



GUTERMANN

AQUASCAN 610

Operating Manual



JW V 1.1

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1. Introduction

The AquaScan 610 has been specifically designed to be an ultra-compact cordless correlator with Bluetooth for download communication. The 'Streetworks Act' friendly sensors with built in radio has led the way in next generation correlators almost eliminating the need for cables. The AquaScan 610 has the highest precision on all pipe materials including uPVC, MDPE and other plastics. The Wizard assist feature makes the operation user friendly. With the Advanced Spectrum Analysis (ASA), multi- filter, manual filter and onsite velocity check options the AquaScan 610 has many features for the experienced user.

1.1 System Components

The AQUASCAN 610 consists of:


- Cordless Correlator
- Two radio-operated sensors
- Battery chargers AC mains and DC,
- Antennae & Extension cables,
- Hydrophone sensors & Cables (optional)
- Bluetooth Headset & Charger
- AQUASCAN 610 viewing software.






1.2 Charging all equipment

The Sensors and Correlator contain rechargeable batteries and can be charged either from AC mains electricity (110 -240v) using the charger supplied or from the 12v DC socket in a car. All 3 components maybe charged at the same time from the red lead supplied. Remove the red cap from the 12v Cigar plug on the red lead and insert it into either the AC mains charger socket for charging in the office or directly into the 12v socket in the car. 2 hours is usually enough time to achieve full charge. Both Sensors LED will flash during charging and then turn off when complete. The Correlators battery symbol will show full when complete.

2. Quick Start Guide

To start, once all components are charged connect antenna to the Correlator and switch on . Connect the Antenna to both Radio Sensors.

- a. Deploy both Sensors by magnetically attaching them to the pipe fittings. Measure the distance between the sensors with a measuring wheel. If hydrophones are used ensure the water connections are leak free. Switch the sensors on by pressing the push button on the top for 1 second until the red LED is on constant before walking half way between the sensors with the Correlator. Note: Both sensors LED must either flash (Plastic Mode) or be constant. A mixed setting would falsify the measurement result! Make sure the A and B radio signals are close to maximum.
- b. Press the **Pipe** button  and enter the pipe material, diameter and distance (measured between sensors with a wheel). Press the Pipe button to verify the indicated data is shown at the top of the main screen.
- c. Check whether the connection with the sensors is good by listening to the sensors with the headset, see chapter 4.3. Optimise Antenna location and sensor contact to create the clearest signal if not already achieved.
- d. Press the button **Start Correlation**  and wait until correlation has completed or stop the correlation after 5 minutes by pressing .
- e. Adjust the filter (see chapter 4.4) setting if necessary to enhance the measurement quality and cleanness (reduced minor peaks and spicks).

- f. With challenging measuring conditions, adjust the measurement duration (Chapter 4.5.8) in the **Settings** for a longer period.
- g. Save the Correlation via manage measurement (chapter 4.5.6).

3. Main Screen

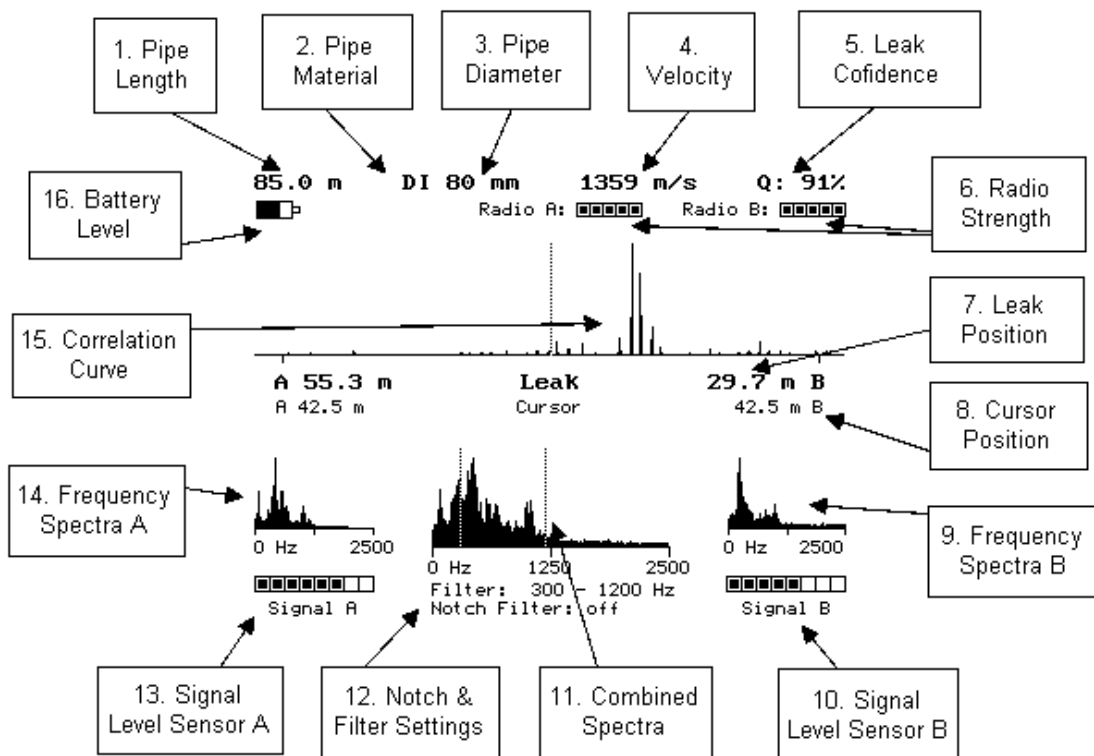




Fig. 1 AquaScan 610 Main Screen

1. Pipe Length is the distance between sensors A & B following the path of the pipe which is not always a straight line.
2. Pipe material is what the pipe is manufacture from, this can often be found on network drawings/maps or known by an experienced operator.
3. Pipe diameter can also be found on pipe network diagrams
4. Velocity is the speed of sound along the pipe wall; this is preset within the velocity tables held in the Correlator and is determined by the combination of 1, 2 & 3.

-
5. Leak Confidence is the percentage possibility of there being a leak; any correlation above 80% should be investigated.
 6. The radio signal strength is an indicator of the quality of the radio reception. The more blocks filled in the better the signal. Stand half way between sensors to balance the number of blocks also listen to the sensors to determine any radio interference.
 7. Leak position is the distance from Sensor A and B to the leak. The tallest correlated peak determines the position.
 8. Cursor position is the distance to the dotted line on the correlation curve. This is user adjustable by using  or .
 9. Frequency Spectra B is the sound signal frequency curve from sensor B and is displayed between 0 to 2500Hz. This is useful for evaluating the sensor's signals individually. You may be able to see: Interferences that the sensors picked up; e.g., from the electricity mains frequency. Mains frequency interference appears as a peak at 50 or 60 Hz, depending on your country.
Weak radio transmission, if the radio transmission is very weak or missing, e.g. caused by an auto-shut-off of the transmitter, the sensor's spectrum will contain a white noise distribution. White noise shows as a nearly equal power distribution across all frequencies. In the graph, you will see the bars for the frequencies form a straight horizontal line.
 10. Signal level B is the sound signal strength indicated by blocks; the more blocks filled in the stronger the signal.
 11. The combined spectra or cross spectrum is a spectrum made up of only the correlating components of the two signals. We recommend using the cross spectrum as a guide to filter adjustment.
 12. Notch Filter; Electricity interference appears as a peak at 50 or 60 Hz, depending on the country e.g. USA and Philippines = 60HZ, Most of Europe, Australia, New Zealand, Singapore, Malaysia = 50HZ. A 50 or 60 Hz Notch filter can be applied to eliminate the interference.
The Filter settings displayed is the bandwidth created by the lower (e.g. 300Hz) and upper filter (e.g. 1200 Hz) which are represented by dotted lines on the combined spectra. These filters are determined by the pipe material selected, using manual filtering the lower and upper filter maybe adjusted- see filtering chapter 4.4
 13. Signal level A is the sound signal strength indicated by blocks; the

more blocks filled in the stronger the signal.



14. Frequency Spectra A is the sound signal frequency curve from sensor B and is displayed between 0 to 2500Hz. This is useful for evaluating the sensor's signals individually.
15. The Correlation Curve displays the processed measurement data for visual evaluation and analysis of the measurement result. A single peak creates a confident result whereas multiple peaks known as a Manhattan sky line is a poor result.
16. Battery level indicator fills in depending on the state of charge; the example currently shows 70% charge. When the battery is full the indicator is filled in completely. A lightening symbol next to battery indicator appears when the charger is plugged in.


4. Correlator Keyboard





Fig. 2 AquaScan 610 Correlator keyboard

4.1 On/Off:

Press  at least 1 sec to turn the Correlator on or off. If the device is on, pressing the  key less than 1 sec will switch the backlight on or off.

Memory reset: Pressing  while powering the unit on will display a menu with the following choices:

- Continue: Continue without deleting anything
- Clear Memory except saved meas.: Delete actual parameters and measurement. Saved measurements will not be deleted
- Clear all memory: Deletes also the saved measurements

Contrast adjust: While the introduction screen is visible, you can change the contrast with  or .

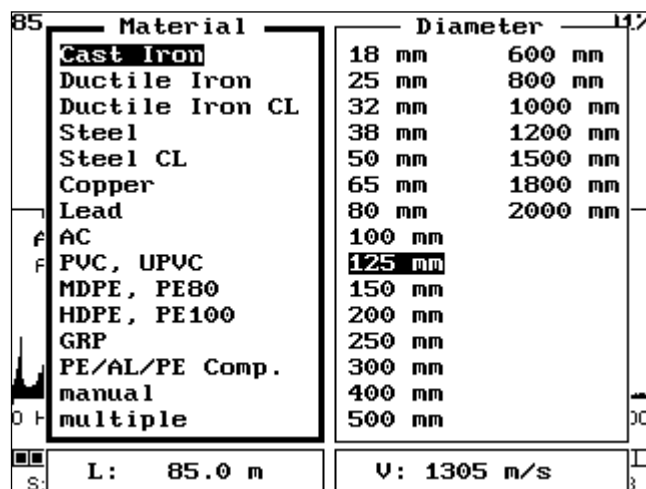
4.2 Pipe Details

Change between the input fields with \checkmark .

Enter a section: Select it with \uparrow / \downarrow and press \checkmark .

Discard changes with \otimes . Set the new parameters with \rightarrow . You can also set the parameters and initiate directly a new correlation with |||| .

Press \rightarrow key to enter pipe parameters:



Material	Diameter
Cast Iron	18 mm
Ductile Iron	25 mm
Ductile Iron CL	32 mm
Steel	38 mm
Steel CL	50 mm
Copper	65 mm
Lead	80 mm
AC	100 mm
PVC, UPVC	125 mm
MDPE, PE80	150 mm
HDPE, PE100	200 mm
GRP	250 mm
PE/AL/PE Comp.	300 mm
manual	400 mm
multiple	500 mm

L: 85.0 m V: 1305 m/s

Fig. 3 Pipe Material Menu

Select material using \uparrow or \downarrow and then \checkmark to move to diameter. Use \uparrow or \downarrow to choose the diameter and \checkmark to accept. Enter length of pipe by increasing or decreasing the digits \uparrow or \downarrow then \checkmark to select until the correct distance is entered. Press \rightarrow key to return to the main screen or |||| to Correlate.

Select **manual** to enter sound velocity instead of material and diameter however the sound velocity must be known by the operator or measured using the velocity check (see chapter 4.5.3.)

If the pipe consists of different materials select **multiple**:

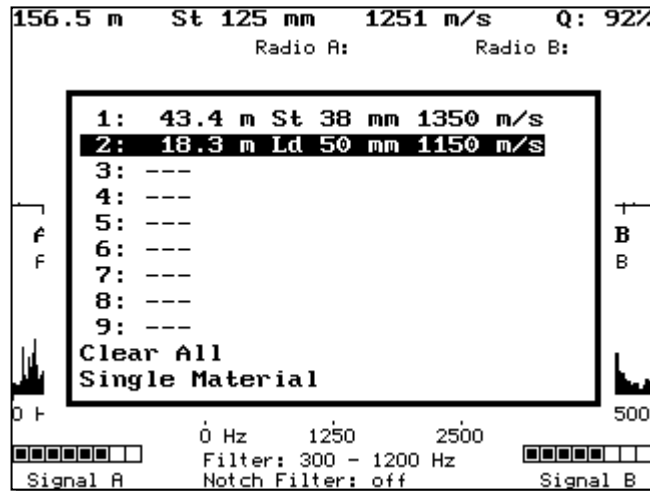




Fig. 4 Multiple Pipe Material Menu

When entering multiple materials the first section is always from sensor A to the change point then next section towards sensor B. Determine how many sections make up the complete pipe between sensor A & B. Press  on section 1 which will initialize the main material menu, enter the pipe details as described for single material. Choose section 2 and repeat the process then section 3 until the whole pipe length has been established.

Clear all deletes the list of sections.

Single Material reverts back to the material menu and allows the entry of 1 section between sensor A & B.

4.3 Listen Function

Press  to enter the Headset/listen menu.

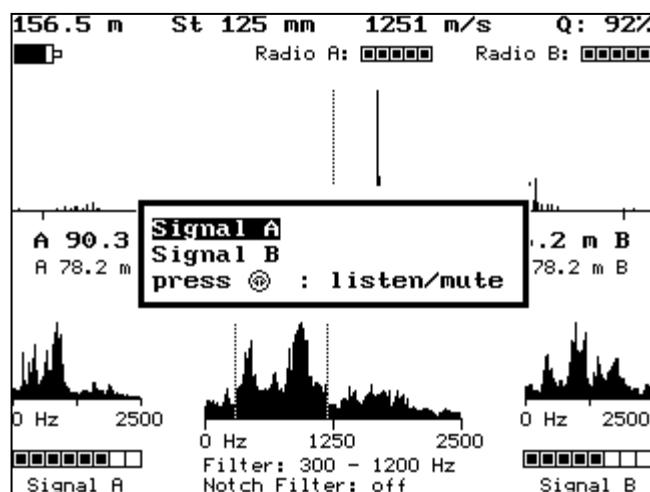





Fig. 5 Headset listen Menu

Connect the Bluetooth headset to the AQ 610. You can initiate the connection from the AQ 610 (see chapter 4.5.1.3.). Press  for entering the headset menu.


 **Note:** Before using the Bluetooth headset for the first time, it is necessary to pair it with the AQ 610 (refer to section 4.5.1.3.).

Change between sensor signal A or B with  or .

Turn listening on/off with  key (mute function)

4.4 Filters

The objective for filtering is to clean up the correlation and unmask any hidden leak.

Press  the filter menu will appear:

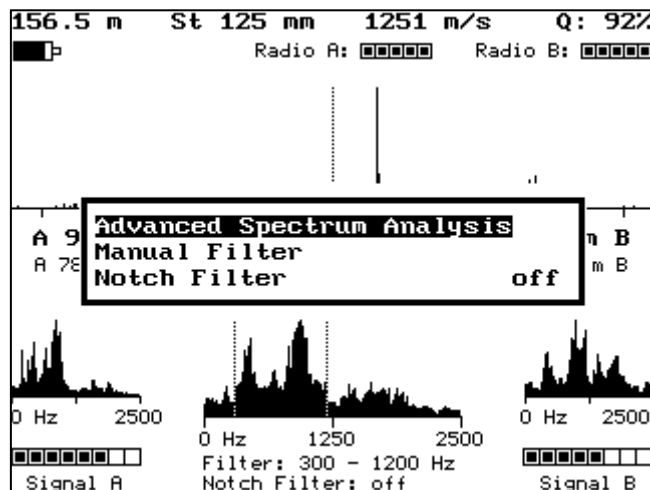


Fig. 6 Filter Menu

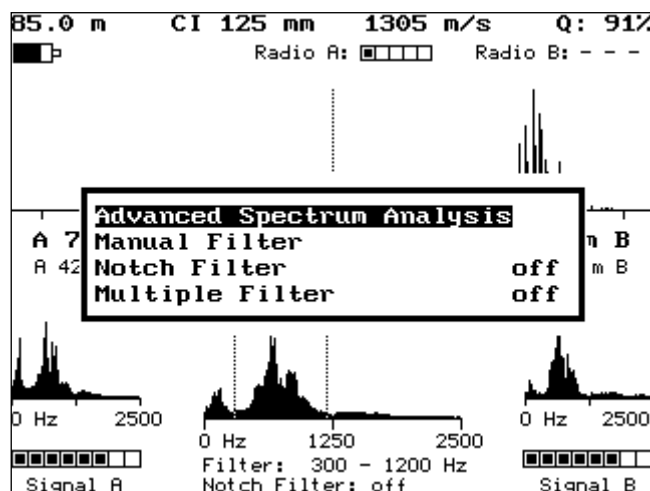


Fig. 7 Optional Multiple Filter Menu

4.4.1. Advanced spectrum analysis:

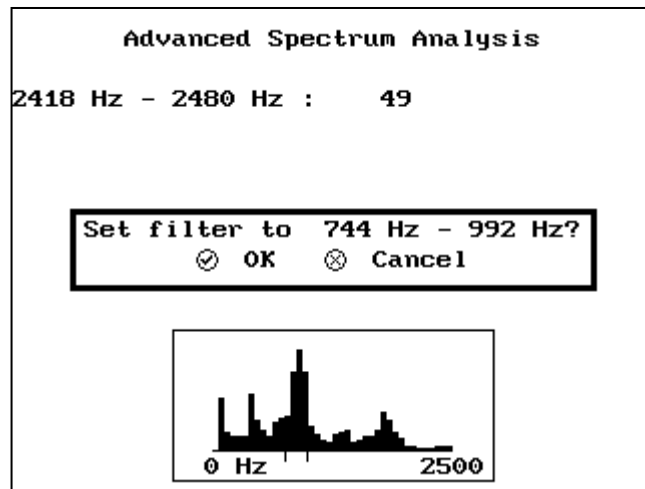


Fig. 8 Advanced Spectrum Analysis

An automatic analysis of the frequency spectrum will be initiated. After the analysis is completed, you have the choice for setting the filters to the calculated values or to discard the results.

4.4.2. Manual filter

1. Listen to the leak to determine if it is high or low frequency.
2. Consider the ground material, leak flow, pipe material, pipe diameter and type of leak to estimate frequency.
3. View the frequency spectrum of A and B and see if you can find matching peaks by frequency (they will not be the large peaks).
4. Start by making an informed estimate at the required filter setting. If you are not successful retry using a series of different settings until you have exhausted every option.

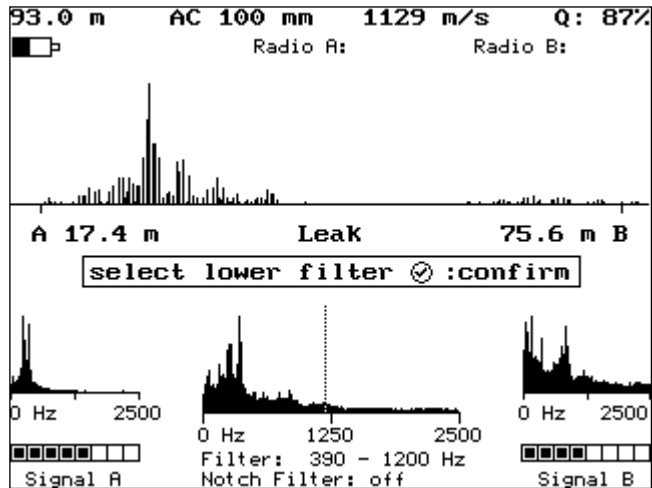


Fig. 9 Select Lower filter

Set filter manually with the cursor in the coherence spectrum graphics.

Select lower filter limit and press ✓

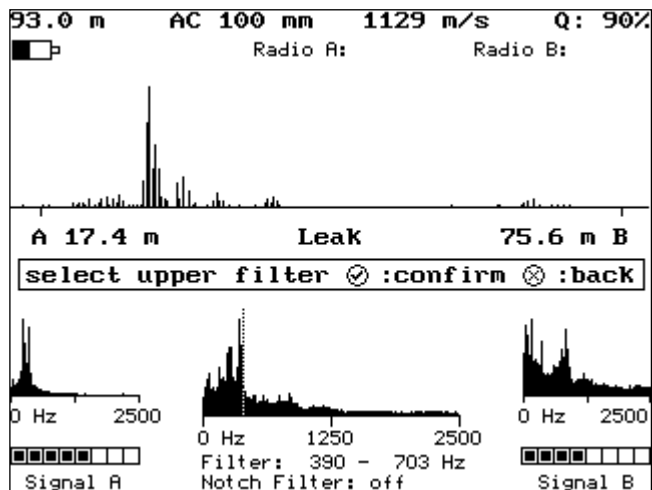


Fig. 10 Select upper filter

Select upper filter limit and press ✓ or press ✕ to return to lower filter limit

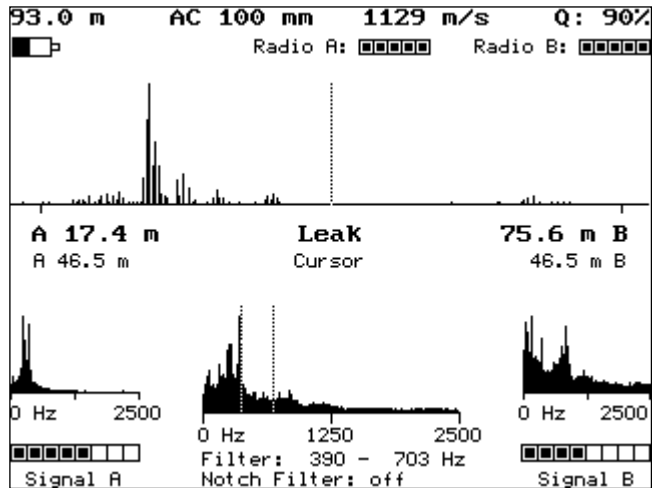


Fig. 11 Resultant filter

The correlation curve and the result will be updated while changing the filter.

4.4.3. Notch filter:

Switch notch filter on or off. When selecting **on** you can enter the notch filter frequency. Notch filter can be used for suppressing electrical mains disturbing signals that belong to a small frequency range, e.g. nearby A/C currents at 50/60 Hz. As a rule 110/120V AC creates a 50Hz disturbance and 230/240V AC create a 60Hz disturbance.

4.4.4. Multiple filters:

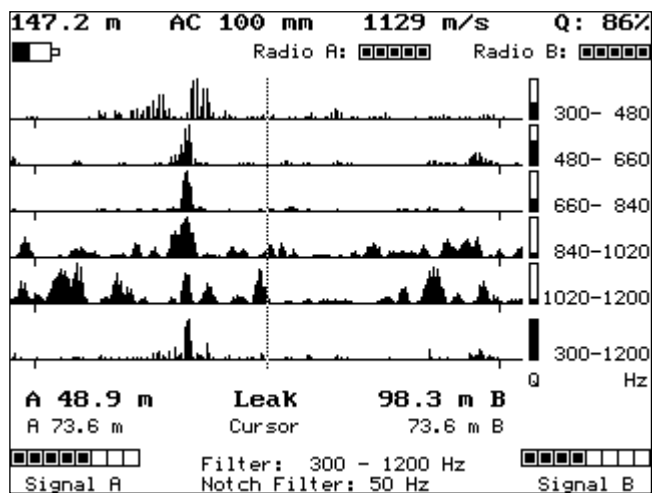


Fig. 12 Multiple filter

Initialise the multiple filter screen by choosing on and press \checkmark or press \otimes to cancel. The main screen will appear as in fig 12 with 6 separate correlation lines with the Q for quality to the right side as well as the filter bandwidth. While the multi filter is active a correlation can be perform by pressing u .

To deactivate the multi filter screen press F then move the cursor to multi filter and press \checkmark highlight off as shown in fig 13 and press \checkmark .

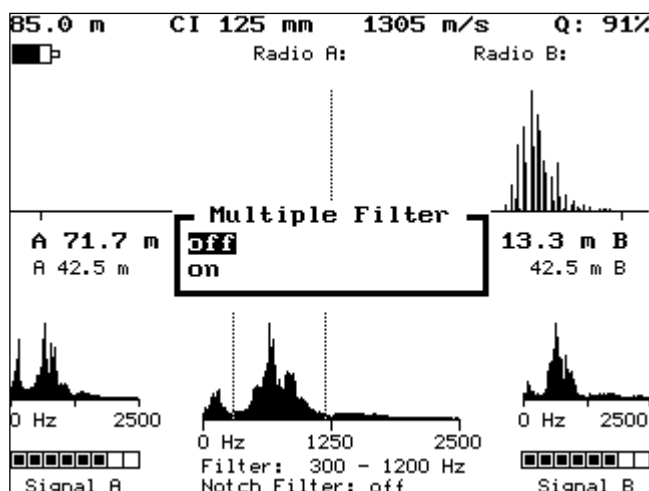


Fig. 13 Multiple filter on/off

4.5 Main Menu

Press M for Main Menu. Select item by using \uparrow / \downarrow keys and confirm with \checkmark :

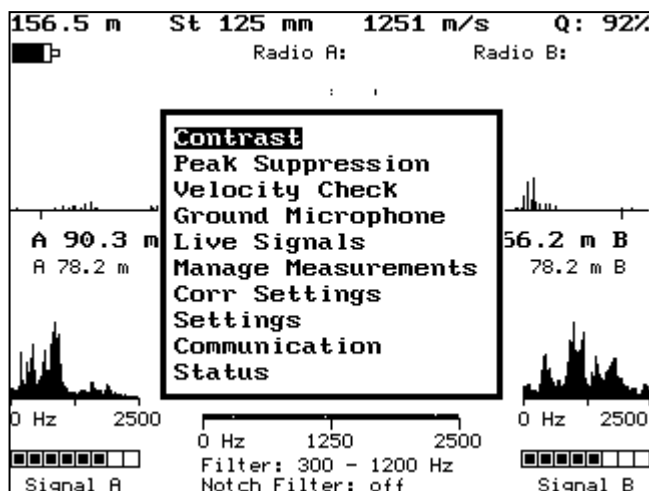


Fig. 14 Main Menu

4.5.1. Contrast

Adjust contrast with \uparrow or \downarrow . Confirm with \checkmark , discard with \times .

4.5.2. Peak Suppression

Use this feature to remove unwanted peaks which are affecting the correlation result. For example; a secondary peak which is caused by consumption as the highest peak is the exact distance to where a household meter is turning, remove this with peak suppression.

First move the cursor to position 1 with \uparrow or \downarrow . Confirm with \checkmark ;

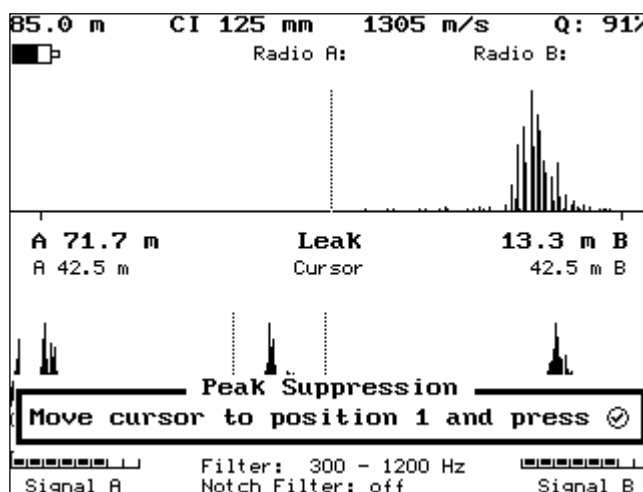


Fig. 15 Peak Suppression part 1

Secondary move the cursor to position 2 with \uparrow or \downarrow . Confirm with \checkmark ;

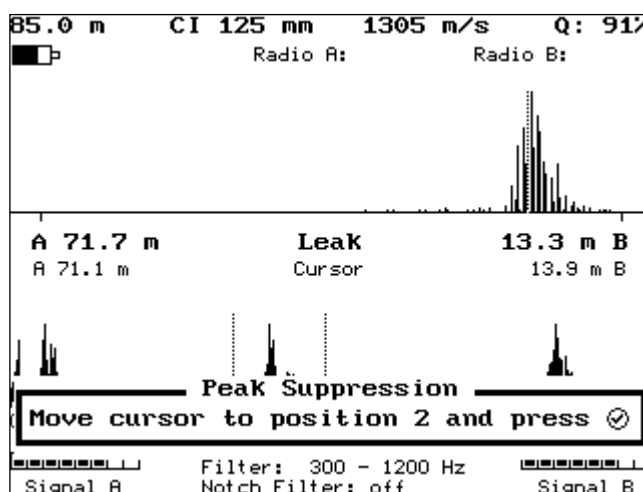


Fig. 16 Peak Suppression part 2

The result below shows the peak has been removed and the distance from A & B has changed;

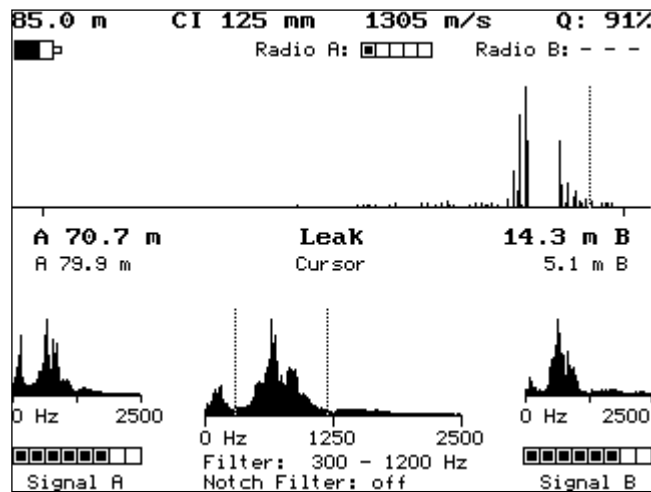


Fig. 17 Peak Suppression result

4.5.3. Velocity Check

The correct sound velocity is very important for the precision of the leak location result. The nearer the leak is to one of the sensors creates a large time delay, the more important the velocity value as during the mathematical correlation process a greater error will occur. It is very important to understand that the sound velocity table, defined by pipe material and diameter, is only theoretic and that the specific real velocity might differ from site to site. We recommend that whenever the measurement shows a leak position which is not in the middle third section of the total distance between sensors A and B, the real on-site sound velocity should be verified. This can only be done when the pipe material to be verified is homogeneous, i.e. is a single material and diameter.

For this velocity check we can either use the real leak itself, by moving both sensors to one side of the leak, or we can simulate a leak i.e. by opening a hydrant or a valve. In this case we simulate the leak outside of the pipe section we are measuring (that means that both sensors are on one side of the leak).

First, enter the distance between sensor A & B with \uparrow or \downarrow . Confirm with \checkmark ;

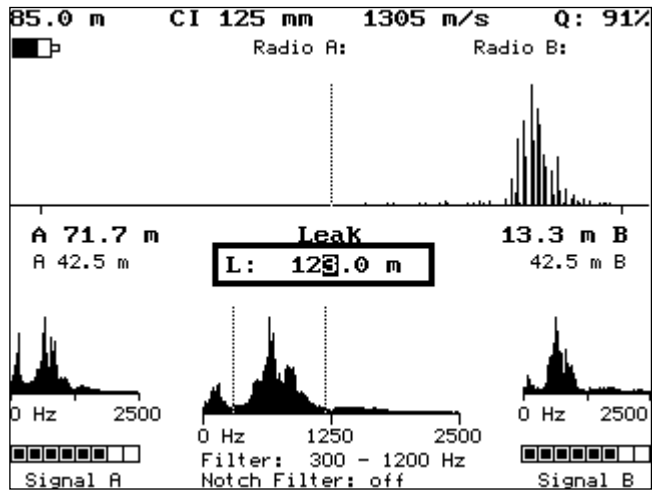


Fig. 18 Velocity Check part 1

Next, Select outside leak Confirm with ;

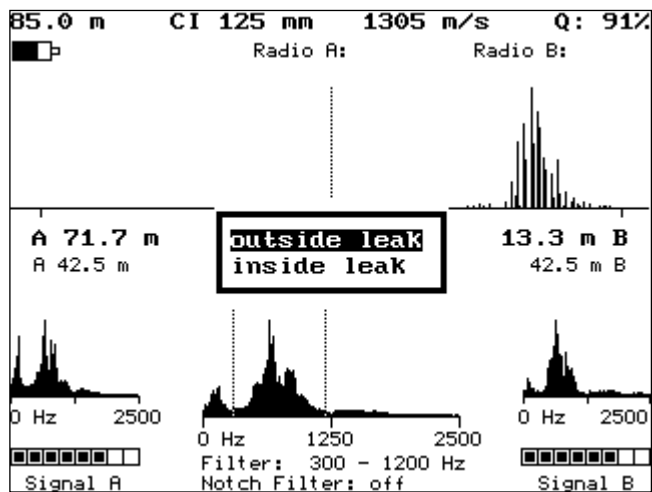


Fig. 19 Velocity Check part 2

Then, Select **metallic** or **non-metallic / unknown** pipe material.

Note: If pipe material is metallic the measurement will be more precise if you select metallic instead of unknown.

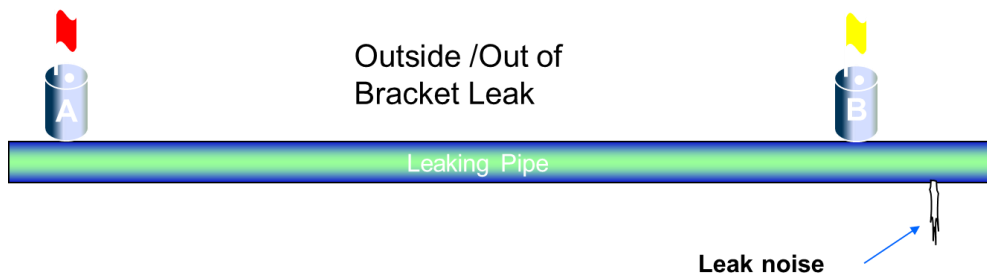


Fig. 20 outside Leak

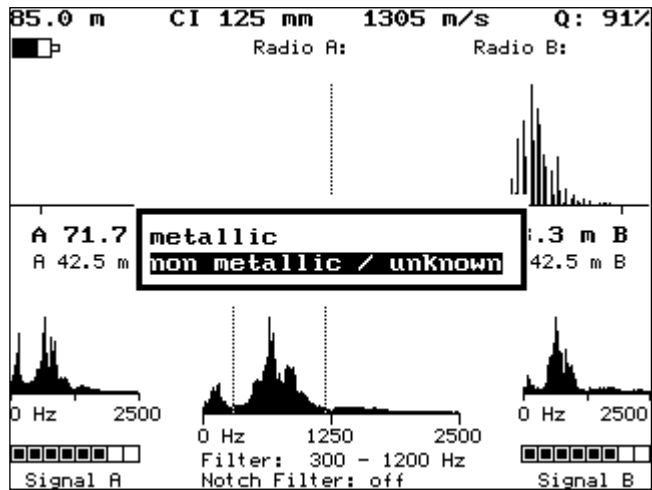


Fig. 21 Velocity Check part 3

The measurement will start automatically. After the measurement has finished the velocity will be calculated and you will be given the option to use the calculated velocity.

For inside leak (sound source is between the sensors at a known position). In case of inside leak the sound source should not be in the middle third of the pipe. If the sound source is exactly in the middle of the pipe it is impossible to determine the velocity. The difference when entering the information is the distance between sensor A and the known leak has to be entered as shown below;

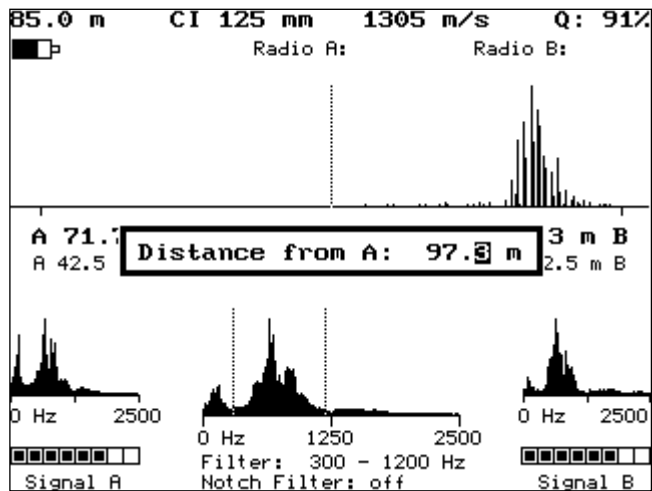


Fig. 22 Velocity Check inside leak

4.5.4. Ground Microphone



Fig. 23 AquaScan 610 with Geophone attached

To assemble the Geophone, take the T-bar handle and screw into the stainless steel plate of the Geophone base in a clockwise direction. There should be no thread visible once complete. When attaching the cable ensure the notch lines up between the 4 way plug on the cable and the socket of the T-Bar. Connect the Geophone to the correlator as shown in fig 23 by removing the cap from the binder socket on the right side of the correlator and then lining up the notch of the binder plug and socket then push and screw clockwise until hand tight.

Please make sure that your headset is connected to the AQ 610 and that it is in mute state before entering the ground microphone screen. See headphone chapter 3.3 for further information.

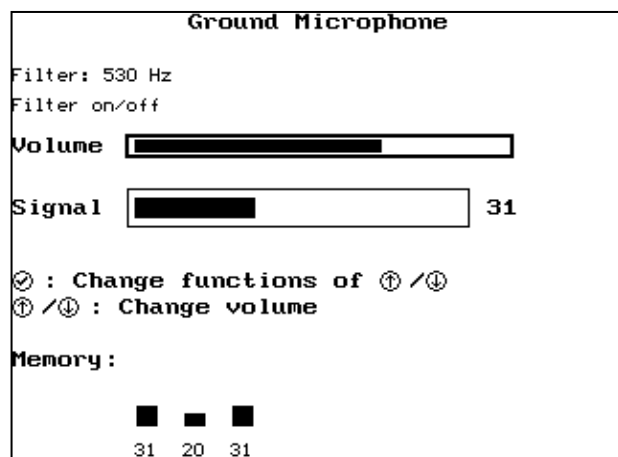






Fig. 24 Velocity Check inside leak

Use  for selecting function:

- Select filter frequency (available when filter is switched on)
- Switch filter on/off
- Change volume

Change value with  or .

Listen to ground microphone sound by pressing . Listening is enabled as long as key is pressed. After releasing key the signal strength value will be memorized and displayed in the lower part of the window.  will delete the last memorized signal strength value.

Leave ground microphone screen by pressing .



Fig. 25 Pin Pointing with a Geophone

Use the Geophone to surface sound and pin point on compact earth, concrete and Tarmac. When sounding on grass use the hand-probe or a piece of plywood to act as a sounding board, this will help to reduce the tickling sound caused by the blades of grass.

With reference to Fig. 26 below, when using the Geophone to pin point the leak move along the path of the pipe in regular (1ft or 300mm) intervals taking a reading at each point, this is depicted by the diagram below which shows a buried pipe and the Geophone taking readings at regular intervals. Use the memory facility to analyze the results and return to the loudest point to confirm the leak.

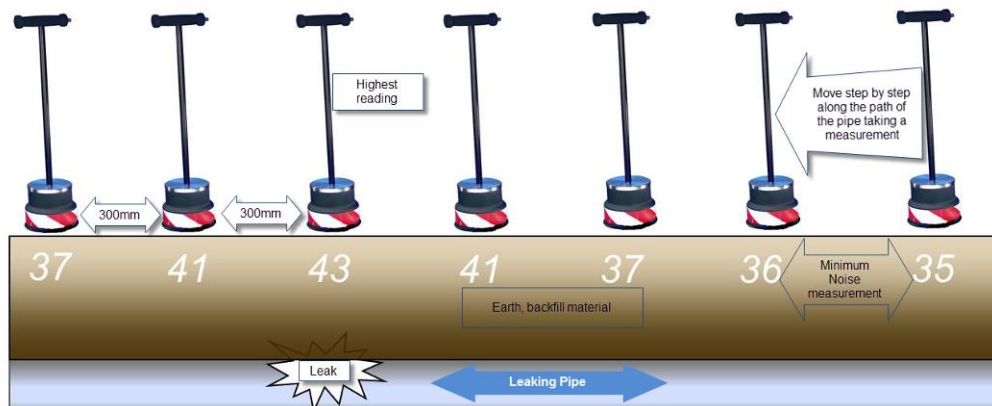


Fig. 26 Method of Pin Pointing with a Geophone

4.5.5. Live Signals

A graph of the sensor signals including the signal strengths will be displayed.

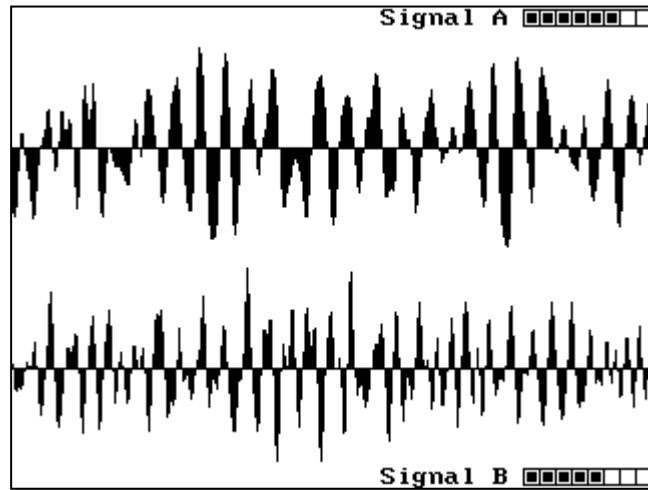


Fig. 27 Live signal window

4.5.6. Manage Measurements

Load, save and delete measurements. Depending on the size of the measurements you can store up to 64 measurements in the internal memory.

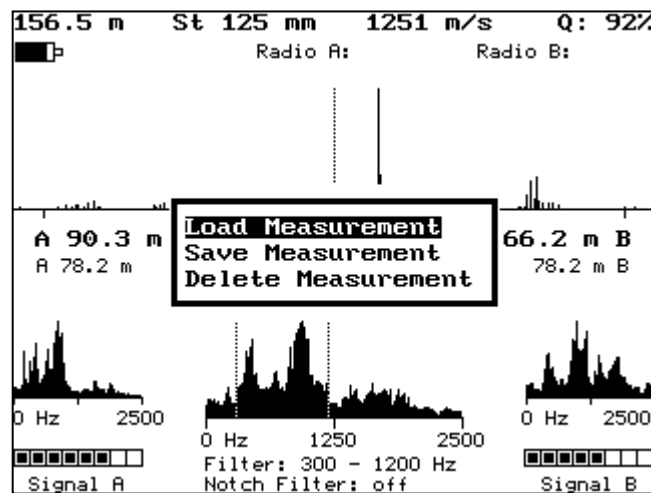


Fig. 28 Manage measurement

4.5.6.1 Load Measurement

A list with stored measurements will appear

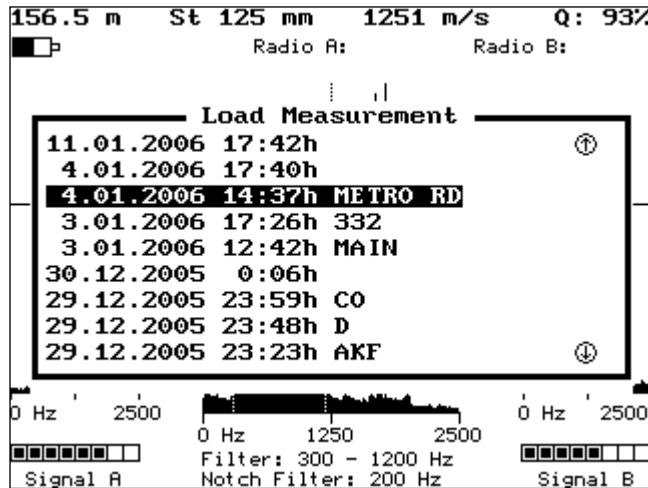


Fig. 29 Load measurement

The newest measurement is at the top. Select a measurement and press \checkmark to load it into the AQ 610. If there are more than 9 measurements in the memory you can scroll the list. Symbols \uparrow / \downarrow indicate that there are more measurements when you scroll up or down.

4.5.6.2 Save Measurement

Save a measurement to the internal memory. Enter a text to identify the measurement; the address is a useful name as when the file is downloaded to the viewing software the address will be printed on the report.

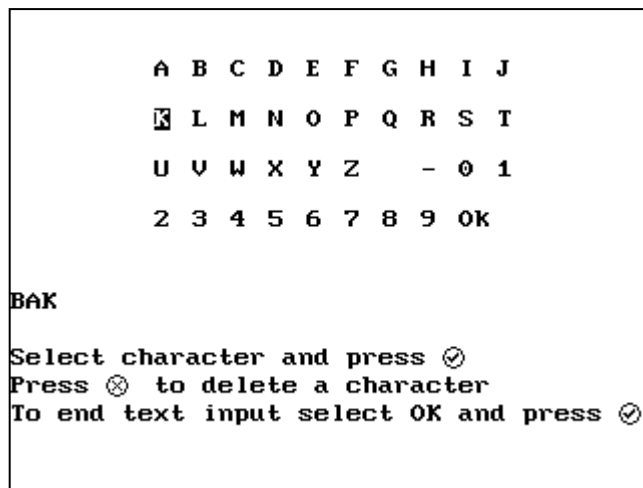


Fig. 30 save Measurement

Select the character by moving the cursor \uparrow / \downarrow and press \checkmark to confirm, repeat this until the name is complete. To delete a character press \otimes . To save move the cursor to OK then \checkmark . Time and date of the

measurements will be saved automatically.

4.5.6.3 Delete Measurement

Select a measurement by using the same process as load measurement.

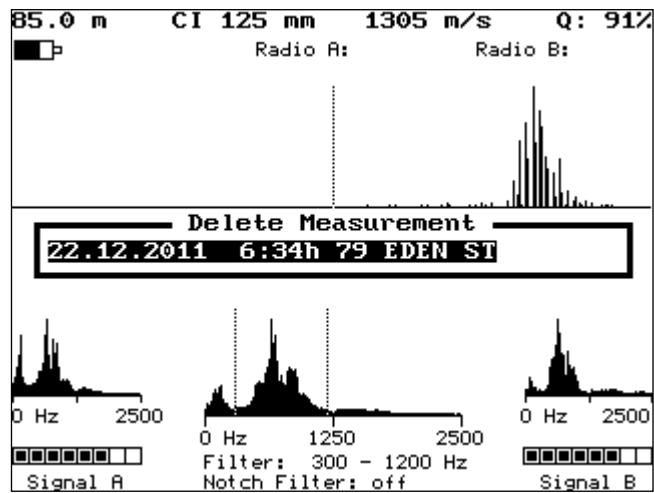


Fig. 31 Delete Measurement

After selecting a measurement you will be asked if you want to delete the measurement. After confirming with the measurement will be deleted.

4.5.7. Corr Settings

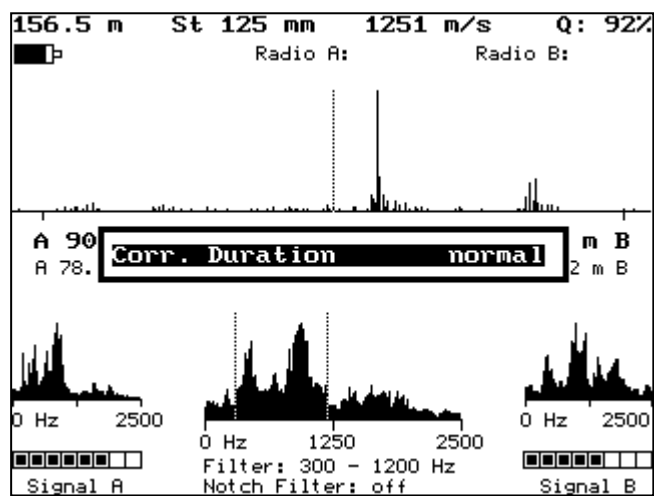


Fig. 32 Corr Duration

Press to open the next window which is shown in fig 28.

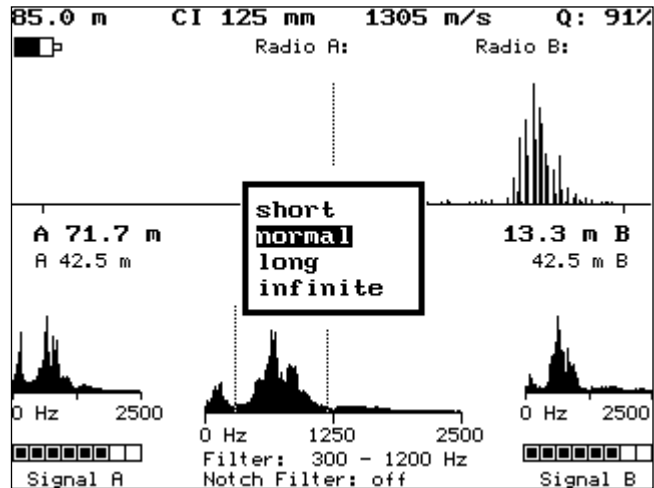


Fig. 33 Corr Settings options

Change the duration of the measurement to:

- short
- normal
- long
- infinite

Highlight the required duration by moving the cursor \uparrow / \downarrow and press \checkmark to confirm.

4.5.8. Settings

The Settings Menu is shown in fig 34 and each option will be covered in this section.

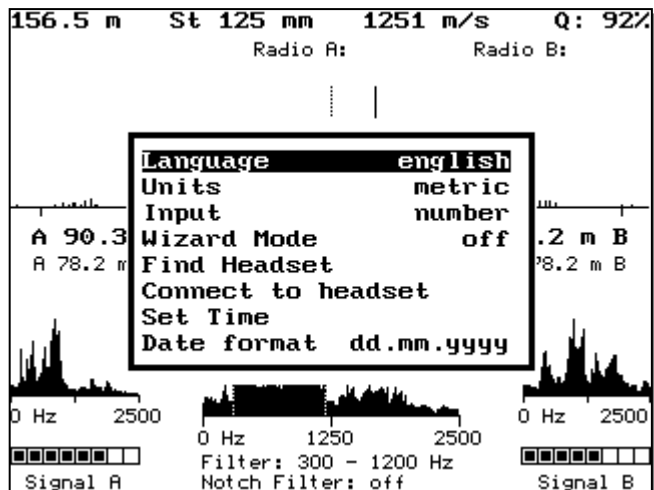


Fig. 34 Settings window

4.5.1.1. Language

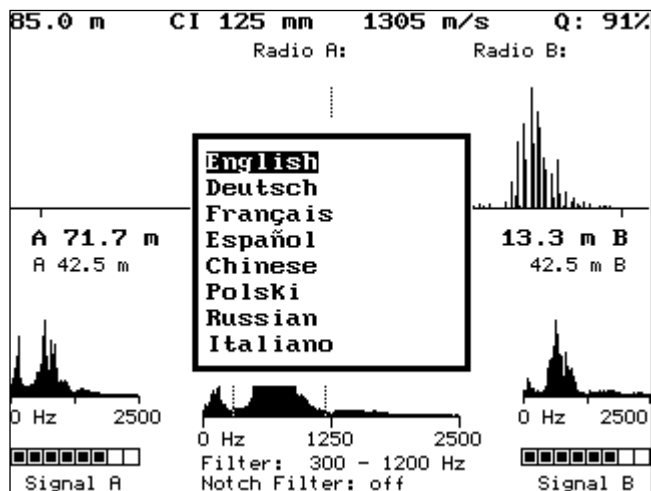


Fig. 35 Language

Change language by choosing from the list shown in fig 35 and press to confirm.

4.5.1.2. Units

Select metric or imperial unit system.


Input

Select method for entering numbers:

Number: / changes whole number.

Digit: / changes single digit of number, switches to next digit, switches to previous digit.

4.5.1.3. Wizard Assist

Switch wizard assisted mode on or off by pressing . Follow the wizard steps to perform a correlation, and example of this is shown below.

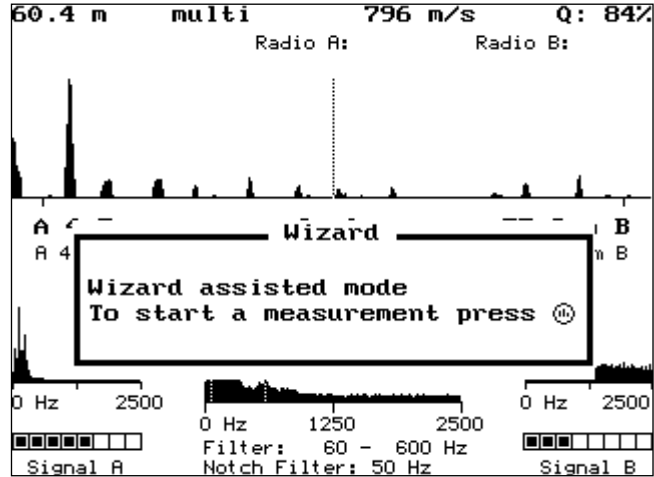


Fig. 36 Wizard Assist Mode

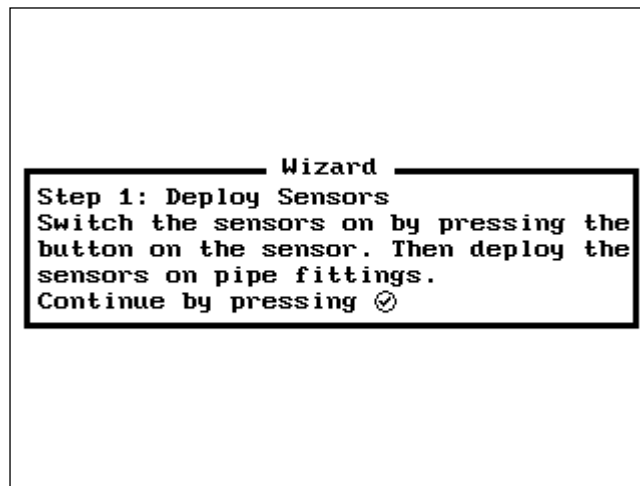


Fig. 37 Wizard Assist Step 1

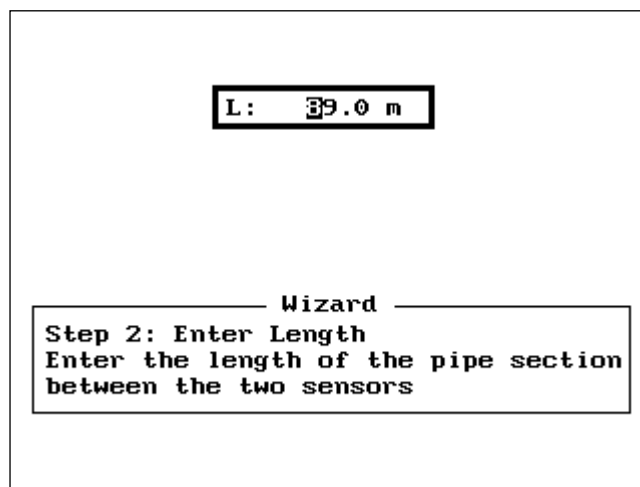


Fig. 38 Wizard Assist Step 2

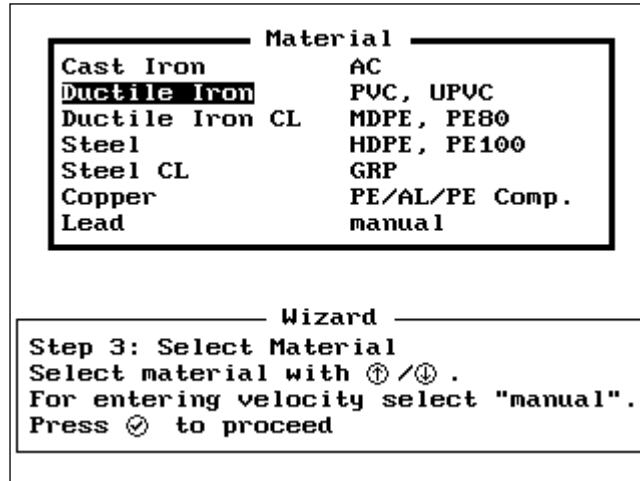


Fig. 39 Wizard Assist Step 3

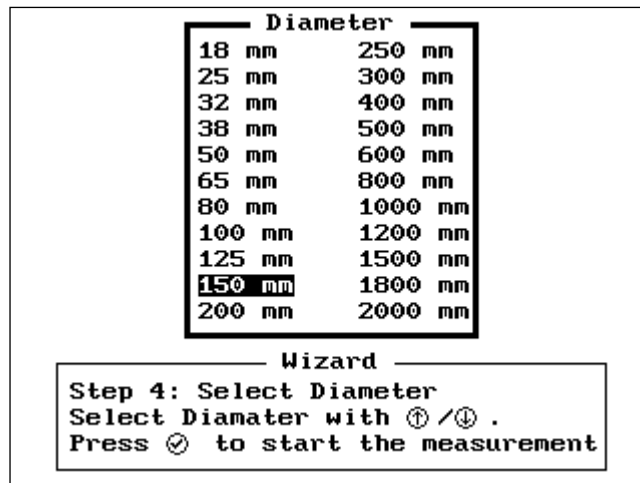


Fig. 40 Wizard Assist Step 4

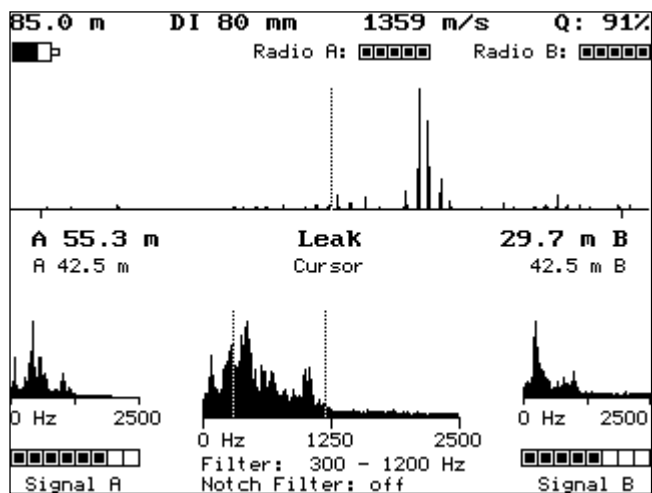


Fig. 41 Wizard Assist result!

4.5.1.4. Find Headset

Searches for the Bluetooth headset to be used and pairs the AquaScan 610 with the headset. Before selecting this, you must make the headset discoverable (refer to operation manual of your Bluetooth headset).

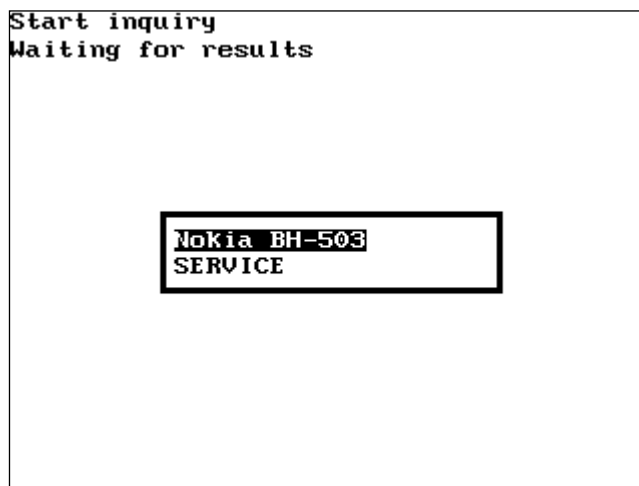


Fig. 42 Bluetooth search result

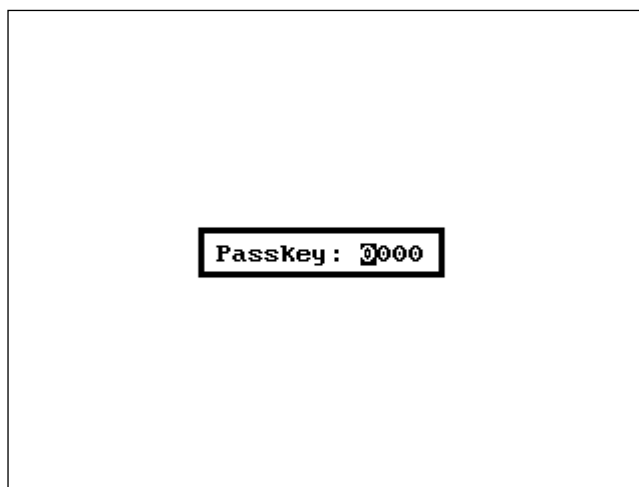



Fig. 43 Enter passkey

Select the headset by highlighting and press  next enter the passkey which is normally 4 zeros or 1234. When the connection is established the sound is heard from one of the sensors (if switched on) or a white static noise can be heard.

4.5.1.5. Connect to Headset

Connects AquaScan 610 to the BT headset which was selected by **Find Headset** (cover previously). Alternatively connect from the headset button.

4.5.1.6. Set Time

Enter the time and date by \uparrow or \downarrow changes single digit, \checkmark switches to next digit, \otimes switches to previous digit.



Fig. 44 Enter Time & Date

4.5.1.7. Date Format

Set date format to dd.mm.yyyy (17.01.2006) or mm/dd/yyyy (01/17/2006).

4.5.9. Communication

Select this option to allow a PC to connect to the AquaScan 610. This feature is used to download saved measurements into the viewing software or update firmware. A Bluetooth pairing must be established between the PC and AquaScan 610 by searching for Bluetooth devices in the PC BT manager. The serial number of the AquaScan 610 is found and highlighted. The passkey is 4 zeros (0000) and the PC will automatically assign a communication port. Take note of the communication port that has been assigned as this is required for both the viewing software and Update software.

Exit communication mode by pressing any key.

4.5.10. Status

Shows Information about the AQ 610 unit:

```
                Status
AQ610-4805-001
ARM Version: 1.05
MSP430 Version: 1.03
Memory: 1255/1712 pages free
MMC: 128 MB
 3.01.2006 13:19:20
```

Fig. 45 Status

Information from top to bottom:

- Serial number
- Firmware version of the main processor
- Firmware version of the core processor
- Memory state
- Size of MMC (Multi Media Card)
- Date and time

5. Sensors



Fig. 46 left; Side View with antenna of B Sensor

Fig.47 above; Top View of B Sensor

For switching the sensors on or off, please press on/off button for at least one second.

The Sensors will remain on for a period of 45 minutes for continuous use thereafter they will turn off. This is a battery saving facility, when this happens the LED indicator on the software will turn from Green to Red. To turn the sensors back on repeat the first step.

The sensors have a built-in rechargeable battery. For recharging the battery the sensors have to be connected to the charging unit. In off state the LED will flash during recharging. As soon as the battery is fully recharged, the LED will stop flashing.

The Sensor Battery should last 8 hours whereas the Correlator is 12 hours.

Charge warning: When battery is almost discharged during operation mode, the LED will start flashing about twice per second. Further operation will be possible for approx. 30 minutes. When battery is discharged, the sensor will shut off automatically.

5.1 Positioning of Accelerometers



Fig. 48 the 'A' Sensor attached to a hydrant spindle

It is critical the accelerometer is positioned in the location that has the least interference and the clearest leak noise. Moving the sensor 10 mm can make a massive difference to their performance. The listen function (see chapter 4.3) should always be used on sensor deployment and the sensor should be positioned so that the highest frequency noise is heard minimising the effect of electrical and mechanical noise. If the chambers are deep enough to take the sensor with antenna then the lid maybe shut (see fig 49) however metallic lids will attenuate the signal reducing the distance of the radio range.

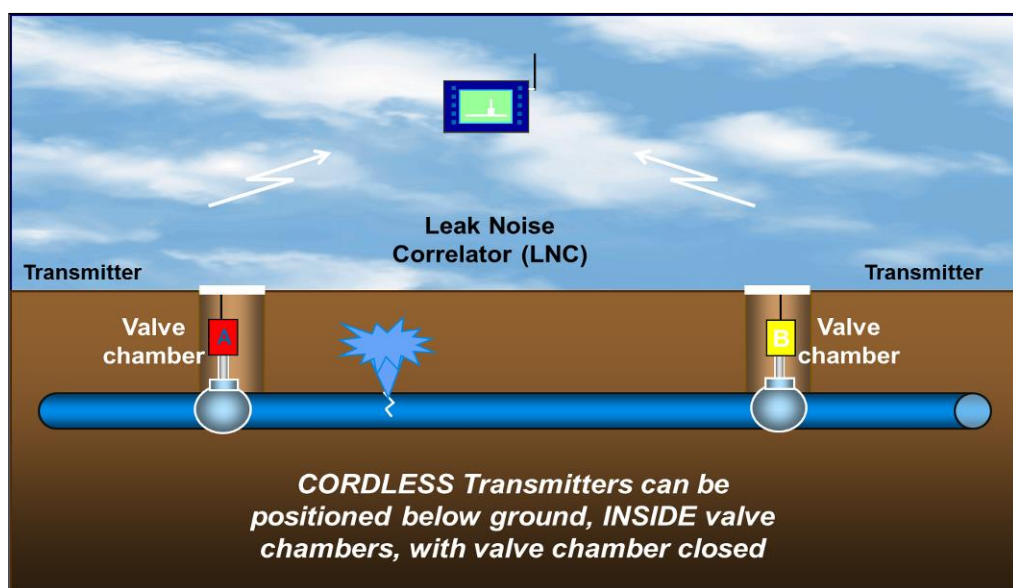


Fig. 49 the AquaScan Sensor deployment

- Connecting on a flange is often better than the pipe itself.
- Connecting on the spindle of a valve is often better than the body.
- Air valves usually make less noise when they are open.
- Big bodied valves with offset spindles often provide very poor noise and the pipe or flange is much better.
- The Body of a Hydrant can be a good conductor of leak noise.

5.1.1. Centralise the Leak

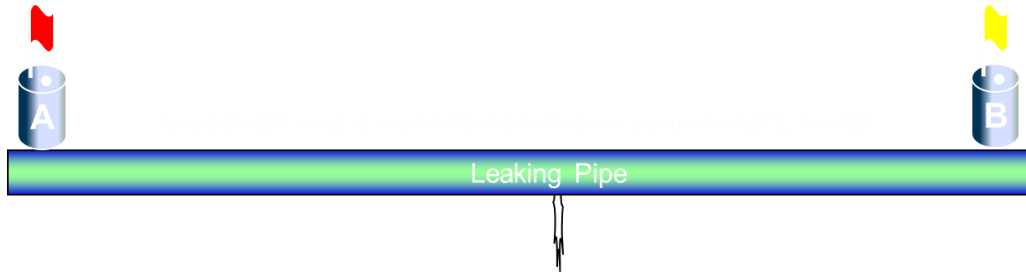


Fig. 50 Centralise the leak by moving either sensor

The correlation results accuracy increases when the leak is in the central 3rd of the screen and not close to either sensor. If the leak is close to a sensor then a long time delay is introduced which creates an error in the result. By centralising the leak the time delay is very small so is the error in the result, even if the incorrect pipe material is chosen.

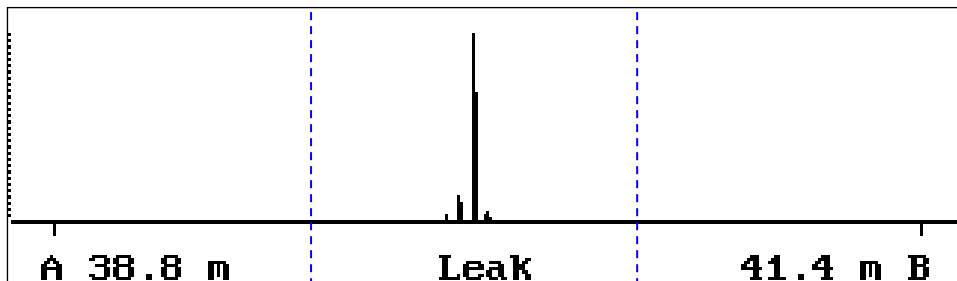


Fig. 51 Centralise Correlation Result

If the correlation result is negative or on the sensor (0.0m) or close to a sensor then this is classed as "Out of Bracket". The actual leak could be beyond the sensor so to confirm this move the sensor (e.g. B sensor in fig 52) to bring the leak in bracket i.e. between the sensors.

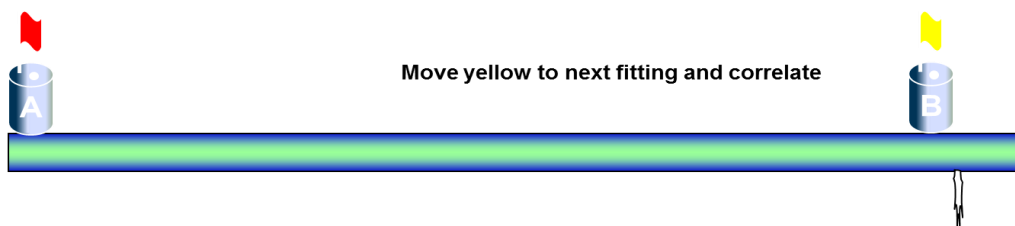


Fig. 52 Out of Bracket so move the sensor

5.1.2. Correlating a T Section

When correlating a T section make sure every point on the T is correlated. A common mistake is to perform 1 correlation which gives the T itself and believe the leak is there. A second correlation must be made by moving one of the sensors (A in fig 53) to the branch of the T.

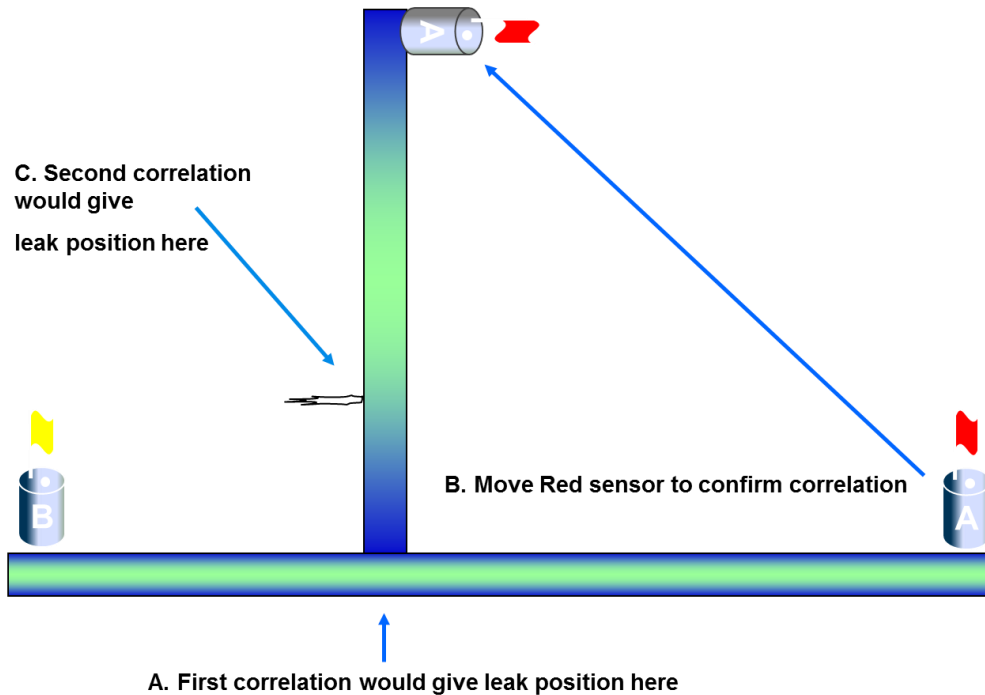


Fig. 53 Correlating a T section

If the correlation result is perfectly central and the distance to the leak from sensor A and B are exactly the same then this is classed as a “Central Correlation” which is an error caused by the sensors being fitted on separate mains. See example correlation in chapter 6, fig 67. To rectify the fault move one of sensors so both are on the same water main.

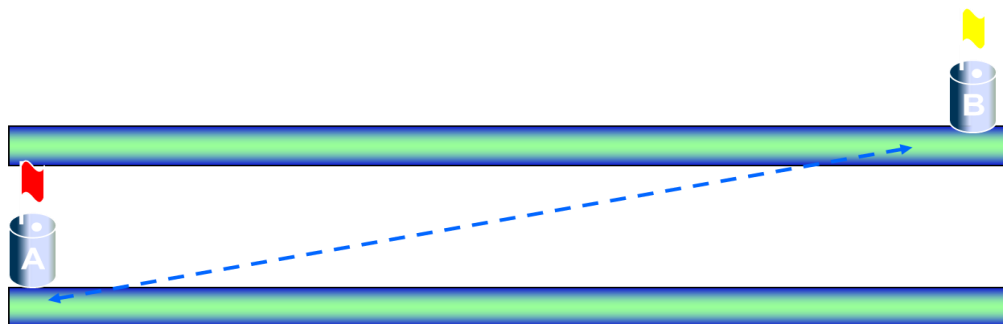


Fig. 54 Parallel Water Mains- “Central Correlation”

5.2 Extension Antenna



Fig. 55 Extension Antenna fitted to chamber lid

- Extension Antenna mini magmount with cable are ideal for improving radio signal strength from a deep chamber.
- Position Sensor antenna to reduce interference from parked vehicles and improve line of sight.
- Position yourself with Aquascan 610 Correlator centrally between the two sensors with best line of sight. If you are correlating around a corner stand on the corner.

Listen to both sensors before correlating, if there is a static or crackling noise, this is radio interference, this needs to be reduced by moving antenna to improve line of site and avoid overhead power cables before correlation starts

5.3 Installation of Hydrophones



Fig. 56 Hydrophone Sensor



Fig.57 Hydrophone with adaptors

- Connection of cable turns off accelerometer
- Blow in Hydrophone and use the listen buttons on the Main Screen to check the sound is audible.
- Flush Tapping.
- Connect Pressure gauge to check the pressure
- Connect the hydrophone with the tapping valve shut, and then fully open the valve ensuring the tapping is completely open.



Fig. 58 Sensor connected to Hydrophone



Fig. 59 Thread taping the adaptors

- Ensure there are no leaks on any of fittings between the hydrophone and pipe. PTFE or Thread tap should be used to create a water tight seal.
- Bleed the air from the hydrophone
- Check the bleed has sealed (see instructions below to seal)



Fig. 60 Hydrophone with Bleed valve

Sealing / cleaning instructions for Hydrophone bleed. Occasionally grit may become trapped in the bleed valve preventing it from fully sealing. Unscrew the bleed valve using a flat blade screwdriver and inspect the mechanism for grit, clean and remove any particles.

Note: Do not clean bleed valve when the Hydrophone is under water pressure.



Fig. 61 removed Hydrophone Bleed Valve

5. Example Results

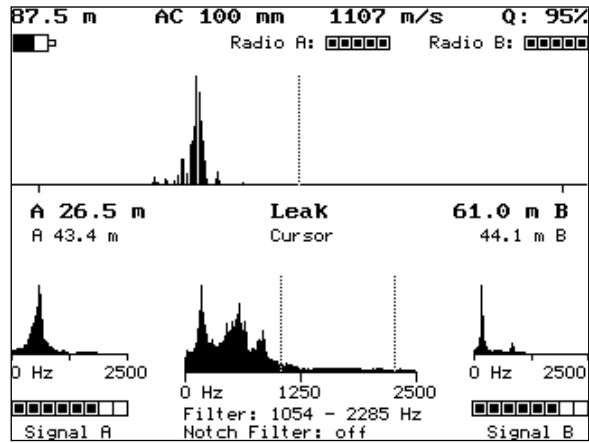


Fig. 62 Excellent Correlation on AC pipe

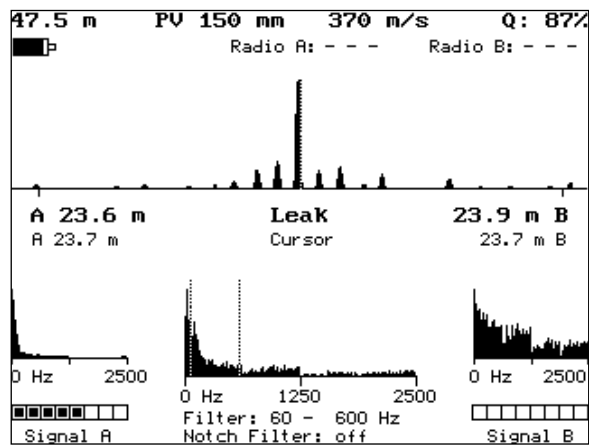


Fig. 63 Good Correlation on PVC pipe

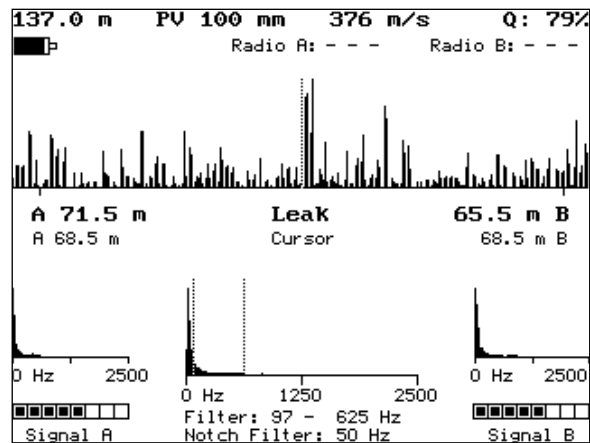


Fig. 64 Poor Correlation on PVC pipe

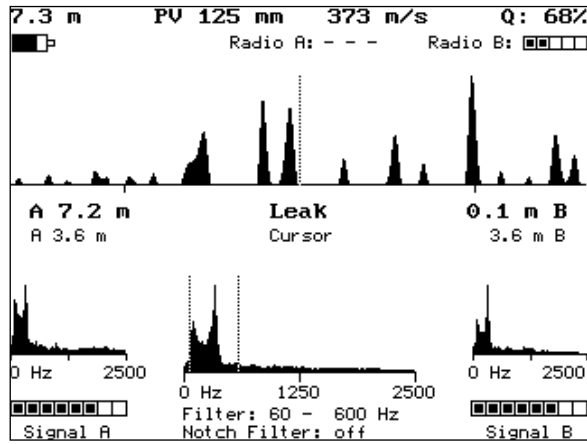


Fig. 65 No Correlation

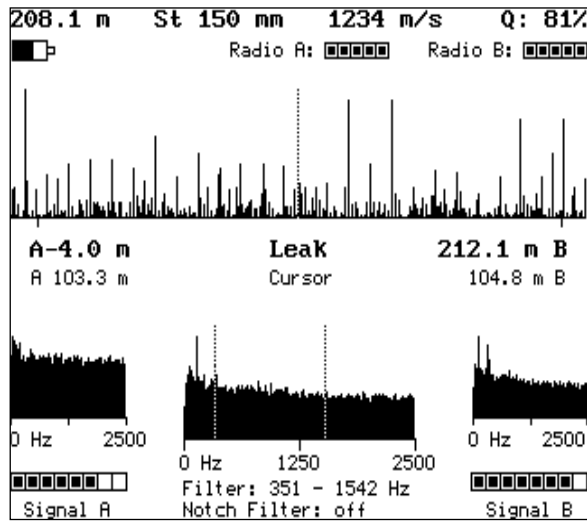


Fig. 66 Out of Bracket Correlation

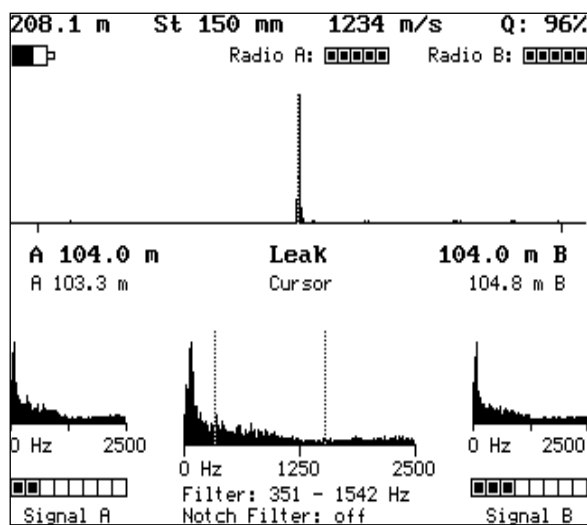


Fig. 67 Centre Correlation

6. Trouble Shooting

Fault	Cause	Solution
No Sound	BT Headphones not paired. Headset Volume control is too low BT Headset not charged	Pair Headset. Increase headset volume control. Charge Headset regularly like a mobile phone
No Display of Correlator	Dead batteries	Charge unit
No radio Connection to Sensors	Low battery on Sensors Sensors turned off	Charge sensors using Car charger Switch sensors on
Poor Correlation spectra	Poor sensor or radio contact	Reposition the sensors Clean magnet contact area Fit Antenna extension cable
Corrupt Display	Memory corruption	Clear memory
Radio signal bars strong full in one sensor and 1 or 2 bars in the other	Stood next to 1 sensor-Air couple with 1 sensor causing interference with the other	Move half way between sensors with the Correlator
Correlation doesn't stop processing	Corr Settings on infinite	Change Corr Settings or manually stop correlation
Centre Correlation	Sensors on different pipes Parallel Mains	Move sensors to same pipe
Result is 0 or negative	The leak noise is from a leaking hydrant which the sensor is on or beyond the sensor	Fix the Hydrant Move the sensor to bring leak in bracket
Leak result is out by several meters	Incorrect Velocity- wrong pipe material or age of pipe	Perform a velocity check
Leak result on a Tee section	Leak could be up the branch of the Tee section	Move sensor to next section of the Tee