

BMIC Operators Guide

Version 1



Warning: This manual contains important safety and operating information.
Please read, understand and follow the instructions in the manual.

Bmic

The Bmic (pronounced “Bee mike“) is an easy-to-use, low cost, electronic listening stick and ground microphone combined. It is ideal for general leak sound-ing operations and can be fitted with either a tripod foot (for use as a ground microphone) or probe rods (for sounding at fittings or in soft ground).

The control unit is a “trigger” operation and a volume/sensitivity rotary control. An LED indicates operation and battery status. It can be used to confirm the position of underground leaks audibly from ground level; sound pipe fittings; penetrate soft ground to listen for leaks or carry out traditional acoustic surveys.

Equipment list

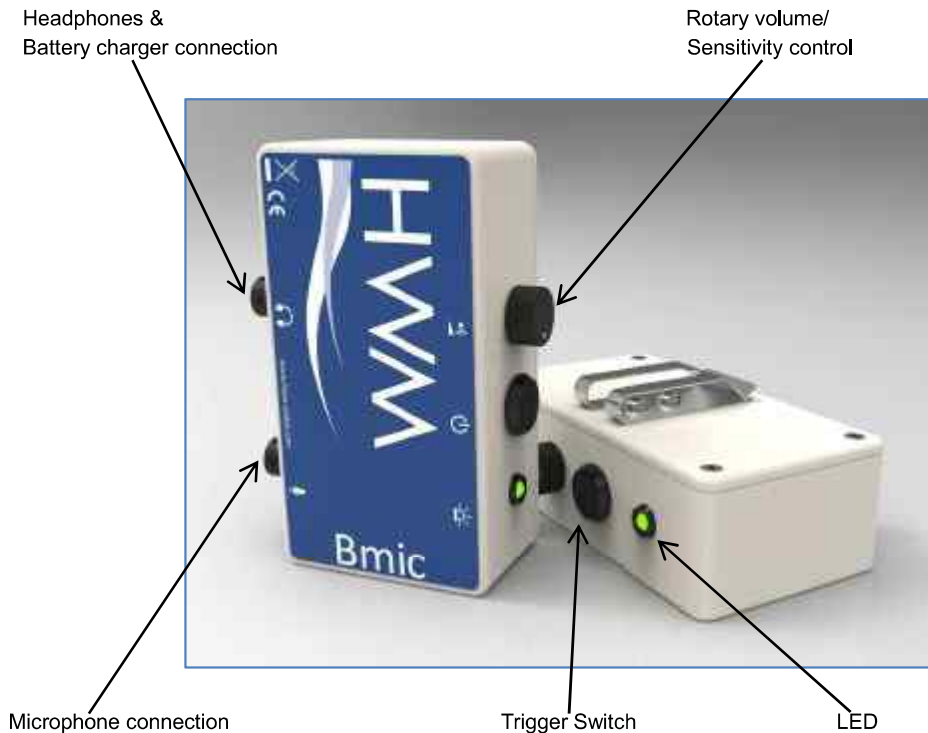
- 1 Bmic hand held control unit
- 2 Microphone unit with cable & Tripod Unit
- 3 2 probe rods
- 4 AC adapter
- 5 Headphones
- 6 Carry bag
- 7 Instruction manual

The Bmic equipment is shown below (note the AC adapter, carry bag and manual are not shown).



Bmic Controls

The picture below shows the location of the rotary control for volume and sensitivity, LED and the trigger switch plus the Electrical connections for the headphones / battery charger and microphone.



Using the Bmic

The Bmic is simple to operate. Select either the probe rods or the tripod unit and screw into the microphone unit. (Use the tripod foot on hard ground and use the probe rods on soft ground or when accessing water pipe fittings). Connect the headphones to the connector and connect the microphone cable to the forward connector. Put on the headphones and press the trigger button on top of the unit to listen for leaks. The volume/sensitivity can be adjusted using the rotary control.

LED indication

The LED shows green when the unit is operating and red to indicate low battery power.

Care of the Bmic

The Bmic is rugged and showerproof (to IP65) but contains electronic circuitry and should be handled with care. It should be kept clean and dry and when necessary cleaned with a damp cloth.



The Bmic in use

Battery Warning

The Bmic contains a Nickel Metal Hydride battery which must not be used on any other equipment if removed. Only batteries supplied by Halma Water Management must be used as replacements. Do not short circuit or misuse these batteries as this may result in explosion or fire.

Battery Replacement

Although the battery is rechargeable it may eventually need to be replaced. To do this undo the four screws underneath the hand-held unit and separate the two halves of the Bmic unit. Gently pull out the battery holder and replace the battery. When refitting the battery and battery holder make sure no wires become trapped.

Charging the BMIC

Connect the charger lead to the headphone connector of the Bmic and connect the charger power lead to the universal 110-240V AC supply. The Bmic can then be charged overnight. An optional accessory is the vehicle cigarette lighter adapter that can also be used to charge the battery.

Bmic Operator Guidance: *Background information for effective acoustic leak detection*

All acoustic leak detection methods are based on the premise that normal water passage through pipelines takes place noiselessly. When the water passage is disturbed a noise is created. Causes can include partial pipe blockages, sudden changes in pipe diameter, abrupt changes in pipe direction, pumps or meters installed in the pipeline, consumer usage or pipeline damage. Pipeline damage can include holes, cracks or splits, complete pipeline rupture, leaking joints or leak-ing valves.

Careful application of leak detection techniques will enable the operator to eliminate detected noises generated by poor pipeline design or consumer usage and to identify leakage due to pipe system damage.

The strength and clarity of noise generated by leaks will be affected by the water pressure, the size and shape of the orifice allowing leakage, the type of ground material around the pipeline, the type of ground cover over the pipe, the diameter, wall thickness and material of the pipeline and the quantity of water leaking.

A small orifice or hole and high water pressure generally produce a higher frequency noise. Often the noise level increases around valves, pipe elbows, T connections, pipe ends etc. since the partial obstruction increases pressure and creates some further disturbance in the water path.

Leak noise is transmitted along the pipeline both through the water and the pipe wall as well as into the ground around the pipe. The noise travels much better through "hard" materials so that the noise travels much further along metallic pipes than asbestos cement pipes which themselves are better than plastic pipes. Ground material generally provides a poorer travel path than the pipeline itself. Soft sandy ground provides a worse travel path than well compacted ground with a hard paved surface covering.

The leak noise can change in strength and pitch as it travels along the pipe or through the ground. The deeper the pipe is buried and the softer the ground the more the noise will be dampened. The harder the pipe material, the higher the frequencies detected will be, and the further from the leak the noise will be detected, this makes it harder to accurately find the exact point of maximum noise.

Background noise can interfere with leak detection. Traffic and machinery noises can travel for considerable distances through both air and ground material and often occur in the same frequency bands as leak noise. Sometimes it is necessary to use leak detection techniques at night when interfering noises are less.

It is very important to adopt a methodical approach when using any instrument for acoustic leak detection.

It is necessary to practice good technique in order to distinguish between different sounds, recognising background or interfering noises, so that they can be eliminated. It is also essential that other (non-leakage) noise sources such as consumer draw-off or partially closed valves are eliminated by logical site inspection practices prior to any excavation taking place.

Hand probe

For normal soft ground surfaces the single pointed extension rod should be connected, do not over tighten the screw thread. For direct contact with underground fittings via access covers it may be necessary to use the second extension rod. To do assemble this remove the single rod and connect the extension rod and re-fit the pointed rod again. If the rods have been over tightened, spanner slots allow easy removal.

Surveying

The leak location can be narrowed down by listening at accessible contact points such as meters, hydrants, valves and stop-taps, which provide points of good sound pick-up particularly if the pipe is metallic. Use the hand-probe/extension rod to listen at these points.

If there are no accessible contact points or if the pipe is of non-metallic material use the microphone foot for listening, placing the foot over the pipe route in the area of the suspected leak. Move along the pipe route listening at each accessible pipe-fitting or at regular positions on the ground until you have identified the area of maximum noise level.

Note: When you are listening on pipe-fittings the location of the point of maximum noise will probably not indicate the leak position, only the fitting closest to the leak. The noise level will also appear stronger where there is less thickness of ground or other material for it to pass through. The leak noise will follow the path of least resistance.

Pinpointing the leak position

Pinpointing the leak position involves a process of comparing a number of leak noises. Select the most suitable sensor device; the microphone foot for hard ground surfaces or the hand probe for soft ground.

Press the trigger to operate the Bmic and adjust the headphone volume control to a comfortable listening level. Once you have listened to the noise through the headphones, release the trigger to switch off the amplifier and move the microphone foot or hand probe to the next test position.

Repeat the sequence to listen to each of the test locations moving along the pipe route in the direction where signal strength is increasing. If the leak noise level falls you have passed the leak and should go back and reduce the distance that you move between measurements. The loudest leak noise will then indicate the location of the leak bearing in mind the ground conditions already mentioned.

Technical Specification

Bmic hand held unit/sensor housing

Piezoelectric high sensitivity sensor mounted in PC-ABS (polycarbonate) housing
Single headphone/charger input socket with automatic sensing of device connected

Connectors

Amphenol military specification connectors for microphone and headphone/charger connections

Charging

Universal 110-240V AC charger with 12V DC output
4-pin Amphenol connectors to control unit
Charge time: Overnight charge.

Microphone housing

High sensitivity piezo-electric sensor mounted in rubber housing with integral strain relief
Low noise 0.75m cable (detachable)
4-pin Amphenol connection to control unit
Weight: 400g

Hand probe attachment

2 stainless steel extension rods (each 400mm long) Weight: 150g

Headphones

Lightweight high quality headphones
Impedance: 16 Ohms
4-pin Amphenol connector to control unit

LED

Green = normal operation
Red = low battery power

Optional accessories

High specification aviation quality headphones
Car cigarette lighter adapter with 12V DC output
Acoustically shielded ground microphone foot, for use in all weather conditions

