User Manual
Version 4.1

AUTO*Test* BAM*bino*

Bearing Acoustic Monitor

10242

AUSTRALIAN MADE

AUTO TEST
Products Pty Ltd

Table of Contents

1. UNPACKING AND FIRST TIME USE

Congratulations on your choice of the AUTO*STOP*™ BAM*bino*. Please take the time to read this User's Manual before using the BAM*bino* in the field. Incorrect or inappropriate use of this instrument may void the warranty. Retain the packing materials for future shipping and transport of the unit for periodic calibration.

The packing box containing your AUTO*STOP*™ *BAMbino* contains:

- AUTO*STOP*™ BAM*bino,* Model 915978
- Microphone
- 240VAC to 12VDC power pack
- User manual.
- Serial Cable
- Software CD
- Smart Card

2. BACKGROUND INFORMATION

2.1 Application

The BAM*bino* is a hand-held, stand-alone portable instrument for the remote detection and analysis of faulty conveyor idler bearings. It uses advanced signal processing techniques to scan ambient conveyor noise to:

- Detect bearing faults
- Detect build-up on rollers
- Screen out extraneous noise to eliminate false alarms

The Fault Detection Technique uses **Roller Speed** to distinguish various bearing fault types whilst detailed knowledge of **the actual bearing type is not required.**

Input parameters Incorporating **Roller speed** can be pre-programmed for up to 8 locations and 2 sub locations, thus eliminating the need to input data into the instrument whilst scanning the conveyer.

Location is a database of stored parameters that can be pre-programmed, from which the operator chooses the required set for his current testing location. There are 8 locations and 2 sub locations enabled for use, all of

which are user named. See Section 5 for how to set the individual location parameters.

On “Power Up”, the operator is only required to select ***Monitoring*** and then choose a **Location**.

By default BAM*bino* is programmed for the whole range of bearings used on standard idlers in conveyors in the Australian mining industry. There will be exceptions, in particular for older conveyors, but AUTO*TEST* can re-program the unit to suit the application if the exact bearing details are submitted with the order prior to shipment.

2.2 Measurement Distance

BAM*bino* only needs to “see” one side of the conveyor to measure all bearings on the carry and return idlers. It can detect faulty bearings within a range of up to three metres. This is possible due to the distinctive signature that faulty bearings emit and can be discerned even in environments possessing high-level ambient noise.

2.3 Modes of Operation

To achieve high execution speed and accuracy, the instrument has three operational modes: A **Scan** mode, both fast and slow and a **Diagnosis** mode. The operator uses the **Scan** mode to sample data as he walks along the conveyor. This is a “quick look” mode of operation that is used for quickly indicating the presence of a faulty bearing. When the instrument detects a noise that is characteristic of a faulty roller, an alarm is set off and the operator would then stop and mark the roller. There is a note pad facility to allow the user to write a comment, and the operator also has the ability to enter the diagnosis mode to display an instantaneous frequency spectrum of the faulty bearing.

The **Bambino** takes about 1.7 seconds to compute the noise data, and signals the operator, it does this continuously, thus the operator can walk along the conveyer at approximately 2 Km/H.

2.4 What is BAM*bino* listening to?

In short **EVERYTHING**. BAM*bino's* sensitive microphone accepts all sounds from the environment. The software analysis program breaks the sounds into components and tests these components for the characteristics found in faulty bearings.

Sit quietly as you read this manual and listen to all those background sounds. You can choose which ones to listen to and which ones to ignore. BAM*bino* is trained to listen to them all and to search for certain characteristics. BAM*bino* may find those characteristics in ordinary sounds like -

Motorbike exhausts	Tonal Harmonics
Diesel engines	Tonal Harmonics
Voices	Tonal Harmonics
Keyboard typing	Repetitive Impulses

Note: BAM*bino* can discern acoustic signals that trigger the alarm even when our own ears sometimes do not. Remember that BAM*bino* is not searching for a sound of some loudness, but for one having the characteristic signature of a bearing fault. If BAM*bino* finds such a sound that has sufficiently distinctive character, then it will trigger its alarm. It is possible to trigger BAM*bino* with some distinctive voice input.

2.5 Hardware/Software

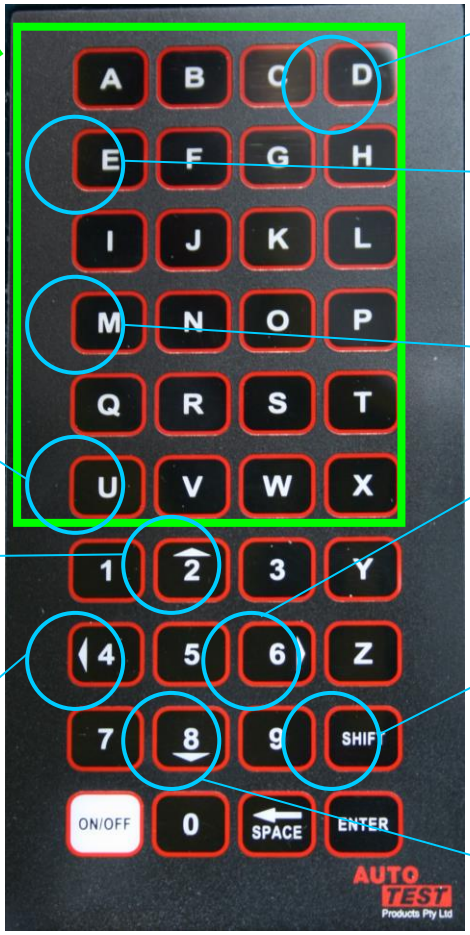
BAM*bino* relies entirely upon signal processing software embedded into the instrument to carry out its functions. It provides an instant audible and/or visual alarm as well as a visible ranking of fault severity. The degree of severity of the characteristic sounds detected are listed on the screen during operation, and continuously updated:

- Bearing OK No alarm Normal, no fault detected
- Bearing Faulty Alarm Fault level signal detected
- Overload Acoustic Signal To Large

Note: If a fault is found the user may record a note and save it to memory for later retrieval on a computer.

3. GETTING STARTED- A QUICK OVERVIEW

Keypad Functions



Alpha Keys A through Z for Entering Location Names and data during setup, also for adding notes during monitoring
Keys can be used with either case by pushing the shift key

D key used to decrease the trigger count in the monitoring mode

E key used to show the extended signal information

M key used to select the monitor mode Fast or Slow

U key used to increase the trigger count in the monitoring mode

Right arrow Key Used to select location or in conjunction with the shift key to adjust the LCD contrast

Up arrow Key used in menus to select line items, also used to adjust the gain in monitor and Diagnose

Shift Key changes the case of alpha keys and allows arrow keys to change function

Left arrow Key Used to select location or in conjunction with the shift key to adjust the LCD contrast

Down arrow Key used in menus to select line items, also used to adjust the gain in monitor and Diagnose

3.1 Conventions

In this manual the following symbol indicates a keypad function (push this button):

Words in *italics* are menu list names.

To implement the instruction on the screen, or to go one more level down the menu, touch

ENTER

3.2 Default Factory Settings

The *BAMbino* is delivered with the following Default Factory Settings which are identical for all 12 Locations:

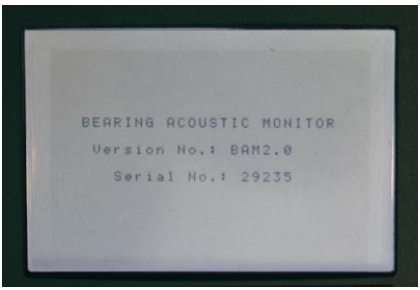
- Location Name: Location 1
  - Conveyer1: Conveyer 1
    - Alarm Band: 6-30 Hz
  - Trigger: 9.0dB
  - Gain 80%

3.3 A Quick Lesson

Touch the ON/OFF button.

The unit will beep and the display brings up the 'Logo screen:

After a few seconds the Start-up screen will be displayed:

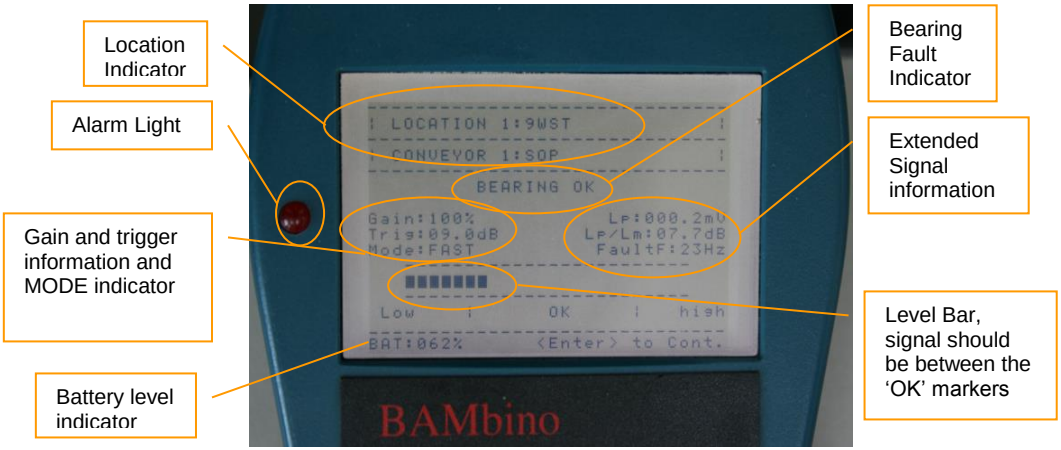


The software version is identified with the “Version No:”. The serial no of the unit is also displayed. Wait approximately 5 seconds for all of the software routines to load and to run a self-check.

The unit then goes straight into its menu Mode.

Selecting Monitor from the menu readies the *BAMbino* for use and defaults to the Location that was active before the last power-off.
Within one second BAM*bino* will be scanning its acoustic environment, listening for noises characteristic of bearing faults **with the settings of the Active** Location.

An example of operation mode screen display would appear as shown below.



NOTE: The level bar indicates that the gain is to low, the user should increase the gain setting by pressing the up arrow (2) to increase the gain within the *OK* bands.

∧ 2

Press the button to increase the ***Gain***.

8 ∨

Press the button to decrease the ***Gain***.

The ***Gain*** numerical value will decrease in steps of 2, i.e. 94 down to 92.

As the ***Gain*** increases the BAM*bino* may trigger an alarm mode. If this occurs decrease the gain by pressing the down arrow key. For optimal performance the gain should be set within the ok band.

To change to another location or conveyer press [6 >]

By pressing the right arrow key the BAM*bino* will scroll through all 8 locations and all 16 conveyers allowing you to select the right setup. When the BAM*bino* is powered up it will always return to the last used location.

During your scanning if the BAM*bino* alerts you of a faulty bearing then you may be required to mark the location, if you press [ENTER]
The BAM*bino* will take you to a text entry screen.
This input screen allows you to make a note and save it with a date stamp to memory for later retrieval on a computer.

Once you have entered your note, press [ENTER]
This will save the note and return you to the main menu.

That's all you will need to do during a routine inspection, i.e. using "***ENTER***" to save a note in BAM*bino* upon alarm. No parameter entry and no gain setting is required. BAM*bino* is able to accommodate a wide range of signal levels, so generally you only have to set the gain once for each conveyor, however if the distance changes significantly or the background noise changes you may have to adjust the gain up or down accordingly.

Before you start using BAM*bino* you need to set it up to suit your needs.

BAM*bino*'s software architecture allows set-ups to be made 2 different ways:

Method 1: the user can load the details of their locations and conveyers from the smartcard. Autotest can supply pre-programmed Cards according to the users specification.

Method 2: the user can enter the details directly into the BAM*bino* using the setup Menu. This then allows the user to save this on a smartcard for later retrieval.

3.2 Starting Your Routine Inspection

If BAM*bino* has already been set-up for your conveyors (i.e. Roller speed and Location name), you can start your inspection straight away, as no data input is required.

1. Switch ON instrument, wait for User Menu.

2. At the USER MENU screen touch the ENTER button.

3. You can scroll through the 16 Conveyors by touching either < 4 6 >

4. Start walking at normal pace pointing BAM*bino* toward the belt at a distance of 1-2 m. When an alarm is triggered on BAM*bino*, stop walking.

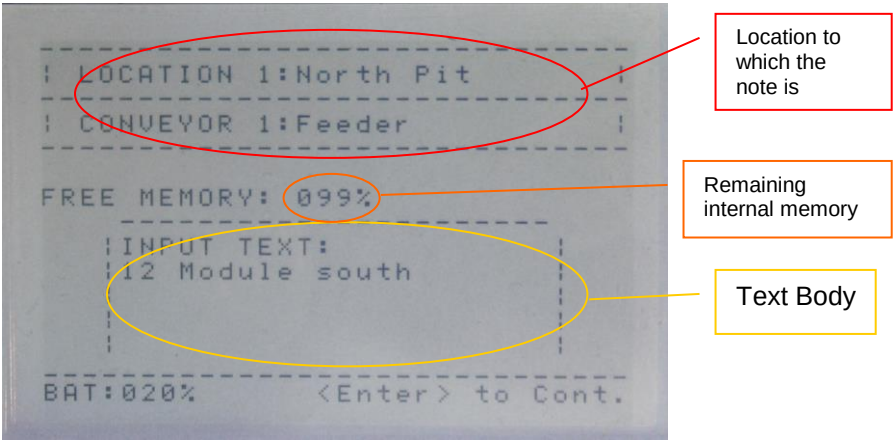
5. If the alarm stays ON, it means that a faulty bearing has been detected within a 3m radius from this position.

Walk back one idler set and take another reading. If the alarm comes ON, walk back another idler set and repeat as above. When the alarm no longer comes ON, the faulty bearing is out of range. Pace 1 m from your position and the idler with the faulty bearing is the farthest. Tag this module and continue your inspection. If the alarm is still erratic you can select Slow Mode by pressing M

You must then wait for about 5 seconds for the BAM*bino* measure the bearing. If the alarm is still active then you have found a faulty bearing

You can move closer to identify exactly which bearing or roller is causing the alarm, and then press ENTER

A notation can then be entered detailing where and what the fault is, this is automatically date stamped, and can be uploaded to a computer at a later date and continue your inspection. Should you wish to add a note press enter from the monitoring screen, the display will look like this:



The text note will be stored in the BAM*bino*'s internal memory, it is stamped with the time and date in addition to the location and conveyor name.

If BAM*bino* has not been set-up for your conveyors, you will need to enter the roller speed before you start your inspection. Enter these parameters as explained in Section 5 and then proceed as above.

Quick Notes (see FAQ for more details):

1. Belt speed must be accurate to within 5%. If not sure what it is, measure it.
2. When an alarm is triggered but is not confirmed in a second measurement ignore it. This may be due to:
   a) the bearing fault being marginal and thus the severity level being borderline between "***Bearing OK***" and "***Bearing Faulty***".
   b) the alarm was triggered by a transient such as a belt splice pass-by, a loud voice, a loud sound from an impact, etc.
   c) the BAM*bino*'s gain is set too high and the overload indicator is on.

3. Alternatively you can select slow mode and take a more accurate measurement, in slow mode the Bambino takes measures a lot more information and provides a more accurate reading, however it takes a lot longer to measure (about 5 seconds) so you must remain still will it measures the roller set.

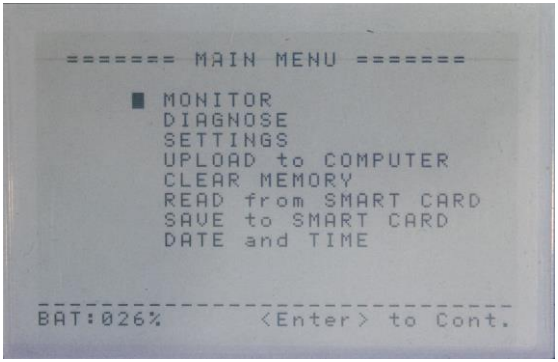
4. You are near a noisy roller, which you think it's faulty but BAM*bino* is not picking it up. What do you do? BAM*bino* scans noise for bearing faults and roller build-up only. The noise you are hearing is probably not due to a faulty bearing. It could be looseness, a squeaking seal, a worn shaft rattling in its support, etc. You should still tag this module but use a different tag to differentiate it from those with faulty bearings.

4. BAM*bino* – A COMPLETE GUIDE

The *User Menu* is accessible after switching the BAM*bino* on and allows the user to do the following:

- Select Monitoring mode
- Diagnose a bearing
- Set up locations, conveyors and roller speed
- Upload to Computer
- Clear Memory
- Read from Smartcard
- Save to Smartcard
- Set date and time

To access this menu, Switch ON the instrument.
The unit will display*:*



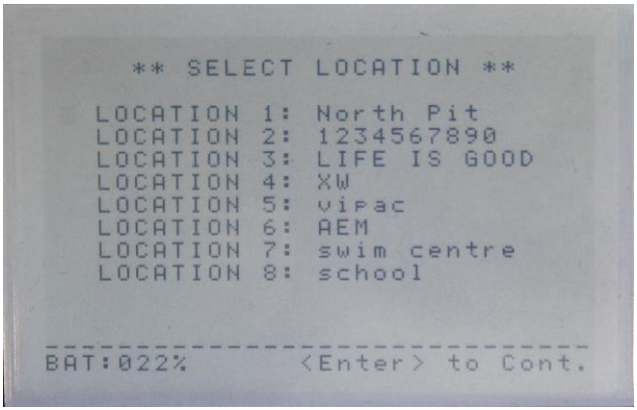
Scroll through the menu using the arrow buttons. [^ 2] or [8 v]

To select an item press [ENTER]

4.1 *Set up locations, conveyors and roller speed* (Conveyor Set-up)

Access the *User Menu* and scroll down the list.

At ***Settings*** press ENTER the button to select, and the unit will indicate:



Scroll through the Locations using the arrow buttons. ∧ 2 or 8 ∨

To select the Location press ENTER

Location is a database of stored parameters that can be pre programmed, from which the operator chooses the required set for his current testing location. There are 8 locations enabled for use each with 2 conveyers. All are user named. See section 5 below for how to set the individual location parameters.

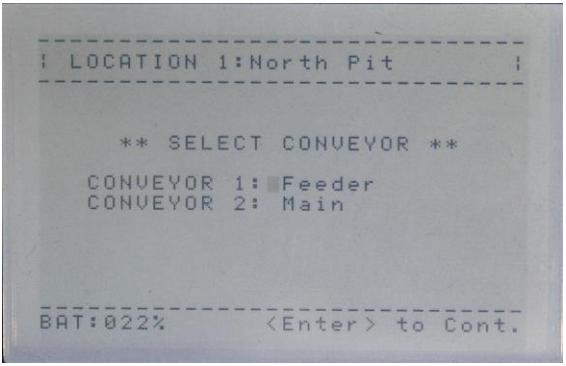
Once a location has been selected the cursor will highlight the first character of the location name. You can overtype the location name in this space, to select an uppercase letter press the shift key, SHIFT

An S will be displayed next to the battery indicator informing you that shifted characters are enabled. To reselect lower case characters you will

need to press the shift key again. The location name is limited to 15 characters.

After you have entered the location name press the unit will indicate:

ENTER



Scroll through the Conveyers using the arrow buttons.

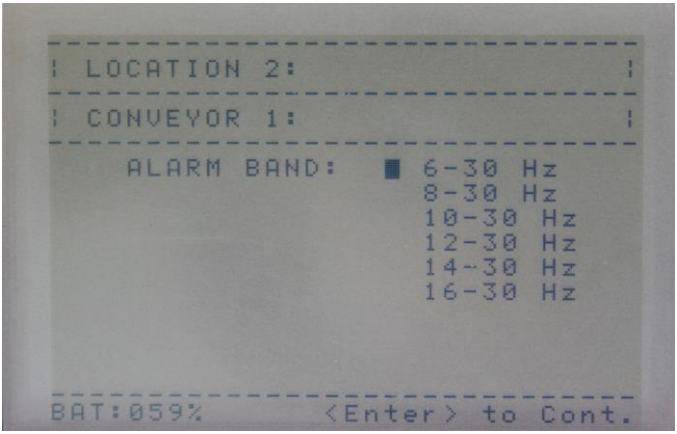
∧ 2 or 8 ∨

To select the Conveyer press ENTER

Once a conveyor has been selected the cursor will highlight the first character of the conveyor name. You can overtype the location name in this space, to select an uppercase letter press the shift key, SHIFT

An S will be displayed next to the battery indicator informing you that shifted characters are enabled. To reselect lower case characters you will need to press the shift key again. The Conveyor name is limited to 15 characters.

After you have entered the Conveyor name press ENTER
The unit will indicate:



Scroll through the Alarm Bands using the arrow buttons.

∧ 2	or	8 ∨

Select an appropriate alarm band, to do this you will need to know the belt speed and from that information calculate the band.

The formula is $\frac{\text{BELT SPEED (m/s)}}{3.14 \times \text{Roller Diameter (m)}}$

The lower alarm band threshold should be as close to the roller speed as possible, for example a speed of 4 Hz would translate to a band setting of 6 - x, while a speed of 9 would require a band setting of 8 – x

The upper band limit should be set as close to three times the roller speed as possible for example 6 Hz would give an upper band setting of 6 - 30

Once the alarm band has been determined press ENTER

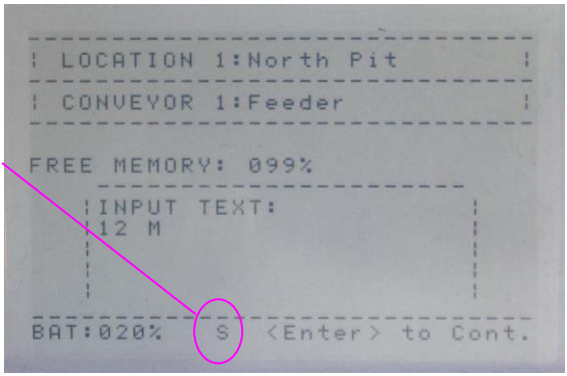
You will be returned to the main user menu, to setup additional conveyers repeat the steps above.

4.2 Shift Key

The shift key allows the user to select upper case and lower case alphabetic characters, it also allows the Screen contrast to be adjusted when used in conjunction with the left and right arrow keys (see 4.3).

Pressing the Key | SHIFT |

Will activate the shift mode and is denoted on the display by an uppercase S in the bottom left of the display. To deactivate the Shift mode press the key again.



Uppercase S denotes shift mode activated

4.3 Monitoring

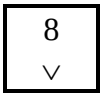
Selecting Monitor from the menu readies the *BAMbino* for use and defaults to the Location that was active before the last power-off.

Within one second BAM*bino* will be scanning its acoustic environment, listening for noises characteristic of bearing faults **with the settings of the Active** Location.

An example of operation mode screen display would appear as shown below.

NOTE: The level bar indicates that the gain is to low, the user should increase the gain setting by pressing the up arrow (2) to increase the gain within the *OK* bands.

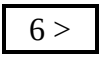
^ 2	Press the button to increase the ***Gain***.



Press the button to decrease the ***Gain***.

The ***Gain*** numerical value will decrease in steps of 2, i.e. 94 down to 92.

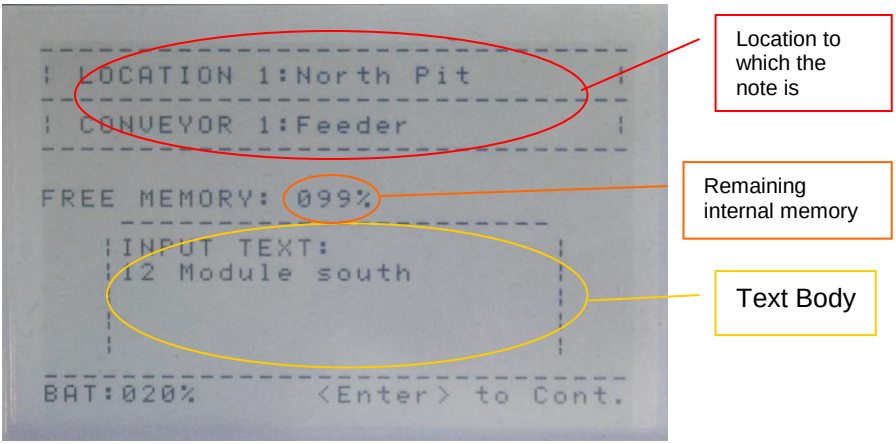
As the ***Gain*** increases the BAM*bino* may trigger an alarm mode. If this occurs decrease the gain by pressing the down arrow key. For optimal performance the gain should be set within the ok band.

To change to another location or conveyer press 

By pressing the right arrow key the BAM*bino* will scroll through all 8 locations and all 16 conveyers allowing you to select the right setup. When the BAM*bino* is powered up it will always return to the last used location.

4.4 Entering Notes

A notation can then be entered detailing where and what the fault is, this is automatically date stamped, and can be uploaded to a computer at a later date and continue your inspection. Should you wish to add a note press enter from the monitoring screen, the display will look like this:



The text note will be stored in the BAM*bino*'s internal memory, it is stamped with the time and date in addition to the location and conveyor name.

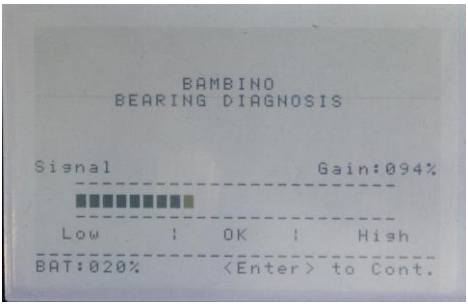
During your scanning if the BAM*bino* alerts you of a faulty bearing then you may be required to mark the location, if you press ENTER The BAM*bino* will take you to a text entry screen. This input screen allows you to make a note and save it with a date stamp to memory for later retrieval on a computer.

Once you have entered your note, press ENTER This will save the note and return you to the main menu.

4.5 Diagnose

Diagnose allows the user to perform an on the spot analysis of a particular bearing. This allows the user to view the fault frequency spectrum for engineering purposes.

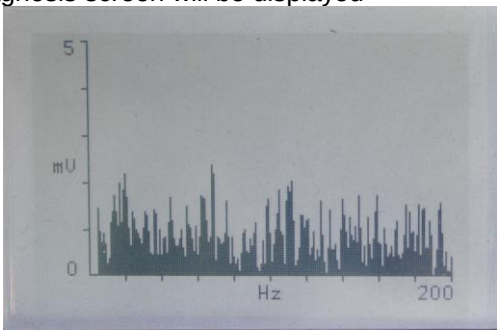
From the main menu select *Diagnose* the screen will display:



Once the appropriate gain is selected using the ^ 2 or 8 v

Press ENTER

The Diagnosis screen will be displayed



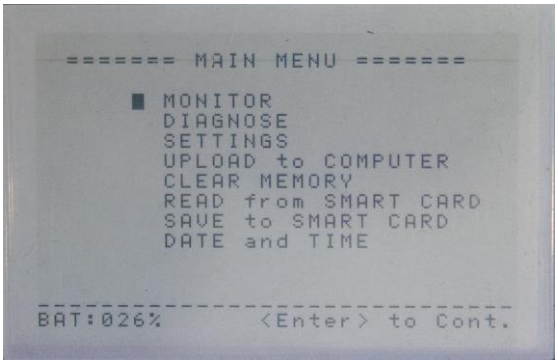
This Frequency spectrum can then be used for detailed analysis of the bearing when the user presses ENTER

The BAM*bino* then goes straight back to the main menu.

4.6 Changing Location

Switch ON instrument, wait for User Menu.

The unit will display*:*



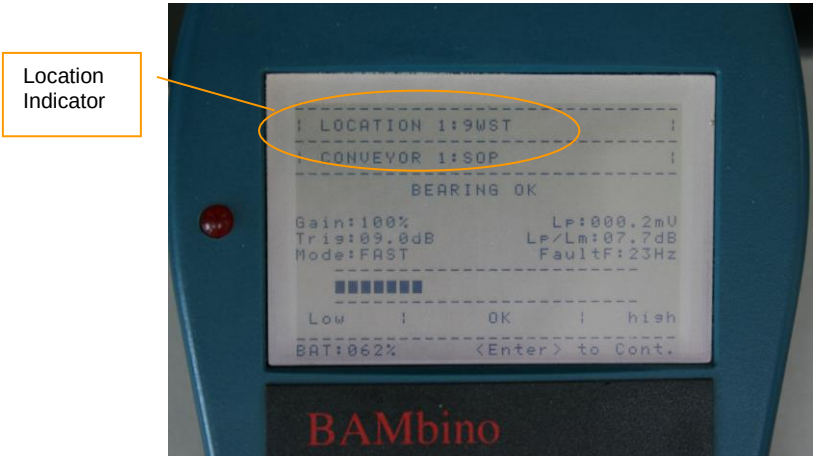
Scroll through the menu using the arrow buttons. [∧ 2] or [8 ∨]

Select the ***MONITOR*** menu option

Press [ENTER]

.

An example of operation mode screen display would appear as shown below.



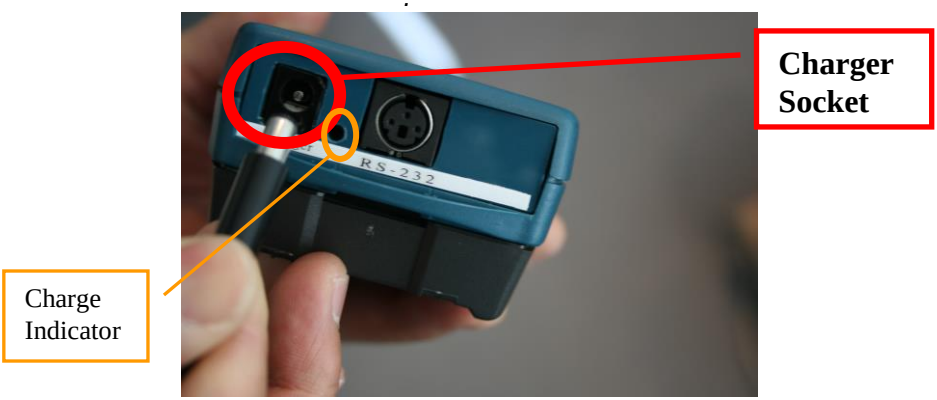
You can scroll through the 16 Conveyors by touching either < 4 or 6 >

The BAM*bino* remember the last location used when it is next powered on.

4.7 Checking the Battery Voltage

The battery voltage is displayed at the bottom left hand corner of every screen. The level displayed is from 0% to 100%

The BAM*bino* will display the message **BATTERY FLAT** when the battery reaches 10% the unit will automatically turn off at 8% and will require charging before it can be turned on again.
To charge the unit simply connect the charger for 4 hours to fully charge the BAM*bino.*
USE ONLY THE POWER PACK SUPPLIED WITH YOUR BAM*bino*.



The Charge indicator lamp will remain on while the unit is charging and turn off when the charge is complete.

4.8 Adjusting The Contrast

To set the ***Contrast*** to a comfortable level,

touch the SHIFT button and use the

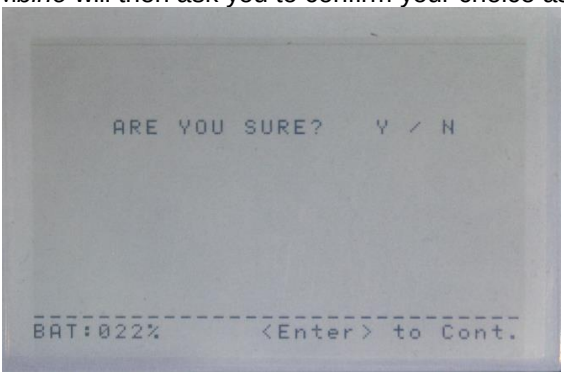
< 4 or 6 > and the contrast will adjust to the desired setting, select the contrast level which best suits the lighting conditions. The BAM*bino* will then remember the setting for the next time it is powered up.

4.9 Using a Smart Card

The BAM*bino* comes equipped with a smartcard. The smart card enables the user to save and retrieve location and conveyor settings conveniently. Each smartcard can hold the details of all 16 conveyors, there is no limit to the number of smartcards that can be used in the BAM*bino.* The smartcard is inserted in the end of the BAM*bino* as shown

You can save your settings to the smart card by inserting the smartcard as shown above, then selecting *SAVE to SMART CARD* from the menu.

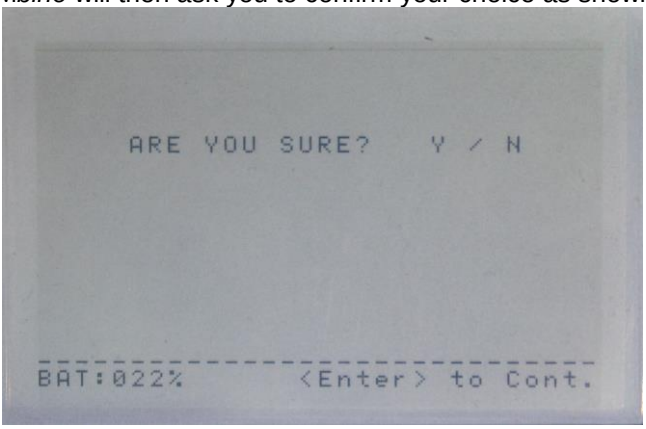
The BAM*bino* will then ask you to confirm your choice as shown below



You should press the Y or N

If you press N you will be returned to the menu.
If you press Y your settings will be stored on the smart card the BAM*bino* will confirm the success or failure of the operation as shown:

You can also read your saved settings to the smart card by inserting the smartcard as shown above, then selecting *READ from SMART CARD* from the menu
The BAM*bino* will then ask you to confirm your choice as shown below



You should press the Y or N

If you press N you will be returned to the menu.
If you press Y your settings will be read from the smart card. The BAM*bino* will confirm the success or failure of the Read as shown:

4.10 Clearing the Memory

To clear the BAM*bino*'s memory of notes and time stamps, you can select ***CLEAR MEMORY*** from the menu. The BAM*bino* will then ask for a confirmation,

You should press the Y or N

The BAM*bino* will then confirm that the memory has been erased and return to the main menu.

4.11 Using a computer

The Bambino comes equipped with a serial port for communication to a personal computer, in addition to the RS232 port the bambino is equipped with a wireless interface.

Note: both the serial communication cable and the wireless USB stick are optional extras and may be purchased from your distributor.

To upload information from the BAM*bino* to your computer you should connect the serial cable to your computer and to the BAM*bino* as shown below

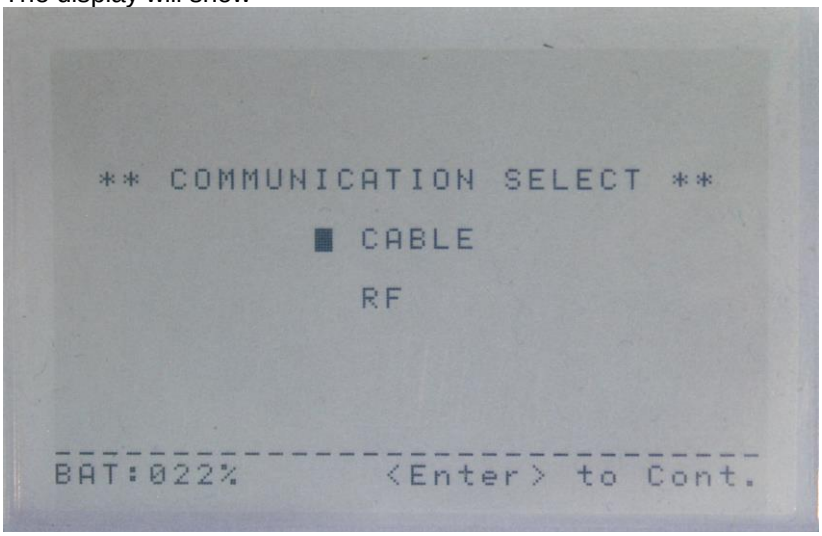
Serial Interface

Or if you want to use the wireless interface, you should plug the wireless USB stick into your computer. The wireless interface has a range of 20m, and uses the ZIGBee protocol.

Select *UPLOAD to COMPUTER* from the main menu.

Press ENTER

The display will show



Select either ***CABLE*** or ***RF*** as applicable

using the arrow buttons. ∧ 2 or 8 ∨

The BAM*bino* will then ask if you want to ***CLEAR MEMORY***

You should press the [Y] or [N]

Pressing N will return you to the memory,
Pressing Y will clear the memory and transmit the data to your PC, once the data has been received by the PC the BAM*bino* will return you to the main menu.

4.12 Setting the time and date

The BAM*bino* has an inbuilt real time clock, this allows the BAM*bino* to keep track of daily events so that each event or note that you save to the BAM*bino*'s memory is stamped with the current date and time. This allows the user to correlate particular notes with the real events and makes it easier to keep track of particular failures.

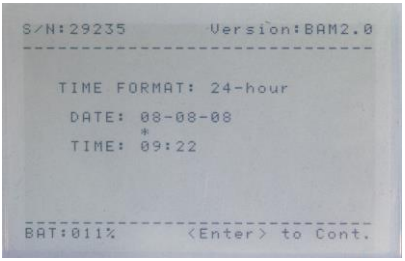
To set the time and date:

Select *DATE and TIME* from the main menu using the arrow buttons.

∧ 2	or	8 ∨

Press ENTER

The Time/date Entry screen will be displayed as shown



The Date should be entered using the number keys until the correct date is entered, after each digit is entered the cursor will advance to the next digit. If an incorrect digit is entered then you can go back a space by selecting the shift mode and pressing the SPACE Key

Once the correct date is entered you can save this to the clock by Pressing ENTER

The Cursor will then automatically advance to the Time. Repeat the above procedure to enter the time.

4.13 Connecting Microphone

The BAM*bino* is supplied with a removable microphone. The microphone is plugged into the BAM*bino's* microphone socket above the smart card slot, a picture is shown below

Your BAM*bino* should be stored with the microphone detached from the BAM*bino* in the case supplied.

Note: care should be taken at all times with the microphone, as damage is not covered under warranty.

4.14 Changing Battery

The bambino is supplied with a NiMh battery pack, this battery pack is specially manufactured for the BAM*bino* to provide optimal life, and is not compatible with other battery packs.

To remove or replace the battery pack, remove the protective cover and press the catch on the battery pack, slide the battery pack away from the bambino. To replace the battery pack put the pack in place and slide onto the bambino until the battery clicks into place, as shown below.

plug the power pack into a 240V wall socket and into the BAM*bino*. The BAM*bino* will need a 4 hour charge to completely charge the batteries, the charge cycle will automatically stop when the charge is complete

6. CALIBRATION AND SERVICE

Like all electronic instrumentation the BAM*bino* must be re-calibrated yearly. The reason for this is to maintain creditability in tests and acceptance of data according to international standards.
For the current cost and time required for re-calibration please contact AUTO*TEST*.

6.1 Packaging

The unit should be packaged in the original shipping container. However, where the container is not available it is important to remember that you are shipping an electronic instrument. Bubble pack or foam should surround the unit and should be inserted into a sturdy cardboard box. Please ensure that the container is locked or otherwise obviously secured.

6.2 Shipping

Labelling
A label should be placed on the outside of the container noting “Electronic Device Fragile”.

Freight Carrier
Container should be sent, Freight Prepaid. AUTO*TEST* has no preference on freight carriers.
Return freight details must be included.

Addressing
Please address to

The Service Department,
AutoTest Products Pty Ltd,
61-63 Parsons St,
Kensington, VIC 3031,
Australia.
Phone: (+61 3) 8840 3000.

8. SPECIFICATIONS

Measured Parameter	Sound pressure
Frequency Range (3dB point)	30Hz to 5kHz
Dynamic Range	86dB
Max Sound Pressure Level	120dB
Max Measurement Distance	3.0m
Directionality	Uni-directional
Response Time	1.7s in Monitoring Mode
Gain	Manual
Alarm	Flashing LED Audible Tone
Displayed Parameters	Bearing O.K. Bearing Faulty Overload
Input Parameters Required	Roller Speed (Hz)
Applicability	Programmed for all common conveyor bearings
Power Supply	Rechargeable battery Pack (automatic power off below 10%) "Battery Flat" displayed
Operating Time	9 hours continuous
IP Rating	IP53
Microphone	7.5mm electret, frequency range 20Hz-16kHz
Display	240 x 160 pixel full graphics display
Keypad	40 keys alphanumeric tactile membrane keypad
Weight	0.4kg
Physical Dimensions	230x95x50mm
Temperature Range	0^{O}-60^{O}C
Humidity Range	20%-90%

9. TROUBLESHOOTING AND FAQ

1. **Question: -** Can BAM*bino* be used underground?

   Answer

   BAM*bino* has not yet achieved intrinsic safety certification status and therefore should not be used in hazardous areas. New government safety regulations stipulate that approval for use of equipment underground is the responsibility of Mine Site Management. It is not AUTO*TEST*'s responsibility to obtain approval for use of BAM*bino* underground.

2. **Question: -** Is BAM*bino* effective on overland conveyors?

   Answer

   Yes. BAM*bino* can be and has been used successfully on overland conveyors. However, you must check that the bearing types on the conveyor in question are included in the list of bearings pre-programmed in BAM*bino*.

3. **Question: -** Some of our conveyors use bearings that are not catered for by BAM*bino*. Does it mean that we can't use BAM*bino* on those conveyors?

   Answer

   No. BAM*bino* can cater for non-standard rollers.

4. **Question: -**Can BAM*bino* be used on other equipment such as motors, pumps, gearboxes, etc. ?

   Answer

   BAM*bino* has been designed for conveyor bearings. Effective use of BAM*bino* on equipment other than conveyors is application dependent. We recommend seeking advice from you local AUTO*TEST* representative as a first step.

5. **Question: -** Are the batteries rechargeable?

   Answer

   Yes. You simply plug the power pack into a 240V wall socket and into the BAM*bino*. The BAM*bino* will need a 4-hour charge to completely charge the batteries, the charge cycle will automatically stop when the charge is complete

6. **Question: -** Can I change the rechargeable batteries?

Answer

Yes. You will need to Purchase a battery pack from AUTO*TEST*. AUTO*TEST* recommends that the rechargeable batteries be changed every 2 years.

7. **Question: -** Can I use any commercial battery charger to recharge the batteries?

   Answer

   No. Use only the power supply module and power pack supplied with your BAM*bino*.

8. **Question: -** How long do I need to recharge the batteries for?

   Answer

   A full charge requires 4 hours with BAM*bino* turned off or 6 hours with it switched on.

9. **Question: -** How can I tell that battery voltage is low?

   Answer

   The BAM*bino* will display the message **BATTERY FLAT** when the battery reaches 10% the unit will automatically turn off at 8% and will require charging before it can be turned on again.

10. **Question: -** BAM*bino* keeps shutting down automatically when I turn it on.

    Answer

    If the battery voltage falls below a suitable level the unit will automatically shut down to prevent permanent damage to the batteries. You must put BAM*bino* on charge before you can use it again.

11. **Question: -** When should the batteries be replaced?

    Answer

    Approximately every 2 years.

12. **Question: -** Does BAM*bino* require calibration?

    Answer

    Like all electronic instrumentation, BAM*bino* must be re-calibrated yearly to maintain credibility in tests and acceptance of data.

13. **Question: -** Can BAM*bino* be configured in advance for a conveyor to save having to input set-up data during monitoring?

    Answer

Yes. BAM*bino* provides memory space for 16 different conveyors to be pre-programmed in advance. In addition you can pre-programme as many smartcards as you require, these can be quickly loaded into the bambino to enable different settings

14. **Question: -** The ambient conveyor noise level varies. Do I need to adjust the gain on BAM*bino* accordingly?

    Answer

    Yes, the gain should be adjusted so that the level is between the 'OK' bars, for most applications the gain will not have to be varied for each environment as the BAM*bino* is sufficiently tolerant to enable sensible readings with a varying ambient noise level.

15. **Question: -** BAM*bino* triggered an alarm in my office. There are no bearings that I know off in my office!

    Answer

    BAM*bino* is sensing ambient noise continuously. In a very quiet environment, BAM*bino* will be listening to many low level noises that we can't hear. Occasionally, some noises will cause it to trigger. There is thus no cause for concern.

16. **Question: -** What else could cause *BAMbino* to trigger apart from faulty bearings?

    Answer

    Speech, loud transient noises.

    If faced with this situation, repeat the measurement in the absence of the interfering noise.

17. **Question: -** How accurate does the belt speed have to be?

    Answer

    Accuracy on belt speed must be within 5%. Do not guess or rely on memory. Use up-to-date documented information or measure it.

18. **Question: -** Some of our conveyors have different size rollers on the carry and return sections. Which roller diameter should we use?

    Answer

    You should enter the lowest roller speed into the BAM*bino.*

19. **Question: -** Do I have to point the microphone at each roller?

    Yes. BAM*bino* uses an uni-directional microphone.

20. **Question: -** How close to the roller does the microphone need to be?

    Answer

    There is no need to get close to the rollers. BAM*bino* has a detection range of up to 3m and allows you to maintain a safe distance from the belt while you walk. A 1m distance from the belt is more than adequate and would put all rollers including those on the far side within BAM*bino*'s range.

21. **Question: -** Can BAM*bino* pinpoint a faulty bearing?

    Answer

    BAM*bino* will detect a faulty bearing within one idler module. But it may not indicate which bearing or which roller is faulty.

22. **Question: -** How do I close in on the idler module with the faulty bearing?

    Answer

    Please refer to Section 3.2, where it is explained in detail.

23. **Question: -** An alarm was activated in confirmed but the noise from the nearby rollers sounds perfectly normal. Is BAM*bino* hearing something I can't hear?

    Answer

    BAM*bino* looks for characteristics that have nothing to do with loudness and has the ability to detect faulty bearings at a very early stage, before bearing noise becomes prominent.

24. **Question: -** A roller, which sounded definitely faulty from the noise it was generating, was not detected by BAM*bino*.

    Answer

    Again, BAM*bino* looks for characteristics that have nothing to do with loudness. The instrument has the ability to distinguish between bearing faults and other noise sources. Many idlers are replaced too early as a result of false judgement based on human ear. This increases maintenance costs unnecessarily. With BAM*bino* you will able to reduce these costs.

    Worn seals almost always initiate idler failure. Most often, idlers with squeaking seals are tagged as faulty and removed. It could be weeks or months before a bearing with worn seals experiences severe damage.

If you have doubts about a roller which was not detected by BAM*bino*, examine it visually looking for worn seals, a worn shaft rattling in its housing, a loose bracket, etc. If no defect is visible and you still have doubts about this roller, you should tag it using a different indicator to those used for faulty bearings and have it inspected once removed.

25. **Question: -** When near a feeder, BAM*bino* triggers continuously. Is this caused by the noise from the feeder?

    Answer

    Readings taken near a feeder are not reliable. Idlers within a 5 m radius of a feeder should be monitored when there is no feed, or stop the feed for a few seconds if possible.

10. WARRANTY

AUTO*TEST* or an Authorised AUTO*TEST* Service Centre warrants this product against defects in material and workmanship for a period of 12 months from the original date of purchase. This warranty applies only to products and components supplied by AUTO*TEST* which can be identified by the trade name or logo affixed to them or by other documents. AUTO*TEST* does not warrant any products not supplied by AUTO*TEST*.

During the warranty period, AUTO*TEST* or an Authorised Service Centre will repair (or at its option replace) any defective component(s) without charge for parts or labour, provided the product is returned in its original or a suitable equivalent container, freight prepaid, to an Authorised AUTO*TEST* Service Centre. Transit insurance and return freight will be at the owner's expense.

In order to obtain calibration, warranty or non-warranty service, ship the product, freight and insurance prepaid to your nearest AUTO*TEST* Service Centre. Attach to the product your name, address, contact phone numbers, description of the problem and if a warranty claim, proof of purchase (dated sales receipt or invoice).

AUTO*TEST* or an Authorised AUTO*TEST* Service Centre reserves the right to refuse warranty repair if accident, abuse, misuse or misapplication has damaged the product in transit or as a result of service or modification by other than an Authorised Service Centre, nor are any other warranties expressed or implied, including any regarding merchantability or fitness for any particular purpose.

AUTO*TEST* or an Authorised Service Centre is not responsible for incidental or consequential damages resulting from the breach of any express or implied warranty, including damage to property and, to the extent permitted by law, damages for personal injury.

11. WARRANTY REGISTRATION FORM

See enclosed warranty card.

12. SPARE PARTS

The following consumables and spare parts can be obtained from AUTO*TEST* or an Authorised AUTO*TEST* Service Centre:

Microphone
Battery Pack
Battery charger.
Smartcard
Hand Strap
Windsock

AUTO *TEST*™ Products Pty Ltd
61-63 Parsons St Kensington VIC 3031 Australia
Phone: (+61 3) 8840 3000 Sales:(+61 3) 8840 3017
Service: (+61 3) 8840 3016 Fax: (+61 3) 8840 3099
Email: service@autotest.net.au info@autotest.net.au
Email: sales@autotest.net.au www.autotest.net.au