VIBROSOUND ANALYSER

USER MANUAL

Models: CM2 & QB2

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SAFETY
READ BEFORE USE

**** WARNING ****
THE SEPARATE MAINS ADAPTER AND MAINS LEAD SHOULD NOT BE USED OUTSIDE OR IN ANY DAMP OR WET CONDITIONS.

The Vibrosound Analyser Model CM2/QB2 is a low voltage unit and there are no hazardous voltages present.

**** WARNING ****
THERE ARE NO USER SERVICEABLE PARTS IN EITHER THE MAIN UNIT, TRANSDUCER, MICROPHONE, POWER SUPPLY OR CABLES. NO ATTEMPT SHOULD BE MADE TO OPEN, ADJUST OR DISMANTLE THESE ITEMS. ANY SUCH ATTEMPT WILL IMMEDIATELY INVALIDATE THE WARRANTY AND INVALDIATE THE CALIBRATION CERTIFICATE.

SPECIFICATIONS

Please consult the latest promotional leaflet for specifications of the CM2/QB2.

OPERATION

General

**** WARNING ****
User parameters are only saved when the option menus are exited by pressing 8. If the unit is simply switched off whilst in the option pages, any changes will be lost.

**** WARNING ****
DO NOT manually pull the paper through the printer when the unit is switched on. If this is done, the printer drive shafts will be sheared off and this is NOT covered under warranty. Only feed paper with the unit switched OFF.

**** WARNING ****
To avoid the pens running out on the paper, do not switch the unit off whilst the printer is printing.

**** WARNING ****
DO NOT rotate the penholder when in the left-hand position in the printer, as this will bend the pen change spring.

The unit is designed in such a manner as to guide the user with clear informative instructions and options displayed on its screen.

This section gives general guidance on use. Specific information relating to each option can be found in its appropriate section.

This equipment is a state of art piece of electronic apparatus. When used correctly, it meets the requirements of a precision grade Type 1 noise analyser (if fitted) and a precision vibration & air overpressure monitor. As such, the equipment must be used in accordance with this manual and instructions given and reasonable care taken in its use and maintenance. In addition, for the requirements of various standards, including BS5228, the noise Leqs should be user calibrated with a calibrated piston calibrator set to 94dB or other value (factory fit option only) before each major noise survey is undertaken. In addition, the equipment is guaranteed to provide the stated accuracy as per its specifications, subject to a 12 monthly calibration (return to base). This calibration should only be performed by Magus Electronics or a Magus approved agent to ensure appropriate accuracy and that all standards are met.

When in operation outdoors, persistent long-term exposure of the microphone to adverse weather (rain) can result in reduced sensitivity. Should this occur, the microphone needs to be gently dried (best achieved by placing in a warm room). Forced drying with hairdryers etc should not be carried out. If long-term monitoring in adverse weather is required, it is suggested that a cover is positioned approximately 0.5 – 1.0M above the microphone to shelter it from direct rain. Care needs to be taken to ensure no reflective waves or obscuration results from the use of any cover.

Equipment Set-up
Vibration

The TA1 transducer (large black cylinder) should be placed on something solid, i.e. solid footpath or road for example and NOT on soft earth. It should be positioned at ground level, adjacent to any property being monitored. The arrow marked L (longitudinal) should point towards the source of vibration. This will make T (transverse) 90° to the vibration and V (vertical). This is the industry standard. The cable supplied should be pushed into the connector on top of the TA1 and into the side of the vibrosound into the socked marked Block A. Note: all the connectors are push fit and must not be turned to attach. To disconnect, the outer collar is pulled which will release the connector. Note: the connector should be first orientated to align the two halves before pushing in. If the seven-channel option has been purchased, position the second TA1 as required and connect to Block B on the side of the Vibrosound. Open the instrument case by lifting up the two clips. Lift the lid fully, to the vertical position. In using the supplied key, turn the switch to the right – ON position and the green light should illuminate. Follow the on-screen instructions or refer to the appropriate sections of this manual.

Equipment Set-up
Noise

Set-up the tripod supplied in the position required and fully extend the legs to give the correct height for the microphone. Position such that the microphone, when clipped into its fastening on the top of the tripod is pointing towards the source of noise. Ensure the windshield supplied is pushed on to the microphone. By aligning the two red dots, connect the supplied cable to the back of the microphone and connect the other end into the Vibrosound socket marked MIC. Open the instrument case by lifting up the two clips. Lift the lid fully, to the vertical position. In using the supplied key, turn the switch to the right – ON position and the green light should illuminate. Follow the on-screen instructions or refer to the appropriate sections of this manual.

Charging

It is recommended that the unit is charged after each use. Connect the supplied power supply to your mains socket and plug the lead into the charger socket on the front panel of the unit. Fastest charging will be achieved with the main unit switched off. Turn the key on the Vibrosound to the OFF position. Switch the mains socket ON, the red power light should be lit and whilst charging, the amber light will be on. When fully charged, the amber light will automatically go off, the charger should then be switched off and disconnected. It is recommended that if the unit is to be stored for long periods without use, that it is charged for approximately one day every month or so. Failure to do this will result in a discharged battery, which may need to be replaced.

**** WARNING ****** Flattening the battery in use to the point where the instrument no longer operates should be avoided where possible. If this does occur, the unit should be switched OFF and re-charged immediately using the above procedure.

Changing Values used in User Settable Parameters

When you need to input a new value, press the appropriate keys to give the number required and where required, press enter to input this number. If a mistake is made, press ENTER and then re-select the option to re-do. Note: On user data, use the left arrow key to re-do characters as required. See the details of options section for more details. Sometimes, the ENTER key will not be required, for example, if the maximum number size is four digits, entering the fourth digit will automatically accept the number without pressing ENTER. This will be clearly evident on the screen.

Impulse Mode

Introduction

This mode is used to record impulse events. These are one-off type events lasting a second or so. The idea is to set a trigger level then enter the impulse mode and only when the trigger level is exceeded, will the unit wake up and record for the specified time and then go back to sleep whilst waiting for the next event.

Results Given:

Time and date set and triggered.
User data if full print option selected.
For each direction, vertical, longitudinal and transverse –

Velocity (PPV) in mm/S
Displacement in mm
Acceleration in M/S/S
Frequency of the Peak in Hz
Resultant Velocity (PPV) in mm/S
Linear Air Overpressure in dB

Graphs of vibration and Air Overpressure if full print option and quantity of graphs set. The graphs can either be combined (useful for observing the relationship between the channels and also saves paper) or separate.

User Parameters Relating to Impulse Mode.

The following parameters can be changed by the user to suit their requirements.

Event Length	The length of the event in milliseconds (1000th of a second).
Trigger Level	The vibration level in PPV required to start an event.
Cut–off Delay	See Below
Sound Meter Base	The base level of the microphone system – for a Quarry Blast, it is suggested that this base would be set to 100 or 120dB as required. Valid ranges are 20, 40, 60, 80, 100, and 120dB. **WARNING** – Setting a base below 100dB may result in the microphone over-scaling and the unit indicating a lower blast value than actual.
Sample Rate	The number of samples per second on each channel, normally 1000.
Print Options	Full, Block and quantity of graphs. See Below.
Alarm Levels	Amber and Red alarm levels in PPV (option).

Cut-off Delay

The best way to explain this is by example. If an event is expected to last 2 seconds maximum, then the event length would be set to 2000. If the cut-off delay was set to 500 for example, then if the event was shorter than expected, say 1 second, once the vibration falls below the trigger level and stays below for the cut-off delay time, then the event length will be reduced on this event only to 1000 + 500, giving an event length of 1.5 seconds. The user should take care to set the cut-off delay greater than any delay between detonators, for example, in Quarry Blasting. By using the cut-off delay, significant savings will be made in paper, pens and will also enable more events to be stored in the memory.

Print Options

If the user selects block printout, the printer (if selected) will print just the table of values. Otherwise, user information, table results and graphs will be given. In this mode, when left unattended, the user can specify how many graphs should be printed before returning to block printout to save paper.

Continuous Mode

Introduction

This mode is used for monitoring of events from 5 minutes to several hours. In this mode, the user can obtain vibration and noise Leq data. In addition, a sound only sub-mode enables the user to obtain Leq data for any time period chosen. The continuous modes can operate with or without a three period timer repeated daily.

Results Given
Sound & Vibration – Print At End Only

Event start time, Event end time.
User data if full print option selected.
For each direction, vertical, longitudinal and transverse –

Velocity (PPV) in mm/S
Resultant Velocity (PPV) in mm/S
Table of Vibration (velocity) Peaks per Interval (maximum of 12) in mm/S
Noise (Leq) Option if Fitted
LMAX , MAX 5 minute Leq, overall Leq, percentiles L10, L30, L50, L90 and table of Leq and 5 minute Leq per interval all in dB (A)

Histograms of vibration and Leq noise.

Results Given
Sound Only

The printer will print the Leq, MAX 5 minute Leq, L10 and L90 for every interval the user selected.

User Parameters Relating to Continuous Mode

C Mode Timer ON or Off	See Below
Table Time Interval	Either used to produce the time interval for the table or the event length if the timer is off.
Print Options	As In Impulse mode with the graphs becoming histograms of the vibration and noise.
Sound Meter Base	Base at which the noise will be monitored above. The microphone has approximately 50dB dynamic range, so as a guide for daytime noise surveys, a base of 60dB would give 55 to 110dB and night time, a base of 20 or 40dB may be selected. Valid ranges are 20, 40, 60, 80, 100 and 120dB only.
Alarm Option	See Impulse Mode above.
Sound & Vibration Print at End Only or Sound Only	In sound only mode, the print interval defines the Leq time period for the printout. This enables the user to obtain any Leq period greater than 5 minutes.

Continuous Mode Timer ON

The unit will produce an event for each of the three time periods. If a period is not required, setting the start and end time to the same values will skip that period. The time periods are repeated daily. See the details of options section for correct setting of these times. Each event produced by the time period will be tabulated using the table time interval set by the user. Note: At present, there is a maximum of twelve intervals per time period.

Continuous Mode Timer OFF

The unit will start an event upon selection of the continuous mode; the event length will be the table time interval set by the user. As soon as the results are displayed and optionally printed, the next event will start for the same duration. This will continue until the user stops the monitoring.

Reprinting Events

Selecting this option will enable any of the last 10 events to be displayed or printed (depending on the print setting). The unit will first search for the events (may take a few minutes depending on the quantity of events in the store). The first 10-event date and times will be displayed. To reprint (or display), enter the event number, 0 to 9 and press ENTER.

Guidance on Selecting & Setting Options

Options Page 1

1: Trigger Level
2: Sound Meter Base
3: Event Length
4: Cut-Off Delay
5: Toggle Print Mode
6: Date/Time
7: User Data
8: Exit

MENU: Next Options Page

Options Page 2

1: Alarm Limits
2: Table Time
3: C-Mode Timer
4: Sound Only (On or Off)
5: Sampling Rate
6: User Cal of Leqs
7: PC Link - Monitor
8: Exit

MENU: Previous Menu

Details of Options

Trigger Level

Used in impulse or dual modes. The level of vibration which when exceeded will initiate an event. Also, used for the cut-off delay. Valid ranges: 0.1 to 50 in millimetres per second PPV.

Sound Meter Base

The base level for the microphone system. The unit will record from this level to 50dB above minimum. Valid entries: 20, 40, 60, 80, 100, 120. Typically set to 100 or 120 for quarry blasting, 20 or 40 for night time noise monitoring and 40 or 60 for daytime noise monitoring.

Event Length

Used only in impulse mode. Set to equal an anticipated impulse event duration. Typically 1500 to 2000 for a quarry blast in milliseconds. Valid ranges: 500 to 9990. 9999 will give maximum length based on the current sampling rate.

Cut-off Delay

The best way to explain this is by example. If an event is expected to last 2 seconds maximum, then the event length would be set to 2000. If the cut-off delay was set to 500 for example, then if the event was shorter than expected, say 1 second, once the vibration falls below the trigger level and stays below for the cut-off delay time, then the event length will be reduced on this event only to 1000 + 500, giving an event length of 1.5 seconds.

The user should take care to set the cut-off delay greater than any delay between detonators, for example, in quarry blasting. By using the cut-off delay, significant savings will be made in paper and pens and will also enable more events to be stored in the memory.

Toggle Print Mode

Short (block) print option gives table information only, full gives user data, table information and graphs with the option to select single or combined graphs and the quantity of graphs printed when left unattended.

Date & Time

Use to enter current date and time information. Follow the format given on the screen, ie, 2 digits then the dot (.) key followed by the next 2 digits etc. The date and time is also displayed at switch on. Please check after resetting.

User Data

Enables the user to enter information relevant to them. Set in two parts, heading then data, 10 characters each and 5 lines. Use the ← to redo any character, the → for the next character, ↑↓ to scroll through the characters. Press ENTER when finished. Unused positions will be set to a "SPACE".

Alarm Limits (option if fitted)

Set amber and red warning levels to drive external alarm unit in millimetres per second PPV, any channel.

If the unit is fitted with a Modem, the user can select to send SMS messages. Use this option to select (1) or not (0). If selected the unit will ask for a message centre number. This must be input according to the following list:-

1 : Australia Optus - +61411990001
2 : Australia Telstra - +61418706700
3 : Australia Vodafone - +61415011501
4 : Australia 3 - +61430004010
5 : Australia Optus (without +61) - 411990001
6 : Australia Vodafone (without +61) - 415011501
7 : UK Vodafone - +447785016005

The numbers to text are stored under user data (see page 19)

Table Time

With the continuous mode timer ON, this is the time used to tabulate the table in minutes (maximum 12 table intervals per timer period). With the timer switched OFF, becomes the event length.

C Mode Timer

Enables the user to view, select timer on or off and change timer settings. ****WARNING**** The first timer period must start and end before the second timer period. The second timer period must start after the first and end before the third timer period and the third timer period must start after the second timer period and end before the first, ie, to monitor 24 hours, the following settings would be valid:

	Start	**End**
Timer A	08:00	18:00
Timer B	18:05	22:05
Timer C	22:10	07:55

Note: Timer C goes to the next day. Also note, 5 minutes has been allowed for the printing, assuming the printer is on.

Sound & Vibration or Sound Only Option

Sound & vibration will give vibration and noise Leqs printed at the end of the event, together with histograms if required.

Sound Only gives print-out of Leq, MAX 5 minute Leq, L10 and L90 at the user selected print interval in minutes.

Sampling Rate

Normally set to 1000 (recommended). Can be reduced to give longer event lengths in impulse mode only. It is recommended that the sampling rate is at least 10 times the frequency of vibration being monitored. It is not recommended setting this to anything other than 1000, unless required to increase the event length. In continuous mode, the sampling rate is fixed at 1000.

User Cal of Leqs.

The on screen instructions must be followed to the letter. A piston calibrator switched on producing 94.0 dB must be firmly fitted to the microphone and the microphone connected correctly to the unit before proceeding. ****WARNING**** Failure to calibrate correctly will result in incorrect Leq readings permanently, until recalibrated.

Cont...

Procedure for User Cal of Legs:

With the microphone correctly connected to the unit and the piston calibrator switched on at 94.0 dB and firmly positioned on the microphone, select this option. Only press MENU to start when you are sure the piston calibrator is correctly set and on and the cable is correctly connected. Press MENU. The display should show 94.0 +/- 0.5dB. If any other value is shown, immediately ring for technical support and assistance. Assuming the above value is shown, switch the piston calibrator off and observe the reading on the screen falling to approximately the sound meter base. If this happens, then you have correctly calibrated your system. ** **WARNING** ** You must proceed to save the calibration value by pressing MENU to exit and then 8 to exit and save the menu options. Note: There is a factory option for different calibrators to be used. If this applies to you, then the 94dB given above will be the value of your piston calibrator.

PC Link Monitor

Use to download the readings to the PC software "monitor". Sub option 2 to clear all stored readings. It is recommended readings are regularly downloaded to the PC and the memory is immediately cleared.

Changing the Paper

IMPORTANT: ENSURE THE UNIT IS SWITCHED OFF.

Using the perforated edge, tear off the protruding paper. Remove the printer cover and wind the remaining paper backwards out of the printer onto the roll.

Remove the paper holder and place the new roll of paper into the space to the rear of the printer, pulling approximately 30 cm of paper from the roll with printed side down, **FEED FROM THE TOP OF THE REEL.**

Tear the end of the paper to form a V shape to facilitate loading and feed the paper through the slot in the rear of the printer until sufficient paper emerges to locate the paper at each side of the printer roller.

Insert the paper holder through the new roll of paper and replace the paper holder into the slots at the rear of the printer.

Feed the paper through the printer cover and replace the printer cover.

Paper Take-up Spool

Remove the detachable spool from the rear slot.

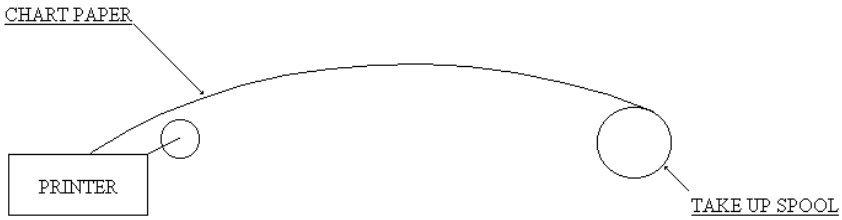
Feed the paper into the slot in the spool.

Feed the spool into its slot, checking the paper alignment on the spool.

Turn the spool a few turns.

Note:- The chart paper from printer must go over the top of the spool (Fig 1)

Fig. 1.



Changing the Pens

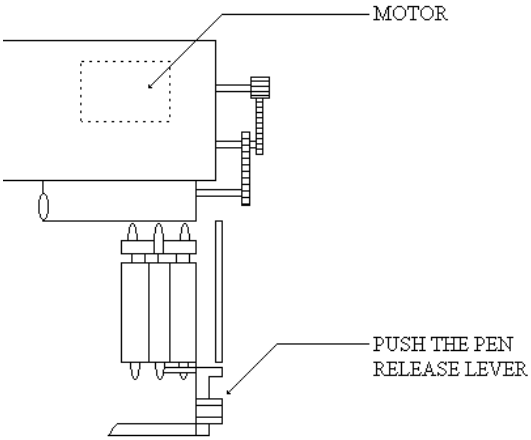
IMPORTANT: ENSURE THE UNIT IS SWITCHED OFF.

Remove the printer cover. Slide the pen holder to the far right.

When the pen carriage is at the right hand side of the printer, press the pen release lever forward (see diagram) and remove the pen.

To install the pen, push the tip of the pen through the ring of the return spring and into the holder.

IMPORTANT: Ensure that the tip of the pen is engaged with the hole of the pen return spring.
To change the next pen, move the holder to the **left** and then rotate **left** and move to the right again.



To download from CM2 to PC

CM2 Vibrosound

1) When at the base menu, select '5' for options
2) Press menu for the next options list
3) Select option 7 – PC Link – Monitor
4) Make sure PC Link cable is attached to the CM2 and the computer. Select '1' to download to wmonitor or '3' to clear store, (after first making sure that you have downloaded all results, because one they have been cleared there is no getting them back).

Computer

1) Select 'wmonitor.exe' program
2) Click on 'connect to vibrosound and download'
3) Highlight 'cm2' then click on 'dial' you should then be prompted for a filename.
4) Press save
5) Click 'ok' when instrument is ready.
6) The CM2 should then download
7) Click 'done' when complete. The CM2 will automatically have gone back to the menu.

Please note:-

Software will not work on Windows Vista. Please use Windows XP or Windows 7 in XP mode!

Converting to Excel

1) Open excel spreadsheet.
2) Select 'File Open' browse to c:/vibro directory.
3) Click All files, then enter filename, i.e tab****.vib. This will open a text import wizard box.
4) Click on delimited, then next, then click space and comma and then on text qualifier at the right hand side click none instead of ".
5) This should then import the file all nicely tabulated in an excel spreadsheet.

Summary Headings

The files are 1: "filename".vib and 2: "tabfilename".vib see below:

Notes:

" " Denotes a field

File 1: (Overall and Tables)

Line 1 –
"V","L","T","Resultant","BV","BL","BT","BResultant", "Year","Month","Date","Hour","Minute","Gain", "Sampling Rate","Locations in Askii","Table Time Interval","Overall Leq","Max 5 Min Leq","Max 5 Min Leq result"

File 2: (Table values only)

Line1 (Table) – "Overall Leq, 5 Min Leq, La90, V, L, T, BV, BL, BT
etc

Other files are also made

Unit serial number.raw – is all information downloaded but unformatted

There are other files created, but are for use by Magus should a problem arise with downloading.