VIBROCK V901 USER INSTRUCTIONS

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INST/MAN/V901/06/22.06.07

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INTRODUCTION

The V901 is an intelligent data logger that can be configured to perform various monitoring operations. It is a lightweight battery powered unit that is designed for use in rugged conditions.

Many options are available and all units can be upgraded as requirements allow.

The basic operation of the V901 is the same, no matter what options are fitted to the unit. For a full description of each function please refer to the relevant section depending on the configuration and options fitted to your particular V901.

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BASIC OPERATION

The V901 is controlled by a microprocessor. There is a 4 line LCD together with 4 button switches to one side. The 4 buttons correspond to the 4 lines on the LCD display. These switches are 'soft' i.e. their function is dependent on what is on the display line. Users will be familiar with this as it is the same as a Bank a.t.m machine (hole in the wall!). When the V901 is off, the display is still active and the microprocessor is in a sleep mode, therefore power consumption is reduced to a minimum.

To turn the unit OFF at any time, press any two of the arrow keys together

There are two 'off' modes, a 'safe mode' where it is safe to remove the batteries and an 'off' mode where the V901 goes into sleep mode, consuming minimal power.

To turn on, press the top (green) button.

In off (sleep) mode, the LCD is active and the set-up parameters are remembered for the next time the V901 is used.

Turn the unit on by pressing the top button - corresponding to the top line of the LCD.

The unit will now go into its start up routine, giving battery voltage, serial number etc. The display will show:-

> VIEW MEMORY
> PILING
> BLASTING
> CUSTOM

The button on the right will act as labelled by the corresponding lines on the LCD.

If no button Presses are made within 4 minutes, the V901 unit will turn itself off.

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In normal operations with one PPV transducer pack, default settings are pre programmed for blasting or piling monitoring.

Simply pressing the BLASTING or PILING button will enable a quick start for monitoring in these modes.

The default settings for PILING are:-

Transducer A
PPV Peak
Continuous mode
20 mmS^{-1} full scale (this is the graph scale)
No timer

The default settings for BLASTING are:-

Transducer A
PPV
Trigger mode
0.5 mmS^{-1} trigger level
No timer

Pressing the **VIEW MEMORY** button will enable the operator to clear the memory or examine the events stored in memory.

The first option is to clear the memory. Usually you will press NO to skip this page and view the memory contents.

If you wish to clear the memory, press YES. A warning will appear before confirming deletion enabling you to escape from the memory erasure.

CLEARING THE MEMORY CLEARS ALL OF IT, NOT JUST ONE EVENT.

When viewing an event in memory, the buttons can be used to scroll through the events. Events on the twin transducer option will have PAGE on the 3rd button down. This is to enable the display to give both the A and B results for that event.

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The type of event, together with the date and time are displayed. Peak values are displayed for that event together with the units of measurement.

The memory has capacity for up to 300 impulsive events. The memory will hold many weeks of continuous vibration histogram events or a mixture of continuous and impulsive events. Memory capacity is variable depending on the type and duration of the events. The memory in the V901 unit is a wrap around type so you will always get the most recent events overwriting the oldest. The memory does not have to be cleared but it is suggested that this is done periodically to speed up downloading to the computer.

The memory is non volatile, so if the battery goes 'flat' the memory will not be lost. The **PRINT** button will enable the event to be printed using the built in thermal printer, if your Seismograph has this option fitted. After pressing the **PRINT** button, open the lid and your event will be printed.

If a button is not touched for 4 minutes while in the Viewing Memory mode, the V901 will turn off to save power.

To escape from the View Memory mode press any two buttons. Then select OFF or MENU.

The **CUSTOM** button enables the operator to set all of the functions of the V901 to enable, for example, the timer mode, change the date or time, change from one transducer to a twin transducer (if fitted) or select another measuring parameter.

If the **CUSTOM** button is pressed, the display will change to:-

ABOUT
CHANGE SETUP
START MONITORING (This line is not present if parameters have not been
previously set up or the power has been removed
when changing batteries)

Pressing the **ABOUT** button will give the software revision for the unit and engineering control codes. The user will not need to use this function. The top button will exit this display and return to the initial display.

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CHANGE SET-UP

When this button is pressed the V901 can be set up for a different operating mode. The options available depend on the factory fitted software and hardware.

The first page shows the current date. A cursor is above the day number. This can be adjusted up or down using the top two buttons. Pressing the select button causes the cursor to move to the month and year numbers. Using the up or down buttons will enable the correct date to be set. Pressing the Enter button will set the date in memory and display the next page.

Time page functions such as the date page, enable the local time to be set. Pressing ENTER will display the next page and set the time in memory.

This page will have the factory fitted options available on the V901 unit.

Use the correct button to enter into the required operational mode for the measuring session.

In trigger or continuous mode, the V901 may be set up to measure in Displacement, Acceleration or Peak Particle Velocity. Usually Peak Particle Velocity (PPV) would be used.

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TRIGGER MODE

The trigger mode is used with the red geophone transducer pack(s). These must be placed firmly in the measuring location and levelled by the use of the adjusting legs. Always tighten the locknuts to avoid any possibility of movement and hence erroneous readings. At particle velocity levels above 5mm/s the use of fixing methods is recommended. Methods of fixing are gluing the levelling feet with rapid epoxy, bolting a clamp over the transducer or placing a sandbag over the transducer. Shallow burial can be used if no other method is possible. It is important to ensure that the transducer is firmly fixed down. If this is not done correctly, the transducer may bounce slightly during a transient vibration. This will always give a HIGH reading.

By pressing the Enter button, the unit can be set up to record in the displacement, acceleration or velocity mode. Select the appropriate button and move to the next page of set-up.

If the option of two transducers is fitted to the unit the next page will enable selection of one or both transducers.

If two tri-axial geophone packs are to be used, there are two options for triggering.

(i) Sensors A and B - This will only allow triggering when vibration is sensed above the trigger threshold on both transducers at the same time. This option is useful when measuring inside and outside a property or to prevent spurious triggering due to localised activity at one of the transducers.

(ii) Sensor A or B - This option enables triggering to occur when ground vibration exceeds the threshold at either of the transducers.

If you require to use only one transducer, ensure that it is plugged into the A socket.

If only one transducer is the factory fitted option, this page will not appear.

The next page will be the Timer function.

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TIMER

Pressing the NO button will skip the use of the timer.
If you require the timer, press Yes to display the start and stop time page. This can be adjusted as was the date and time by using the appropriate keys.

When the timer is in use, recording will start and stop at the same times every day. When the timer is in shutdown mode, the battery consumption is reduced to minimal allowing much longer operation on one battery charge in the field.

The timer function is also used to avoid filling the memory with unwanted data, e.g. no night time measuring needed or only measure during certain time periods.

EVENT NUMBER

This page displays an event number that is incremented by one each time the unit triggers. It can be set by using the appropriate buttons to any number required. It plays no part in the memory allocation or order and is purely for labelling purposes e.g. to identify specific events.

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TRIGGER LEVEL

The V901 will show the trigger level in the units selected previously i.e. in terms of Acceleration (g), Displacement (mm) or usually Peak Particle Velocity (mm/s).

The trigger level is set to enable the unit to respond to an impulsive event only above this pre-set level. The level can be increased or decreased by using the appropriate buttons. Pressing the RESET button will give the factory default of 0.5 mm/s PPV to be rapidly entered without using the other buttons. This is the most commonly used level.

The V901 unit is automatic in use once the trigger level is set for an impulsive event. The unit can measure up to 200mm/s and trigger levels can be set as low as 0.1mm/s PPV. (Caution should be exercised at this extreme low level of vibration as background vibrations often cause a trigger). The length of time of an event is also automatic on the V901 unit. It will record an event from 2 seconds up to a maximum of 18 seconds so long as there is vibration above its trigger level.

ALARMS

This is an option that allows the V901 unit to trigger an external alarm system. The exact configuration of the alarm will depend on customer requirements. These can be audible sirens, flashing lights or high energy strobe lighting.

If the alarm is fitted and is required, the two alarm levels can be set via the four buttons and the LCD. When there is an exceedance of either alarm level, the output from the unit will trigger the external alarm. Any alarm level can be set for the first stage alarm (1) but the second stage alarm (2) must be set to a higher level than the first.

The alarm function will work in trigger or continuous mode and in any of the velocity, acceleration or displacement modes of operation.

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START MONITORING

This is the final set-up page where the start of the monitoring can be commenced, or if No is pressed, the screen will revert to the first page of the set-up procedure.

If the set-up of the unit is carried out before its use is required e.g. the day before etc, it is important to start the unit monitoring before turning off. This will enter the set-up into the memory.

When the unit is then turned on in its monitoring location, the Start Monitoring option can be used from the first page on the LCD and the unit will use the stored operating parameters.

If the Timer mode is in use and the set-up is done in a shut-off time period, the unit will display

TIMED SHUTDOWN
ON AT (TIME)

when the start monitoring is selected.

The unit can be turned on by the top button enabling any changes to be made in the set-up e.g. turning off the timer.

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CONTINUOUS MODE

If this option is chosen the measurement parameters can be selected in units of velocity, acceleration, displacement or resultant ppv.

When the required parameter is selected and the other pages selected i.e. number of transducers, text, timer, etc, the scale of the stored graph must be selected.

This is done via the buttons as before, giving a range from 0.5 to 200 mm/s ppv or corresponding acceleration or displacement levels. The unit will record a maximum event up to 200 mm/s as a number, but if the graph scale for the histogram is set too low, the graph will overload on the subsequent display when downloaded to the PC.

As a rough guide, the 20mm/s range would be used on ground engineering measurements at buildings and the 2mm/s range for background vibration surveys.

In the continuous mode, the LCD will display the largest value recorded in a 10 second period with the display updating every 10 seconds. The results of transducer A or A & B where fitted will be displayed together with the date and time and the units of measurement. This enables an operator in attendance to have a real time appraisal of the vibration levels.

Press NEXT to display the maximum value measured within the current hour. Press NEXT again to display the event maximum value since the start of the current session.

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VIBRATION DOSE MODE

V901 Seismographs configured for Vibration Dose mode are supplied with a gold coloured tri-axial transducer pack, to be only connected to the VDV socket.

The VDV timer will allow an eight and sixteen hour period to be selected for day and night-time operation. Normally the daytime period will start at 07:00 hrs and night-time period at 23:00 hrs.

It is possible to select just daytime measurements, just night-time measurements or both. Each measurement period will be stored as a separate event in memory.

VDV 30 second scale can be selected. This is to allow the full scale of the stored graph to be selected. Each bar on the graph represents the 30 second VDV and should not be confused with the total vibration dose.

Pressing **Start monitoring** will commence the measuring period and the LCD will display the 10 second VDV and the estimated 1 hour VDV.

By pressing the Next arrow button the display can be scrolled to show the sixteen hour predicted (or 8 hour by night) VDV and the total VDV from the start of the measuring period.

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TRANSDUCER MOUNTING

One of the most critical aspects of vibration monitoring is the placement and coupling of the measurement transducer. The accuracy of any seismic reading is only as good as the quality of the connection between the transducer and the ground surface. This connection, known as coupling, is vitally important in obtaining valid results. While it may seem that placing a sensor on firm ground, and even spiking it into the ground, should provide good coupling, often it does not. In order to be sure that the seismograph is faithfully recording the actual motion of the ground, the link between the ground and the sensor must be no less than perfect. The potential for decoupling becomes greater with high particle velocities, associated with high-frequency vibration, i.e. high accelerations. Thus, the problem of decoupling is most often seen when recordings are made at short distances. This is when the highest frequencies are present, as well as the highest particle velocities. At acceleration levels greater than 0.2g the transducer should be buried completely when the measurement surface consists of soil. When done in a careful manner, this is probably the ultimate way of assuring that perfect coupling with the ground is obtained. However, if not done properly, this method can also lead to erroneous readings. A sandbag can also be effective if used properly, being loosely packed and large enough so that, when placed on the sensor, all sides of the bag are resting firmly on the ground surface. When measuring on a firm surface attachment can also be by means of resin or bolting. When recording within a building, bolting or high modulus resin should be used on vertical surfaces. Measurements on floors having compliant coverings should be avoided. British Standard guide 7385: 1990 discusses the mounting of transducers located within buildings in greater detail. The same document discusses monitoring being undertaken at different levels within a building to identify dissipation or magnification as well as simultaneous monitoring on the building foundation and ground outside to establish transfer functions.

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BATTERIES

The V901 uses two 'D' size batteries for monitoring. It is strongly recommended that the V901 is fitted with alkaline batteries such as Duracell™ MN1300, for maximum operating efficiency.

By using the timer function, battery life can be extended.

As a rough guide, under laboratory conditions, the following battery life is likely:-

24 hours on	20 days
12 hours on, 12 hours off	34 days
8 hours on, 16 hours off	45 days
4 hours on, 20 hours off	65 days
2 hours on, 22 hours off	84 days

Field use may give shorter times.

The above table is to be used as a guide only, as battery type, manufacture and temperature will vary the times.

CARE AND MAINTENANCE

The V901 unit is a sensitive piece of electronic recording instrumentation. It is built to be used in the field, but should be protected from the worst of the weather. Placing the instrument in a plastic bag during use in heavy rain or muddy conditions will prolong the life of the unit.

The batteries should be replaced when the percentage battery life (shown on the LCD display) falls to 0%.

Before storing the instrument for a long period, ensure that the batteries are removed and the instrument is clean and dry.

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USE OF PC DOWNLOAD AND PLOTTING SOFTWARE

The CD ROM contains the new and old versions of the V901 software. To install the new version, follow the instructions from Step 1. To install the old version, open the folder 'V901 OLD' on the CD ROM, and double click on 'Vibrock installation file (118kb)'. This will install the old software version - then proceed from Step 5.

1. Insert the software CD ROM. Open the contents of the CD ROM, using 'My computer', and double click on the 'Setup' computer icon.
2. When prompted, click 'OK'. Then click on the 'Computer icon' button.
3. Click on 'continue'.
4. If the following message appears – 'a file being copied is older than the file currently on your system. It is recommended that you keep this file' – click 'YES'.
5. When the software has finished installing, remove the CD ROM.

If you have any problems using this software, please see the trouble shooting section, or contact our Instrumentation Department, on 01773 711211.

DOWNLOADING THE MEMORY OF THE V901

Plug the download lead into the PC and the V901. Turn on the V901. The V901 will shut down after 4 minutes if no button presses are made.

Run the software by clicking on '**Start**', '**Programs**', '**Vibrock**'. Using the standard Windows type pull down menus, select **'Communications**', '**Get Index**', and click '**OK**'.
This will download the index of the entire contents of the memory. The event number, date, time and vibration level will be displayed on each line. Double click on the event you wish to view and the PC will download and display the selected event, as a Graph.
By moving the mouse pointer around the graph, you will see the vibration value and time.

To **view** the summary data, select '**Graph**' then '**Summary Data**'.

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To **print** the selected event, click on '**File**' then '**print**'. The graph and summary data will be printed.

To **export** the graph data to Microsoft Excel, select 'file', 'export' and 'data to file'. Then minimise the Vibrock software, locate and open your file. It will open as an Excel file. This will show the data of the graph.

To view another event, close the graph you are viewing, and double click on the next event you wish to view.

To **print** the index, select '**Index**' and '**Print Index**'.

To **print all** events in the index, in their **graph form** (with summary data), select '**File**', '**Print**', '**Print All**'. This will print all the results and may take a few minutes, depending on the number of results stored.

To **PRINT SELECTED EVENTS IN THEIR GRAPH FORM**, (with summary data), left click once in the selected column of the events on the index, you require. This will place an asterisk (*) next to your events. Then click 'file', 'print' and 'print selection'. This will print the selected events in their graph form and may take a few minutes, depending on the number of events selected.

To **print** the **Summary data** of **all the events** in the index, select 'index', 'full index' and 'all'. The events are then sent to the printer. Click 'ok' when prompted. If you have a colour printer, the trigger events are in blue and the continuous events are in red.

To **print** the **summary data** of only the **events you require**, left click once in the selected column of the events on the index, you require. This will place an asterisk (*) next to your event(s). Then select 'index', 'full index' and 'selection'. The events are then sent to the printer. Click 'ok' when prompted. If you have a colour printer, the trigger events are in blue and the continuous events are in red.

To **save** event(s), click on each event under the 'Selected' banner of the index. An asterisk will appear in the 'Selected' column. Select '**File**' then '**Save**' then '**Save Selection**'. Follow the on screen instructions and your selected event(s) will be saved to your PC.

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After files have been saved to your PC, they may be displayed, or by clicking on the 'File' banner and select 'Open', an event may then be selected from your PC's memory.

If a section of the graph needs to be expanded i.e. zoomed in on, position the pointer on the left side of the desired section of the graph and click the left mouse button. Then move the pointer to the right side of the desired section and click the left mouse button again. The display will change to the zoomed in portion of the graph. To view the full graph again, click on 'Graph' and select **'Restore Full View'**.

Text can be added or edited onto the header of the graph by selecting the pull-down 'Graph' and **'Edit Text'**. This will now display the text beside the date and time. The text will also be printed in this position when 'print' is selected.

A previously stored file can be displayed by using the pull-down '**File**' and '**Open**' options. As with normal Windows procedures, a file can be stored on a variety of drives or directories.

TROUBLE SHOOTING SECTION

If you cannot install the software, then on your computer, find your CD ROM drive icon, and double click on it. This will show you the files on the CD ROM. If you are using Windows XP, then double click on the setup.exe file – this will install the software.

If you are **not using Windows XP**, then open the folder labelled 'V901 OLD'. When this folder has opened, double click on the Install file. The old version software will be installed.

If you cannot download the index, then you may have to change the COM Port setting (the default setting is port 1). To change the port setting, select '**Communications**', '**Set Up**', '**Local**'. Select another Port and click '**OK**'. Now download the index. If the index does not download, try another port setting (there are 4 in total).

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If you cannot save selected events to your PC, you may have selected one or more events with the same event number. Simply deselect one of the duplicated events. You can now save the selected events. You will have to save the events with a duplicated event number separately (you will have to give them a new 5 character filename when saving them). These events will still be saved into the same folder as all other events you have previously saved.

If you are still having problems with the software or require any technical assistance, please contact our Instrumentation Department, on 01773 711211.

RESET FUNCTION

If your Seismograph fails to switch on correctly (2 rows of black squares may be visible on the display), then try the following reset function.

Open the lid and remove one of the circular battery covers. Press and hold the green button and then refit the battery cover. The display should power up correctly. Stop pressing the green button and the normal on screen menu will appear.

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HOW TO INSTALL THE USB DRIVER SOFTWARE

Your V901 Seismograph may have a USB port fitted for PC communication, or it may be fitted with the older RS232 port. These instructions refer to both models. YOU MUST INSTALL THIS SOFTWARE **AFTER** YOU HAVE INSTALLED THE V901 DOWNLOAD SOFTWARE.

1. Plug in the USB Adaptor (or Seismograph using the supplied USB cable) into your Computers USB port. On your computer desktop a message may appear which says 'new hardware detected'.
2. The windows installation wizard should also appear. Follow the on screen instructions, which will instruct you on how to install the USB driver software.
3. When the installation wizard has finished, remove the CD ROM and connect the grey RS232 cable that came with your Seismograph to the USB Adaptor, and then connect the other end of the grey RS232 cable to the Seismograph. **If you were not supplied with this cable** then you should already have the Seismograph connected to your PC as per Step 1.
4. Ensure the Seismograph is switched on.
5. Open the Vibrock Software and select 'communications', 'get index' and then click on 'ok'.
6, The memory of the Seismograph should download and it will look like a spreadsheet.
7. Double click on any line (each line is a measured event), and the graph for this event will appear.
8. IF YOU GET AN ERROR MESSAGE AT STEP 5, then you may have to change the port settings of your USB port on your computer. This is very easy to do. Just follow the instructions on the page, titled 'How to change the com port setting on your computer'.
9. Please remember to use the same USB port on your computer whenever you are communicating with the Seismograph.

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HOW TO CHANGE THE USB COM PORT SETTING ON YOUR COMPUTER

If you cannot download the index of the Seismograph, it may be because the USB port on your computer is numbered higher than port 4. To rectify this, use the following procedure, but please ensure you have full administration access if your computer is part of a network. If you do not have full access, then you will not be able to carry out this procedure.

1. Keep the USB adaptor (or Seismograph if you were not supplied with an adaptor) plugged into the computer.
2. On your Computers desktop, click 'START' and select 'CONTROL PANEL'.
3. Double click on 'SYSTEM'.
4. Click on 'HARDWARE' then 'DEVICE MANAGER'.
5. Click on the cross, next to 'PORTS'.
6. There should be a line which reads 'Prolific USB-to-Serial Comm Port (Com#), where # is a number. Remember this number.
7. Close all windows so you are back at your desktop.
8. Double click on 'MY COMPUTER, 'LOCAL DISK:(C)', open the 'PROGRAM FILES' folder, open the 'VIBROCK' folder.
9. Double click on the 'VIBROCK CONFIGURATIONS SETTINGS' file. On the seventh line down, it should say port=1. Change this 1 to the number you found at step 6. Click 'FILE' and 'SAVE'.
10. Close all windows so you are back at your desktop.
11. Open the Vibrock software. Ensure the Seismograph is switched on. Click on 'communications', 'get index' and click 'ok'. The index will download.

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REMOTE COMMUNICATIONS OPTION

The following description is only applicable to V901's connected to land line or GSM modems. These modems are available from Vibrock Limited.

Under the Communications banner select Set-up and Remote. Then select the comms port for the modem and set as default (this needs only to be done the first time).

Select Dial-up and enter the location name and telephone number for the remote V901(s). Once this list of remote telephone numbers has been entered, highlight the line required and click on DIAL. This will establish the Dial-up connection between the users computer and the remote V901's modem.

Operation is then the same as if the V901 were connected directly to the PC i.e. Get Index and download events.

Operation of the V901 may be undertaken remotely by clicking on Operate, when a virtual screen and keypad will be displayed. Functionality is then the same as when using the V901 directly. When you have finished with Remote Operation click on 'Remote Operator exit' then click 'communications' and 'close Dial-up'.

BUILT IN PRINTER OPTION

The V901 may be supplied with the built in thermal printer.

To print an event, turn on the Seismograph. At the menu screen press the **View Memory** key. At the Clear Memory prompt press the **No** key and use the Up and Down keys to scroll through to the required event. Press the Print key and open the lid. Your event will be printed.

To charge the printer's battery, plug the charger into the **mic/alarm/power** socket. The red charge light and green 6v light will be visible. The battery is fully charged when the charge light goes out.

The printer uses thermal paper, which is available from Vibrock Limited.