gm instruments Ltd

A1 Acoustic Rhinometer

User Software Guide
And Installation Notes
V9

CE 0473

FACTREE Software Services

Contents Page

Installation Procedure

COMPUTERS SUPPORTED
A1 will work on any PC which can run Windows 2000, XP or Vista and which has a free USB socket. NB units, which comply with EN60950, should be used.

PRINTERS SUPPORTED
As these instruments operate in a Windows environment, print capability depends on you having installed a printer under Windows. Virtually any printer, which works under the version of Windows you have, will be suitable.

INSTALLATION SEQUENCE

The software comes on 2 CD's and should be installed **before connecting the A1 Rhinometer to your PC**. It is also advisable to close any other programs you may be running while performing the installation as you may need to close down the PC during this operation.

GMI SOFTWARE
Put the CD in your drive, navigate to it using My Computer/Windows Explorer, and double click on the file SETUP.EXE. Accept the defaults offered at each stage.

INTERFACE BOARD SOFTWARE (Measurement Computing)
Ensure the USB cable is not connected to the A1 unit.
Put the CD in your drive. If your PC is set to autorun CD's then allow this to happen while accepting the defaults offered. The program Instacal and other driver software will be loaded to a folder called Measurement Computing.

If your PC does not automatically run the CD's installation program, click on My Computer, select and open your CD drive, and then double click on mccsetup.exe to install the programs and files.

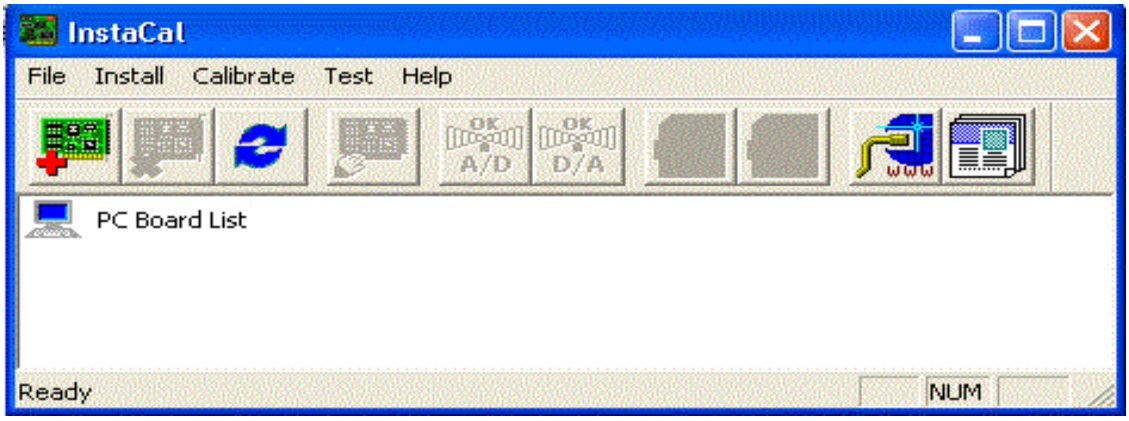
The installation program will offer defaults all of which should be accepted.

INTERFACE BOARD HARDWARE
The last installation operation is to have your PC identify the USB A/D convertor, which is built into the A1 unit.

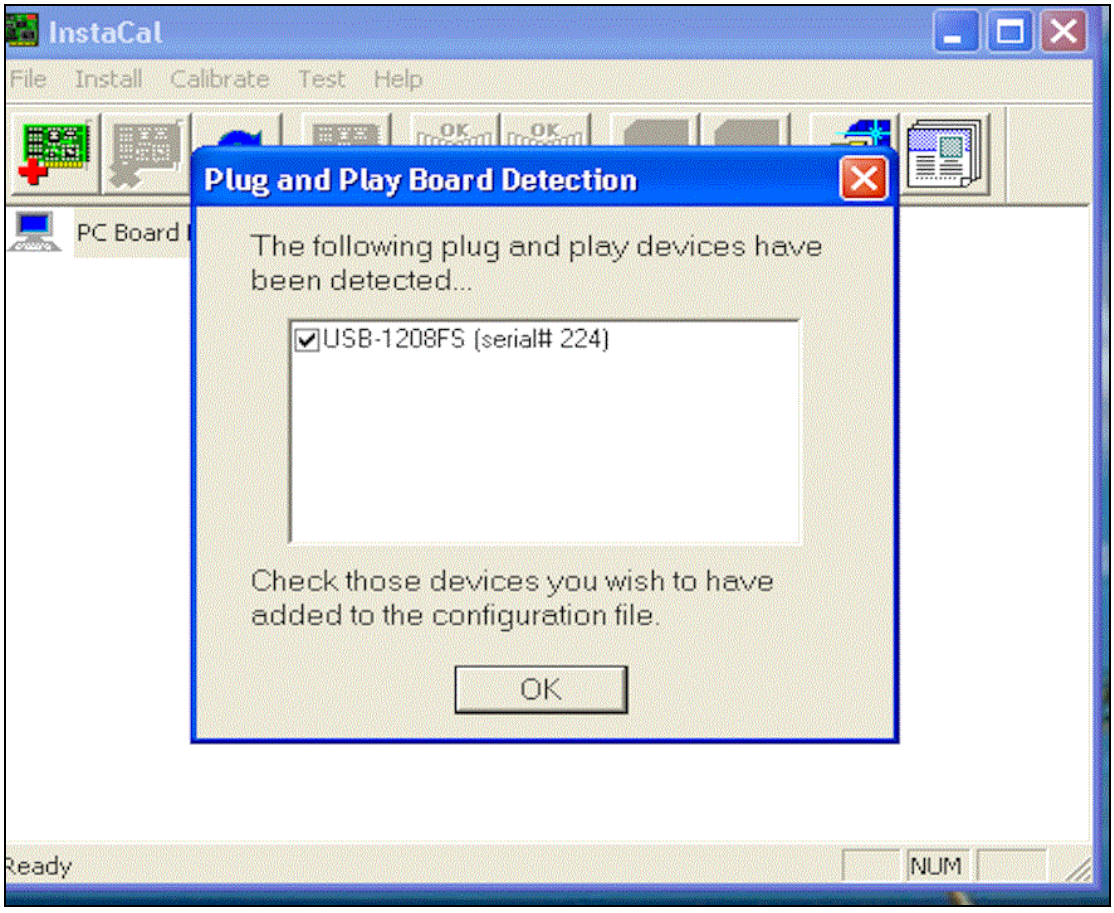
Click on

START/ALL PROGRAMS/MEASUREMENT COMPUTING/DAQ/INSCAL32.EXE

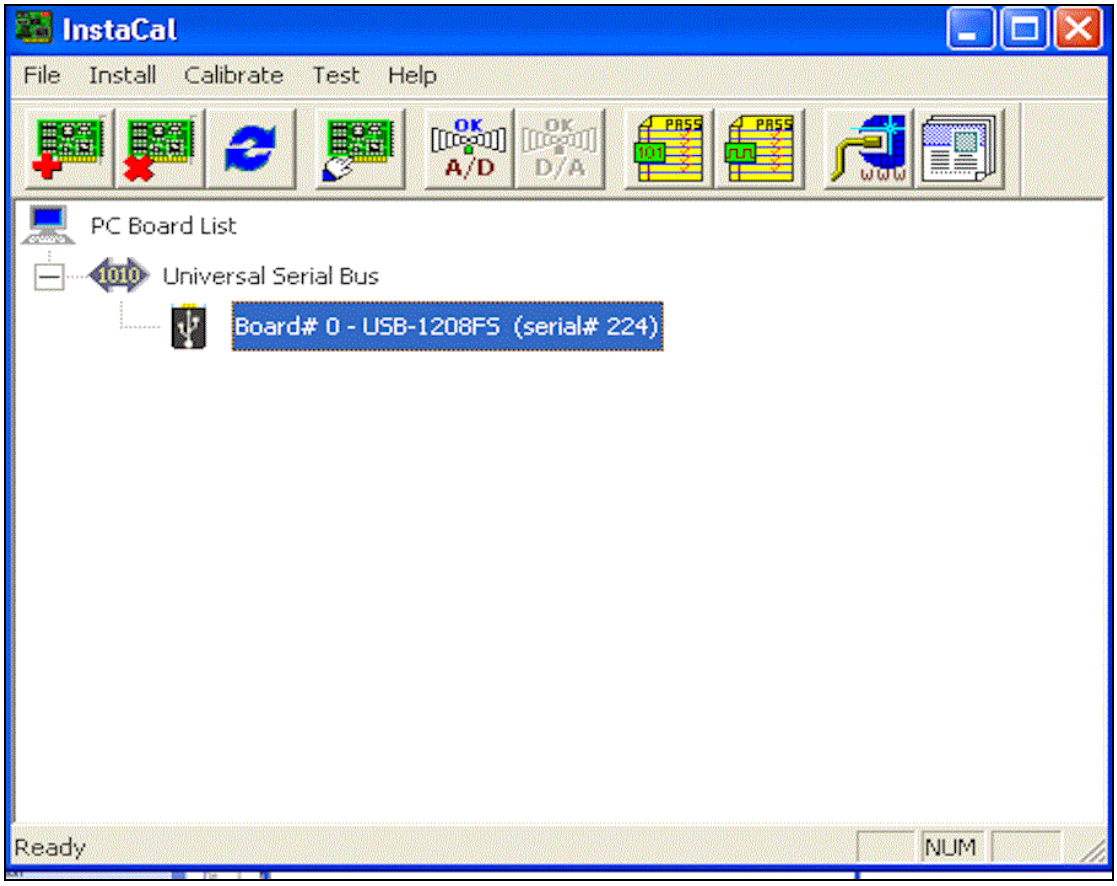
and Instacal will show no boards installed as shown overleaf.



Connect the USB cable between the A1 and the PC and power up the A1 unit. Wait for a few seconds as the USB interface is recognised and the drivers loaded. Once completed the Instacal screen will offer the opportunity to install your USB board.



Click on OK.

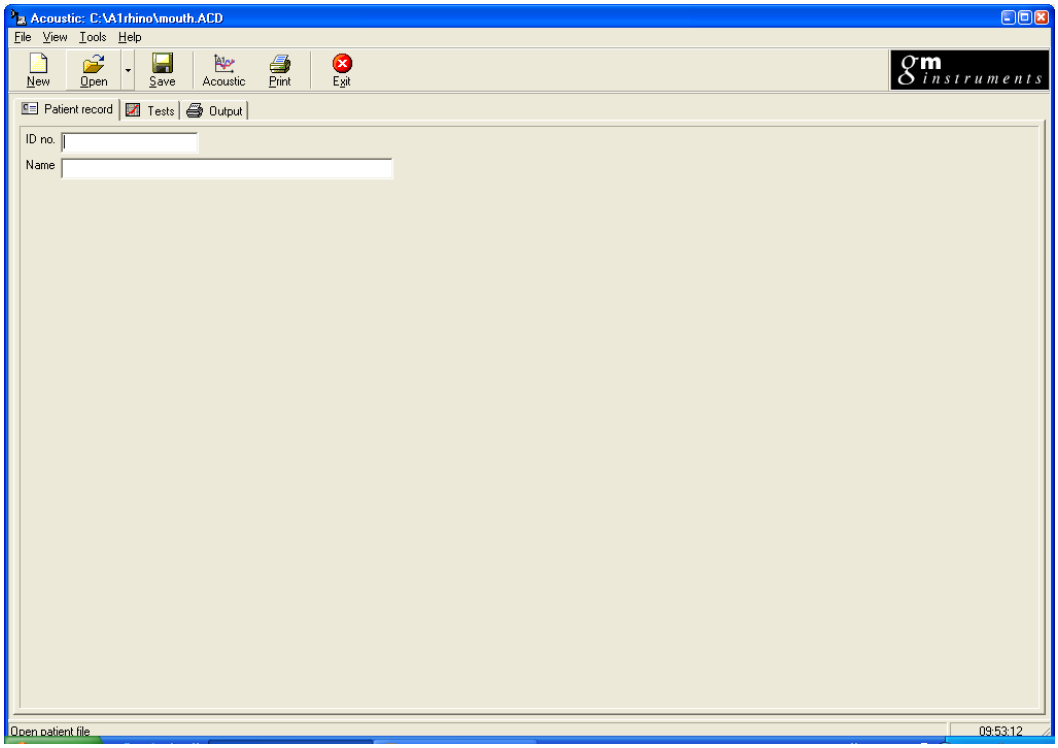


When the Instacal program shows the screen above, installation is complete and Instacal can be closed down.

The A1 Acoustic Rhinometer program can now be started by clicking on

PROGRAMS/GMI NASAL MEASUREMENTS/ACOUSTIC RHINOMETER

The opening window is as shown on the next page.



A number of elements within the program can be configured to suit your application and although you may wish to change them again later it should be noted that fields within the Patient Information screen should not be changed after storing results for a particular subject as the stored information may become inaccessible.

How to Configure the Software

All changes are made by clicking on TOOLS and OPTIONS. A new window named SETTINGS is then displayed which shows 4 tabs, each of which contain user configurable items. The 4 tabs are labelled:-

Formatting, in which you can change the colour of almost any element of the program on screen or printout.

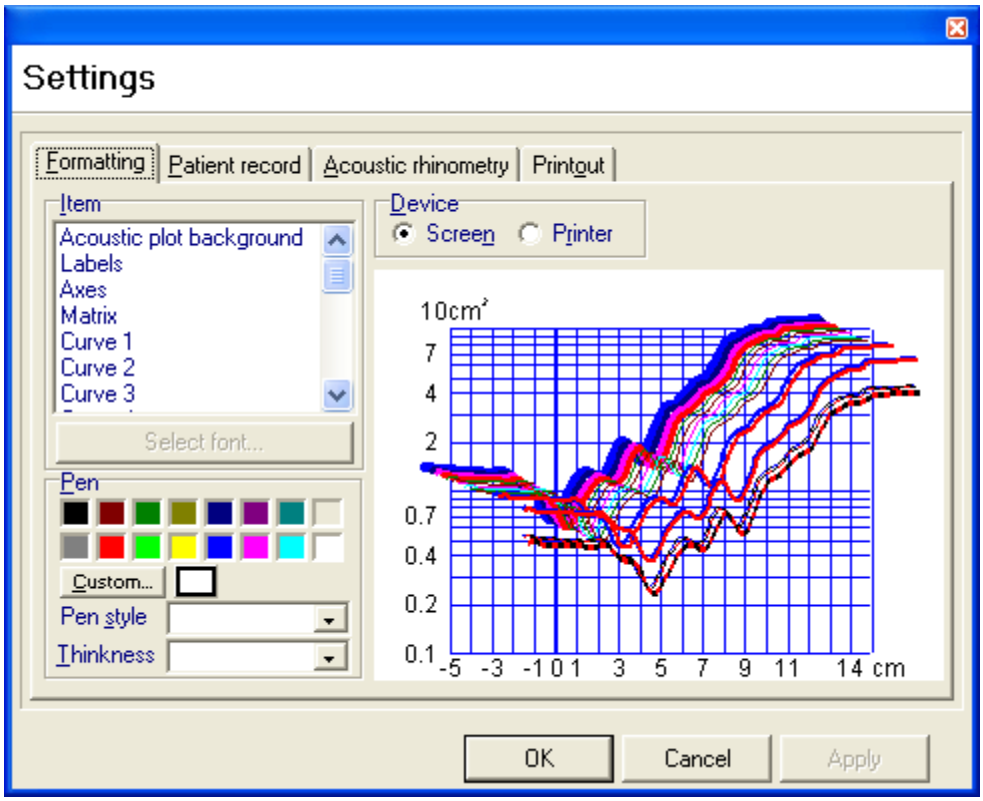
Patient Record, in which you can alter the number of fields available for information input, their size, their names and the type of characters, which are acceptable. You can also tell the system to use a particular field entry as the patient file name.

Acoustic Rhinometry, leads you to the preset options available when using the acoustic rhinometer facilities.

Printout, The header text and margin details can be modified from here.

A detailed description of each of these Tab screens along with a screen image follows below:

Formatting Tab



The formatting tab screen is made up of the following elements:-

Device “radio” button....from which you can select **Screen** or **Printout** for alteration.

Item scrolling window, which contains a list of the screen or printout elements, whose colour can be changed.

Pen colour palate, from which you choose the colour you want applied to any element selected in the item window.

Pen Style window, which can be applied to any line drawing element, selected from the item window.

Pen Thickness window which allows you to apply different line thicknesses to any line drawing element, selected from the item window.

Preview window, which lets you see the effect of a change.

To make a change to the default settings select **Screen** or **Printer**, select an **Item** from the list, select your chosen **Pen** colour and if appropriate **Pen Style** or **Thickness.** You will immediately see the effect of that change in the **Preview** window.

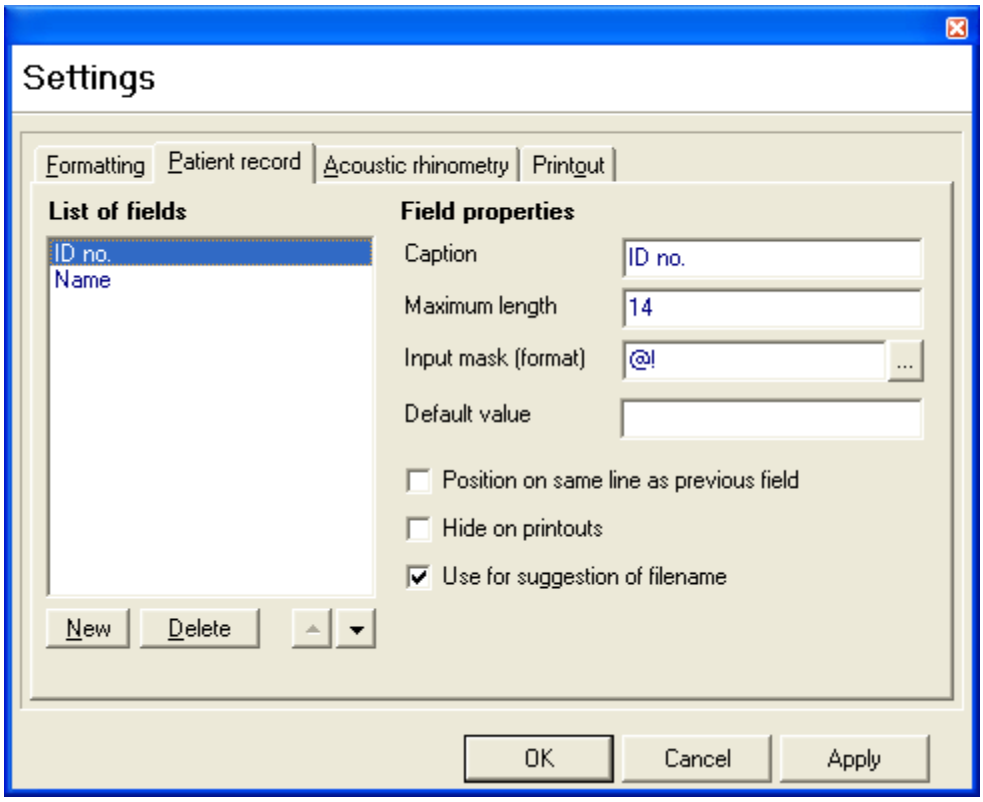
If you click on **Apply** the change will be recorded and you can move to another element.

If you click on **OK** instead of **Apply**, the change will be made, and recorded, but you will close the **Setup** window and return to the main screen.

Please note that any element can be set as a foreground or background colour. Normally you would select a colour as a foreground element and have black selected as the associated background element. If however you want to clearly see coloured dotted lines, then a light background colour should be selected.

By default colours are selected for screen display and black for printouts, but colours can be added to printouts if you wish that.

Patient record Tab



The default setting for **Patient record** information contains only a couple of fields, but you can add to them the entry points you want. You can put them in any order, define what kind of data is acceptable for entry in any field and specify the size of field.

The Patient record tab contains the following elements:-

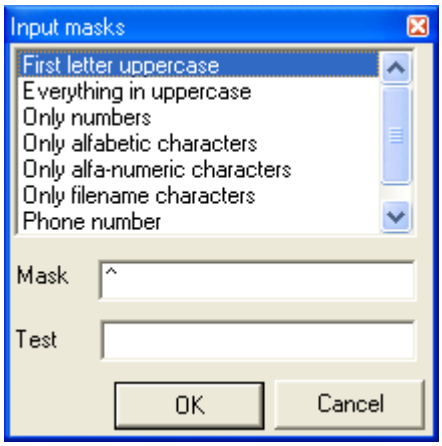
List of Fields is a window, which shows the current “labels” already selected for inclusion. If you click on one of these it can be edited or deleted or its position moved within the group. When highlighted the information relating to its structure is shown on the right hand side of the window under the headings of:-

Caption the current label selected for editing.

Maximum Length the number of character spaces allocated in the **Patient Information** window against that name.

Input Mask (format) the conditions applied to character entry in the associated **Caption** field. An example of most of the options are shown below:-

In the above example ID is highlighted in the **List of Fields** window. The label ID No is shown in the **Caption** field and it can be seen that currently space is allowed for 14 characters. The mask applied was one which only allowed numbers or letters for entry in that field but no spaces or other characters. **Masks** can be selected or changed by clicking on the button on the extreme right of the **Mask** field.



The **Input Mask** window allows selection of the conditions you want to apply and has space below for you to try out or **Test** the restrictions. If you wish to keep the currently selected field, click on **OK,** and then on **Apply**.

If you wish to discard any field click on **Delete.**

If you want to change the order in which they appear, highlight the one you want to move and then use the **UP** or **Down** arrow'd buttons to the right of the **Delete** button.

You can place more than one item on a line by placing it below the item you want it lined up with and clicking on **Position on Same Line as Previous Field** found under options.

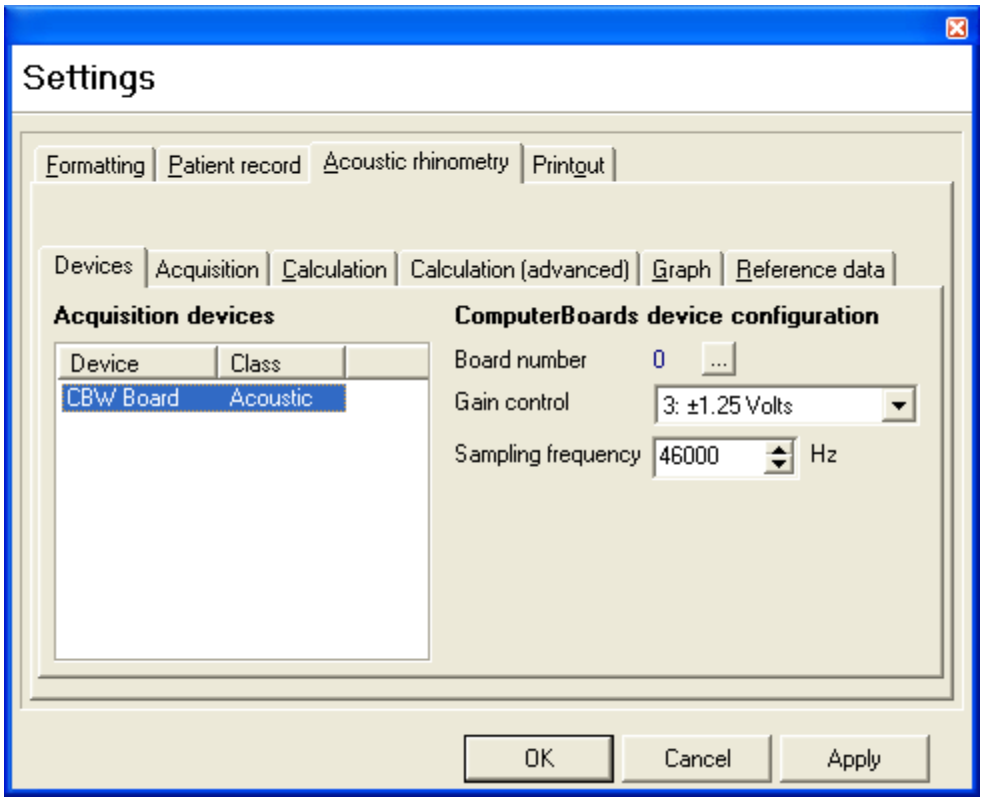
You can also "hide" a field from printout by highlighting it and clicking on the **Hide in Printouts**, again found under options.

A field can be used for the test file name by highlighting it and then clicking on **Use for Suggestion of Filename**, found under options.

Acoustic Rhinomentry Tab

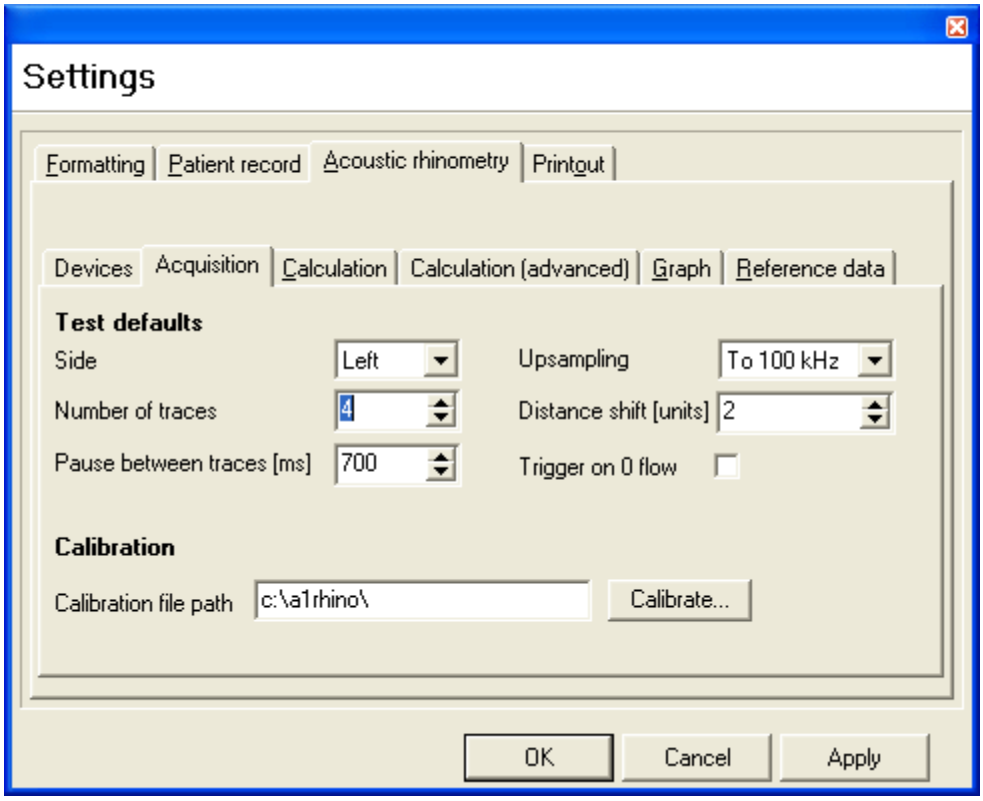
The following items can be found within the Acoustic rhinomentry Tab:-

Acoustic rhinomentry / Devices Tab



The Computer Board section of this can be viewed by clicking on the text **CBW Board**. Note that the above parameters are those, which are normally set for a USB system, and should not normally be altered.

Acoustic Rhinometry / Acquisition



Side sets the side of the nose first offered as your default test side.

When acquiring acoustic data the information can be obtained from a single measurement or from the average of a series of curves. The item labelled **Number of traces** specifies what is to constitute a single test.

The **Distance shift** factor allows a small lateral movement of the measured data curve to give the best fit when comparing a measurement made with an artificial nose against the theoretical line produced by the profile of an artificial nose. It effectively compensates for variations in the speed of sound under different conditions.

If a series of curves are to be created as part of a single measurement (normally 4), the system requires a finite delay between each of the curves, in order to “recover” from the measurement. The “**Pause**” allowed is specified here.

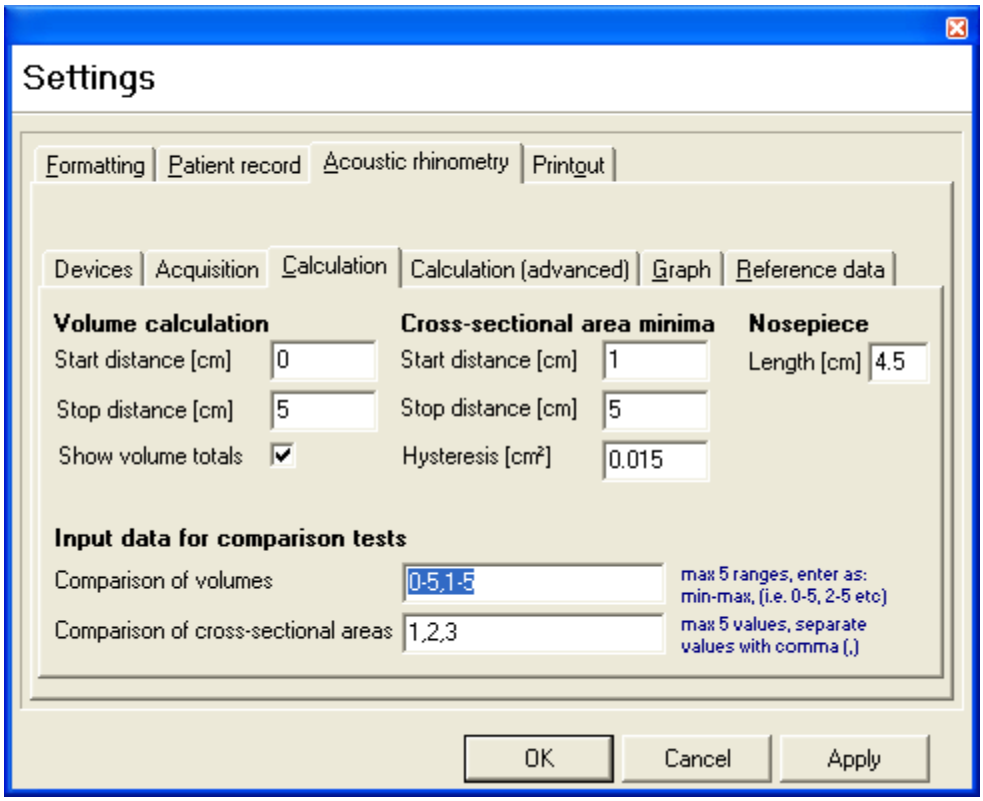
Upsampling sophisticated signal reprocessing data resampling techniques are used to increase the basic sampling rate to the equivalent of the rate shown here (normally 100,000 Samples per second).

Trigger on 0 Flow, a facility used with an open sound tube and concurrent Rhinomanometry / Acoustic Rhinometry Measurements

Calbration File Path is the place the system is to store it's calibration files

Calibration Button duplicates the button on the Acquisition screen

Acoustic Rhinometry / Calculation Tab



Volume Calculation start and stop distances specify the section of the nose over which you want to calculate a volume.

Cross-Sectional Area Minima's specify the section of the nose over which you want to look for turning points, and by quoting a hysterisis level, what constitutes a turning point.

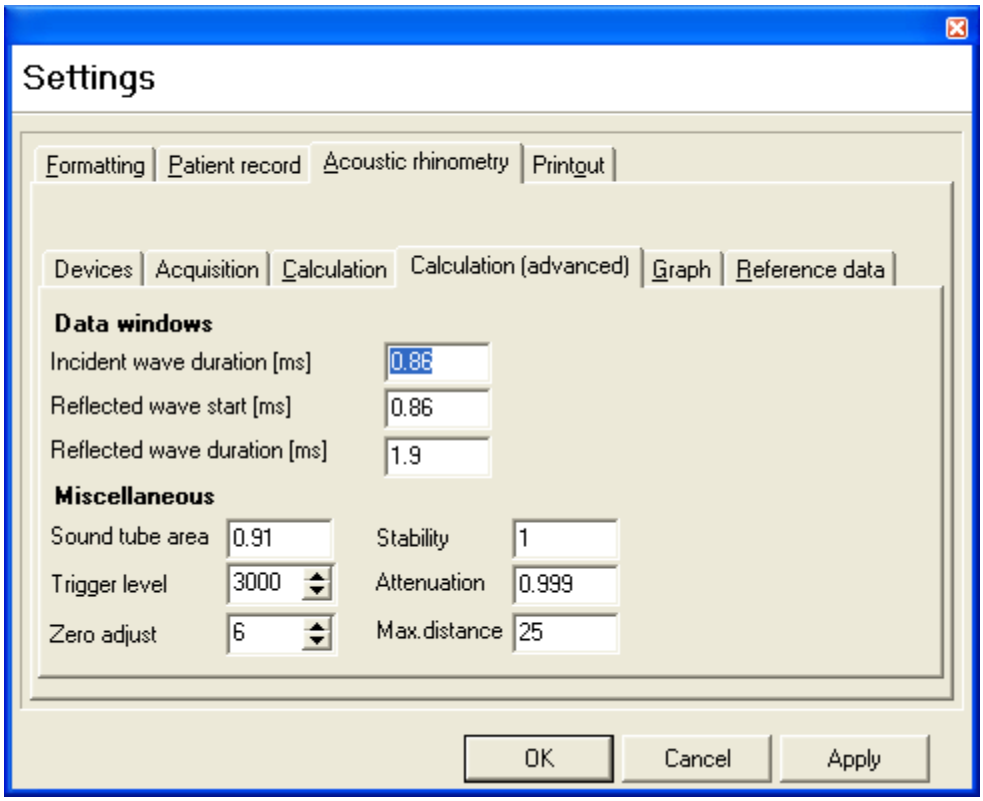
Nosepiece Length allows you to tell the software what nosepiece you are using to let it adjust the graphical display accordingly.

NB for anatomical nosepieces, "Nosepiece Length" should be set to 4.5, while if conical nosepieces are used, this should be set to 7.

Comparison Of Volumes allows you to specify the volumes reported between up to 5 pairs of distances, when a Comparison display is on screen.

Comparison Of Cross-Sectional Areas allows you to specify up to 5 distances at which points cross sectional areas will be reported, when a Comparison display is on screen.

Acoustic Rhinometry / Calculation (Advanced) tab



All of the parameters set up within this dialog box are pre set by us and stored on your program CD to give best possible performance on your system.

Alternative small animal/child/adult/open/dual sound tubes will use different values.

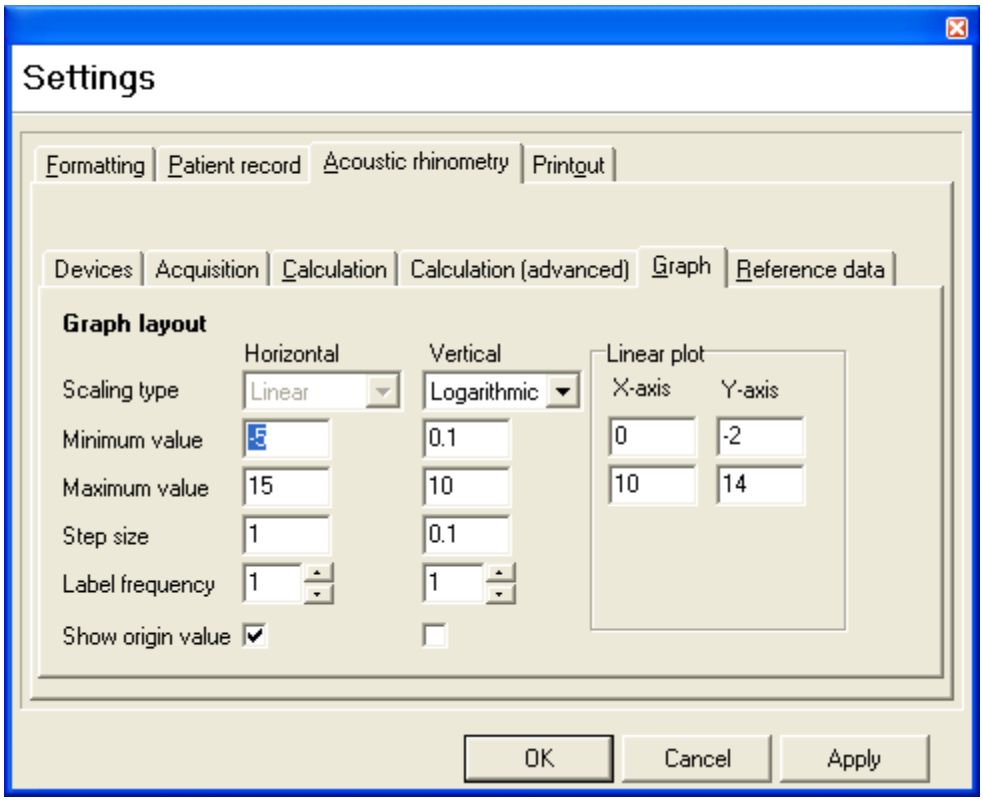
Sound Tube Area, **Zero adjust**, **Stability** and **Attenuation** factors are adjusted to provide optimum results while setting up the system along with the artificial nose and straight tube, as recommended by the standardisation committee.

The **Maximum distance** factor is normally set to 25 to limit the size of files created when generated and saved. Normally scaling of the horizontal axis is set to run from –5 to +15 cm, so the minimum requirement is a maximum distance of 20. If you want to measure further back, say to 25 cm, then the horizontal scale would need to be set to run from –5 to +25 and the maximum distance set to at least 30.

If an improper data message is produced during acquisition the **Trigger level** factor can be reduced to allow measurements to be made.

Data windows are constants for a particular sound tube.

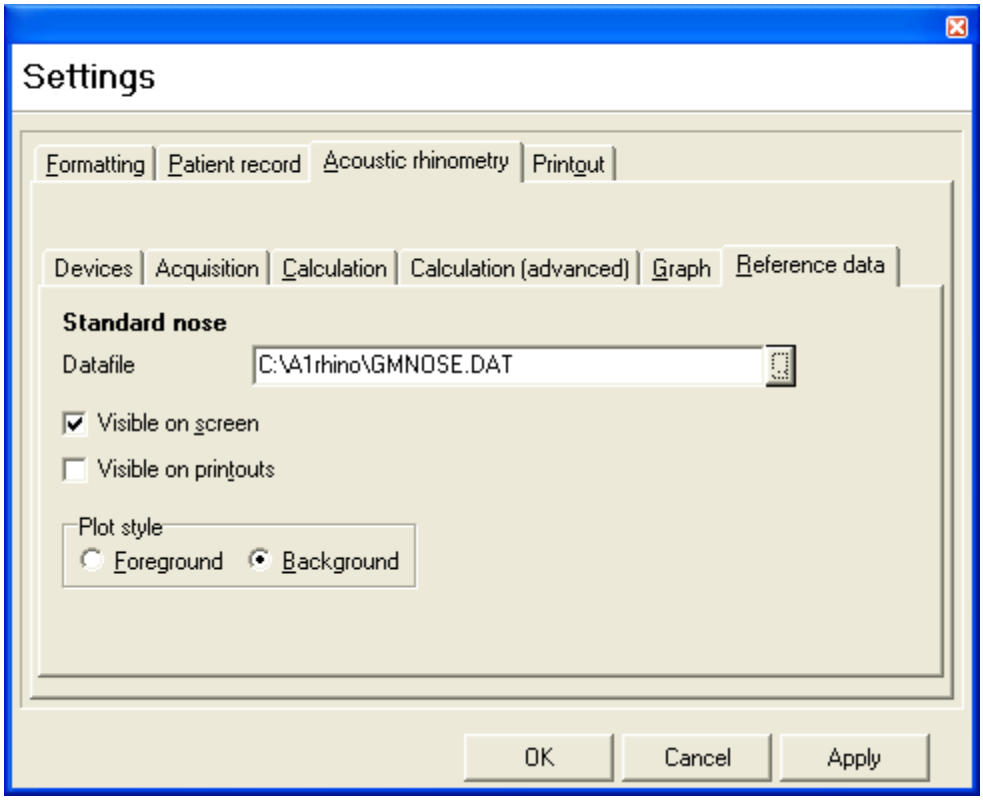
Acoustic Rhinometry / Graph Tab



The scaling for the distance and cross sectional area axis can be set up from here, for both the normal acquisition screen and also the comparison and analysis view screens.

Please note that a logarithmic scale should not be assigned a minimum value of zero. Additionally the scaling used when in linear plot mode can be set.

Acoustic Rhinometry / Reference Tab



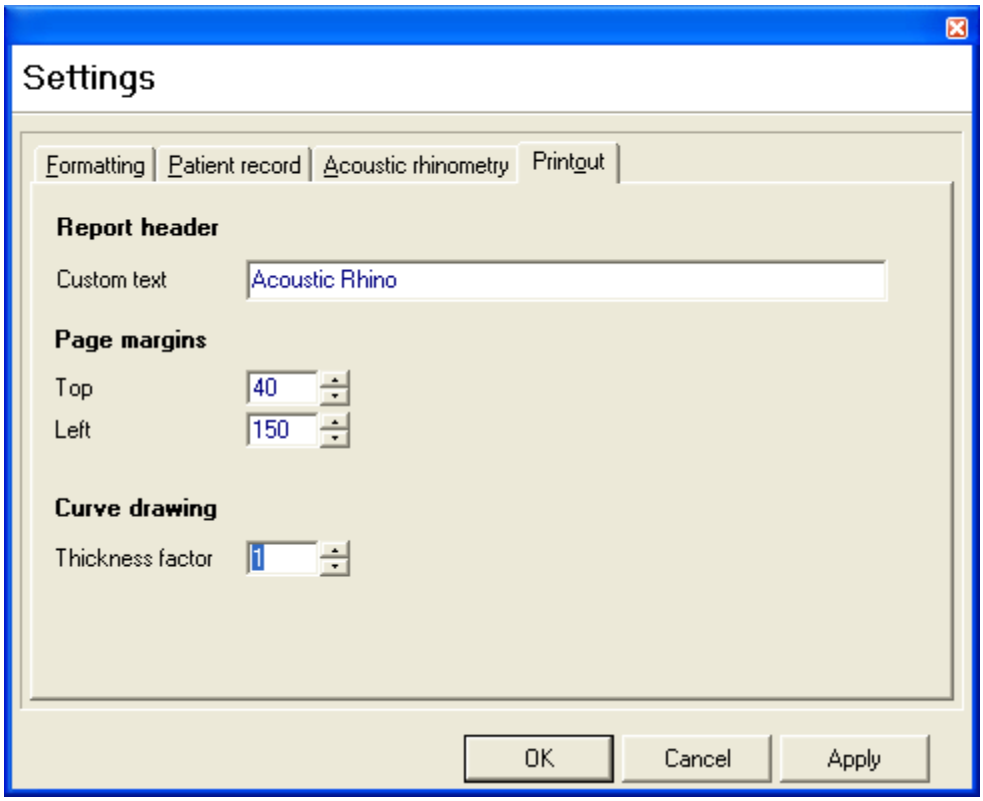
Validation of system performance can be made by comparing a theoretical "standard nose" curve, with that obtained when making a measurement on a "standard nose" model.

The A1 standard nose allows such a system check to be made. The reference tab in the acoustic section shown above, allows the appropriate theoretical curve to be drawn on the screen in a colour and line style specified in the View tab, under control of check boxes on this screen.

The **Datafile** used under normal circumstances of basic sample rate of 46,000 per second upsampled to 100,000 per second is called 46GMNOSE.DAT and can be selected from file by clicking on the button to the right of the **Datafile** window. The **Datafile** can be shown on screen if **Visible on Screen** is selected and can be seen on printouts if **Visible on Printouts** is selected.

The **Plot Style** of **Foreground** and **Background** can be set if desired.

Printout Tab



The **Printout Tab** allows the setting of a title, which will appear on printouts, and the alteration of margins.
More detailed control of printer options is available in the normal Windows print driver.

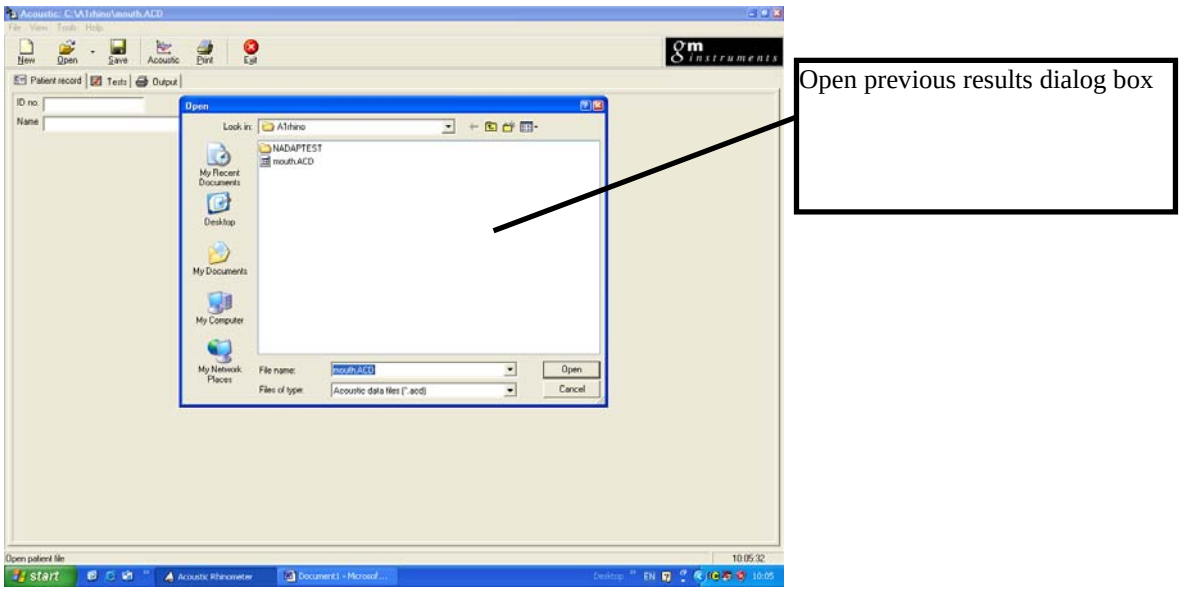
Starting a Test

To prepare for measurements on a subject who has already been tested

1. Click on the button marked OPEN and then using the dialog box offered, go to the folder you store your results in and click on the appropriate subject's file name.

2) You will then be able to check that you have the correct subject by examining the patient details by clicking on the PATIENT RECORD tab. Clicking on the TESTS tab will show you all previous test dates and results for that patient.

3) See below to make additional measurements on this subject. (New acoustic record.)

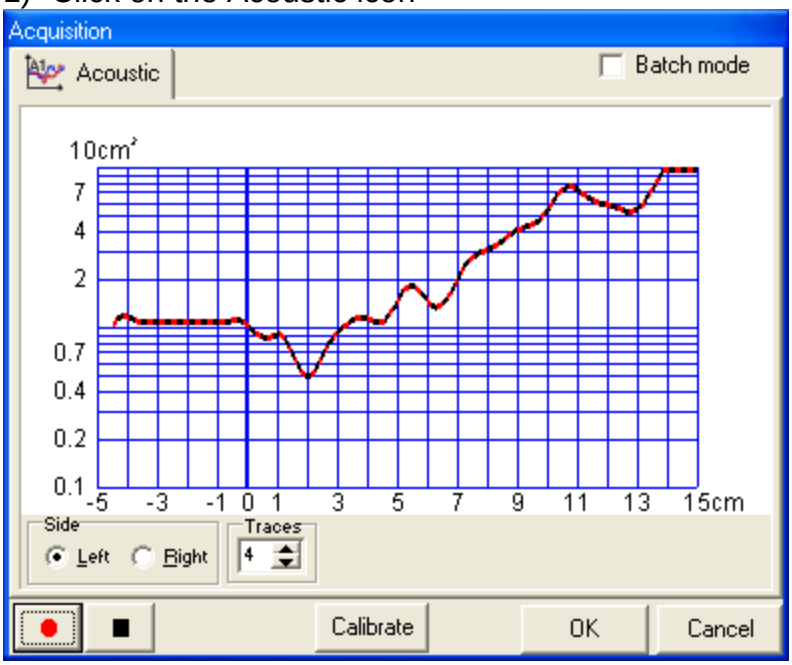


To prepare for measurements on a new subject

1. All current patient information and test results are cleared when the program is started or if, having performed other measurements, you click on the NEW button.
2. In either event the cursor is set to the first field in the patient record window.
3. You can then enter the required patient details. Pressing TAB after entering information in each field will take the cursor to the next one.
4. To make measurements (acquire), click on the Acoustic icon on the top tool bar.

To make a new Acoustic Rhinometry record

1) Click on the Acoustic icon



2) Confirm that the side you want to test is selected (left or right), and once the patient is connected, click on the red button to begin the acquisition. Alternatively, provided the cursor is within the acquire window, you can start a test sequence by clicking the mouse centre button/scroll wheel. We can also supply a USB connected footswitch, which performs the same function.

3) Once the preset number of measurements have been taken the system will stop taking in data, will show you the resultant curves, each of which is drawn in a different colour and will add the test to the test list for that subject.

4) If any curve is obviously bad it can be de-selected by clicking in the appropriate check box in the TRACES section on the right of the screen.

5) Comments can be added in the box found on the bottom of the screen.

6) If required additional testing can be done or the current test printed by clicking on PRINT, or saved by clicking on SAVE.

7) The OUTPUT tab can be used to create a printout consisting of a number of curves selected by clicking in the check box on the left of the test list.

To compare test results (L/R and L/R pre against L/R post)

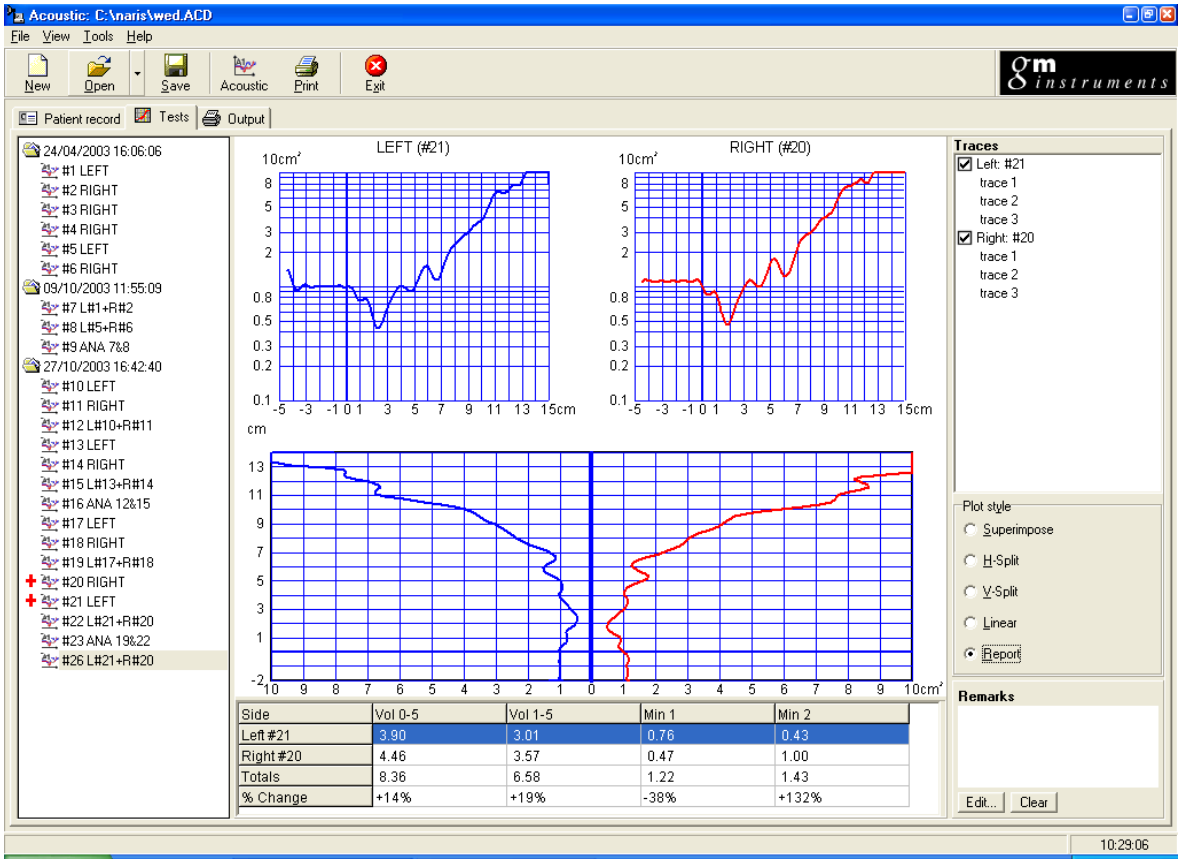
If you want to create a complete nose record from Left and Right side results

1) Select the TESTS tab
2) Click on the Left test, using the left mouse button.
3) Hold down the CTRL key and click on the Right test using the left mouse button. Both tests will now be "selected". Click on the second test result using the right mouse button and from the drop down menu, click on compare.
4) A new test entry is created which shows both Left and Right curves. This can be displayed in a number of ways and can be changed by selecting different "radio" buttons found in the bottom right hand side of the screen.

To compare two same side results the above paragraph should read:-

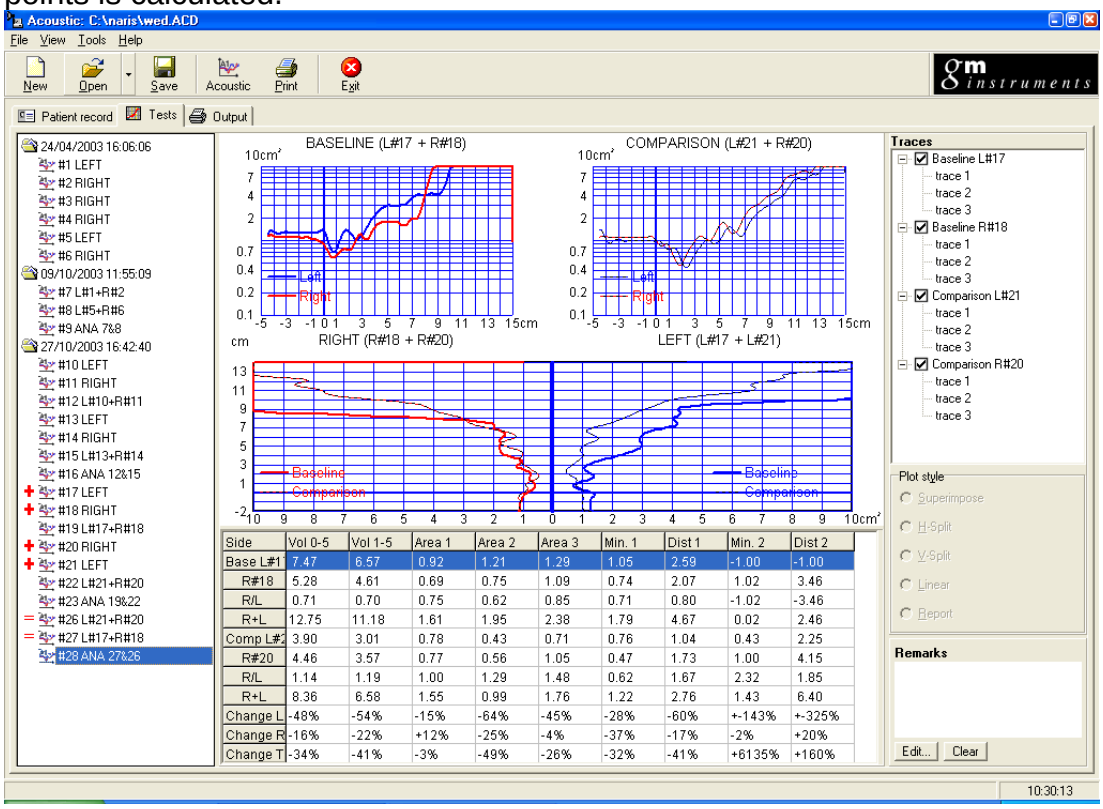
If you want to create a test which compares two LEFT or RIGHT side results

1) Select the TESTS tab
2) Click on the test you want to be the baseline test, using the left mouse button.
3) Hold down the CTRL key and click on the test you want to be the comparison test using the left mouse button. Both tests will now be "selected". Click on one of the tests using the right mouse button and from the drop down menu, click on compare.
3) A new test entry is created called COMPARE, which shows both curves. This can be displayed in a number of ways and can be changed by selecting different "radio" buttons found in the bottom right hand side of the screen.



It is also possible to compare a pair of total nose records. In this case one pair (L+R) record is designated as the baseline result and a second pair (L+R) is designated as a comparison result. (Colours and line styles for these are specified in the formatting tab)

The baseline (L+R) record is clicked on using the left mouse button, the CTRL key is held down and the comparison record (L+R) is clicked on using the left mouse button and both records are now selected. Click on either using the right mouse button and from the drop down menu, which appears, select compare.
This new record is called an ANALYSIS record and when selected a detailed examination of the two sets of results is possible and % change at different points is calculated.



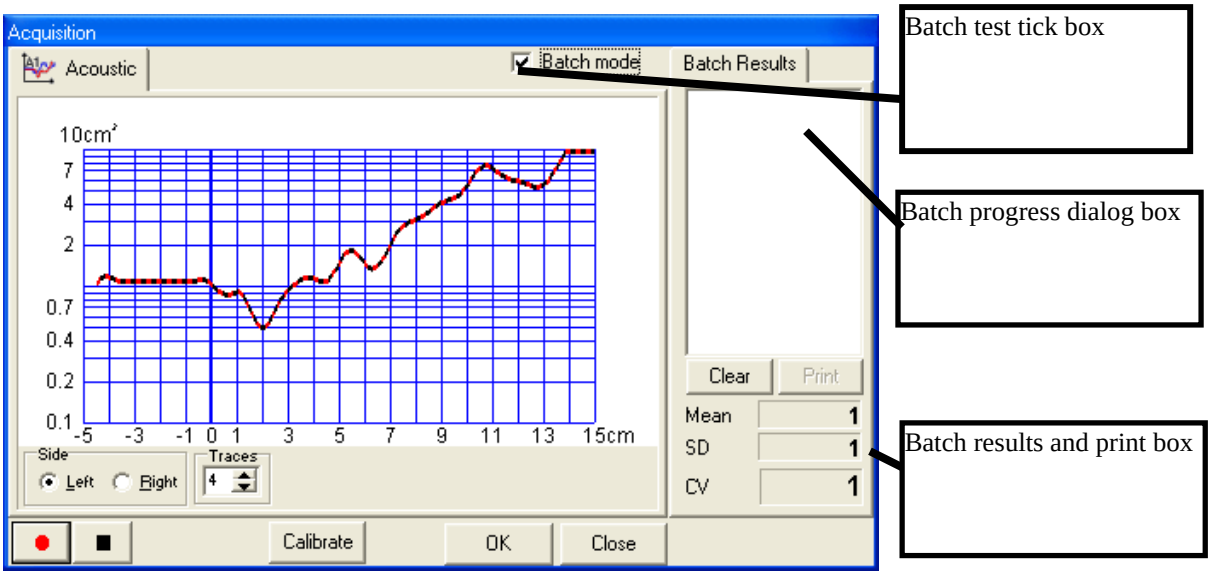
Side	Vol 0-5	Vol 1-5	Area 1	Area 2	Area 3	Min. 1	Dist 1	Min. 2	Dist 2
Base L#1	7.47	6.57	0.92	1.21	1.29	1.05	2.59	-1.00	-1.00
R#18	5.28	4.61	0.69	0.75	1.09	0.74	2.07	1.02	3.46
R/L	0.71	0.70	0.75	0.62	0.85	0.71	0.80	-1.02	-3.46
R+L	12.75	11.18	1.61	1.95	2.38	1.79	4.67	0.02	2.46
Comp L#2	3.90	3.01	0.78	0.43	0.71	0.76	1.04	0.43	2.25
R#20	4.46	3.57	0.77	0.56	1.05	0.47	1.73	1.00	4.15
R/L	1.14	1.19	1.00	1.29	1.48	0.62	1.67	2.32	1.85
R+L	8.36	6.58	1.55	0.99	1.76	1.22	2.76	1.43	6.40
Change L	-48%	-54%	-15%	-64%	-45%	-28%	-60%	+-143%	+-325%
Change R	-16%	-22%	+12%	-25%	-4%	-37%	-17%	-2%	+20%
Change T	-34%	-41%	-3%	-49%	-26%	-32%	-41%	+6135%	+160%

To delete a test result

Select the test result to be deleted from the test list using the left mouse button to view it on screen and allow you to confirm that you do want to delete this result. Then click on the test again this time using the right mouse button, and from the menu, which appears, select delete.

Batch Test Facility (available on Executive versions only)

Validation of test results is a facility, which has proved to be invaluable in many situations. In acoustic rhinometry result variation is normally caused by distortion of the nose or leakage in the connections to it. The batch test facility has been incorporated into the Executive version of the program in order to allow users to check for these sources of result variation.
The program offers the possibility of switching on the “batch” process when you go in to the acquire screen, by clicking on the small check box on the top right hand side of the window. An additional section of window is then added to the acquire screen in which a number of pieces of information will be added as test results are taken in.



At the end of the first test the words “Start batch” will be shown in the progress dialog box. At this point the subject should be disconnected from the equipment, and then reconnected again. The test start red button should be clicked on again to start part two. Once completed a coefficient of variance percentage change figure will be shown in the progress box, while additional information such as the mean resistance, standard deviation between values and the CV% figure are shown in the results section. If the CV% figure is 10% or below then normally the tests will be considered to be close enough and indicate the strong likelihood of being accurate, as the chance of creating the same distortion or leakage twice in succession is remote. However additional tests can be added to the batch (with the subject disconnected between them each time) if you want further re assurance.
The batch values can be printed directly without any possibility of modifying the data by clicking on the batch print button and when you click on close, the batch tests are transferred to the normal test list for further examination and permanent storage.

Data Export Facility (available on Executive versions only)

Test results can be output from A1 in a number of ways.

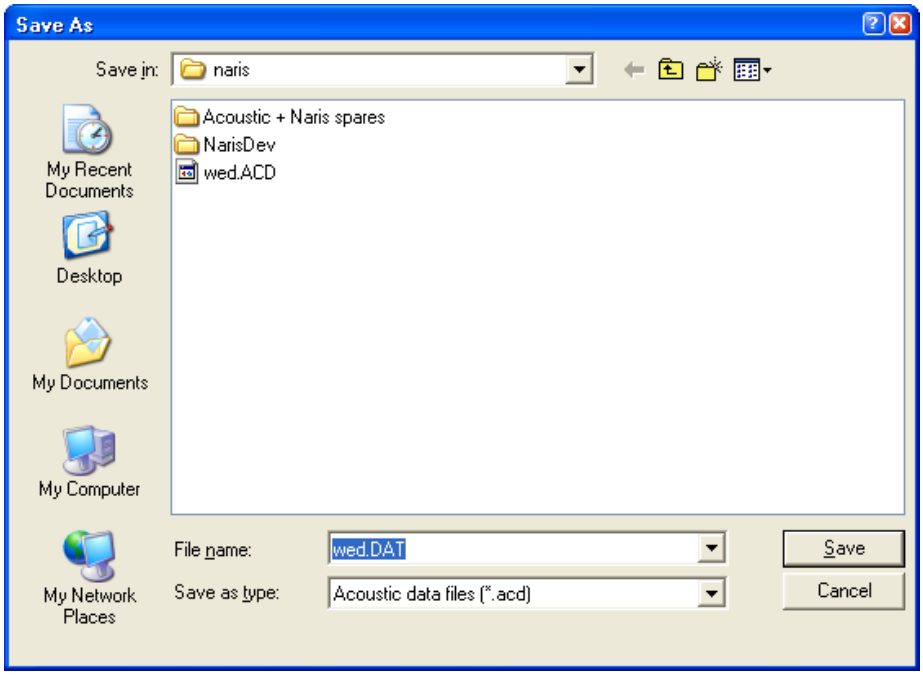
Standard Printouts
Graphical and numerical information can be output in the form of printed records either directly from the TEST screen by selecting records required and clicking on the PRINT button, or as a composed report by clicking on the OUTPUT tab and selecting the records you want on your report. These can be viewed on the right of the screen prior to clicking on PRINT.

Screen Transfers
A single tap on your keyboard “Print Scrn” key will transfer the content of the screen to the clipboard, which can then be pasted into other record keeping systems.

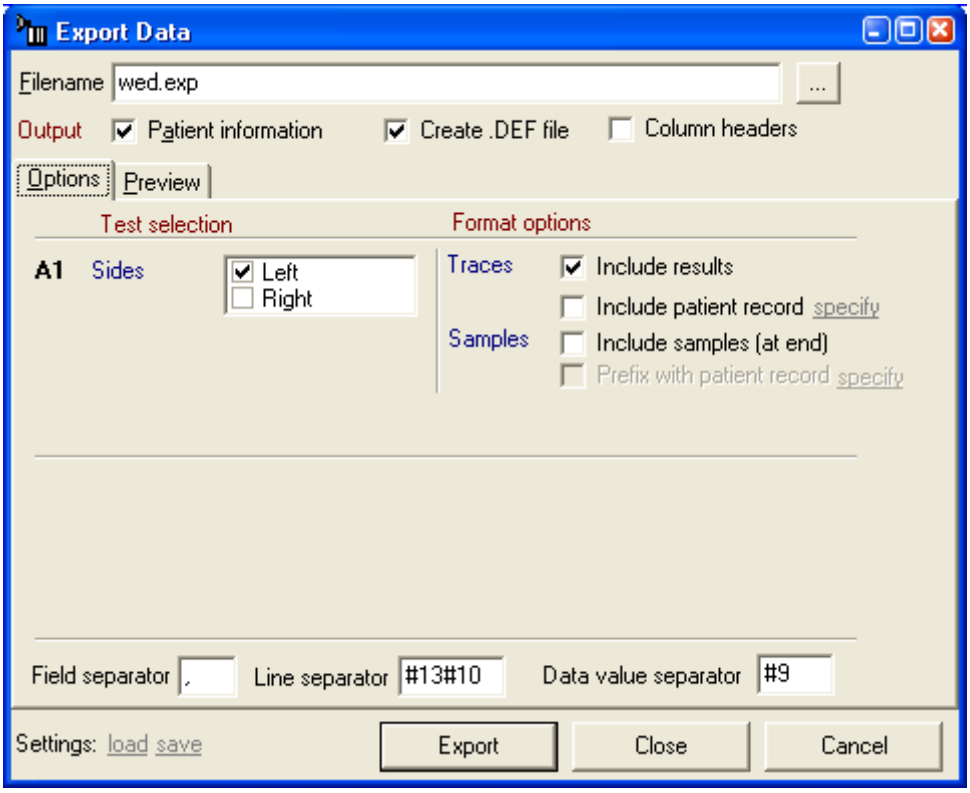
Data Output
Numerical information can also be output from Executive versions of A1 in in 2 ways.

1) Cross sectional area values at preset time intervals.

This is done by saving a record or group of records to a file of type .DAT. The .DAT format saves cross sectional area values sequentially at a fixed distance interval, which depends on the acquisition rate. At the standard sampling rate of of 100kHz, area values are presented every 1.73 mm along the distance axis.
Click on save, select files of type .dat, enter the file name, if not entered automatically, and then click on SAVE. The saved file can then be viewed in Notepad or put into other software for processing.



2) An export facility can be found under the File drop down menu. When clicked you are presented with a setup dialog box.



This allows you to select which type of information to export to a file of type .exp, what patient information you want included in the file and whether the information should be calculated values, "raw" data, or a mixture of both.

As a companion to the .EXP file a .DEF file can be created at the same time which names each item of data in the .EXP file.

Both types of file can be opened within commercial packages, such as Microsoft Excel, and subsequently processed in any way you wish.