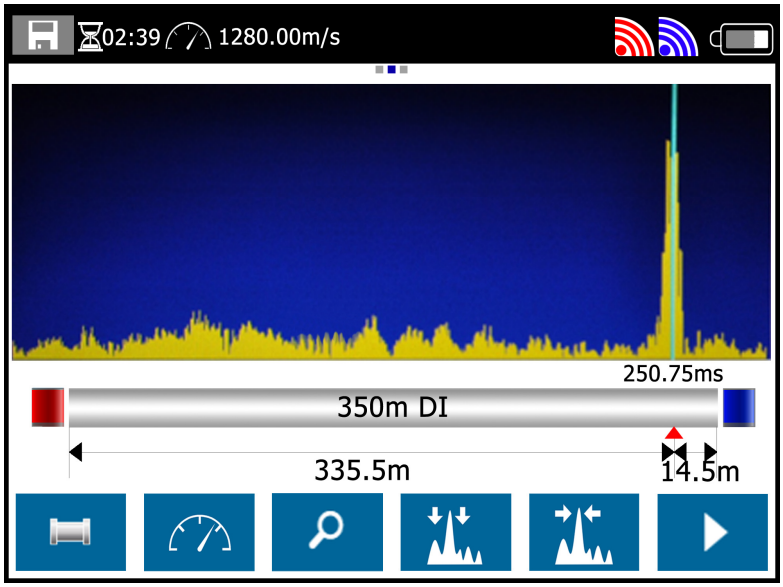
5.6 Velocity Correction

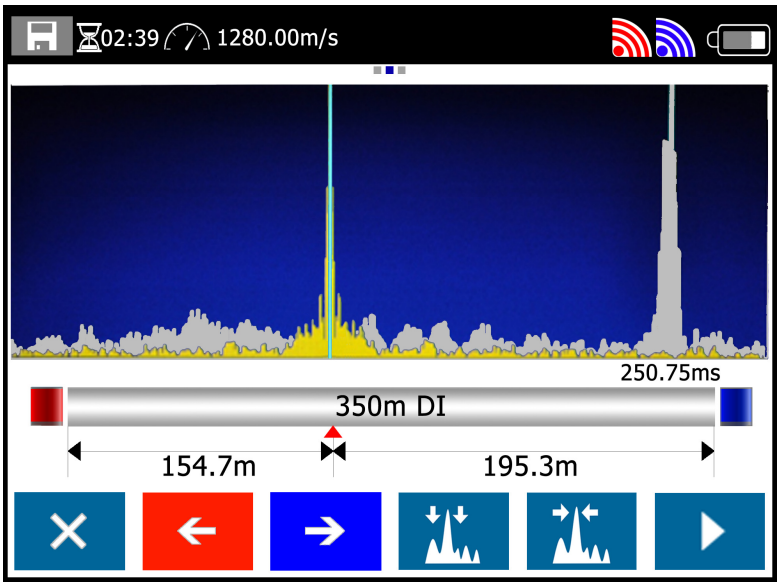
Velocity correction overcomes the largest error for accurate leak position.
It allows the true velocity of sound in the pipe(s) to be measured, meaning the accuracy of the distance to the leak can be improved for multiple materials and/or aging pipes. There must be a leak in the pipe work at a known location to use this feature; this is commonly produced by opening a hydrant.

5.6.1 Velocity Correction Example

- Correlate the leak as usual on site:

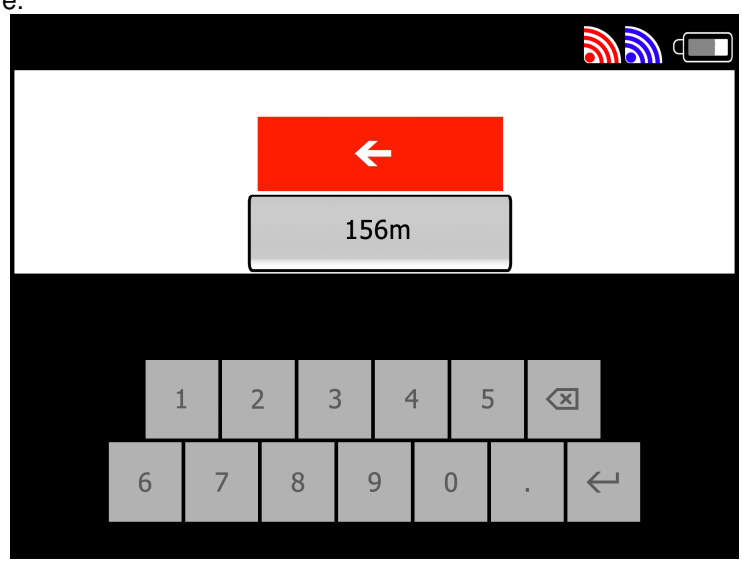


- Tap the Velocity Correction button.
- The original leak display will change to grey.
- Open the hydrant (or create another known source of leak noise) and perform another correlation. The peak will be formed at the source of noise. Use the GoTo Peak button or the keypad buttons to move the cursor onto this peak.

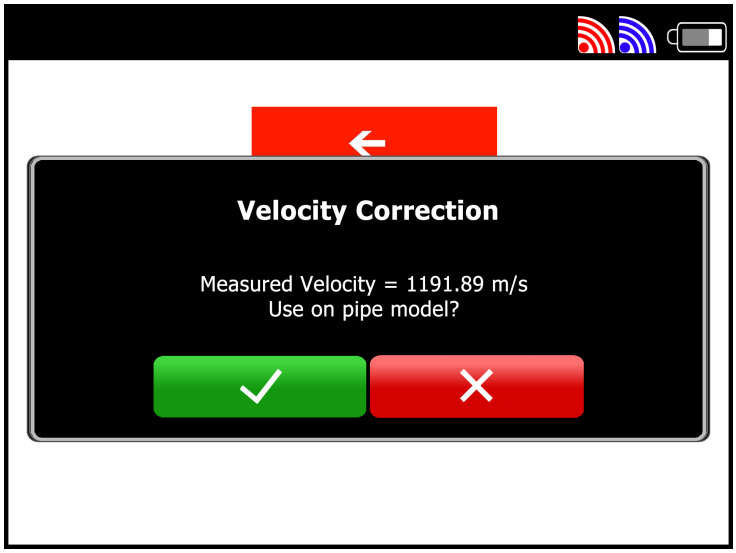


- In this example the hydrant is actually located at 156 metres from the red transmitter. However, the velocity being used in Eureka3 locates the noise as 154.7 metres from red.
- Tap the red arrow to indicate that the peak is toward the red transmitter (or if it was toward the blue tap the blue arrow).

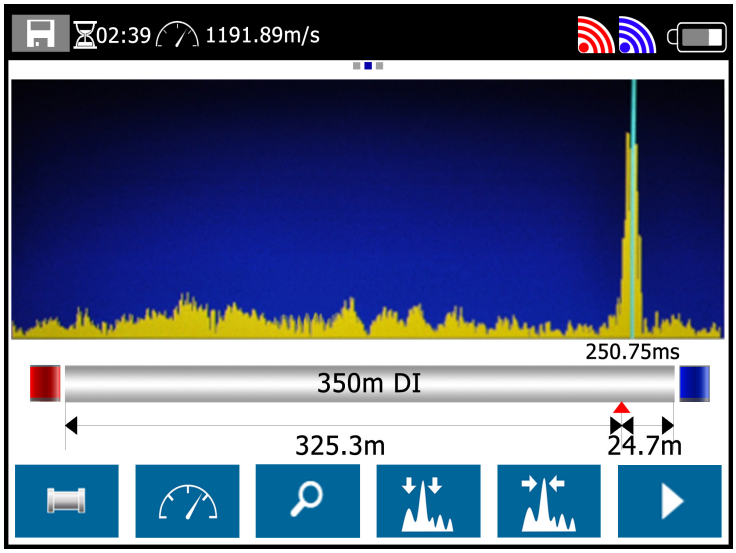
- A keypad will be displayed allowing entry of the peak position. Edit the value to be 156 metres. If the peak position was out of brackets (so beyond the sensor) a value of 0 metres should be entered here.



- On accepting this distance the software will calculate a new average velocity for the full pipe model. To accept this new velocity tap the green tick, otherwise cancel the operation by tapping the red cross.



- The original correlation graph will now return to the foreground, with the new velocity being applied, giving a more accurate leak position. The value of velocity being used will be displayed in the top left corner of the screen.



If any changes are made to the pipe model after a velocity correction has been performed, the Eureka3 software will return to using the default velocity for that pipe material.

5.7 Save Data

Tap the save data disc icon to save data to the internal memory and an external USB memory stick, if attached.

When the icon is tapped the save screen opens; this has the following items:

- Location Field
- Operator Field
- Comments Field
- Tick Button
- Cross Button
- Copy Reports Button

5.7.1 Location Field

Tap within this field and a keyboard appears; enter location data as required. Tap on the return key to move to the next field. You can tap off the keyboard to end data entry.

5.7.2 Operator Field

Tap within this field and a keyboard appears; enter operator data as required. Tap on the return key to move to the next field. You can tap off the keyboard to end data entry.

5.7.3 Comments Field

Tap this field and a keyboard appears; enter comments as required.

5.7.4 Tick Button

Tap the tick button to save the data to the internal memory and a USB memory stick if connected.

5.7.5 Cross Button

Tap the cross button to abandon the data report.

5.7.6 Copy Reports Button

Tap this button to copy all reports from the internal memory to an attached USB memory stick. The message 'Delete all reports after copying to devices?' is displayed. To remove the reports from the internal memory tap the green tick at this prompt.

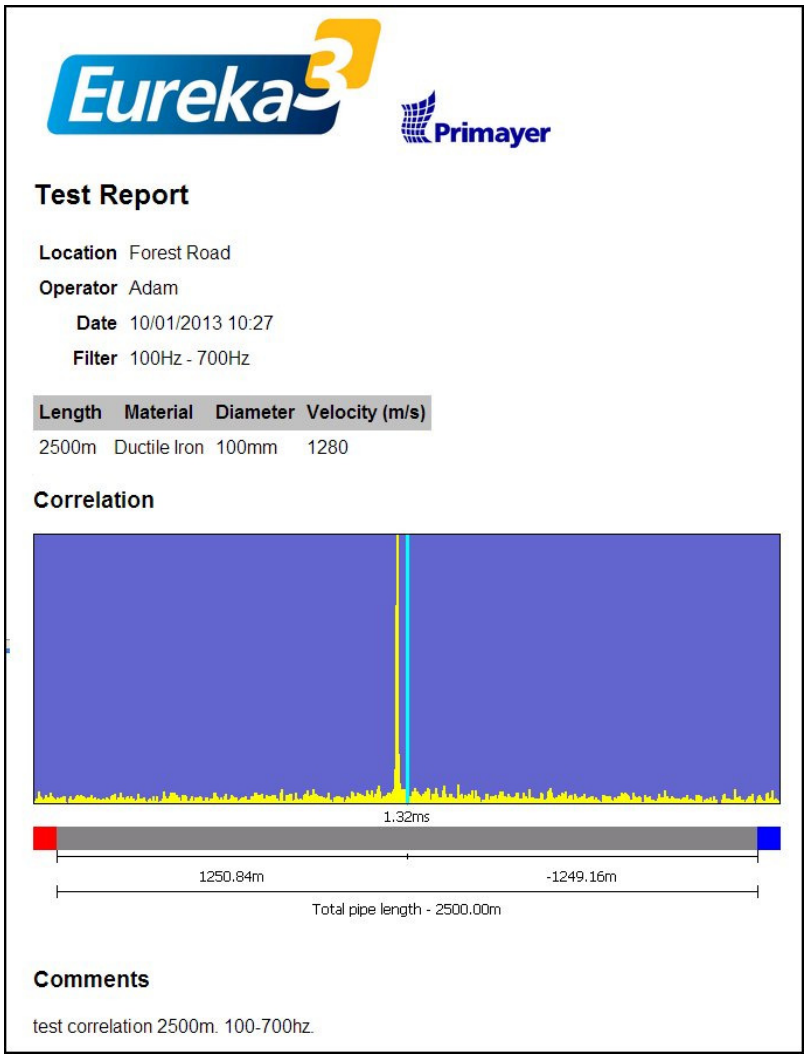
	After copying reports to a USB memory stick PrimeTouch must be put into power save mode before unplugging this USB device; otherwise corruption of the memory stick can occur. Once the memory stick has been removed PrimeTouch can be taken out of power save mode.

5.7.7 Exported Reports

Data copied to a USB memory stick will be saved into a folder called "Eureka3 Reports". For each report saved there will be two data files. Each file is named with the time and date of the correlation.

5.7.7.1 Data Report Example

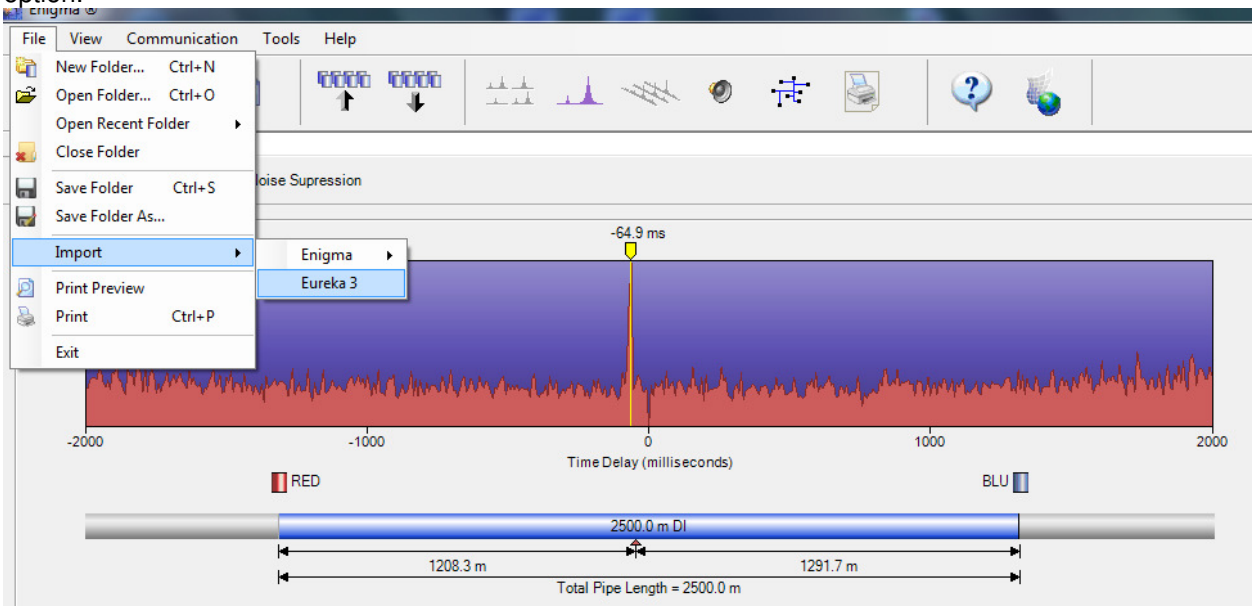
For each saved correlation there is an HTML file which can be opened within a standard internet browser. Primayer recommends use of Google Chrome™ for best viewing of these reports.



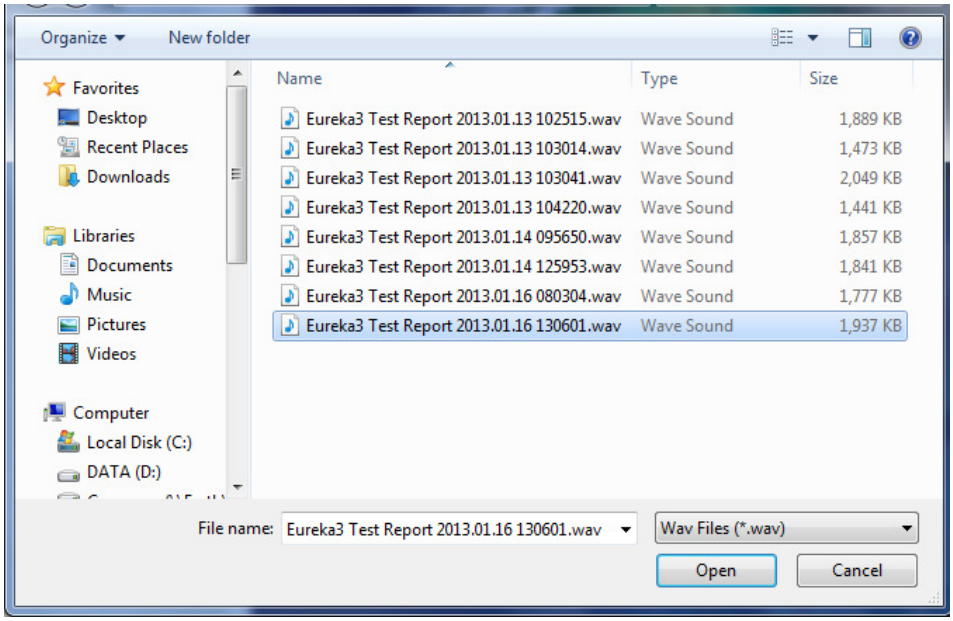
5.7.7.2 WAV file for import into Enigma

The other file saved is a stereo WAV file of the recorded leak sound used to correlate. This file can be transferred to the Enigma software for post-analysis.

To import a file into Enigma, launch the Enigma software and select the File-Import-Eureka3 menu option.



Select the Eureka3 report folder location and select the WAV file for the appropriate correlation.



The WAV file will be opened and the data displayed within the Enigma software.

If GPS location information has been saved for the transmitters this will be transferred, and the pipe model will be displayed at the appropriate location on a Google Map™. Some of the features within the Enigma software will be unavailable because there are only two sensors and one WAV file associated with a Eureka3 correlation (for example the thumbnail display, epoch displays and velocity measure).

For more details on how to use the Enigma software please refer to the Enigma System manual.

Enigma software v1.5 or above must be used to import Eureka3 data. To obtain an update to this version please contact Primayer Customer Support.

5.8 Transmitter Menu

This menu is displayed by tapping one of the transmitter icons on the correlation screen. The menu shows:

- Swap Transmitters
- Set GPS Coordinates
- Hydrophone
- Accelerometer.

5.8.1 Swap Transmitters

Tap this menu option to swap the red and blue transmitter positions on the display. Swapping the transmitters does not affect the sound in the headphones. This is useful if the pipe model has been entered the wrong way around.

5.8.2 Set GPS Coordinates

Eureka3 can record the GPS location of the transmitter positions. A GPS locator within PrimeTouch is continually searching for location data whilst the unit is switched on.

To save the GPS position of a transmitter position PrimeTouch next to the appropriate transmitter and tap the appropriate red or blue transmitter icon on the correlation screen, then select the Set GPS Coordinates option.

If there is no current GPS lock, a 'Waiting for GPS position' message is shown. When position information is available 'Position Retrieved Successfully' is displayed. To abandon the positioning tap the cross button; to accept the position data and save the position of the transmitter, tap the tick button.

The same procedure should then be followed for the other transmitter.

As with all GPS positioning a good clear view of the sky is required to obtain a GPS position.

5.8.3 Hydrophone/Accelerometer

A tick is shown next to the current sensor type. Change from accelerometer to hydrophone as appropriate for each transmitter. Changing the sensor type will automatically adjust the filters that are used for the correlation. After making the appropriate selection, tap the red cross to close the menu.

When PrimeTouch is initially powered on both transmitter sensor types will be returned to the default of accelerometer. This is only on initial power up and does not apply if PrimeTouch is placed in power save mode.

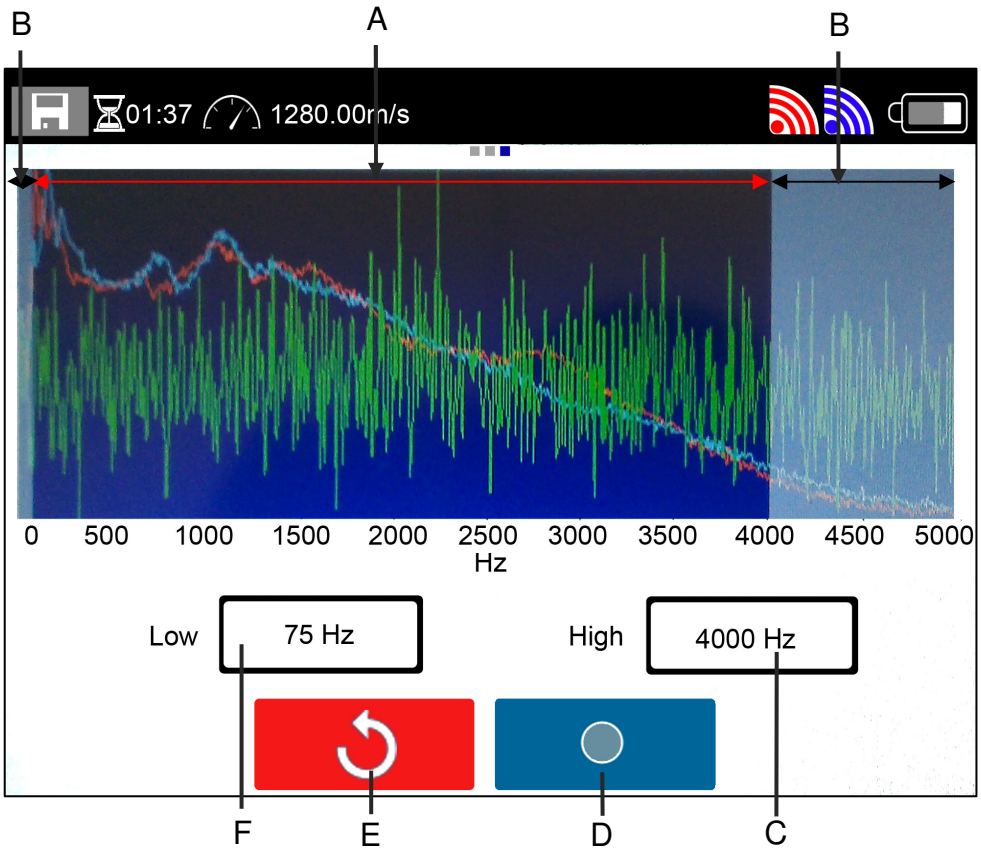
5.9 Direct Input

It is possible to use a sensor plugged directly into PrimeTouch in place of one of the radio transmitters. When the sensor is plugged in, a prompt is displayed asking which radio transmitter this sensor will replace. Press the appropriate colour transmitter button. The icon displayed at the end of the pipe model on the correlation screen will update to indicate a direct sensor input is being used. To stop using the direct input and return to using two radio transmitters simply unplug the sensor from PrimeTouch.

If the incorrect transmitter is selected when plugging in the direct input, unplug the sensor and start the operation again selecting the correct transmitter when prompted.

	To listen to the sound from the direct input, select the sound for the transmitter this input has replaced.

5.10 Frequency Spectrum/Coherence Screen



Key	Description
A	Range of frequencies used for correlation
B	Range of frequencies not used for correlation
C	High filter value
D	Filter swipe enable button
E	Restore Defaults button
F	Low filter value

	Filters can only be adjusted when a correlation is not running. Any filter changes made will become active when a new correlation is started.

	Only a single high/low pass filter is available for selection in Eureka3. To use more complex filtering, or for auto-filtering options, data should be saved and transferred to the Enigma software for analysis.

5.10.1 Low Filter Value

This shows the lower frequency limit of the filter. To change, tap the value and the numeric keyboard will show. Use the backspace button to delete characters during frequency entry as required. To cancel data entry, tap the screen outside the numeric keyboard area.
The low filter value must be 3Hz or above in addition to being below the high filter value.
As the value of the low filter is changed the range of frequencies shown as to be used for the correlation on the frequency spectrum display will change.

5.10.2 High Filter Value

This shows the upper frequency limit of the filter. To change, tap the value and the numeric keyboard will show. Use the backspace button to delete characters during frequency entry as required. To cancel data entry, tap the screen outside the numeric keyboard area.
The high filter value must be 5000Hz or below in addition to being above the low filter value.
As the value of the high filter is changed the range of frequencies shown as to be used for the correlation on the frequency spectrum display will change.

5.10.3 Filter Swipe Enable Button

The filter high and low frequency values can be set by swiping the screen. To activate this function, tap the filter swipe button and it will turn yellow. You can now drag over the part of the spectrum display that you want to use as the filter. To exit the filter swipe mode, tap the filter swipe button so that it returns to blue.

5.10.4 Restore Defaults Button

Use the orange restore defaults button to restore the low and high filter values to defaults for the selected pipe model and sensor.

5.10.5 Frequency Spectrum Data

The frequency spectrum for each transmitter (or direct input) is displayed in the appropriate colour. The graph displayed represents the amplitude of each frequency component of the noise received. If only one colour is visible then check the transmitter icon at the top of the screen to ensure there is adequate received signal.

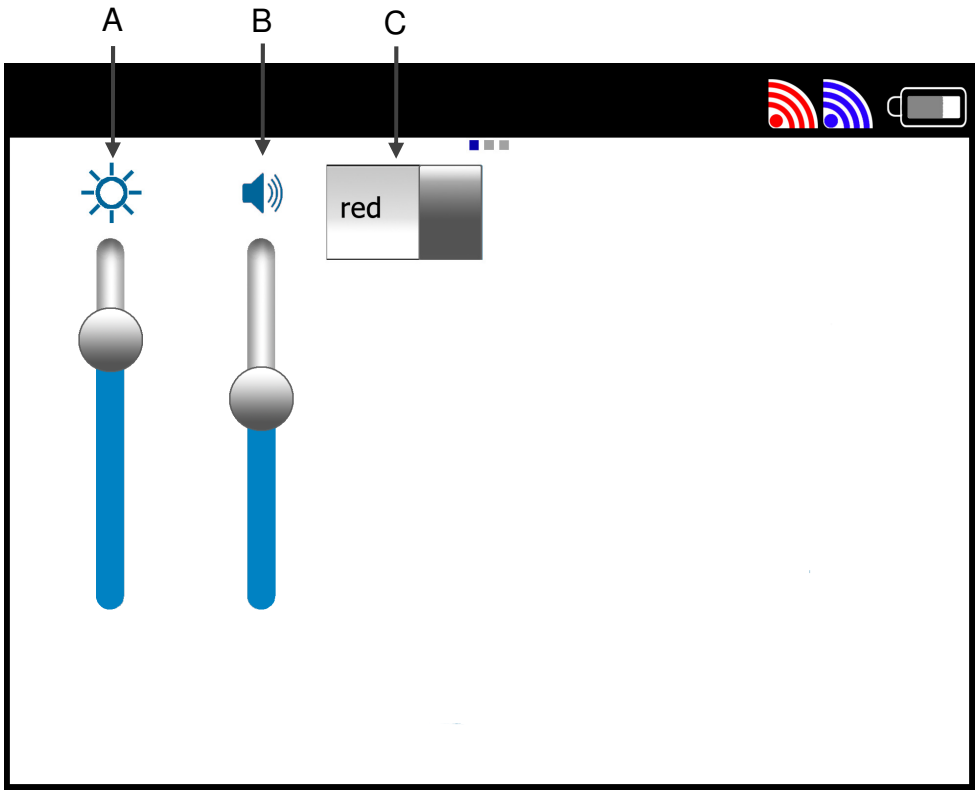
5.10.6 Coherence

The coherence shows the similarity between the two spectra at each frequency. Where the coherence is higher, use the filters to select this band of frequencies to increase the quality of the correlation graph.

	Any filter changes made will be used on future correlations. The current correlation graph is not updated to reflect the newly selected filters. Filters are applied immediately to the sound output to the headphones.

5.11 Controls Screen

The controls screen is accessed by swiping left from the main correlation screen.



Key	Description
A	Brightness Slider
B	Volume Slider
C	Red or Blue Channel Audio Selector

5.11.1 Listen to Red/Blue Channel

Sound from a single channel will be output in both headphone earpieces. Tap this button to switch between the red or blue channels. The sound output is filtered using the current filter settings.

5.11.2 Volume Control Slider

Move the slider to set the volume in the headphones.

5.11.3 Screen Brightness Slider

Move the slider to set the brightness of the screen, there is a slight delay as the screen brightness adjusts.

6 Appendix 1 – Eureka3 Technical Specification

Performance	
Time delay range	±2500ms
Maximum distance (theoretical)	Iron pipe; 3000 metre PVC pipe; 1300 metre
Distance resolution	0.1 metre
Signal sampling	16 bit
Signal frequency range	3Hz – 5000Hz
Multiple pipe entry	Six materials
Noise suppression function	Yes
Coherence function	Yes
Velocity correction	Yes
Leak noise post-processing	Via Enigma software

PrimeTouch™	
Display	Resistive touch screen
Suitable for use in sunlight	Yes
GPS position feature	Yes
Direct signal input	Use in place of red or blue transmitter
Internal Memory	2 Gbyte
Leak noise data storage (internal memory)	>150 correlations
USB ports	2
Battery operating time:	8 hours (with automatic power save in use)
Recharge time	5 hours (temperature dependent)
Language availability	Multiple
Protection rating	IP53
Dimensions	205 x 205 x 90mm
Weight	1.35kg
Operating temperature	-10℃ to +45℃

Transmitter	
Radio frequency range	407 – 472MHz (dependent upon country of use)
Power output high/low	0.5 W / 50mW
Battery operating time	Up to 18 hours (depending on usage pattern)
Battery level indication	LED
Integral accelerometer sensor	Yes
Noise level indication	Yes
Protection rating	IP67
Dimensions	185mm x 65mm Ø
Weight	0.9kg
Operating temperature	-10℃ to +45℃

Accelerometer Sensor	
Sensitivity	10V/g
Cable length	2 metres
Protection rating	IP68

Battery Charger	
Transport case	Ruggedised with in-case battery charging
Mains charger	110/240 VAC
Vehicle charge	12 VDC

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