VX-54WH is installed, the following three measurement modes are available: IST mode, RMS mode, MAX mode.

In each case, the Mode key is used to switch among modes.

FFT analysis is possible only for the currently selected mode.

IST mode: FFT analysis result for one frame is shown.

Note
A "frame" refers to a set of time series data or frequency range data necessary for FFT processing. The time for one frame depends on the analysis bandwidth setting.

$$Y_n = \sqrt{\frac{1}{n} \sum_{i=1}^n X_i^2}$$

RMS mode: FFT analysis result for a number of average frames is shown.

$Y_n$ : Averaged data

$X_i$ : Individual frame data

$i$ : 1, 2, 3...n

$n$ : Number of frames to be averaged

MAX mode: FFT analysis result for maximum value in each frequency over measurement time is shown.



## IST mode

After power-on, the IST mode is selected.

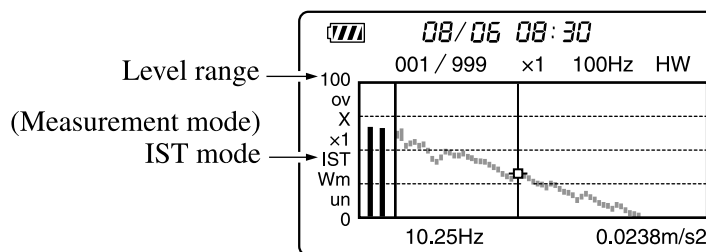
In IST mode, measurement starts when the measurement screen appears. Therefore there is no need to start or stop the operation with the Start/Stop key. The level indication is updated, but the elapsed time indication remains at 000.

1. When the display indicates another mode, press the Mode key to set measurement mode to IST.
2. Press the Menu key to display menu screen 1/6, and make the required settings for frequency span, window function, cursor position, etc.

### Note

The Frame No. item need not be set (can be any value).

3. Press the Menu key to bring up the measurement screen.



4. Set the level range with the Level Range keys. Make the setting so that the graph is centered.

If overload occurs during measurement, the indication **ov** appears. If underload occurs during measurement, the indication **un** appears. If the **ov** or **un** indication appears frequently, change the level range setting.

You can move the cursor position with the ◀, ▶ keys. The frequency and level value for the cursor position are shown as a numeric indication at the bottom of the screen.

By pressing the Pause/Cont key, you can pause and resume the level indication. During pause, the ■■ symbol is shown.

The X axis and Y axis on the analysis screen can be zoomed for display.

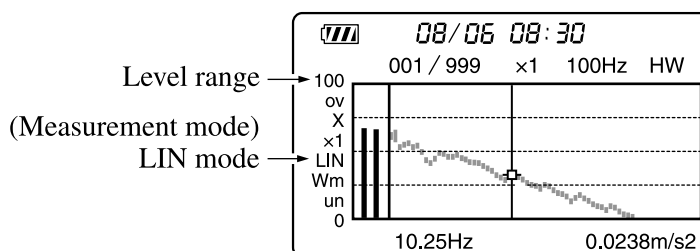
## LIN mode (VM-54 mode only)

1. Press the Mode key to set measurement mode to LIN.

**Note**

When you switch to LIN mode by pressing the Mode key, some data may be shown on the display. These are measurement results from the last time that LIN mode was used. Simultaneous measurement in LIN mode and MAX mode is not possible.

2. Press the Menu key to display menu screen 1/6, and make the required settings for frequency span, display zoom ratio, number of frames, window function, and cursor position.
3. Press the Menu key to bring up the measurement screen.



4. Set the level range with the Level Range keys. Make the setting so that the bar graph display is centered.  
If the **ov** or **un** indication appears frequently, change the level range setting.

**Note**

After the measurement was started, the level range setting cannot be changed. Before starting measurement in LIN mode, check that the level range setting is suitable in IST mode.

5. Press the Start/Stop key to start the measurement.  
During measurement, the ► symbol indicating that measurement is in progress flashes, and the elapsed time is displayed.

6. You can move the cursor position with the ◀, ▶ keys. The frequency and level value for the cursor position are shown as a numeric indication at the bottom of the screen.
7. By pressing the Pause/Cont key during measurement (processing), you can pause and resume the measurement (processing) result display. The pause interval is not included in the measurement time. During pause, the ■■ symbol is shown.
8. When the number of frames set in step 2 has been processed, the measurement stops automatically. To stop the measurement before that, press the Start/Stop key.
9. If overload occurs at least once during measurement, the indication "ov" appears. If underload occurs at least once during measurement, the indication "un" appears. Therefore, if "ov" or "un" is shown at the end of the measurement, the processing value includes overload or underload data.

<b>Important</b>
During processing, most keys including the Level Range keys are inactive. Only the following keys operate: Start/Stop, Pause/Cont, ◀, ▶, Light You must establish all required settings before starting the measurement.

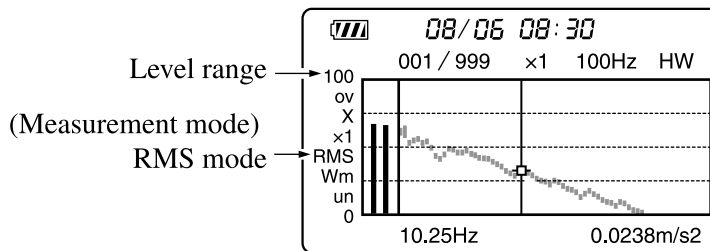
The X axis and Y axis on the analysis screen can be zoomed for display.

## RMS mode (VX-54WS, VX-54WB, VX-54WH)

1. Press the Mode key to set measurement mode to RMS.

<b>Note</b>
When you switch to RMS mode by pressing the Mode key, some data may be shown on the display. These are measurement results from the last time that RMS mode was used. Simultaneous measurement in RMS mode and MAX mode is not possible.

2. Press the Menu key to display menu screen 1/6, and make the required settings for frequency span, display zoom ratio, number of frames, window function, and cursor position.
3. Press the Menu key to bring up the measurement screen.



4. Set the level range with the Level Range keys. Make the setting so that the bar graph display is centered.  
If the **ov** or **un** indication appears frequently, change the level range setting.

<b>Note</b>
After the measurement was started, the level range setting cannot be changed. Before starting measurement in RMS mode, check that the level range setting is suitable in RMS mode.

5. Press the Start/Stop key to start the measurement.  
During measurement, the ► symbol indicating that measurement is in progress flashes, and the elapsed time is displayed.

6. You can move the cursor position with the ◀, ▶ keys. The frequency and level value for the cursor position are shown as a numeric indication at the bottom of the screen.
7. By pressing the Pause/Cont key during measurement (processing), you can pause and resume the measurement (processing) result display. The pause interval is not included in the measurement time. During pause, the ■■ symbol is shown.
8. When the number of frames set in step 2 has been processed, the measurement stops automatically. To stop the measurement before that, press the Start/Stop key.
9. If overload occurs at least once during measurement, the indication "ov" appears. If underload occurs at least once during measurement, the indication "un" appears. Therefore, if "ov" or "un" is shown at the end of the measurement, the processing value includes overload or underload data.

<b>Important</b>
During processing, most keys including the Level Range keys are inactive. Only the following keys operate: Start/Stop, Pause/Cont, ◀, ▶, Light You must establish all required settings before starting the measurement.

The X axis and Y axis on the analysis screen can be zoomed for display.

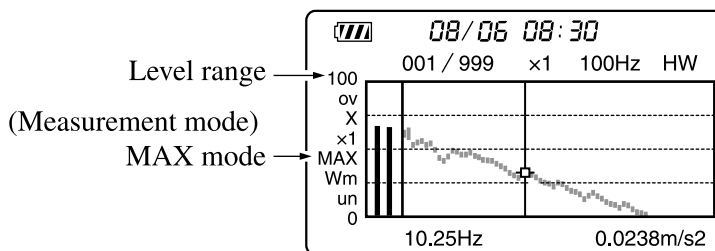
## MAX mode

1. Press the Mode key to set measurement mode to MAX.

### Note

When you switch to RMS mode by pressing the Mode key, some data may be shown on the display. These are measurement results from the last time that MAX mode was used. Simultaneous measurement in LIN mode and MAX mode is not possible.

2. Press the Menu key to display menu screen 1/6, and make the required settings for frequency span, display zoom ratio, number of frames, window function, and cursor position.
3. Press the Menu key to bring up the measurement screen.



4. Use the W\*/W\*(a) key to select the frequency weighting characteristics.
5. Set the level range with the Level Range keys. Make the setting so that the bar graph display is centered.

If the **ov** or **un** indication appears frequently, change the level range setting.

### Note

After the measurement was started, the level range setting cannot be changed. Before starting measurement in MAX mode, check that the level range setting is suitable in IST mode.

6. Press the Start/Stop key to start the measurement.  
During measurement, the ► symbol indicating that measurement is in progress flashes, and the elapsed time is displayed.

7. You can move the cursor position with the ◀, ▶ keys. The frequency and level value for the cursor position are shown as a numeric indication at the bottom of the screen.
8. By pressing the Pause/Cont key during measurement (processing), you can pause and resume the measurement (processing) result display. The pause interval is not included in the measurement time. During pause, the ■■ symbol is shown.
9. When the number of frames set in step 2 has been processed, the measurement stops automatically. To stop the measurement before that, press the Start/Stop key.
10. If overload occurs at least once during measurement, the indication "ov" appears. If underload occurs at least once during measurement, the indication "un" appears. Therefore, if "ov" or "un" is shown at the end of the measurement, the processing value includes overload or underload data.

<b>Important</b>
During processing, most keys including the Level Range keys are inactive. Only the following keys operate: Start/Stop, Pause/Cont, ◀, ▶, Light You must establish all required settings before starting the measurement.

The X axis and Y axis on the analysis screen can be zoomed for display.

## Menu screen in pause mode

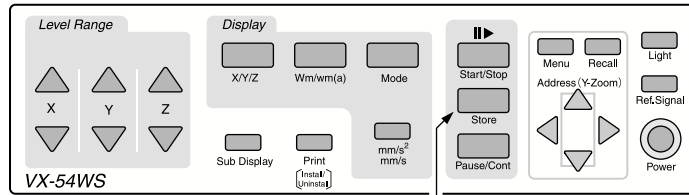
If there are vibrations that you want to exclude from processing during LIN, RMS, or MAX mode measurement, press the Pause/Cont key to set the unit to the pause condition. Press the key again to resume processing. In IST mode, the data display update can be paused and resumed with this key. In the pause condition, only the Store, Pause/Cont, Menu, X/Y/Z, ◀, ▶, Light, Sub Display, and Print keys are active. By pressing the Menu key, you can set the X axis zoom ratio and control cursor movement.



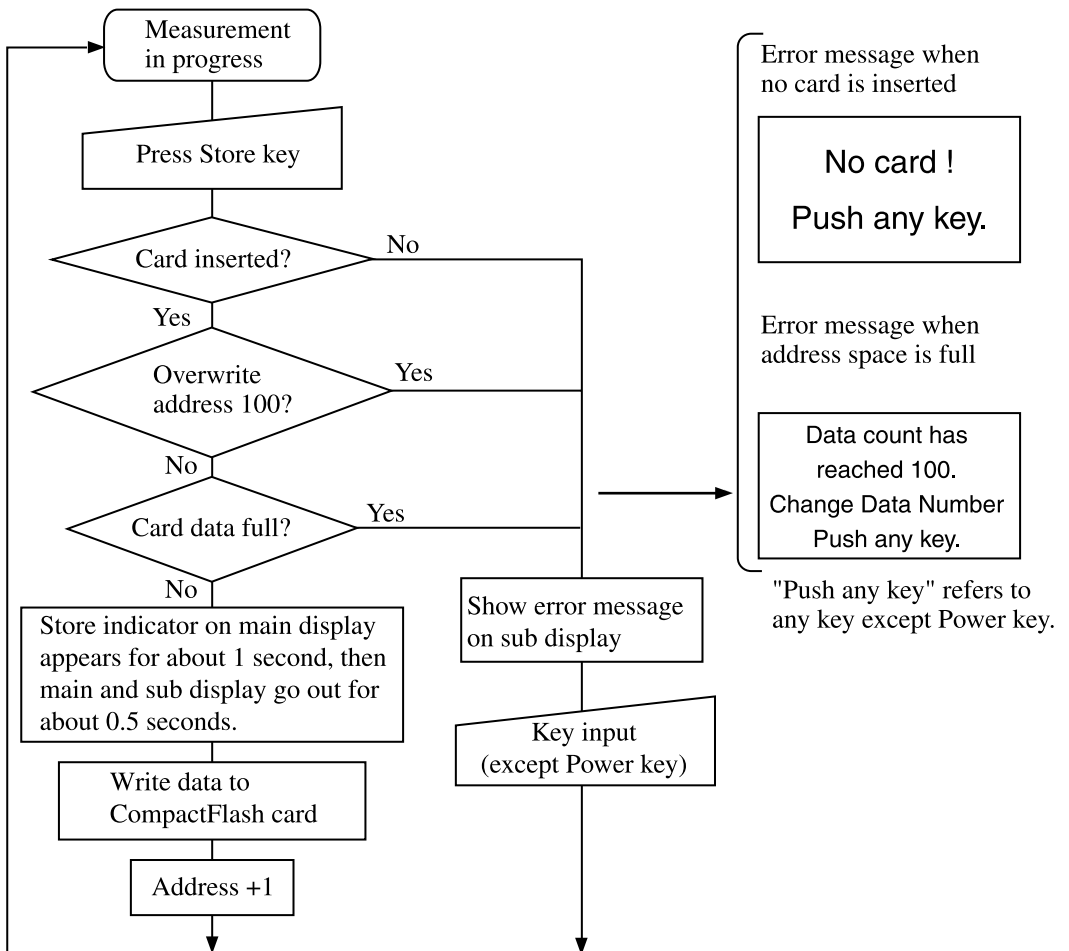
# Memory Operations

## Data storage

The VX-54FT offers only manual store. Data are stored at the point when the Store key is pressed.



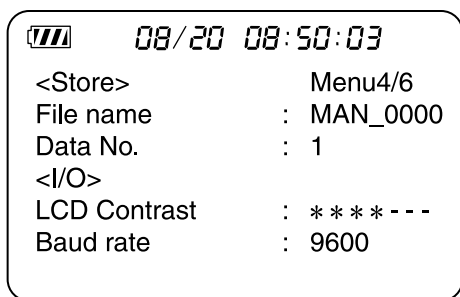
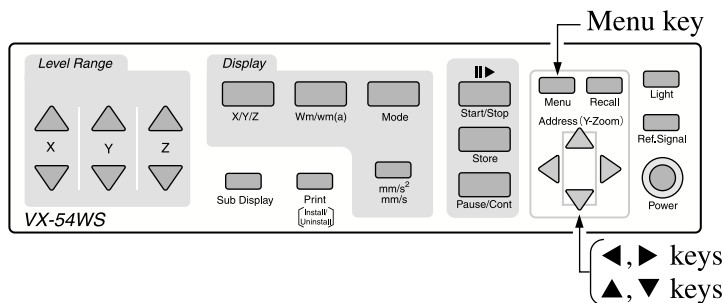
Store key



Data can be stored only on the VX-54FT card. Each file with a unique file name can contain up to 100 data sets numbered 1 to 100. One set of data comprises FFT data for 3 channels.

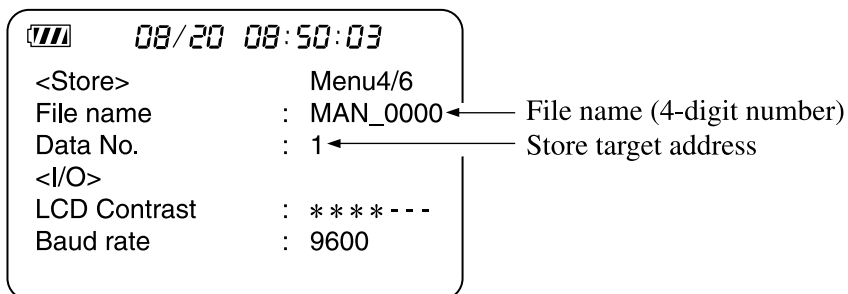
The procedure for storing data on the VX-54FT card is as follows.

1. Press the Menu key to bring up menu screen 4/6.



Menu screen 4/6

2. Specify a 4-digit number for the "File name" item.  
Use the ▲, ▼ keys to move the cursor, and use the ◀, ▶ keys to increase or decrease the number two digits at a time.
3. Specify the store target address for the "Data No." item.  
Use the ◀, ▶ keys to set the number in the range from 1 to 100.



Menu screen 4/6

<b>Important</b>
The unit does not check if there are data to store. When the Store key is pressed, any data that are present in the selected address will be overwritten. Use the recall function to check whether there are any data in the address that you want to keep.

4. Press the Menu key to go to the measurement screen.
5. Perform measurement (or processing). For information on measurement and processing principles, see the preceding section "Measurement" (page 35).

6. In IST mode, the measurement data at the point when the Store key is pressed will be stored on the VX-54FT card.

In LIN mode, RMS mode, and MAX mode, the Store key should be pressed after measurement is completed or when measurement is paused. The displayed measurement result as well as the measurement settings will be stored on the VX-54FT card.

The store process takes about 10 seconds, and the "Data No." will be incremented by 1. With each push of the Store key, the current measurement data are stored in the address indicated by the "Data No." display.

The stored data comprises the overall level values (or processing results) for each frequency as well as the measurement parameters.

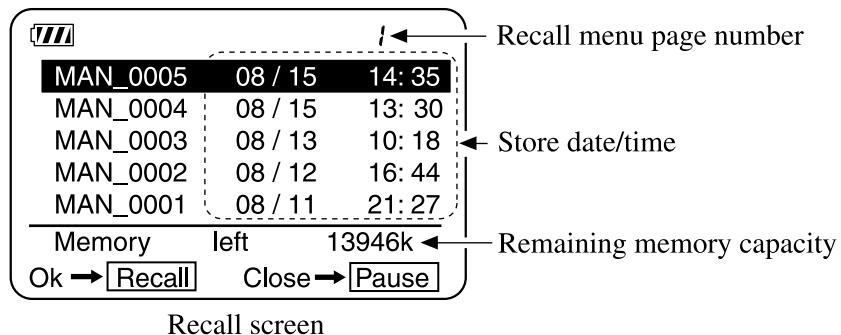
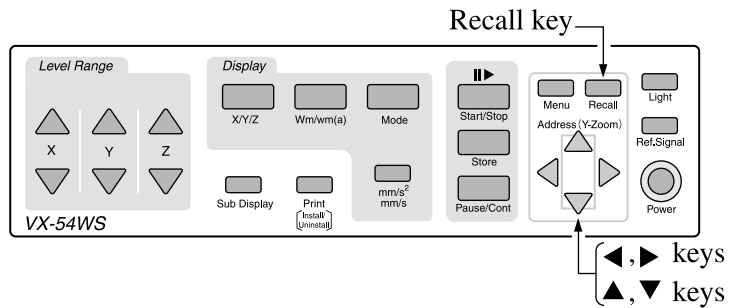
<b>Important</b>
Never turn power off or remove the card while data are being stored. Otherwise program data or internal parts of the unit may be destroyed.

<b>Note</b>
If you press the Store key while the "Data No." is 100, the "100" indication flashes. This indicates that data cannot be stored in this condition. Change the "Data No." item on menu screen 4/6.

## Reading stored data

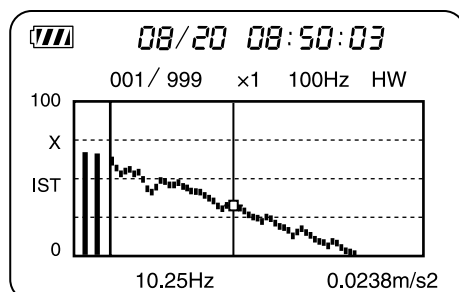
Data stored on the VX-54FT card can be called up as follows.

1. Press the Recall key to bring up the recall screen. Files with stored data are listed in descending order of measurement date, with the most recent file at the top.



Recall screen

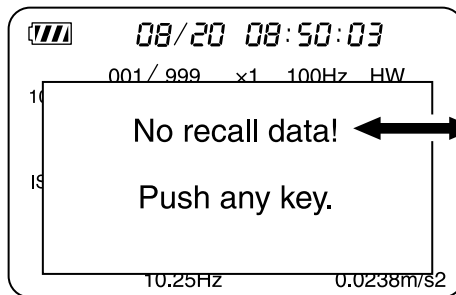
2. Use the ▲, ▼ keys to select the file you want to call up. (The file name is shown in reverse.)
3. Press the Recall key. The data of the selected file are shown on the screen. To change the address (Data No.), use the Start/Stop key and Pause/Cont key.



Recall data screen

4. You can use the ◀, ▶ keys to move the cursor and check the level for the respective frequency.
5. To return to the recall screen, press the Recall key.
6. To finish recall mode, press the Pause/Cont key.

If there are no data to recall, the following indication is shown.



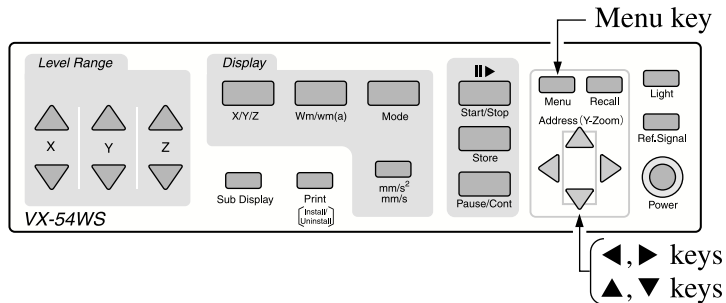
**No recall data!**

The indication "No recall data" alternates between normal and reverse display.

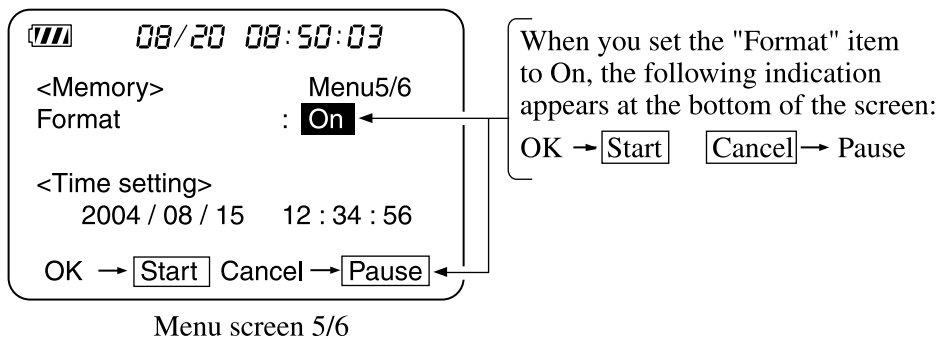
## Clearing data

To clear all data stored on the VX-54FT card, proceed as follows.

1. Press the Menu key to bring up menu screen 5/6.



2. Use the ◀, ▶ keys to set the "Format" item to On.
3. When you set the "Format" item to On, a screen such as shown below appears. If you wish to proceed with erasing all data, press the Start/Stop key.



4. All stored data on the card are cleared, and the "Format" item on menu screen 5/6 returns to the "Off" condition.

### Note

It is not possible to clear only specified address data or specified file data. Only bulk clearing of all data on the card is possible. Use this function with care.

Note that the Microsoft Excel file for processing data that is included on the card will also be erased.

## Store data format

The data stored on the memory card are in CSV format. A structure of folders and files is created on the memory card.

The subdirectory name uses the lower 4 digits of the file name as specified on the menu screen.

The file structure of data stored on the card is as shown below. One set of data is stored as 2 lines.

CompactFlash card -- \VX-54FT -- \MAN\_\*\*\*\* -- \MAN\_\*\*\*\*.csv

\*\*\*\* stands for a number specified via the menu screen.

The data on the card are stored in the order header, address 1 data, address 2 data ... address 100 data.

### Header section

The header section takes up the first 4 lines.

Header, line 1

VX-54FT, CPUV\*.\*\*\*\*,DSPV\*.\*\*\* ↓

Header, line 2

Address, Calculation mode, Time-weight, Store time/Beginning time, Freq. Span (Hz), Frame No., Window, m/s<sup>2</sup> / mm/s<sup>2</sup> / mm/s, Partial Over All (Min), Partial Over All (Max) ↓

Header, line 3

Channel, Level Range, Frequency-Weight, O.A. (W), O.A. (FFT), No. 1, No. 2,..., No. 200 ↓

Header, line 4

No. 201, No. 202,..., No. 399, No. 400, Over, Under, Pause ↓

## Data section

The data section starts at line 5, after the header.

Because the 3-channel data for one address take up 7 lines, the data for address 1 are on lines 5 to 11, the data for address 2 are on lines 12 to 18, and so on.

Data section, line 1

Data contents corresponding to line 2 of header

Data section, line 2

X channel data contents corresponding to line 3 of header

Data section, line 3

X channel data contents corresponding to line 4 of header

Data section, line 4

Y channel data contents corresponding to line 3 of header

Data section, line 5

Y channel data contents corresponding to line 4 of header

Data section, line 6

Z channel data contents corresponding to line 3 of header

Data section, line 7

Z channel data contents corresponding to line 4 of header



Title	Description
Address	Address number
Calculation mode	Processing mode
Time-weight	Spare
Store time/Beginning time	Store date/time, measurement start date/time
Freq. Span (Hz)	Frequency bandwidth
Frame No.	Number of frames for processing
Window	Window function
m/s <sup>2</sup> , mm/s <sup>2</sup> , mm/s	Unit
Partial Over All (Min)	Lower frequency limit for partial overall value
Partial Over All (Max)	Upper frequency limit for partial overall value
Channel	Channel
Level Range	Level range
Frequency-Weight	Frequency weighting characteristics
O. A. (W)	Overall value calculated from time domain
O. A. (FFT)	Overall value calculated from FFT synthesis
No. 1 to No. 400	Measurement value for each line
Over	Overload
Under	Underload
Pause	Pause

# Printing

An optional printer can be connected to the unit to produce hard copy of measurement values.

For information on how to connect and set up the printer, see the documentation of the VM-54.

## Printing measurement parameter information (menu screens)


You can produce hard copy of the displayed menu screens.

1. Press the Menu key to bring up the menu screen display.
2. Use the Menu key to select the menu screen (1/6 to 6/6) that you want to print.
3. Press the Print key.

A sample printout is shown below. The actual font and size may differ.

Sample printout

Menu screen 1/6 printout example

	08/22	10:20:55
<FFT Analyze>		Menu1/6
Freq. Span	:	100Hz
Frame No.	:	1
Window	:	HANN
O.A.(W)Disp.	:	On
Display X-Zoom	:	×1
Cursor Position	:	O.A.

## Printing measurement data

You can produce hard copy of the displayed measurement screen with graph data.

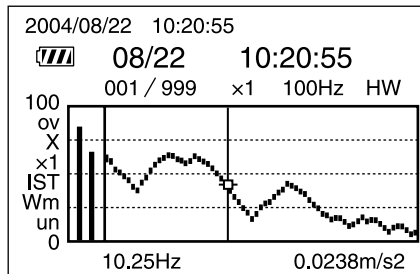
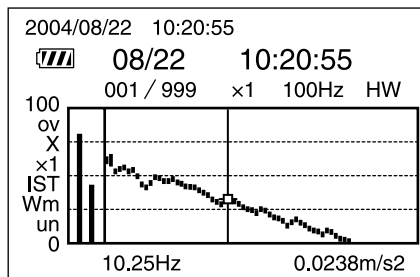
During measurement, press the Print key.

Measurement data at the point when the Print key is pressed will be printed.

A sample printout is shown below. The actual font and size may differ.

Sample printout

IST mode printout example



# Factory Defaults

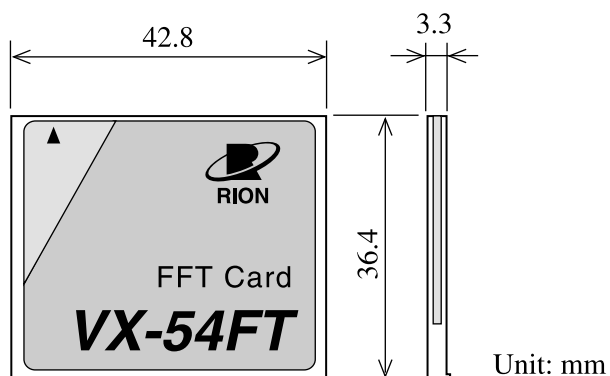
The factory default settings (initial settings) of the unit are listed below.

FFT analysis mode:	IST
Freq. Span (frequency bandwidth):	100 Hz
Frame No. (number of frames):	10
Window (window function):	HANN
O.A.(W) Disp:	On
Display X-Zoom:	×1
Cursor Position:	Freq.
Partial O.A.:	Off
Sensor Type:	PV-83CW
File name:	MAN_0000
Data No. (address):	1
LCD Contrast:	*****_
Baud rate:	19200 (bps)
Format:	Off

If you turn power on while holding down the Start/Stop key, the unit comes up with the following settings. The date/time setting and the memory contents are not reset.

# Specifications

Media	64 MB CompactFlash card
Dimension, Mass	36.4 (H) × 42.8 (W) × 3.3 (D) mm, 8 to 11.4 g
Equipment compatibility	3-Axis Vibration Meter VM-54, or VM-54 with one of the following option programs installed: VX-54WS Marine Vibration Card VX-54WB Whole Body Vibration Card VX-54WH Hand-Arm Vibration Card
Supplied accessories	Instruction manual 1 Inspection certificate 1



Dimensional drawing

## Specifications for 3-Axis Vibration Meter VM-54 with FFT Analysis Card VX-54FT program installed

Measurement items For the following 3 items, 3 channels are measured simultaneously

- 1) FFT processed spectrum display
- 2) Effective value (O.A.) calculated from time domain
- 3) O.A. value \* calculated from frequency domain (FFT result)

\* Partial overall value for a specified frequency range can also be calculated.

Measurement channels X, Y, Z (3 channel simultaneous analysis)

Frequency range settings

50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz

Frequency span	Sampling frequency	Sampling interval	Frame time	Frequency resolution
50 Hz	128 Hz	7.8125 ms	8 s	0.125 Hz
100 Hz	256 Hz	3.90625 ms	4 s	0.25 Hz
200 Hz	512 Hz	1.953125 ms	2 s	0.5 Hz
500 Hz	1.28 kHz	0.78125 ms	0.8 s	1.25 Hz
1 kHz	2.56 kHz	0.390625 ms	0.4 s	2.5 Hz

Window functions Hanning, Rectangular

Number of analysis lines

400 (excluding DC component)

Processing functions Instantaneous value, RMS method, maximum value

Display screens Main display: Shows instantaneous value in specified channel (rms with 1 second integration time) and processing value

Sub display: Shows FFT analysis result in specified channel and overall value simultaneously

Number of display lines: 100

X axis: Frequency (Hz)

Display zoom factor settings:

×1, ×2, ×4

Y axis: Linear

Display zoom factor settings:

×1, ×2, ×4, ×16, ×64, ×256

Menu screen, recall screen

### Frequency weighting characteristics

Available frequency weighting settings depend on operating environment.

VM-54: Flat (0.5 to 1000 Hz)

VX-54WS: W<sub>m</sub>, bandwidth control compensation characteristics (1 to 80 Hz), flat (0.5 to 1000 Hz)

VX-54WB: W<sub>m</sub>, W<sub>b</sub>, W<sub>c</sub>, W<sub>d</sub>, W<sub>j</sub>, W<sub>k</sub> and bandwidth control compensation characteristics (0.5 to 80 Hz or 1 to 80 Hz), flat (0.5 to 1000 Hz)

VX-54WH: W<sub>h</sub> and bandwidth control compensation characteristics (8 to 1000 Hz)

### Number of processing frames

max. 999 (selectable in 1-frame steps)

Overlap 50% (no overlap at 1 kHz)

Level range Selectable level range depends on operating environment and sensor type. Velocity setting available for VX-54WS only.

With PV-83CW Acceleration (VX-54WS):

30, 100, 300, 1000, 3000, 10000 mm/s<sup>2</sup>

Acceleration (VX-54WB, VX-54WH, VM-54):

0.03, 0.1, 0.3, 1, 3, 10 m/s<sup>2</sup>

Velocity:

1, 3, 10, 30, 100, 300 mm/s

## With charge or CCLD sensor and acceleration measurement

- When sensitivity setting is 0.0100 to 0.0999 mV/(m/s<sup>2</sup>) \*  
30, 100, 300, 1000, 3000, 10000 m/s<sup>2</sup>
- When sensitivity setting is 0.100 to 0.999 mV/(m/s<sup>2</sup>) \*  
3, 10, 30, 100, 300, 1000, 3000, 10000 m/s<sup>2</sup>
- When sensitivity setting is 1.00 to 9.99 mV/(m/s<sup>2</sup>) \*  
0.3, 1, 3, 10, 30, 100, 300, 1000 m/s<sup>2</sup>
- When sensitivity setting is 10.0 to 99.9 mV/(m/s<sup>2</sup>) \*  
0.03, 0.1, 0.3, 1, 3, 10, 30, 100 m/s<sup>2</sup>

\* Sensitivity units are mV/(m/s<sup>2</sup>) for CCLD sensor and pC/(m/s<sup>2</sup>) for Charge sensor.

## With charge or CCLD sensor and velocity measurement

- When sensitivity setting is 0.0100 to 0.0999 mV/(m/s<sup>2</sup>) \*  
1000, 3000, 10000 mm/s
- When sensitivity setting is 0.100 to 0.999 mV/(m/s<sup>2</sup>) \*  
100, 300, 1000, 3000, 10000 mm/s
- When sensitivity setting is 1.00 to 9.99 mV/(m/s<sup>2</sup>) \*  
10, 30, 100, 300, 1000, 3000 mm/s
- When sensitivity setting is 10.0 to 99.9 mV/(m/s<sup>2</sup>) \*  
1, 3, 10, 30, 100, 300 mm/s

\* Sensitivity units are mV/(m/s<sup>2</sup>) for CCLD sensor and pC/(m/s<sup>2</sup>) for Charge sensor.

With PV-57(A) Acceleration: 0.3, 1, 3, 10, 30, 100, 300, 1000 m/s<sup>2</sup>  
Velocity: 10, 30, 100, 300, 1000, 3000 mm/s

Data store function	Manual store on VX-54FT card 3-channel FFT spectrum data stored in CSV format Max. 100 data sets per file (3-channel data form 1 set)
Recall function	Data stored on VX-54FT card can be recalled on sub display
Printing function	Hard copy of sub display contents can be produced on dedicated printer



Outputs	AC output for selected frequency weighting characteristics (O.A.)
Power requirements	AC adapter or IEC R14 (size "C") battery × 4
Battery life	16 hours or more continuous operation (with PV-83CW connected, at room temperature, using alkaline batteries)
Ambient conditions for use	-10 to +50°C, max. 90% RH

