



 **AQUASCAN 900**
DIGITAL MULTI POINT CORRELATOR



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Installation or update of the AQ900 software on the Palm

- Start the program "Install Tool"
- Press the "Add" button and select the file AQ900_v122.prc (122 identifies the version number and will change with each update).
- When performing the next Hotsync® the program will be installed on the Palm PDA.

When using the standard installation procedure of the Palm Desktop program, instead of the first 2 steps you can simply 'double-click' the file AQ900_v122.prc.

Setup of the Palm

The AQ900 is usually pre-installed upon delivery. The following procedure is only necessary when you change the Comm Link or add additional sensors:

Start the AQ900 program. Press the highlighted "AQ900" in the upper left-hand corner and select Options/Setting. The following screen will appear:

Sensor	Id
A	10007
B	10009
C	10006
D	10010
E	10000↓

Link BT Address is the Bluetooth Address of the Comm Link to be contacted by the Palm PDA. Switch on the Comm Link and 'tap' on the address field. A new window will appear, showing all the Bluetooth appliances that were found. Select AQ900. The Bluetooth address of the AQ900 Comm Link will now appear in the address field.

You can add any number of sensors by pressing the 'add' button. Select each sensor on the list, 'tap' the "Edit" button and enter the ID number to be found on the respective sensor.

Select metric or imperial measures: Press the highlighted "AQ900" in the upper left-hand corner and select Options/Preferences from the menu bar. When tapping on the down-arrow, you can set the AQ900 program to show either metric or imperial measures.

Future updates of the Comm Link or the sensor software can be carried out by pressing the highlighted "AQ900" on the upper left-hand corner and selecting 'Options/Update'.

Performing a correlation

There are two ways to carry out the correlation measurement:

- as a real-time correlation, where preparing the measurement, recording and read-out are executed instantly one-after-the-other
- as a time-delayed correlation, where recording and read-out are executed after a user selected time delay. The time-delayed correlation is especially useful under difficult conditions for radio transmission.

a) Real-time correlation

- Deploy the sensors to the selected measurement location. Switch on the sensors and the Comm Link.
- In the main screen select "Record"
- Select the appropriate filter setting: Low for PVC/MDPE, High for Cast Iron/Steel
- Select the sensors which are used for recording
- 'Tap' "Start Recording". The recording procedure of the leak noise will start and proceed entirely in the background, while the program will change to the Parameter screen.
- Enter the parameters (while recording is being conducted in the background)
- Select "OK". The result will appear as soon as the recording is terminated.

Step 1: Sensors and Comm Link

To switch on the sensors and the Comm Link, press the "on/off" button. On the sensors, keep the button de-pressed for a second until the LED is illuminated. The Comm Link will automatically switch off if not used within a 15 minute period. The sensors will auto-switch-off 45 minutes after the last contact.

Step 2: Main screen

The main screen appears after starting the program (see also chapter "Main screen"). It will show the last performed or loaded measurement. If you want to perform a new measurement, 'tap' the "Record" button. For further and more detailed information please refer to the chapter "Main screen".

Steps 3, 4 and 5: Record screen

Record

Sensor filter:

A 10007

B 10009

C 10006

Tap on Sensor number to communicate with Sensor

▼ 1 Min.

Sensor filter: The sensors have a built-in hardware filter that is capable of filtering out low frequency interference (e.g. traffic). Leaks on cast iron and steel pipes normally produce a high frequency noise. It is therefore recommended to set the filters to “High”. Leaks on PVC and MDPE pipes usually produce a low frequency noise. On plastic pipes it is therefore recommended to set the filter to “Low”.

Select the sensors: Tick the box of those sensors that are used for the measurement. In case you use all the available sensors, press the “Select all” button.

By ‘tapping’ on the sensor number you can contact the specific sensor directly (see chapter Sensor).

Using the “Done” button you can return to the main screen without starting the measurement. If you want to start the measurement, ‘tap’ on the “Rec. Immediate” button. This will start the measurement procedure and the program will automatically change to the Parameter screen.

Steps 6 and 7: Enter the parameters

In this screen you can enter the pipe parameters (length, material and diameter) plus the sensor configuration. Alternatively, if you first want to check whether or not the specific pipe section has a leak (without needing to enter the real parameters), you can simply press the button “Test Parameter”. The displayed correlation will show whether there is a leak in this pipe section, and hence, whether you need to enter the parameters for a correct result. The test parameters will not alter or overwrite any real parameters that may have been entered earlier.

Configuration: Indicate the location/configuration of the sensors by selecting the respective icon.



The traditional correlation using 2 sensors:

Enter the distance between the sensors and the pipe material.



3 Sensors in a straight line:

Enter the distances between the sensors 1 and 2, and between sensors 2 and 3. Also enter the pipe material. The “Multi-Mode” button on the material screen also offers the option to enter a pipe consisting of subsections with different pipe materials.



3 Sensors in a T-section:

Enter the distances of the sensors to the T. Each section from a sensor to the T has to be entered as a separate pipe section, hence you have to select 3 pipe materials. Important: If a section consists of several materials, observe the order of entering the pipe details: start from the sensor towards the T-section.

Enter the pipe material: Select the field indicating the pipe material. This will bring up the screen, on which you can select the pipe material and the diameter.

Single material: Select the material and then the diameter from the displayed list. If the sound velocity is known, select “manual” on the material list and enter the velocity.

Mixed material: First select the button “Multi-Mode” and then the number of subsections. Enter the respective length of the subsection in the list. Then ‘tap’ on the material indicated next to the length and select the correct material and diameter. Please note that you can select between “Single Mode” and “Multi-Mode” for each subsection.

Important: If you have selected the configuration of 3 sensors in a T-section and you need to enter mixed materials, then always start entering the sub-sections from the sensor towards the T.

The program allows the user to define which sensor is located in each position. This enables the user to position any sensor at any position of the configuration. See list of sensors at the bottom of the screen for each position on the icon.

When you are satisfied with all the parameter details, please confirm by ‘tapping’ the “OK” button. The program will then bring back the main screen and the correlation result will appear as soon as the recording is finished.

During recording the progress is indicated in the middle of the top line of the screen. There are 2 different indications:

- While preparing the sensors for the measurement, a “P” is indicating the preparation phase
- During transfer of the signals to the Comm Link and then to the Palm the progress is shown in %

b) Time-delayed correlation

In a time-delayed correlation the programming of the sensors, the noise recording, and the transfer of the memorized leak noises to the Palm are independent procedures and can be carried out at different points of time. Depending on the conditions, you can first program the sensors, at a later time deploy the sensors, and at yet another later point in time transfer the memorized leak noise to the Palm PDA.

Preparing a time-delayed correlation

Select the “Record” button in the main screen. The record screen will now be displayed.

Record

Sensor filter: low high

A 10007 Select All

B 10009

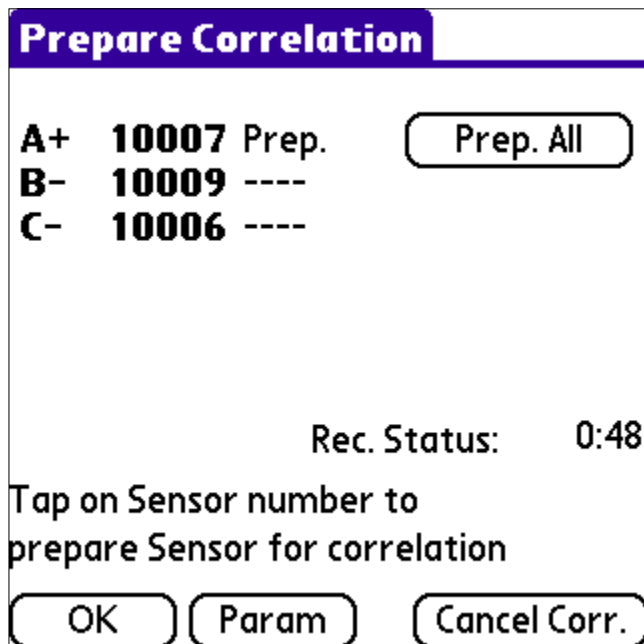
C 10006

Tap on Sensor number to communicate with Sensor

Rec. Delayed ▼ 1 Min.

Rec. Immediate Done

Select the sensor filter and the sensors as described for the real-time correlation. At the right-hand side of the button "Rec. Delayed" you can select the time duration until recording. 'Tapping' with your stylus on the "Rec. Delayed" button will start the recording count-down and display the Prepare Correlation screen:



This screen serves to prepare the sensors for correlation before the end of the count-down. The remaining count-down time is indicated at "Rec. Status".

There are 2 possibilities for preparing the sensors:

- ☞ Prepare the sensors individually: Tip on the specific sensor in the list.
- ☞ Prepare all the sensors simultaneously: Tip on the "Prep. All" button. All the sensors, which have not yet been prepared for recording, will now be prepared one after the other.

The preparation state of the sensors will be indicated on the list as follows:

Not ready: – sign after the sensor name, and ---- after the sensor ID number.

Ready: + sign after the sensor name, and „Prep.“ after the sensor ID number.

If preparation of a sensor was not successful, you can repeat the procedure. But in any case, this has to be done before the "Rec. Status" count-down has reached 0:00.

Transferring the time-delayed recording

As soon as the count-down has reached 0:00, the prepared sensors start to record the leak noise. After recording the "Rec. Status" will indicate "ready": as of this moment the recorded leak noise can be transferred.

For reading out/transferring the recorded leak noise there are the same possibilities as for preparing the sensors:

- each sensor individually by tipping on the sensor in the list
- all the sensors simultaneously by 'tapping' on the "Read All" button. If the transfer of the leak noise of one sensor has not been successful, it can be repeated. The transfer process of "Read All" is done in the background: this means that you can continue using the program. The progress of the transfer process will be indicated in %, like during real-time correlation.

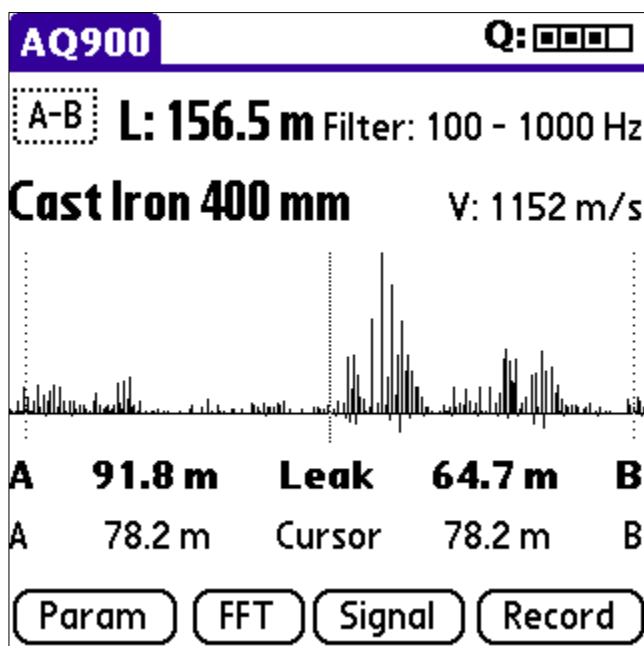
The successful read-out of a sensor is indicated by a * after the sensor name and "Read" after the sensor ID number.

The entering of parameters is done like in the real-time correlation: 'Tap' on "Param" to change to the parameter screen.

Remarks

- Never retrieve the batteries from the Comm Link during the delayed recording: this could falsify the result. Switching the Comm Link off does not interfere with the recording process.
- You can leave the “Prepare Correlation” screen at any time. When you return to this screen you can simply continue the procedure where interrupted.
- You can interrupt the recording by tipping on the “Cancel Corr.” Button in the prepare correlation screen.
- During the programmed recording time the sensors must be switched on and be deployed on the measurement location.

Main Screen



When you start the program, the Main Screen is displayed.

On the top right-hand corner you will find the quality indicator for the correlation result. The more boxes are filled, the better the quality of the correlation result.

Above the correlation curve, the sensors (used for this correlation) as well as all the measurement parameters are displayed. When correlating with 3 sensors, you can visualize the result of any 2 sensors by ‘tapping’ on the sensor ID field in the upper left-hand corner.

The lightly dotted line on both sides of the correlation curve indicate the location of the sensors on the pipe. The cursor (visualized as a dotted line in the middle of the curve) can be moved by ‘tapping’ on the desired new location on the graph. The cursor will jump to the respective spot.

Below the correlation graph, the correlation result is displayed. The first line in bold letters indicates the distance of the leak from the selected sensors, the second line shows the location of the cursor with respect to these sensors.

At the bottom of the screen you will find the main navigation buttons:

Param Enter the parameters. The parameters can be adjusted at any time, also later. The result will be adjusted accordingly.

- FFT** Display of the frequency analysis and of the filter setting.
- Signal** Display and acoustic playback of the recorded signals.
- Record** Start a new measurement and contact the sensors.

The menu on the Main Screen

'Tapping' on the highlighted AQ900 field in the upper left-hand corner will offer the following menu bar:

File

Here you can save, load to the screen or delete a saved measurement: see chapter "File management of the saved measurements".

Functions

Calculate V:

This function is also called **Tri-correlation or automatic velocity check**. When correlating with 3 sensors you can apply the unique built-in feature of automatic calculation of the real on-site sound velocity in order to avoid dry holes. The correlation result will always be correct and precise. After correlation press the highlighted "AQ900" in the upper left-hand corner and select Functions/Calculate V. The program will then perform an automatic velocity check, calculate and indicate the correct velocity. You can accept the calculated velocity by tipping on "OK" or reject it by tipping on "Cancel". The correlation result will be adjusted accordingly and the calculated velocity will be displayed on the right-hand side above the correlation curve.

Peak Suppression:

If you want to eliminate an undesirable peak indicating a non-leak noise source (such as a consumption) which disturbs the correlation, press the highlighted "AQ900" in the upper left-hand corner and select Functions/Peak Suppression. Then define the section of the curve you wish to suppress by gliding with the stylus on the screen over the entire section to be suppressed. You can repeat the same procedure for as many peaks as you wish to suppress. After changing the correlation, or when you leave the main screen, the original correlation curve will be displayed again.

Options

Preferences:

Select your preferred language and indication of the measurement units: metric (in metres and mm) or non-metric/imperial (feet and inches).

Settings:

This enables you to define and identify the Comm Link and the sensors to be used: see chapter Setup of the Palm PDA.

Update:

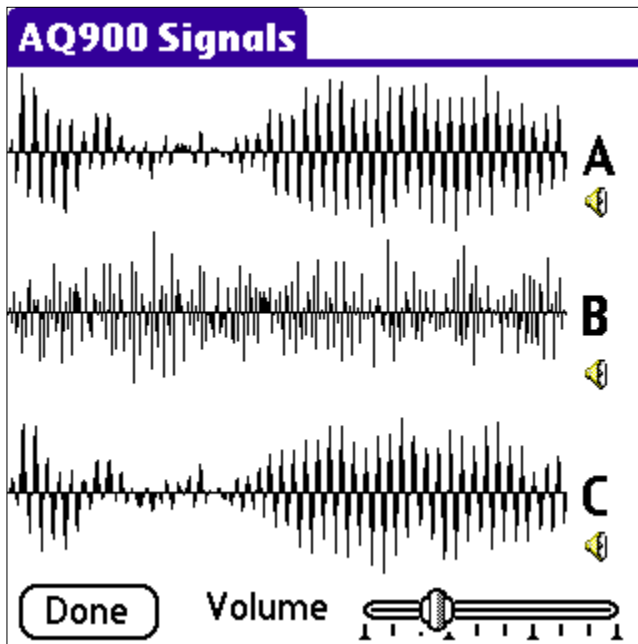
It is the policy of Gutermann International to update every client to the latest software version as soon as it

is available. This service is free of charge. Gutermann International will supply the latest updates by e-mail. You can transfer the latest update via HotSync™ to your Palm PDA. The Options/Update function will allow to update your Comm Link and your sensors automatically.

About:

Information about the program version.

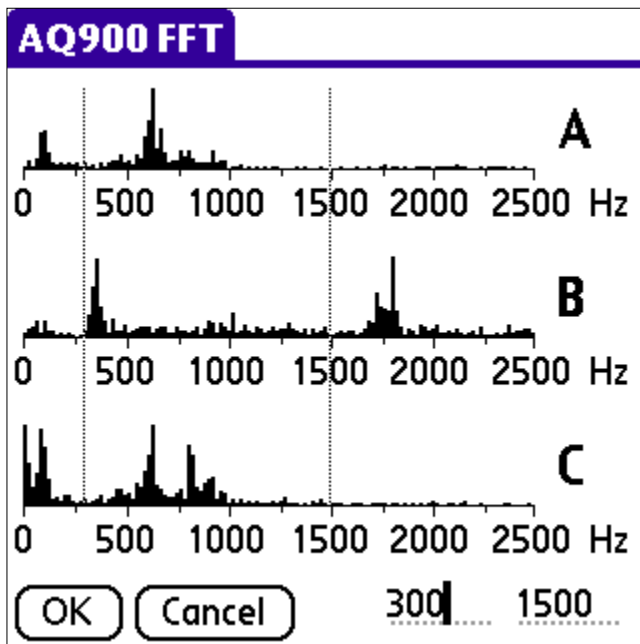
Signal



The signal screen displays the recorded signals of the measurement. After 'tapping' on one of the loudspeaker symbols you can listen to the signal (leak noise) of the respective sensor. 'Tapping' again on the same symbol will stop the listening function. You can adjust the volume by dragging the volume symbol to the right or to the left.

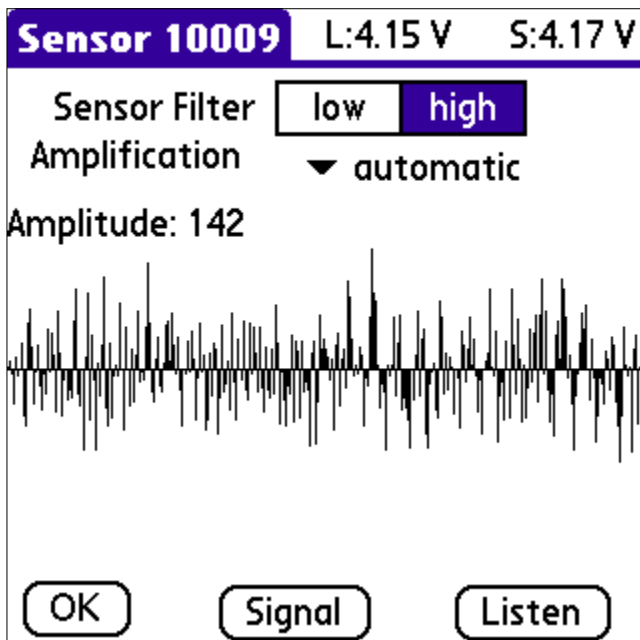
The real-time signal of each sensor can be displayed on the Sensor screen.

FFT



In this screen the FFT of each signal is displayed. The dotted lines indicate the filter setting. You can manually adjust the filter setting by entering the desired values at the bottom or by moving the cursor in the graph: simply tip with the Stylus on the desired spot.

Sensor



Tapping on the sensor number in the “Record” screen will allow you to communicate with each sensor individually. The Sensor screen will appear.

In the top line, next to the sensor number, the battery charge is shown: L: for the Comm Link, S: for the sensor.

Sensor Filter: There are two possible settings: “low” and “high”

“low” means that the signal is unfiltered. This setting is normally used for plastic pipes and large diameters or very long distances.

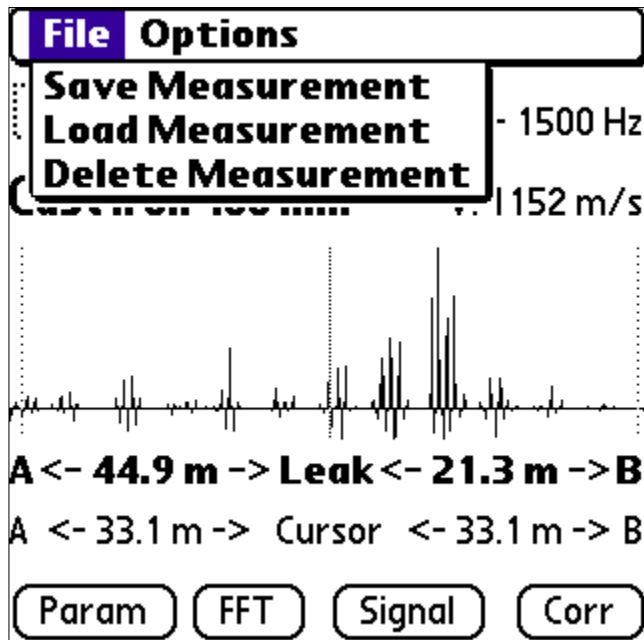
“high” means that the low frequencies are filtered out. On metallic pipes you should normally use the “high” filter setting. You can change the setting by tapping on “low” or “high”.

Amplification: Signal amplification can either be set to automatic (= automatic gain) or you can select a fixed signal amplification between 0 and 10, 10 being the highest amplification.

Signal: When selecting this button, the real-time signal of this sensor is continuously displayed. ‘Tapping’ on this button again will stop the action.

Listen: Depending on the Palm hardware you can listen to the leak noise on the respective sensor. ‘Tapping’ on this button once again will stop the listening function.

File management of the saved measurements



After tapping on the highlighted AQ900 field in the upper left-hand corner of the main screen, select “File”. Here you can save, load to the screen or delete a saved measurement.

AQ900 Q: []

A-B L: 66.2 m Filter: 300 - 1500 Hz

Cast Iron 400 mm V: 1152 m/s

Save Measurement

Enter Comment

Baker Street

OK Cancel

After selecting “Save” you can enter a comment such as the address of the leak location. By ‘tapping’ the “OK” key, the measurement will be saved; when ‘tapping’ “Cancel”, saving will be interrupted.

Load Measurement

stored measurements

5.5.04 17:28	Baker Street
23.4.04 18:23	test

OK Cancel

When selecting “Load” a list of the saved measurements will appear on screen. Select the desired measurement by tapping on the respective entry.

When selecting “Delete” the same list will appear. After tapping on the OK key, you will be asked whether or not you really want to delete this measurement.