Heart Rhythm Scanner
Professional Edition

Comprehensive Health Assessment System

User's Manual

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1. Technical Support

Call:	Contact your local dealer
Write:	support@biocomtech.com
Visit:	www.biocomtech.com

Call your local dealer for:

- Product installation
- Troubleshooting
- Product use

According to our customer support policy we charge customers $60.00 an hour with $15.00 increments for all incoming calls and $75.00 an hour when we return calls.

Each new customer has one hour of technical support free. If a computer and peripherals comply with our requirements and configured properly, there is enough time to get the system up and running within this hour.

Any support related to hardware repair, accessories and supplies replacement is free of charge.

We encourage you to send us any reports on possible software bugs, comments and suggestions about this product.

Biocom Support Team

2. Start the Program

The Heart Rhythm Scanner Professional Edition software is a standard standalone Windows application installed on your local PC.

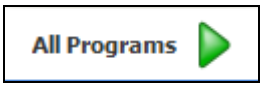
To start the application use one of the following options.

Option 1:

1. Double-click this icon on your desktop screen.

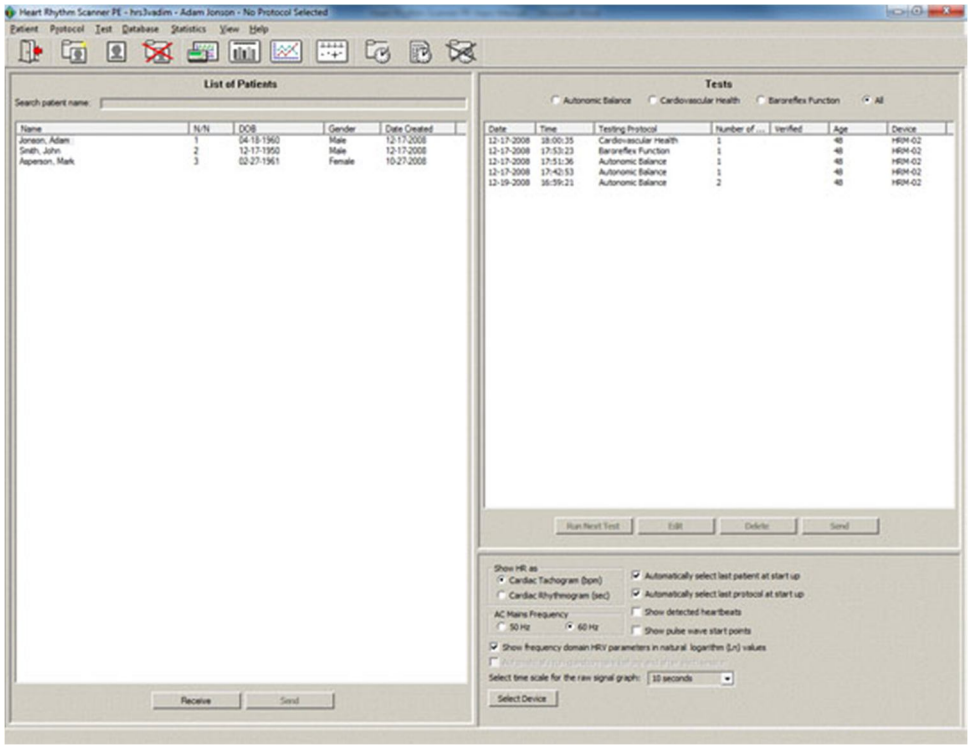
Option 2:

1. Click this button.



2. Select this menu option.
3. Select the **Biocom Technologies** menu option.
4. Select the **Heart Rhythm Scanner PE** menu option.
5. Select the **Heart Rhythm Scanner PE** shortcut.

Once the program starts the following window opens:


Heart Rhythm Scanner PE - hrs3vadim - Adam Jonson - No Protocol Selected
Patient Protocol Test Database Statistics View Help
List of Patients
Search patient name:
Name N/N DOB Gender Date Created
Jonson, Adam 1 04-18-1960 Male 12-17-2008
Smith, John 2 12-17-1950 Male 12-17-2008
Asperson, Mark 3 02-27-1961 Female 10-27-2008
Receive
Send
Tests
Autonomic Balance
Cardiovascular Health
Barorefles Function
All
Date Time Testing Protocol Number of ... Verified Age Device
12-17-2008 18:00:35 Cardiovascular Health 1 48 HRM-02
12-17-2008 17:53:23 Barorefles Function 1 48 HRM-02
12-17-2008 17:51:36 Autonomic Balance 1 48 HRM-02
12-17-2008 17:42:53 Autonomic Balance 1 48 HRM-02
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Automatically select last protocol at start up
Show detected heartbeats
Show pulse wave start points
Show frequency domain HRV parameters in natural logarithm (Ln) values
Select time scale for the raw signal graph:
10 seconds
Select Device

3. Configure the Program

The Heart Rhythm Scanner software can be manually configured to change its visual appearance and functionality.

3.1. Show / Hide Control Bars

By default the software displays two standard GUI elements called control bars:

Tool bar — a horizontal bar shown at the top of the program window right below the top menu containing special buttons performing the most used operations.

Status bar — a horizontal bar shown at the very bottom of the program window, which displays useful status information depending on specifics of the program operations at each particular moment.

These controls can be hidden or shown.

To hide the toolbar:
- Select the **View** menu option
- Uncheck the **Toolbar** menu option

To show the toolbar:
- Select the **View** menu option
- Check the **Toolbar** menu option

To hide the status bar:
- Select the **View** menu option
- Uncheck the **Status bar** menu option

To show the status bar:
- Select the **View** menu option
- Check the **Status bar** menu option

3.2. Show / Hide Program Settings Panel

By default the software displays a special panel giving access to various important program settings. This panel can be hidden or shown.

To hide the settings panel:
- Select the **View** menu option

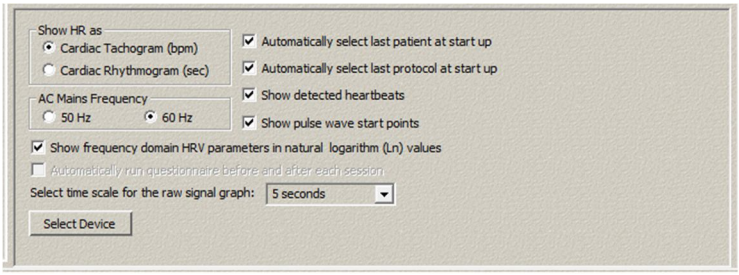
- Uncheck the **Settings** menu option

To show the settings panel:

- Select the **View** menu option
- Check the **Settings** menu option

3.3. Modify Program Settings

You can modify the following program settings whenever they are shown on the settings panel:



Show HR as

Select one of the following options:

Cardiac Tachogram (bpm) – to show heart rate line graph;

Cardiac Rhythmogram (ms) – to show cardiac interval bar braph.

AC Mains Frequency

Select one of the following options:

50 Hz – in most countries except North America;

60 Hz – in North America.

Automatically select last patient at startup

Check this option to enable automatic selection of the last tested patient when the program starts.

Automatically select last protocol at startup

Check this option to enable automatic selection of the last used testing protocol when the program starts.

Show detected heartbeats

Check this option to enable showing blue dots on every heartbeat (ECG or pulse wave traces) displayed during test recording.

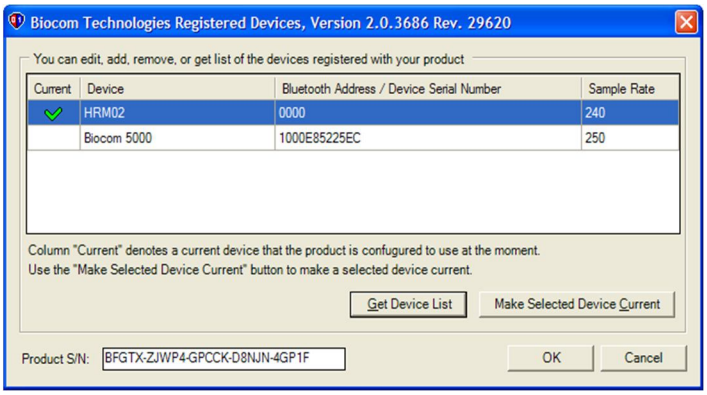
Show pulse wave start points

Check this option to enable showing vertical markers indicating the beginning of each pulse wave.

Show frequency domain HRV

All frequency domain HRV parameters can be shown either in

parameters in natural logarithm (Ln) values	absolute values (ms^2/Hz) or their natural logarithms (Ln). Check this option to use logarithmic values throughout the program.
Select time scale for the raw signal graph	Use this dropdown menu to set time scale for the graph showing ECG or pulse wave signal trace during the test. The following options are available: 5, 10, 20, 30 or 60 seconds.
Select Device	Click this button to select a signal acquisition device that will be used by this software. The following window will open:



Typically the Heart Rhythm Scanner PE software is provided with one device option so there is nothing to choose from. However in special cases like volume license when one copy of the software identified by a unique **Product SN** (serial number) may be linked with multiple devices of the same or different type.

Click **Get Device List** button to obtain the list of devices associated with this product serial number. The program will connect to Biocom License Server through the Internet, retrieve the list of devices and show them on this list.

Select the device you want to use with this software on this PC and click **Make Selected Device Current** button. A new selection will be marked with a green checkmark.

Click **OK** to save new device selection, or click **Cancel** to leave the old choice current.

If you choose a Bluetooth type device then its unique Bluetooth address will be shown on the settings panel next to the **Select Device** button.

4. Manage Patients

Patients are the main subjects to whom all testing capabilities of the Heart Rhythm Scanner are applied. So the software provides all necessary means to manage subjects' records.

4.1. Add New Patient Record

To add a new patient record use one of the following options.

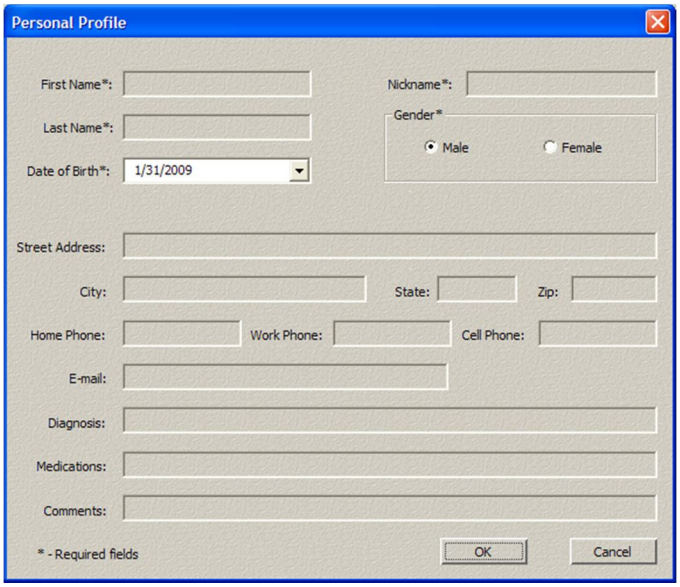
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Patient** menu option.
2. Select the **New** menu option.

The following window opens:



Type new patient's information into respective data filed. Some fields marked with an asterisk (*) are required to be filled out.

To enter date of birth use one of the following ways:

Option 1:

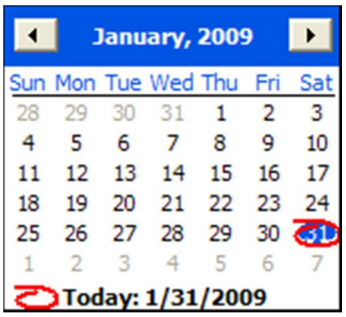
Type the date directly into the field as follows:

1. Click into the first number representing month.
2. Enter the month.
3. Move to the next number representing the day using a right arrow key or by direct clicking into the number.
4. Enter the day.
5. Move to the next number representing the year using a right arrow key or by direct clicking into the number.
6. Enter the year.

Option 2:

Select the date from the calendar as follows:

1. Click on the down arrow button on the right side of the field. The following calendar window opens:



2. Select month by repetitive clicking the left or right button or by clicking into the month name and selecting an appropriate month from the popup menu.
3. Once the month is selected select the day by direct clicking into the number.
4. Select year by clicking into the year number. This will activate a year selector. Type in the year or repetitively click the up or down key to scroll to the right year.

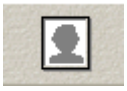
Once all necessary fields are filled out click **OK** to save a new patient record.

Click **Cancel** if you wish to abort creation of the new patient record.

4.2. Edit Patient Record

To edit any existing patient record use one of the following options.

Option 1:

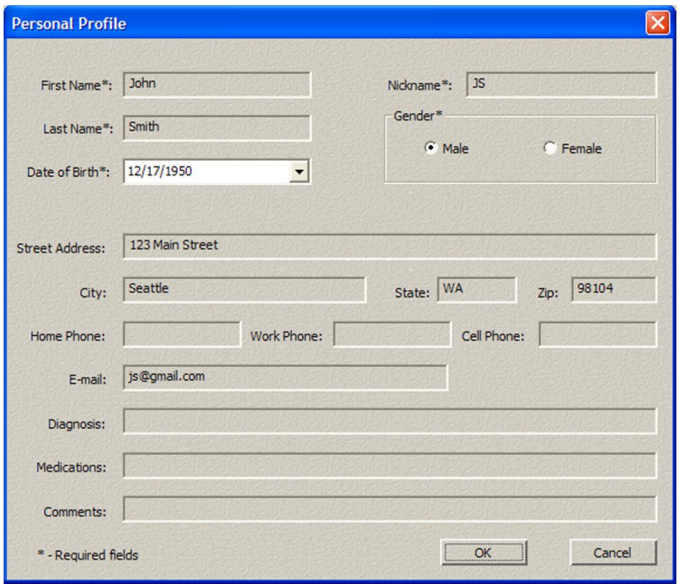


1. Select an appropriate patient name from the list of patients.
2. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the **Patient** menu option.
3. Select the **Edit** menu option.

The following window opens:



Edit any data field as it is described in the previous section.

Click **OK** to save the patient record.

Click **Cancel** if you wish to keep the patient record unchanged.

4.3. Delete Patient Record

To delete any existing patient record use one of the following options.

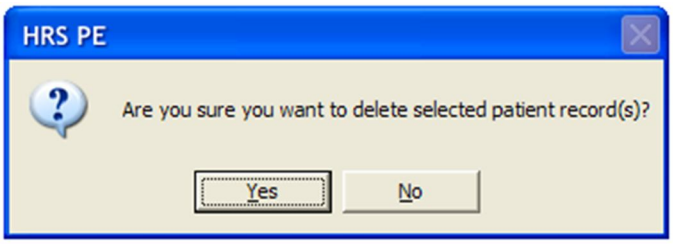
Option 1:

1. Select an appropriate patient name from the list of patients.
2. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the **Patient** menu option.
3. Select the **Delete** menu option.

The following window opens:



Click **Yes** to delete selected patient record.

Click **No** to abort deletion.

Important! Please keep in mind that deletion of any patient record will permanently destroy it along with all test data associated with this patient.

5. Autonomic Balance Test

5.1. Test Description

The autonomic balance test is based on short-term HRV analysis of resting heart rate recordings of 5 minutes long. Such recordings are assumed to be done at a steady-state physiological condition and should be properly standardized to produce comparable results. The test recording should be done in comfortably sitting relaxed position, limiting body movements, conversations, any mental activities.

According to the standards set forth by the Task Force of the European Society of Cardiology and North American Society of Pacing and Electrophysiology in 1996, there are two methods of analysis of HRV data: time- and frequency-domain analysis. For both methods the heartbeat intervals should be properly calculated and any abnormal heartbeats found.

5.2. Test Parameters

5.2.1. Time-Domain HRV Parameters

Time-domain measures are the simplest parameters that can be calculated off 5-min recording. The following time-domain parameters are calculated:

Mean HR	bpm	Heart rate mean value.
Mean RR	ms	Heartbeat interval mean value.
SDNN	ms	Standard deviation from mean RR value. It is associated with the net effect of all regulatory factors.
RMS-SD	ms	Root mean square of the standard deviation. It is associated with parasympathetic regulatory influence.
pNN50	%	Percentage of heartbeat intervals differing more than 50 ms from previous intervals. It is associated with parasympathetic regulatory influence.
TI	a.u.	Tension Index. Its increase is associated with an increased influence of the sympathetic regulation.
Mean BVP	a.u.	Blood volume pulse mean value.
BVP SD	a.u.	Standard deviation from mean blood volume pulse value.

5.2.2. Frequency-domain HRV Parameters

A power spectrum analysis is applied to a 5-min sequence of normal heartbeat intervals. The following frequency-domain parameters are calculated:

TP	ms^2/Hz	Total power calculated for a frequency range from 0.0033 Hz to 0.4 Hz. It is associated with the net effect of all regulatory factors.
VLF	ms^2/Hz	Very low frequency calculated for a frequency range from 0.0033 Hz to 0.04 Hz. The physiological meaning of this band is most disputable. With longer recordings, it is considered to represent sympathetic tone as well as slower hormonal and thermoregulatory effects. There are some findings indicating that in shorter recordings VLF has fair representation of various negative emotions, worries, rumination etc.
LF	ms^2/Hz	Very low frequency calculated for a frequency range from 0.04 Hz to 0.15 Hz. It is considered that LF reflects sympathetic tone with some contribution of the parasympathetic tone.
HF	ms^2/Hz	Very low frequency calculated for a frequency range from 0.04 Hz to 0.15 Hz. It is considered that HF reflects parasympathetic (vagal) tone and fluctuations caused by spontaneous respiration known as respiratory sinus arrhythmia.
LF/HF Ratio	a.u.	LF/HF Ratio is used to indicate balance between sympathetic and parasympathetic tone. A decrease in this score might indicate either increase in parasympathetic or decrease in sympathetic tone. It must be considered together with absolute values of both LF and HF to determine what factor contributes in autonomic imbalance.
LF norm	%	Normalized low frequency indicates contribution of the LF parameter in the total power excluding contribution of VLF: LF norm = LF / (TP – VLF)
HF norm	%	Normalized high frequency indicates contribution of the HF parameter in the total power excluding contribution of VLF:

HF norm = HF / (TP – VLF)

5.3. Perform a New Test

To perform a new autonomic balance test use one of the following options.

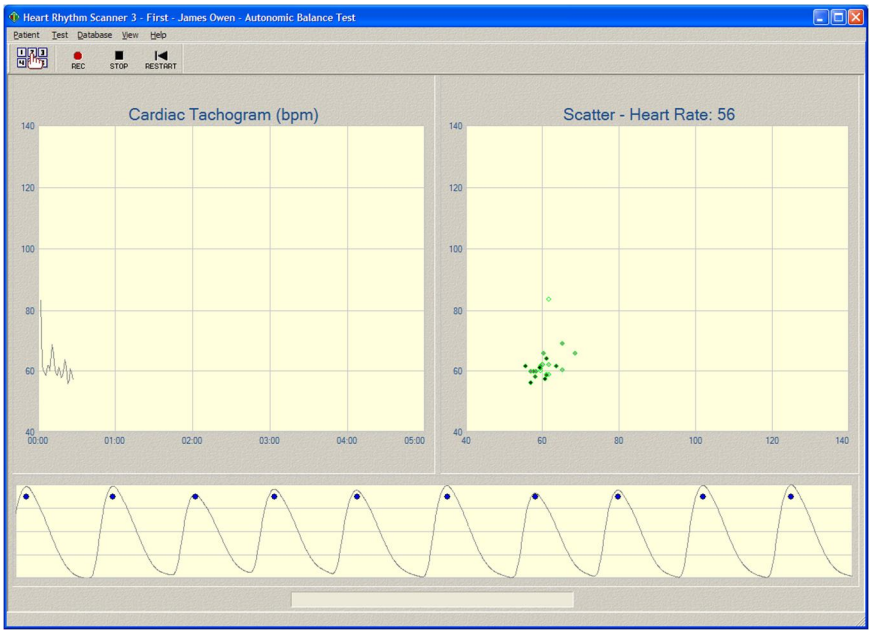
Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select the Autonomic Balance Test from the group of test types shown above the list of tests on the right panel.
3. Click this button on the top toolbar.

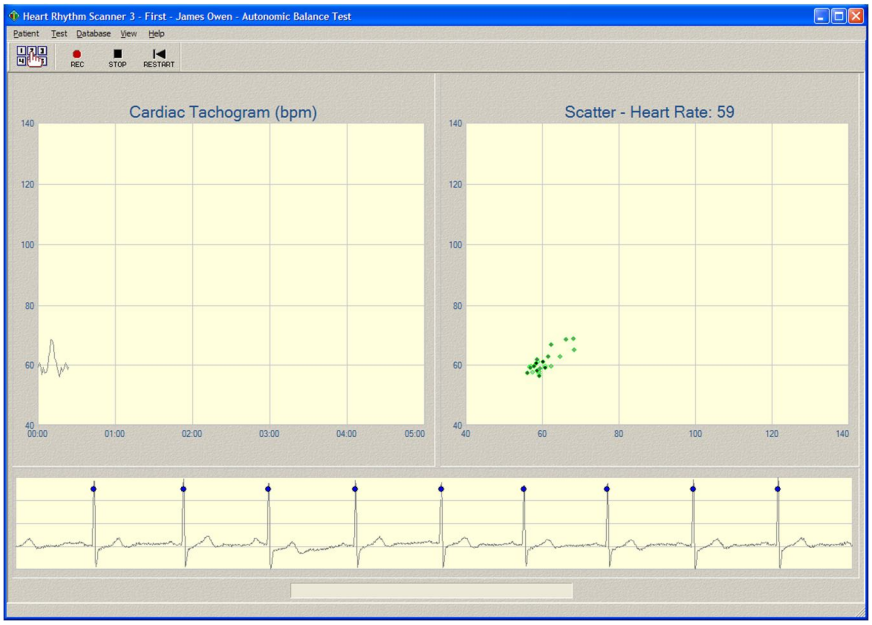
Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the Autonomic Balance Test from the group of test types shown above the list of tests on the right panel.
3. Select the **Test** menu option.
4. Select the **Start** menu option.

If the system is equipped with a pulse wave sensor the following window opens:



If the system is equipped with an ECG recorder the following window opens:



Once you see a regular ECG or pulse wave signal and heart rate readings appear normal, the program is ready to start test recording.

To begin test recording use one of the following options.

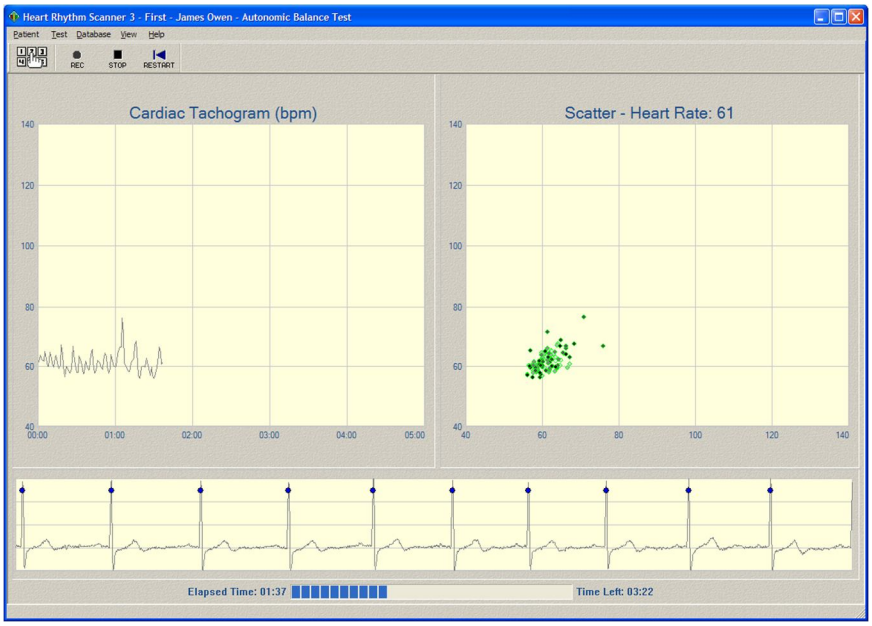
Option 1:

1. Click this button on the top toolbar.

Option 2:

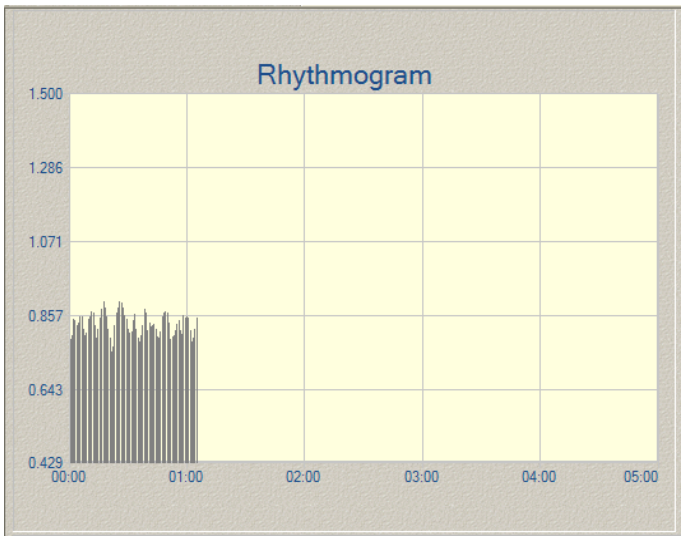
1. Select the **Test** menu option.
2. Select the **Record** menu option.

The following window opens (if the system is equipped with an ECG recorder):



A test progress indicator is displayed at the bottom of the program window showing how much time has elapsed and left.

If the program is configured to display the cardiac rhythmogram (heartbeat intervals in milliseconds) instead of cardiac tachogram (heart rate in beats per minute) the following bar graph will be shown on the left panel:



Sometimes you may need to restart the test when you think the quality of test data may be questionable (e.g. if an ECG electrode fell off or patient started coughing, etc.).

To restart the test use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Restart** menu option.

The program will stop the test time counter and returns to the moment where you have been before beginning test recording.

Once the test recording is over the program automatically stops and shows the following message:

It indicates that the test is complete and notifies about quality of test data, which may be one of the following:

- ***The test data quality is good, so the result can be accepted.***
- ***The test data quality is fair, so the data can be accepted but some editing might be required at later time.***
- ***The test data quality is poor, so the result cannot be accepted. It is strongly recommended to repeat testing.***

Sometimes you may need to stop the test before it automatically finishes.

To stop the test use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Stop** menu option.

5.4. Perform an Additional Test

Sometimes you may need to perform multiple tests logically linked to one group or sequence of tests. For example, you may test your patient before and after a treatment session.

Logical linking of more than one test of the same type will let you view the results of those tests in various forms of data comparison views.

To perform an additional autonomic balance test do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select the test from the list of tests on the right panel to which you

want to add an additional test.

3. Click the **Run Next Test** button below the list of tests.

The additional test will be performed in the same way as described above.

Once the additional test is complete, the respective **Number of Tests** counter in the list of tests will be increased by 1.

5.5. Verify Test Data

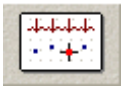
5.5.1. Verification Basics

It is always suggested to perform verification of the test data. This is an interactive process of reviewing recorded signal (ECG or pulse wave) to check if the program detected right heartbeats. If you find any heartbeats were detected incorrectly or missed you may manually mark them to make sure the analysis will be performed correctly.

To start the test data verification use one of the following options.

Option 1:

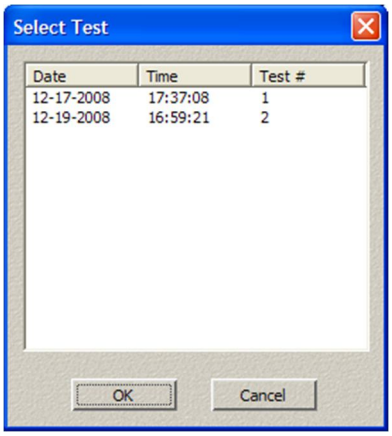
1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Click this button on the top toolbar.



Option 2:

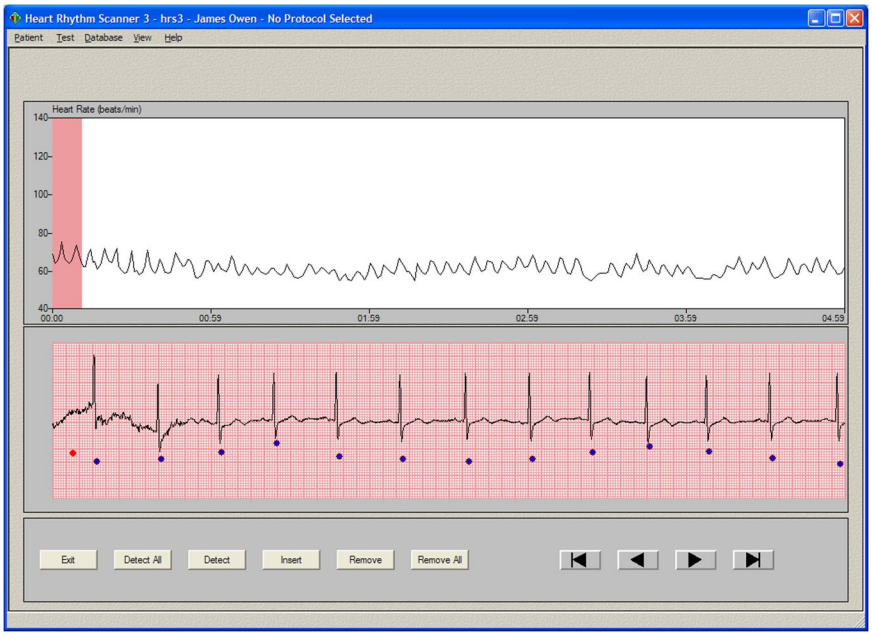
1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Select the **Test** menu option.
4. Select the **Verify** menu option.

If selected test is actually a sequence of tests (as it was described above) the following list opens:



Select the test you want to verify from this list and click **OK**.

Once the test is properly selected the following window opens:



The upper graph shows a cardiac tachogram of the entire test record.

The bottom graph shows a recorded signal (ECG or pulse wave). Only a portion of the recorded signal is visible on the screen. It corresponds to the part of the cardiac tachogram highlighted with a pink bar.

To scroll the signal back and forth, use the following buttons:

Bring the signal to the beginning.

Move the signal one step backward.

Move the signal one step forward.

Bring the signal to the end.

When the program "thinks" that certain heartbeat is normal, it puts a blue dot mark on it.

When it "decides" that a heartbeat is abnormal, it puts a red dot mark on it and respective heartbeat interval will be specially tagged. These tags will allow the program to exclude tagged intervals from time domain analysis and replace them with interpolated intervals for frequency domain analysis.

The vertical position of each blue or red dot corresponds to its respective heart rate value.

There are two ways to mark abnormal heartbeats:

1. Automatically
2. Manually

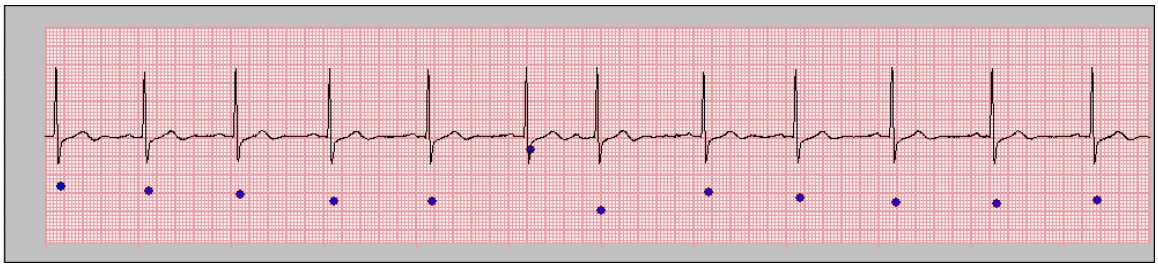
By default the program automatically processes the whole recording when you enter the data verification mode and puts all blue and red dots wherever it decides appropriate.

However this does not give a 100% guarantee that the program will do this absolute accurately because physiological signals are extremely complex. In contrast a specially trained eye could find any anomaly in the signal with much higher accuracy.

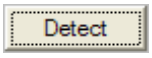
That is why manual editing is a powerful mechanism of ensuring the highest accuracy in getting test results.

Here is how the manual editing works.

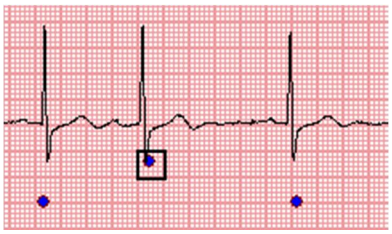
5.5.2. Tagging Abnormal Heartbeats



When you find an abnormal heartbeat not detected by the program automatically as shown above, you may fix it manually taking the following steps:

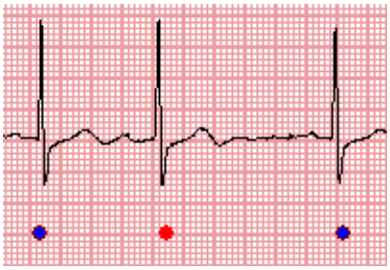


1. Click this button to activate manual tagging mode. The mouse cursor in this mode will become a black hollow square.



2. Move the square cursor so that a blue dot which must be tagged appears inside of the square.

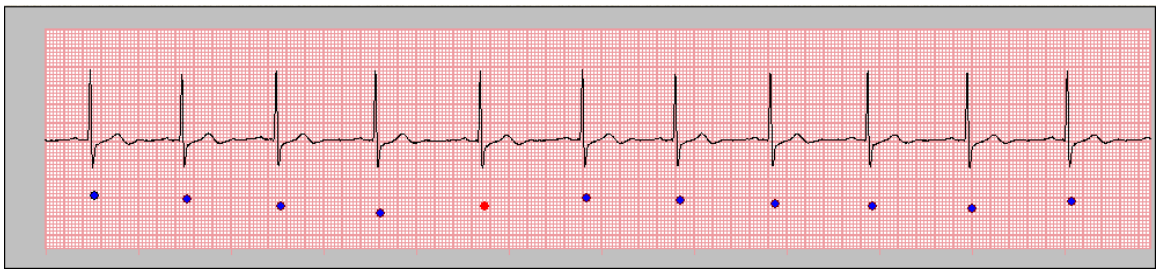
3. Click the left mouse button.



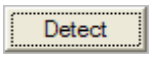
4. The mouse cursor becomes normal again. The tagged dot becomes red.

5.5.3. Untagging Normal Heartbeats

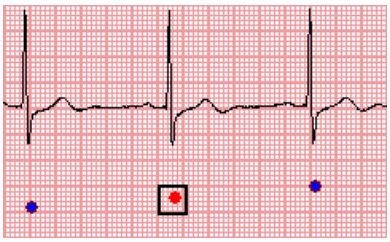
The program may mistakenly tag a normal heartbeat as abnormal. Nobody is perfect!



When you find a normal heartbeat automatically tagged by the program as shown above, you may fix it manually taking the following steps:

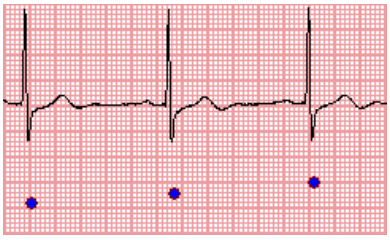


1. Click this button to activate manual tagging mode. The mouse cursor in this mode will become a black hollow square.



2. Move the square cursor so that a red dot which must be not tagged appears inside of the square.

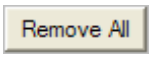
3. Click the left mouse button.



4. The mouse cursor becomes normal again. The untagged dot becomes blue.

5.5.4. Untagging All Heartbeats

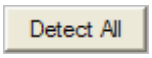
Sometimes it is helpful to remove all tags placed by the program automatically or by you manually and start verification process from scratch.



1. Click this button to remove all tags.

5.5.5. Tagging All Heartbeats

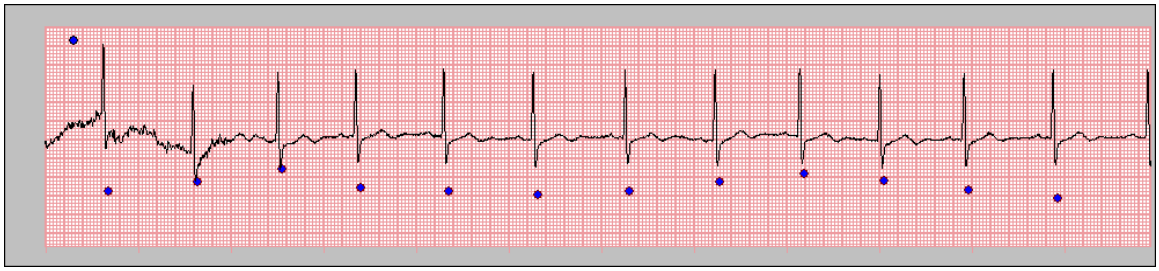
After removing all tags placed by the program automatically or by you manually it might be wise to let the program place all relevant tags automatically as it is done by default before the very first verification procedure.



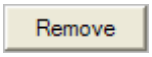
1. Click this button to remove all tags.

5.5.6. Removing Wrong Heartbeats

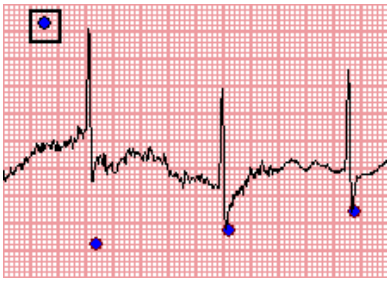
Sometimes the program may find a heartbeat where there is no heartbeat at all.



When you find a heartbeat detected by the program, which does not seem to be a heartbeat at all, you may fix it manually taking the following steps:

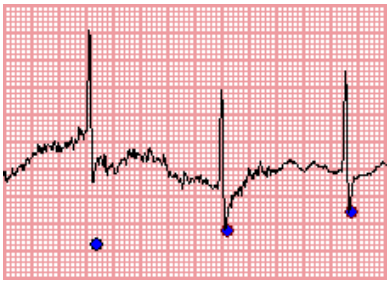


1. Click this button to activate heartbeat removal mode. The mouse cursor in this mode will become a black hollow square.



2. Move the square cursor so that a dot which must be removed appears inside of the square.

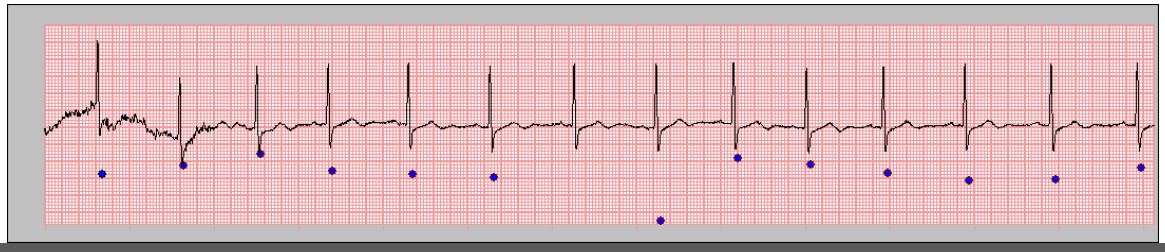
3. Click the left mouse button.



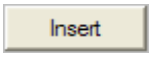
4. The mouse cursor becomes normal again. The unwanted dot disappears.

5.5.7. Inserting Missing Heartbeats

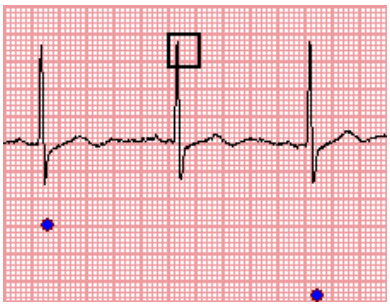
Sometimes the program may not find a normal heartbeat.



When you find a normal heartbeat not detected by the program, you may fix it manually taking the following steps:

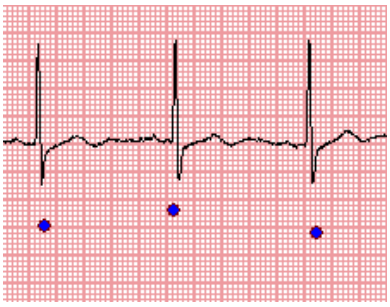


1. Click this button to activate heartbeat insertion mode. The mouse cursor in this mode will become a black hollow square.



2. Move the square cursor so that a dot which must be removed appears inside of the square.

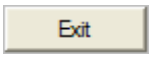
3. Click the left mouse button.



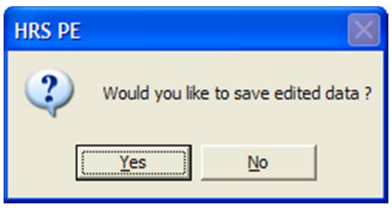
4. The mouse cursor becomes normal again. The missing dot appears.

5.5.8. Finishing Verification Procedure

When you are done with data verification process you may return to the main program mode.



1. Click this button to exit data verification mode.



2. The following prompt appears if you made any changes in verified recording.

3. Click **Yes** if you want to save the results of data verification. Click **No** to exit without saving the changes.

4. The program goes back to the main mode window.

5.6. View Selected Test Results

To view the results of any selected test use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Select the **Test** menu option.
4. Select the **View Test** menu option.

By default the program opens a printable test report view as described in the next section.

5.6.1. Printable Test Report

This is a default test report view which is automatically shown when entering a selected test report mode.

It is designed for the purpose of being printed out on a standard sheet of paper in landscape orientation.

If this is a sequence of tests then multiple report pages are generated.

Use a vertical scrollbar on the right side to scroll the content up and down.

To switch to this view use one of the following options.

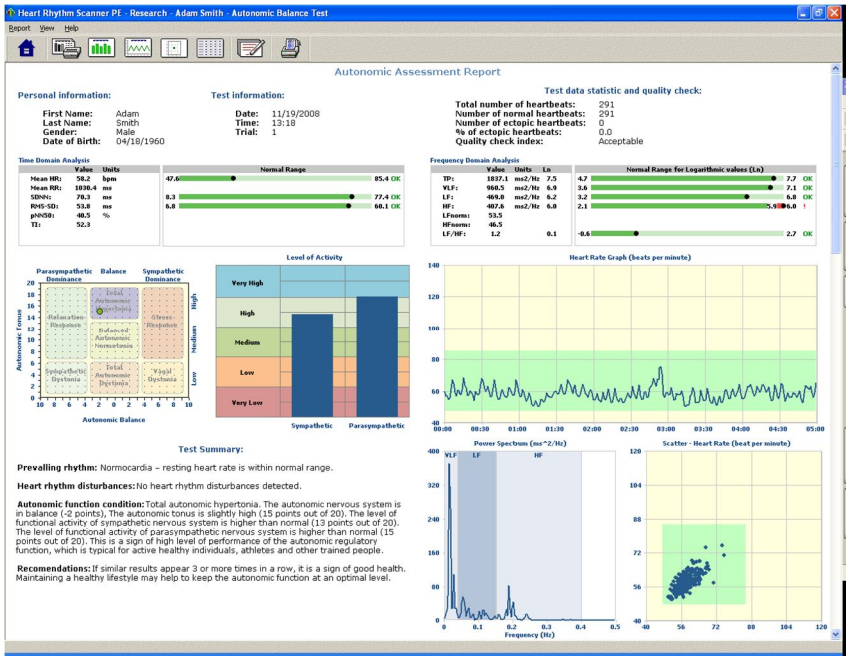
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Printable** menu option.

The following window opens:



5.6.2. Bar Chart Report

This view shows bar charts for each parameter calculated in this test.

The number of bars on each chart depends on the number of tests in the sequence. Single tests will show only one bar on each chart.

To switch to this view use one of the following options.

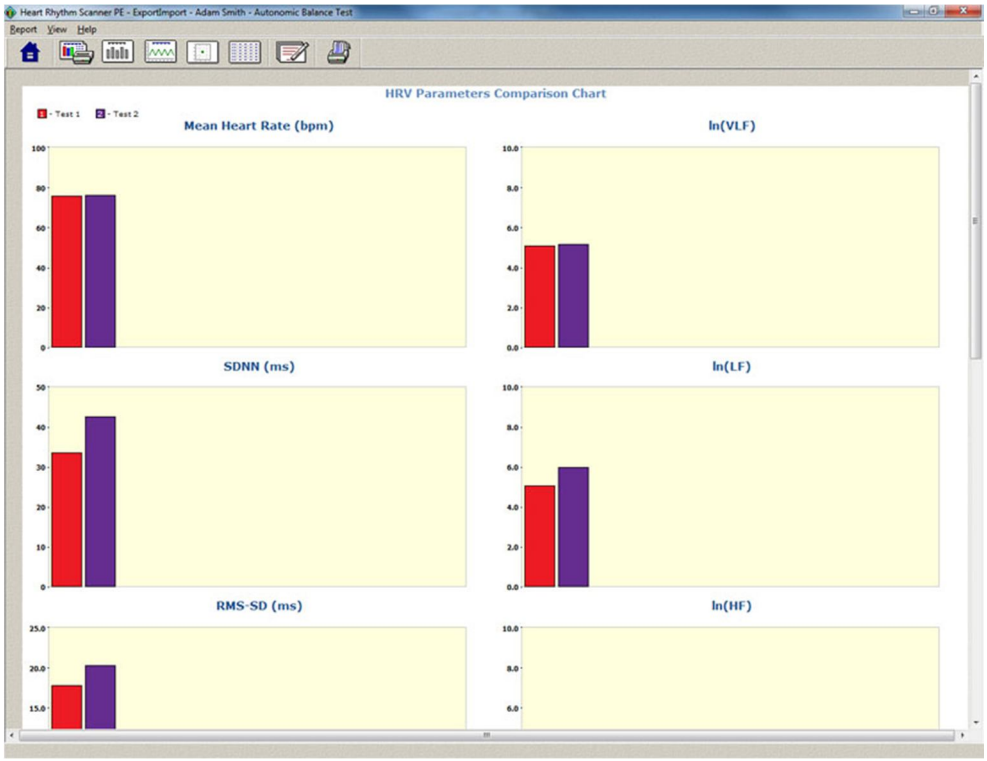
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Parameters** menu option.

The following window opens:



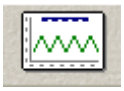
5.6.3. Heart Rate Graph Report

This view shows a line graph of heart rate (cardiac tachogram) recorded in this test.

If a sequence of tests containing more than one test is selected then multiple graphs will be displayed in this view.

To switch to this view use one of the following options.

Option 1:

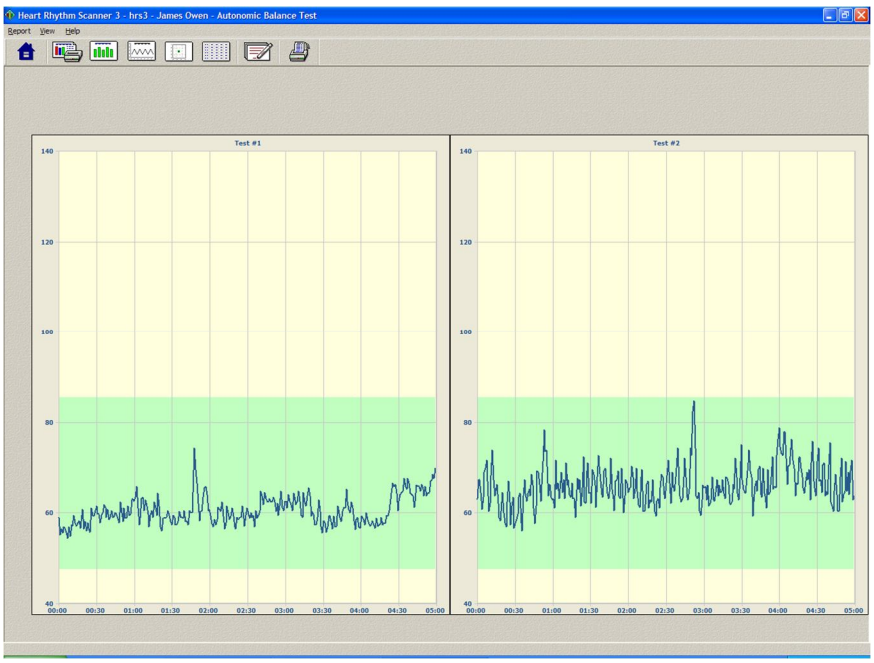


1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Heart Rate** menu option.

The following window opens:



If more than 2 tests are in the test sequence, use a horizontal toolbar to scroll the graphs back and forth.

5.6.4. Autonomic Balance Diagram

This view shows an autonomic balance diagram. The diagram indicated an autonomic balance on horizontal scale and autonomic tonus on vertical scale. The result is shown as a color dot in the intersection of both scales.

If a sequence of tests containing more than one test is selected then more than one dot will be displayed on the diagram.

To switch to this view use one of the following options.

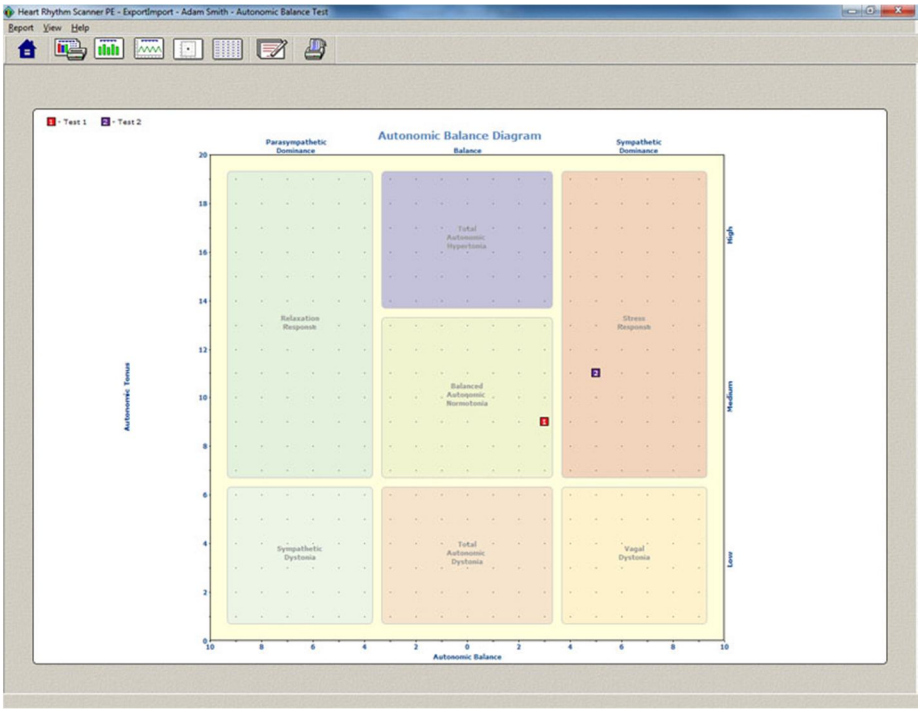
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Diagram** menu option.

The following window opens:



5.6.5. Tabular Report

This view shows all calculated parameters in numerical format.

If a sequence of tests containing more than one test is selected then more than one data column will be displayed on the sheet.

To switch to this view use one of the following options.

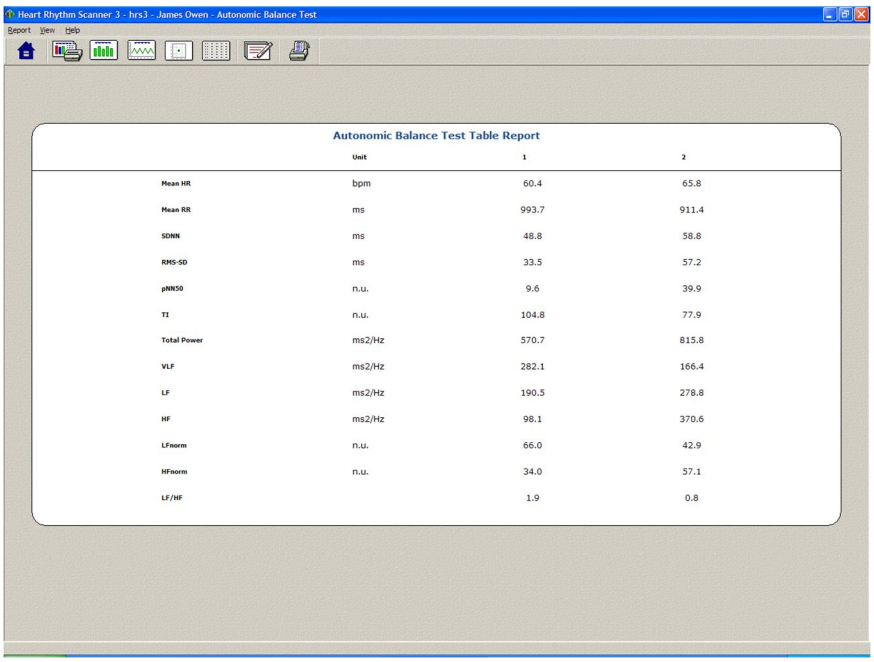
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Table** menu option.

The following window opens:



Autonomic Balance Test Table Report

	Unit	1	2
Mean HR	bpm	60.4	65.8
Mean RR	ms	993.7	911.4
SDNN	ms	48.8	58.8
RMS-SD	ms	33.5	57.2
pNN50	n.u.	9.6	39.9
TI	n.u.	104.8	77.9
Total Power	ms2/Hz	570.7	815.8
VLF	ms2/Hz	282.1	166.4
LF	ms2/Hz	190.5	278.8
HF	ms2/Hz	98.1	370.6
LFnorm	n.u.	66.0	42.9
HFnorm	n.u.	34.0	57.1
LF/HF		1.9	0.8

5.6.6. Exit Report View

To exit current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

5.7. Interpreting Test Results

The best way to interpret an autonomic balance test is to use a printable autonomic balance test report because it includes all information obtained from the test data.

5.7.1. Quality Check

First of all make sure that the quality check of the test data gives positive results.

Look at this section of the report and make sure that the quality of test data is acceptable:

Test data statistic and quality check:

Total number of heartbeats:	301
Number of normal heartbeats:	301
Number of ectopic heartbeats:	0
% of ectopic heartbeats:	0.0
Quality check index:	Acceptable

5.7.2. Prevailing Heart Rhythm

Check the prevailing heart rhythm detected during the test in this section of the report:

Test Summary:

Prevalling rhythm: Normocardia – resting heart rate is within normal range.

Heart rhythm disturbances: No heart rhythm disturbances detected.

Autonomic function condition: Balanced autonomic normtonia. The autonomic nervous system is in good balance (-1 points), The autonomic tonus is medium (12 points out of 20). The level of functional activity of sympathetic nervous system is normal (11 points out of 20). The level of functional activity of parasympathetic nervous system is higher than normal (12 points out of 20). This is a sign of optimum performance of the autonomic regulatory function.

Recomendations: If similar results appear 3 or more times in a row, it is a sign of good health. Maintaining a healthy lifestyle may help to keep the autonomic function at an optimal level.

5.7.3. Heart Rhythm Disturbances

Check the heart rhythm disturbances detected during the test in this section of the report:

Test Summary:

Prevalling rhythm: Normocardia – resting heart rate is within normal range.

Heart rhythm disturbances: No heart rhythm disturbances detected.

Autonomic function condition: Balanced autonomic normtonia. The autonomic nervous system is in good balance (-1 points), The autonomic tonus is medium (12 points out of 20). The level of functional activity of sympathetic nervous system is normal (11 points out of 20). The level of functional activity of parasympathetic nervous system is higher than normal (12 points out of 20). This is a sign of optimum performance of the autonomic regulatory function.

Recomendations: If similar results appear 3 or more times in a row, it is a sign of good health. Maintaining a healthy lifestyle may help to keep the autonomic function at an optimal level.

5.7.4. Autonomic Function Condition

Check autonomic function condition assessed in the test in this section of the report:

Test Summary:

Prevalling rhythm: Normocardia – resting heart rate is within normal range.

Heart rhythm disturbances: No heart rhythm disturbances detected.

Autonomic function condition: Balanced autonomic normtonia. The autonomic nervous system is in good balance (-1 points), The autonomic tonus is medium (12 points out of 20). The level of functional activity of sympathetic nervous system is normal (11 points out of 20). The level of functional activity of parasympathetic nervous system is higher than normal (12 points out of 20). This is a sign of optimum performance of the autonomic regulatory function.

Recomendations: If similar results appear 3 or more times in a row, it is a sign of good health. Maintaining a healthy lifestyle may help to keep the autonomic function at an optimal level.

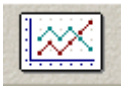
5.8. View Test History

You may perform many tests for the same patient over prolonged period of time. Looking at the test history may give you a valuable insight in how the autonomic function has been performing over that period of time.

To view the test history use one of the following options.

Option 1:

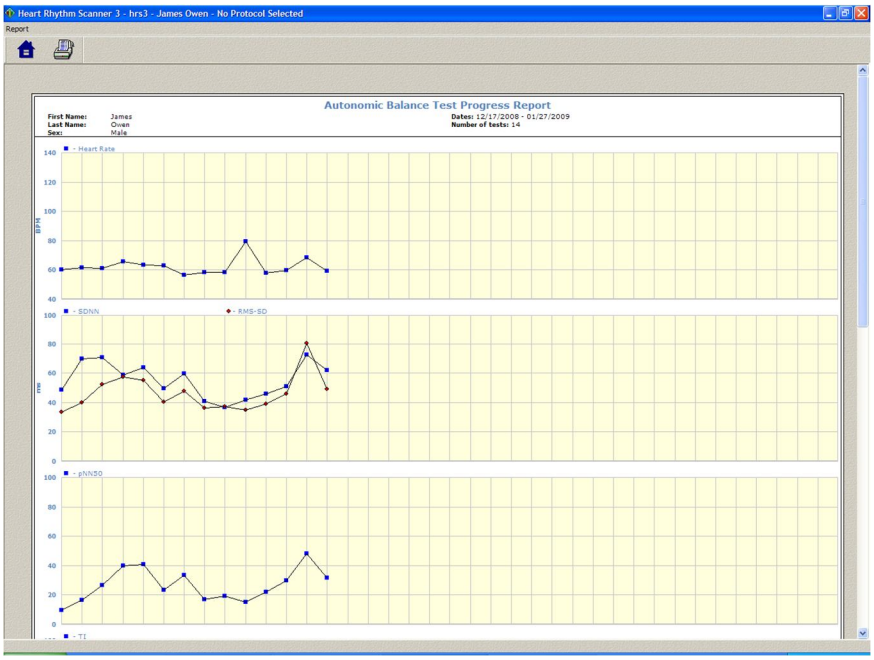
1. Select an appropriate patient name from the list of patients.
2. Select an appropriate protocol name from the **Testing Protocol** drop-down list on the right panel.
3. Click this button on the top toolbar.



Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the **Autonomic Balance Test** from the group of test types shown above the list of tests on the right panel.
3. Select the **Test** menu option.
4. Select the **View Progress** menu option.

The following window opens:



This view shows line graphs for all calculated test parameters across all performed tests.

Use a scrollbar on the right side to scroll the view up and down.

To exit the current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

6. Cardiovascular Health Test

6.1. Test Description

The cardiovascular response to the act of changing a posture from sitting to standing is used as an indication of the autonomic function. On the other hand, it shows how well the cardiovascular system performs, which is a clear indicator of the cardiovascular health.

It is one of several tests described by Ewing that have certain clinical value because they are simple, non-invasive, easy-to-use reproducible and have clear difference between normal and abnormal results.

The whole test takes about 11 minutes. A baseline recording is performed during the initial 5 minutes while patient is in sitting position. Then a standup maneuver is performed within one minute followed by the final 5 minutes of recording while patient remains standing.

6.2. Test Parameters

6.2.1. Cardiovascular Tolerance

Cardiovascular tolerance is evaluated based on HRV parameters of standup maneuver (representing a physiological transitory process caused by this maneuver). It indicates dynamic regulatory reserves of the cardiovascular system. High cardiovascular tolerance means that cardiovascular system has the higher ability to respond to physical or emotional challenges causing its adaptation response.

The standup maneuver causes heart rate to rise within the first 10-15 seconds because blood pressure drops due to gravitational redistribution of the blood mass. Then the cardiovascular system attempts to compensate an orthostatic effect of standing up. As a result blood pressure returns to its normal level and heart rate drops.

Normally a standup maneuver causes heart rate to rise. The intensity of the increase depends on the age and functional wellbeing. The quicker the heart rate achieves its lowest value after its peak and the lower that minimum is (which translates into higher 30:15 Ratio value) the higher cardiovascular tolerance is.

The following parameters are calculated to assess cardiovascular tolerance:

30:15 Ratio	a.u.	Ratio between cardiac intervals at 30th and 15th second of standup maneuver.
HR max	bpm	Highest heart rate achieved during the standup maneuver.
HR min	bpm	Lowest heart rate achieved after the highest HR value during the standup

		maneuver.
Time HR max	sec	Time to achieve the highest heart rate value during the standup maneuver.
Time HR min	sec	Time to achieve the lowest heart rate value during the standup maneuver.

6.2.2. Cardiovascular Adaptation

Cardiovascular adaptation is evaluated based on HRV parameters derived off 5-minute data recorded in sitting and standing positions. It indicates the ability of the cardiovascular system to adapt to physiological changes caused by physical or emotional challenges causing its adaptation response. This assessment is based on changes occurred in the autonomic regulatory function under the influence of this challenge.

The standup maneuver causes the cardiovascular system quickly react to gravitational change to do a temporary compensation of its function. This translates into rapid and brief increase in heart rate followed by a relatively quick decrease in heart rate practically to the level which was before standing up.

However since the body remains standing for longer period of time the cardiovascular system has to adapt to new condition to continue providing an adequate blood supply to all vital organs. This may require the autonomic nervous system to change its regulatory activity to achieve that adequacy. So the less dramatic change in the autonomic regulation was required the better adaptation occurred.

A standard autonomic balance assessment must be performed for each 5-minute blocks (before and after standing up) to figure out what changes have occurred in the autonomic function to achieve body's adaptation.

The following parameters are calculated for both pre- and post-standup to assess cardiovascular adaptation:

Mean HR	bpm	Heart rate mean value.
SDNN	ms	Standard deviation from mean RR value. It is associated with the net effect of all regulatory factors.
RMS-SD	ms	Root mean square of the standard deviation. It is associated with parasympathetic regulatory influence.
TP	ms^2/Hz	Total power calculated for a frequency range from 0.0033 Hz to 0.4 Hz. It is associated with the net effect of all regulatory factors.

VLF	ms^2/Hz	Very low frequency calculated for a frequency range from 0.0033 Hz to 0.04 Hz. The physiological meaning of this band is most disputable. With longer recordings, it is considered to represent sympathetic tone as well as slower hormonal and thermoregulatory effects. There are some findings indicating that in shorter recordings VLF has fair representation of various negative emotions, worries, rumination etc.
LF	ms^2/Hz	Low frequency calculated for a frequency range from 0.04 Hz to 0.15 Hz. It is considered that LF reflects sympathetic tone with some contribution of the parasympathetic tone.
HF	ms^2/Hz	High frequency calculated for a frequency range from 0.04 Hz to 0.15 Hz. It is considered that HF reflects parasympathetic (vagal) tone and fluctuations caused by spontaneous respiration known as respiratory sinus arrhythmia.
LF/HF Ratio	a.u.	LF/HF Ratio is used to indicate balance between sympathetic and parasympathetic tone. A decrease in this score might indicate either increase in parasympathetic or decrease in sympathetic tone. It must be considered together with absolute values of both LF and HF to determine what factor contributes in autonomic imbalance.

6.3. Perform a New Test

To perform a new cardiovascular health test use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select the **Cardiovascular Health Test** from the group of test types shown above the list of tests on the right panel.

3. Click this button on the top toolbar.

Option 2:

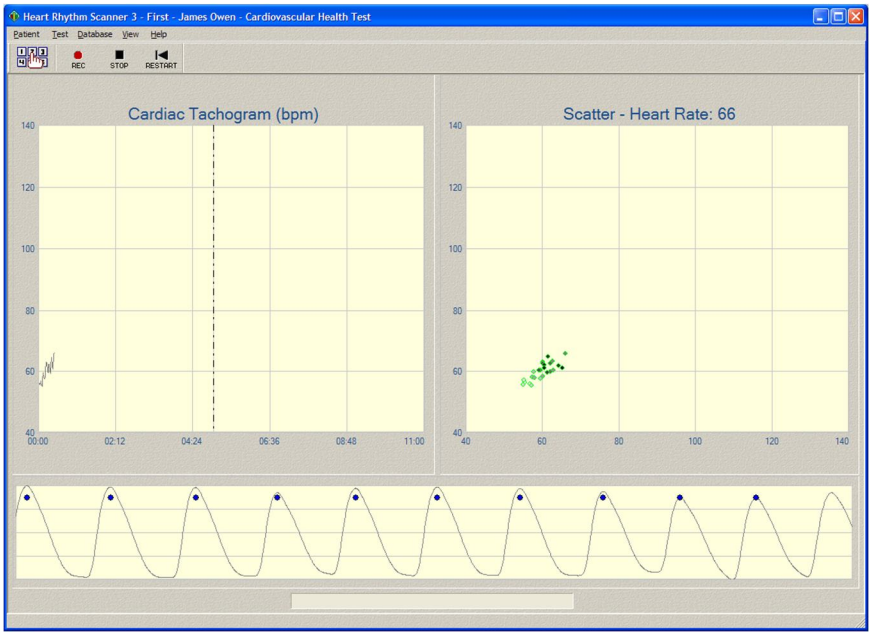
1. Select an appropriate patient name from the list of patients.

2. Select the **Cardiovascular Health Test** from the group of test types shown above the list of tests on the right panel.

3. Select the **Test** menu option.

4. Select the **Start** menu option.

If the system is equipped with a pulse wave sensor the following window opens:



If the system is equipped with an ECG recorder then an ECG trace shows up instead of pulse wave.

Once you see a regular ECG or pulse wave signal and heart rate readings appear normal, the program is ready to start test recording.

To begin test recording use one of the following options.

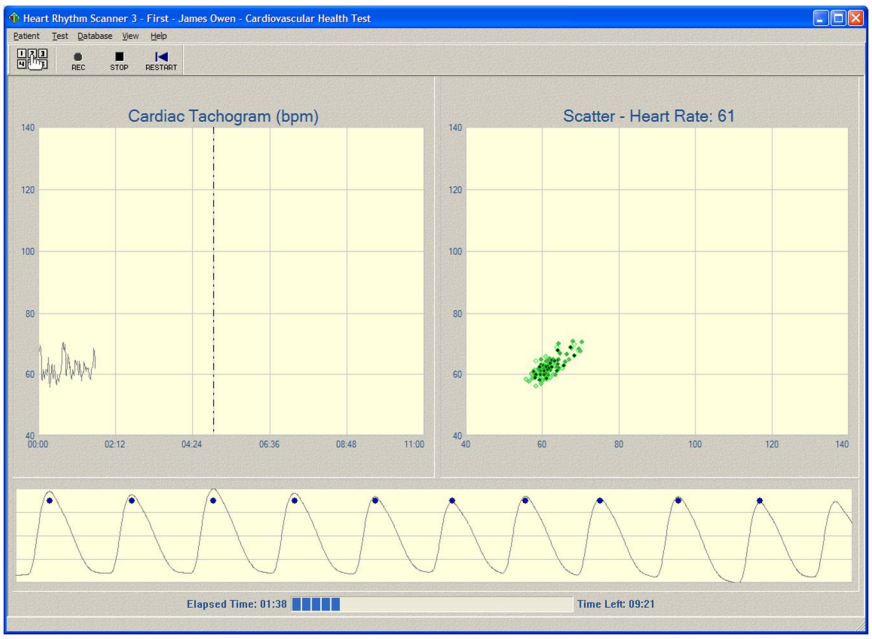
Option 1:

1. Click this button on the top toolbar.

Option 2:

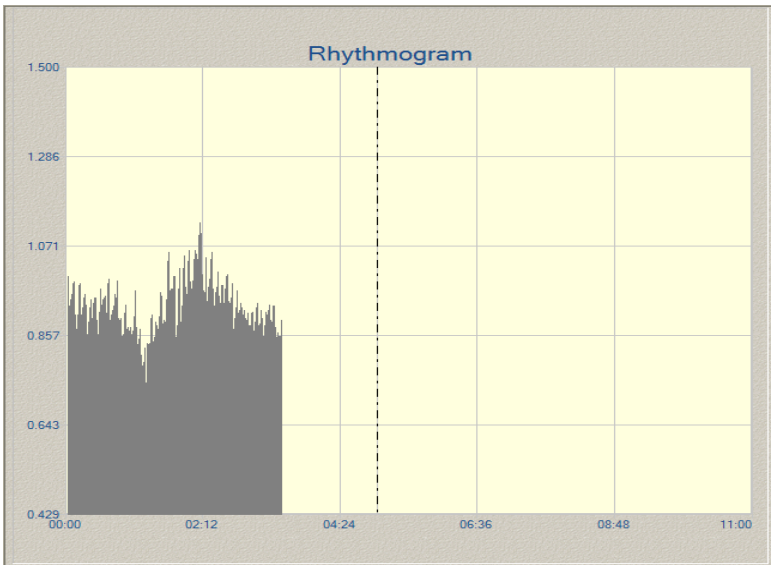
1. Select the **Test** menu option.
2. Select the **Record** menu option.

The following window opens (if the system is equipped with an ECG recorder):



A test progress indicator is displayed at the bottom of the program window showing how much time has elapsed and left.

If the program is configured to display the cardiac rhythmogram (heartbeat intervals in milliseconds) instead of cardiac tachogram (heart rate in beats per minute) the following bar graph will be shown on the left panel:



Sometimes you may need to restart the test when you think the quality of test data may be questionable (e.g. if an ECG electrode fell off or patient started coughing, etc.).

To restart the test use one of the following options.

Option 1:

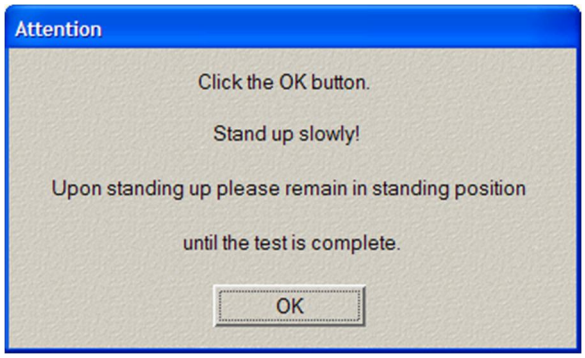
1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Restart** menu option.

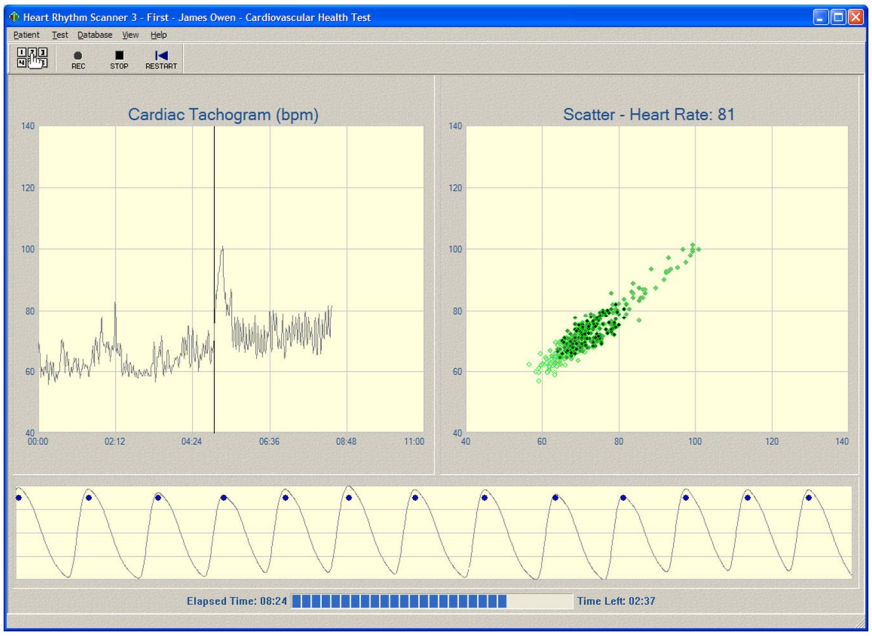
The program will stop the test time counter and returns to the moment where you have been before beginning test recording.

Once the 5-min baseline recoding is over the program will prompt you to instruct patient to standup. The following message will show up:



While the patient is standing up click **OK**.

The program will continue test recording and displaying data for another 6 minutes:



Once the test recording is over the program automatically stops and shows the following message:

It indicates that the test is complete and notifies about quality of test data, which may be one of the following:

- ***The test data quality is good, so the result can be accepted.***
- ***The test data quality is fair, so the data can be accepted but some editing might be required at later time.***
- ***The test data quality is poor, so the result cannot be accepted. It is strongly recommended to repeat testing.***

Sometimes you may need to stop the test before it automatically finishes.

To stop the test use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Stop** menu option.

6.4. Perform an Additional Test

Sometimes you may need to perform multiple tests logically linked to one group or sequence of tests. For example, you may test your patient before and after a treatment session.

To perform an additional cardiovascular health test do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select the test from the list of tests on the right panel to which you want to add an additional test.
3. Click the **Run Next Test** button below the list of tests.

The additional test will be performed in the same way as described above.

Once the additional test is complete, the respective **Number of Tests** counter in the list of tests will be increased by 1.

6.5. Verify Test Data

The process of the cardiovascular health test data verification is identical to verification of the autonomic balance test data.

Please refer to the Section 6.5 for details.

6.6. View Selected Test Results

To view the results of any selected test use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Select the **Test** menu option.
4. Select the **View Test** menu option.

By default the program opens a printable test report view as described in the next section.

6.6.1. Printable Test Report

This is a default test report view which is automatically shown when entering a selected test report mode.

It is designed for the purpose of being printed out on a standard sheet of paper in landscape orientation.

If this is a sequence of tests then multiple report pages are generated.

Use a vertical scrollbar on the right side to scroll the content up and down.

To switch to this view use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Printable** menu option.

The following window opens:

6.6.2. Bar Chart Report

This view shows bar charts for each parameter calculated in this test.

The number of bars on each chart depends on the number of tests in the sequence. Single tests will show only one bar on each chart.

To switch to this view use one of the following options.

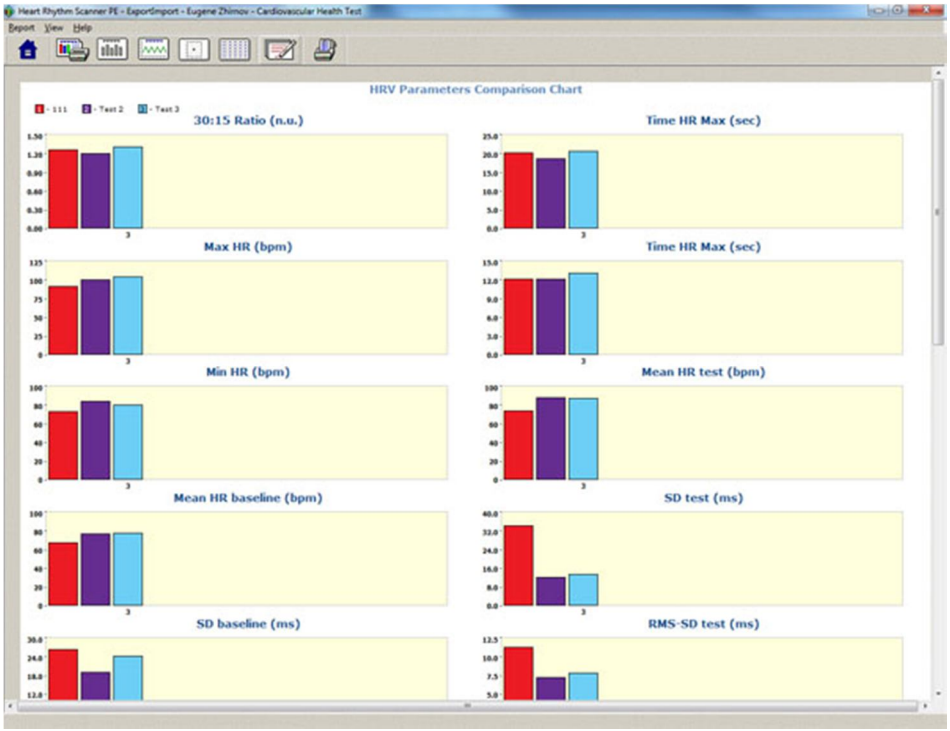
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Parameters** menu option.

The following window opens:



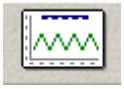
6.6.3. Heart Rate Graph Report

This view shows a line graph of heart rate (cardiac tachogram) recorded in this test.

If a sequence of tests containing more than one test is selected then multiple graphs will be displayed in this view.

To switch to this view use one of the following options.

Option 1:

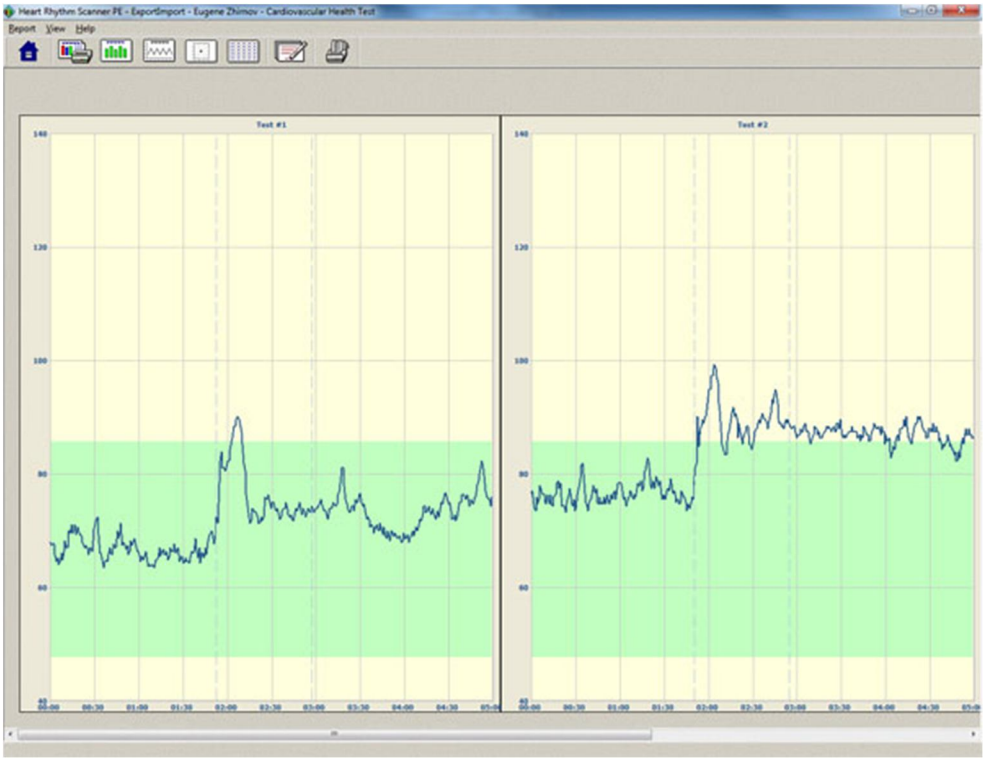


1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Heart Rate** menu option.

The following window opens:



If more than 2 tests are in the test sequence, use a horizontal toolbar to scroll the graphs back and forth.

6.6.4. Cardiovascular Health Diagram

This view shows a cardiovascular health diagram. The diagram indicated a cardiovascular adaptation level on horizontal scale and cardiovascular tolerance level on vertical scale. The result is shown as a color dot in the intersection of both scales.

If a sequence of tests containing more than one test is selected then more than one dot will be displayed on the diagram.

To switch to this view use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Diagram** menu option.

The following window opens:

NOT AVAILABLE AT THIS TIME!

6.6.5. Tabular Report

This view shows all calculated parameters in numerical format.

If a sequence of tests containing more than one test is selected then more than one data column will be displayed on the sheet.

To switch to this view use one of the following options.

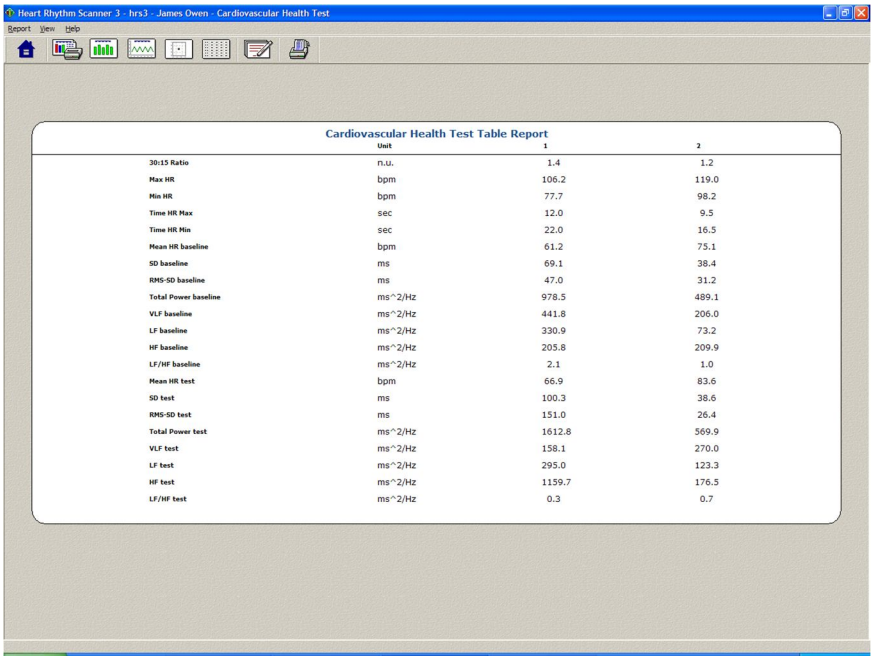
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Table** menu option.

The following window opens:



	Unit	1	2
30:15 Ratio	n.u.	1.4	1.2
Max HR	bpm	106.2	119.0
Min HR	bpm	77.7	98.2
Time HR Max	sec	12.0	9.5
Time HR Min	sec	22.0	16.5
Mean HR baseline	bpm	61.2	75.1
SD baseline	ms	69.1	38.4
RMS-SD baseline	ms	47.0	31.2
Total Power baseline	ms^2/Hz	978.5	489.1
VLF baseline	ms^2/Hz	441.8	206.0
LF baseline	ms^2/Hz	330.9	73.2
HF baseline	ms^2/Hz	205.8	209.9
LF/HF baseline	ms^2/Hz	2.1	1.0
Mean HR test	bpm	66.9	83.6
SD test	ms	100.3	38.6
RMS-SD test	ms	151.0	26.4
Total Power test	ms^2/Hz	1612.8	569.9
VLF test	ms^2/Hz	158.1	270.0
LF test	ms^2/Hz	295.0	123.3
HF test	ms^2/Hz	1159.7	176.5
LF/HF test	ms^2/Hz	0.3	0.7

6.6.6. Exit Report View

To exit current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

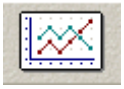
6.7. View Test History

You may perform many tests for the same patient over prolonged period of time. Looking at the test history may give you a valuable insight in how the autonomic function has been performing over that period of time.

To view the test history use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select the **Cardiovascular Health Test** from the group of test types shown above the list of tests on the right panel.

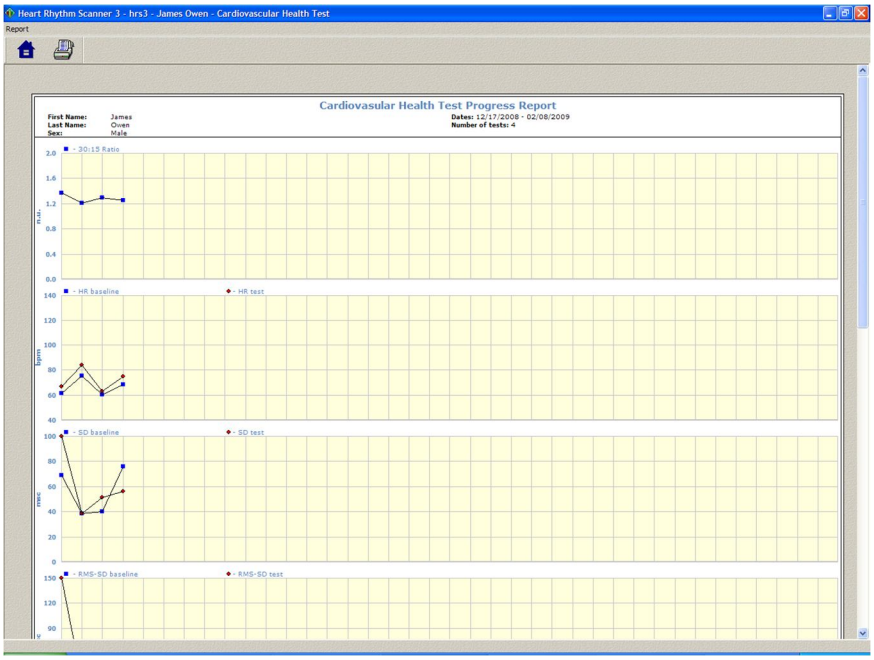


3. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the **Cardiovascular Health Test** from the group of test types shown above the list of tests on the right panel.
5. Select the **Test** menu option.
6. Select the **View Progress** menu option.

The following window opens:



This view shows line graphs for all calculated test parameters across all performed tests.

Use a scrollbar on the right side to scroll the view up and down.

To exit the current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

7. Baroreflex Function Test

7.1. Test Description

The baroreflex is a physiological mechanism responsible for changing heart rate in response to changes in systemic blood pressure. Rapid and dramatic drops in blood pressure may cause dangerous drops in blood supply to the vital organs such as brain and thus lead to dizziness or even fainting. So the baroreflex swiftly increases heart rate when blood pressure drops to compensate possible decrease in blood supply.

It is very important that baroreflex has sufficient functionality to properly react to changes in blood pressure and compensate cardiac output by increasing the heart rate.

To measure the baroreflex function a deep paced breathing maneuver is used.

During deep inhalation the chest is expanding and its internal pressure drops leading to slight drop in blood pressure because large blood vessels inside the chest are stretched when chest is expanded. The baroreflex causes a quick increase in heart rate as described above.

When deeply exhaling the chest contracts so its internal pressure rises causing blood pressure to rise as well due to shrinking large blood vessels in the chest. The baroreflex causes a quick decrease in heart rate as described above.

This phenomenon is also known as respiratory sinus arrhythmia.

It was found that the highest changes in heart rate induced by deep breathing happen when breathing at rate of about 6 breaths per minute.

Thus measuring oscillations in heart rate when breathing deeply at 6 breaths per minute is a simple yet effective way to measure baroreflex function. The less baroreflex functionality is the lesser heart rate oscillation happen.

Baroreflex function naturally degrades with age. However various health conditions may affect the elements participating in baroreflex mechanism and thus lower its functionality leading to potentially serious complications.

The test is performed during 1 minute.

7.2. Test Parameters

The following parameters are calculated:

Mean E/I Ratio	a.u.	Mean ratio value between the longest heartbeat interval during expiration and the shortest interval during inspiration.
Max E/I Ratio	a.u.	Maximum ratio value between the longest heartbeat interval during expiration and the shortest interval during inspiration.
Frequency	Hz	Resonant frequency of oscillations of heart rate.
Standard Deviation HR	bpm	Standard deviation of heart rate values off their mean value.
Max Variation HR	bpm	Maximum variation of heart rate within one breathing cycle.
Mean Variation HR	bpm	Mean variation of heart rate among all breathing cycles.
Minimum HR	bpm	Minimum HR value during the test.
Maximum HR	bpm	Maximum HR value during the test.

7.3. Perform New Test

To perform a new baroreflex function test use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select the **Baroreflex Function Test** from the group of test types shown above the list of tests on the right panel.

3. Click this button on the top toolbar.

Option 2:

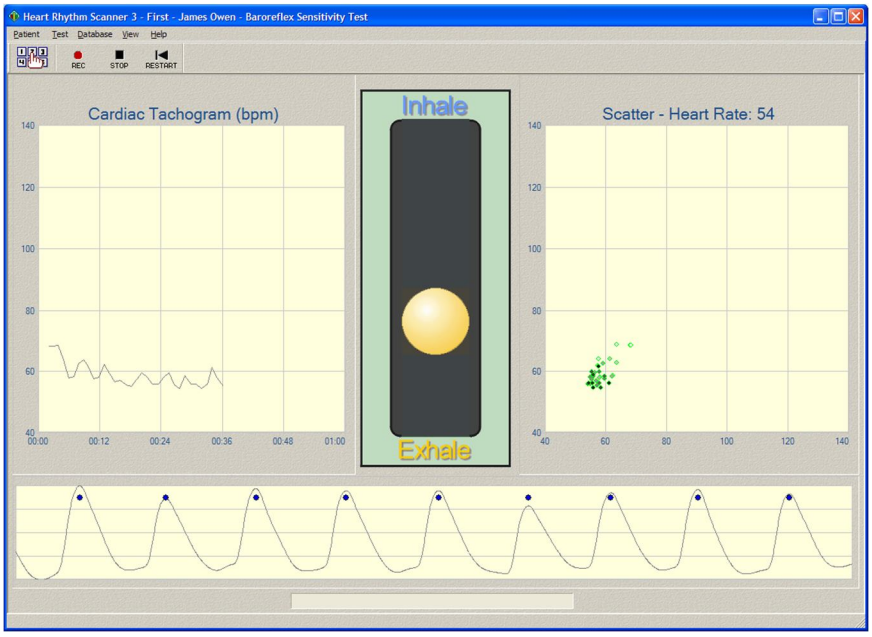
1. Select an appropriate patient name from the list of patients.

2. Select the **Baroreflex Function Test** from the group of test types shown above the list of tests on the right panel.

3. Select the **Test** menu option.

4. Select the **Start** menu option.

If the system is equipped with a pulse wave sensor the following window opens:



If the system is equipped with an ECG recorder then an ECG trace shows up instead of pulse wave.

Once you see a regular ECG or pulse wave signal and heart rate readings appear normal, the program is ready to start test recording.

To begin test recording use one of the following options.

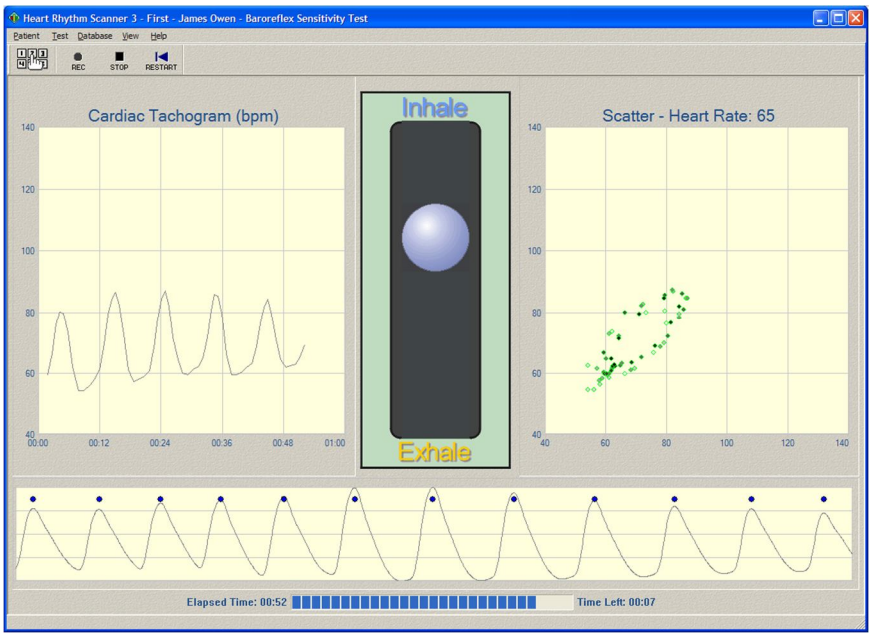
Option 1:

1. Click this button on the top toolbar.

Option 2:

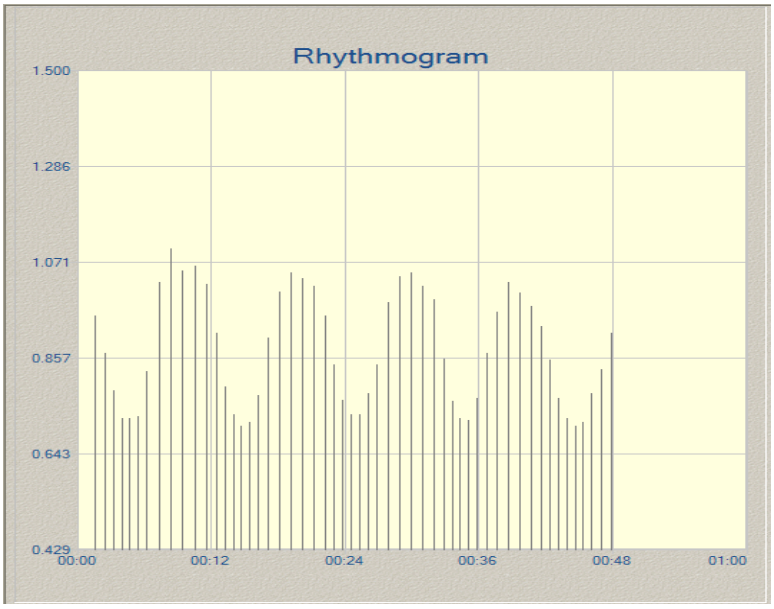
1. Select the **Test** menu option.
2. Select the **Record** menu option.

The following window opens (if the system is equipped with an ECG recorder):



A test progress indicator is displayed at the bottom of the program window showing how much time has elapsed and left.

If the program is configured to display the cardiac rhythmogram (heartbeat intervals in milliseconds) instead of cardiac tachogram (heart rate in beats per minute) the following bar graph will be shown on the left panel:



Sometimes you may need to restart the test when you think the quality of test data may be questionable (e.g. if an ECG electrode fell off or patient started coughing, etc.).

To restart the test use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Restart** menu option.

The program will stop the test time counter and returns to the moment where you have been before beginning test recording.

Once the test recording is over the program automatically stops and shows the following message:

It indicates that the test is complete and notifies about quality of test data, which may be one of the following:

- ***The test data quality is good, so the result can be accepted.***
- ***The test data quality is fair, so the data can be accepted but some editing might be required at later time.***
- ***The test data quality is poor, so the result cannot be accepted. It is strongly recommended to repeat testing.***

Sometimes you may need to stop the test before it automatically finishes.

To stop the test use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Test** menu option.
2. Select the **Stop** menu option.

7.4. Perform Additional Test

Sometimes you may need to perform multiple tests logically linked to one group or sequence of tests. For example, you may test your patient before and after a treatment session.

Logical linking of more than one test of the same type will let you view the results of those tests in various forms of data comparison views.

To perform an additional baroreflex function test do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select the test from the list of tests on the right panel to which you want to add an additional test
3. Click the **Run Next Test** button below the list of tests.

The additional test will be performed in the same way as described above.

Once the additional test is complete, the respective **Number of Tests** counter in the list of tests will be increased by 1.

7.5. Verify Test Data

The process of the baroreflex function test data verification is identical to verification of the autonomic balance test data.

Please refer to the Section 6.5 for details.

7.6. View Selected Test Results

To view the results of any selected test use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Select an appropriate test from the list on the right panel.
4. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.

3. Select the **Test** menu option.
4. Select the **View Test** menu option.

By default the program opens a printable test report view as described in the next section.

7.6.1. Printable Test Report

This is a default test report view which is automatically shown when entering a selected test report mode.

It is designed for the purpose of being printed out on a standard sheet of paper in landscape orientation.

If this is a sequence of tests then multiple report pages are generated.

Use a vertical scrollbar on the right side to scroll the content up and down.

To switch to this view use one of the following options.

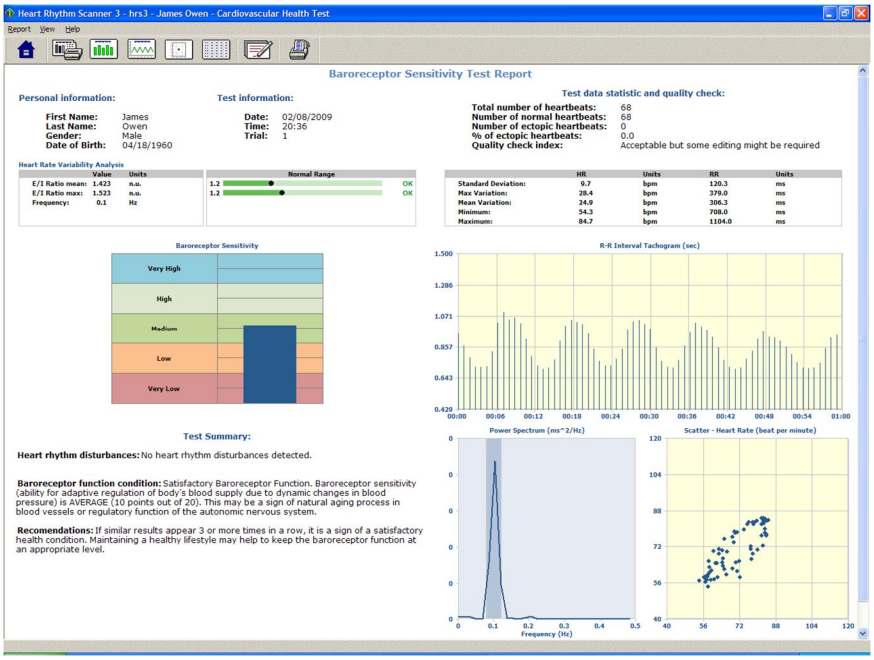
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Printable** menu option.

The following window opens:



7.6.2. Bar Chart Report

This view shows bar charts for each parameter calculated in this test.

The number of bars on each chart depends on the number of tests in the sequence. Single tests will show only one bar on each chart.

To switch to this view use one of the following options.

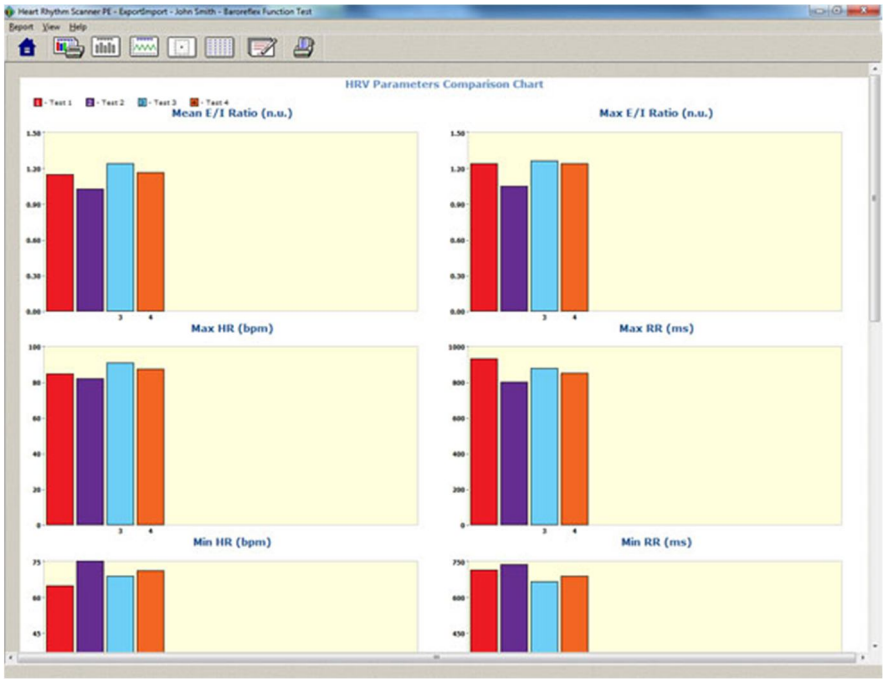
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Parameters** menu option.

The following window opens:



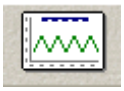
7.6.3. Heart Rate Graph Report

This view shows a line graph of heart rate (cardiac tachogram) recorded in this test.

If a sequence of tests containing more than one test is selected then multiple graphs will be displayed in this view.

To switch to this view use one of the following options.

Option 1:

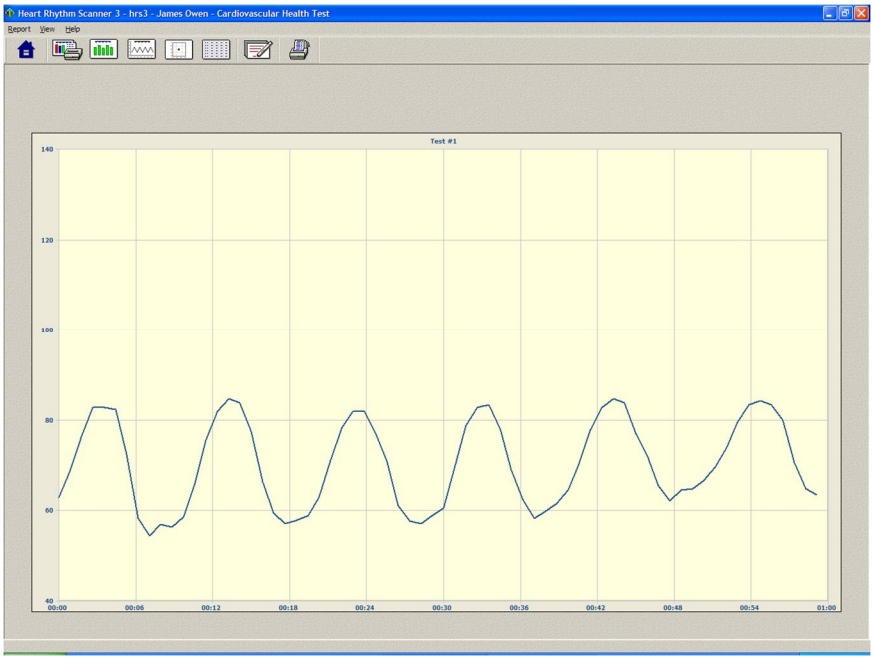


1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Heart Rate** menu option.

The following window opens:



If more than 2 tests are in the test sequence, use a horizontal toolbar to scroll the graphs back and forth.

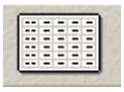
7.6.4. Tabular Report

This view shows all calculated parameters in numerical format.

If a sequence of tests containing more than one test is selected then more than one data column will be displayed on the sheet.

To switch to this view use one of the following options.

Option 1:

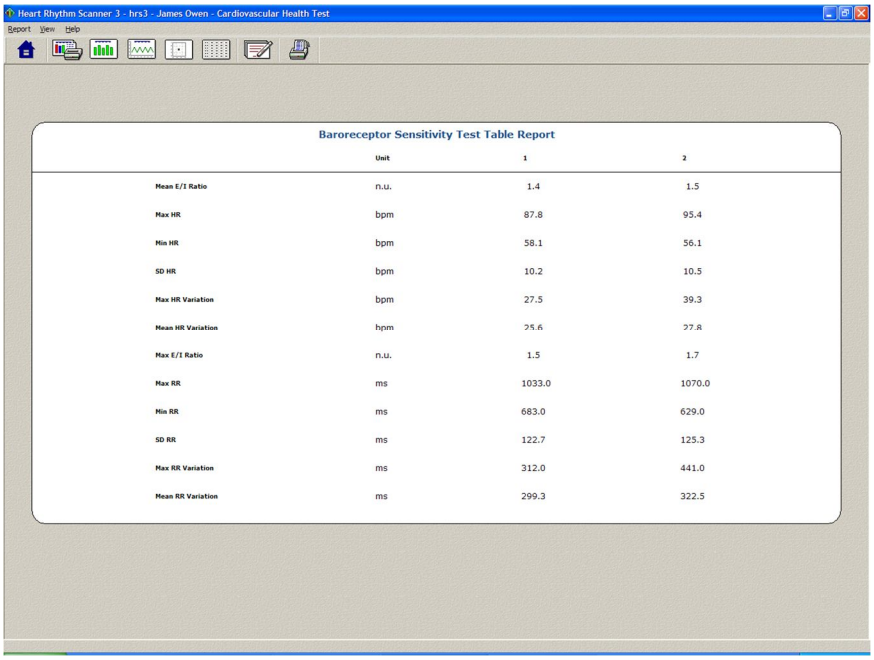


1. Click this button on the top toolbar.

Option 2:

1. Select the **View** menu option.
2. Select the **Table** menu option.

The following window opens:



Baroreceptor Sensitivity Test Table Report

	Unit	1	2
Mean E/I Ratio	n.u.	1.4	1.5
Max HR	bpm	87.8	95.4
Min HR	bpm	58.1	56.1
SD HR	bpm	10.2	10.5
Max HR Variation	bpm	27.5	39.3
Mean HR Variation	bpm	25.6	27.8
Max E/I Ratio	n.u.	1.5	1.7
Max RR	ms	1033.0	1070.0
Min RR	ms	683.0	629.0
SD RR	ms	122.7	125.3
Max RR Variation	ms	312.0	441.0
Mean RR Variation	ms	299.3	322.5

7.6.5. Exit Report View

To exit current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

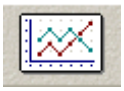
7.7. View Test History

You may perform many tests for the same patient over prolonged period of time. Looking at the test history may give you a valuable insight in how the autonomic function has been performing over that period of time.

To view the test history use one of the following options.

Option 1:

1. Select an appropriate patient name from the list of patients.
2. Select the **Baroreflex Function Test** from the group of test types shown above the list of tests on the right panel.

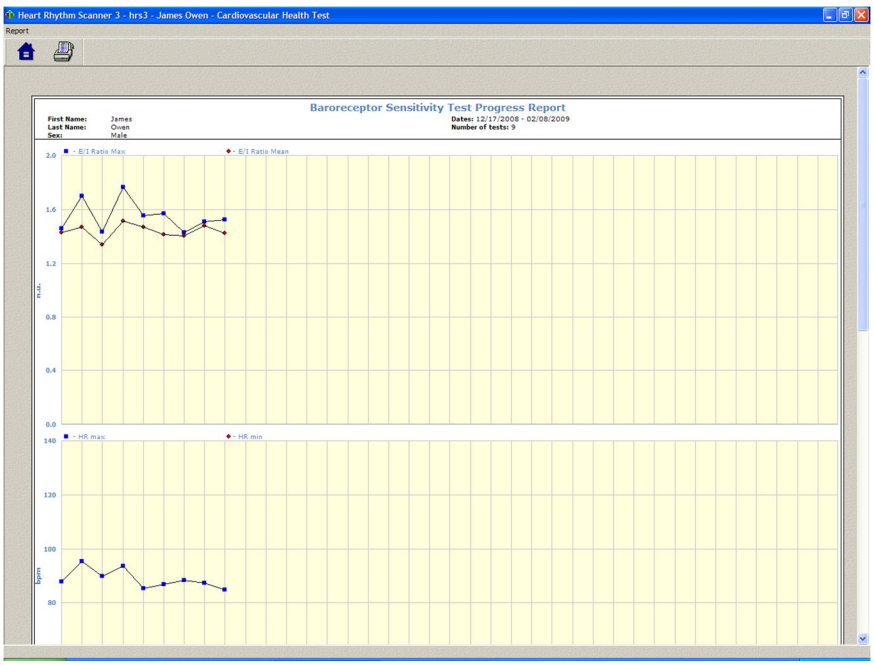


3. Click this button on the top toolbar.

Option 2:

1. Select an appropriate patient name from the list of patients.
2. Select the **Baroreflex Function Test** from the group of test types shown above the list of tests on the right panel.
3. Select the **Test** menu option.
4. Select the **View Progress** menu option.

The following window opens:



This view shows line graphs for all calculated test parameters across all performed tests.

Use a scrollbar on the right side to scroll the view up and down.

To exit the current report view and return to the main mode use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Quit** menu option.

8. Manage Test Results

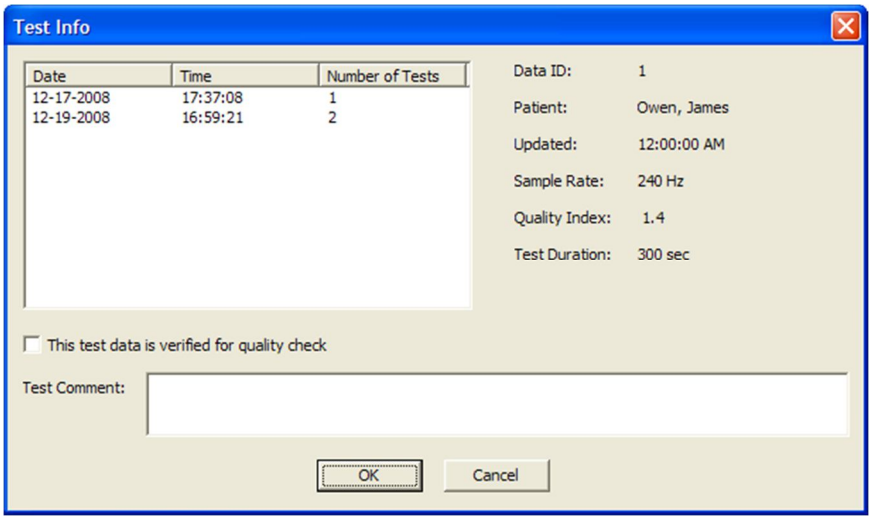
8.1. Edit Test Comments

You may put your comments to any test and the program will store them along with test data.

To enter or edit test comments do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Click the **Edit** button below the list of tests.

The following window opens:



If you chose a sequence of tests then a list of test belonging to this sequence will be shown here.

The following steps must be done to edit test comments:

1. Select an appropriate test from the list in this window.
2. Enter test comment in the field below.

Optional:

3. You may put a checkmark in **This test data is verified for quality check** if you did data verification to it.

4. Click **OK** to save the comment.

By clicking this button on the toolbar you may access this window to edit test comment when reviewing a selected test results.

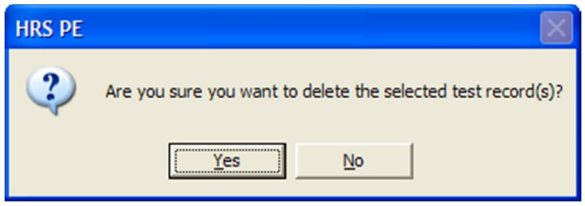
8.2. Delete Test

Sometimes you may have to delete any test record.

To delete the test do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel.
3. Click the **Delete** button below the list of tests.

The following window opens:



Click **Yes** to confirm deletion.

Click **No** to abort deletion.

Important! Please keep in mind that deletion of any test record will permanently destroy it.

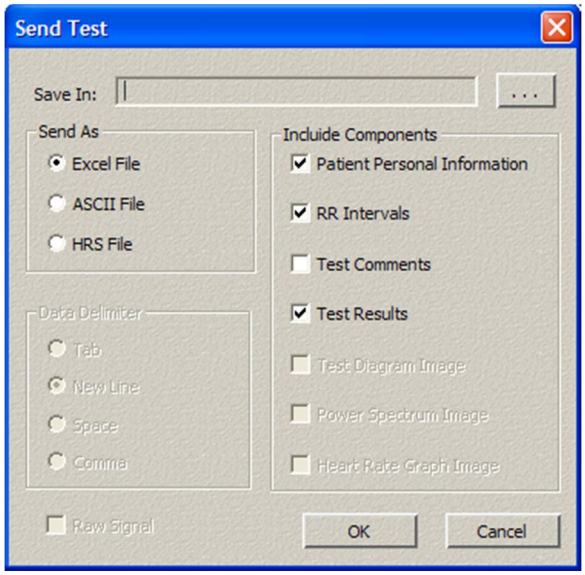
8.3. Send Selected Test Data

You may send or export selected test data putting them in a file of specific format readable by other software (e.g. ASCII or Excel) or another Heart Rhythm Scanner system.

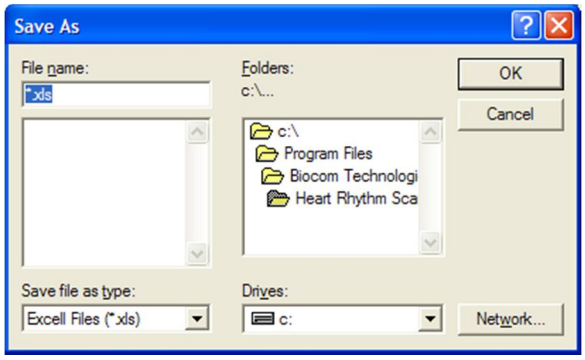
To send the test do the following steps.

1. Select an appropriate patient name from the list of patients.
2. Select an appropriate test from the list on the right panel. You may select multiple tests by pressing and holding the **Ctrl** button and clicking respective tests in the list. All selected tests will become highlighted.
3. Click the **Send** button below the list of tests.

The following window opens:



Do the following steps to complete sending data:



1. Click this button to open the following window:
2. Use this standard tool to specify a target filename and its location on your disk or network.
3. Click **OK** when done.

4. Select the type of file format from the **Send As** group.

5. Set all appropriate checkmarks in the **Include Components** group to specify what data will be exported.

Optional:

6. Set the **Raw Signal** checkbox if you want to export recorded signal (ECG or pulse wave) into ASCII file only!

7. Click **OK** to complete sending data.

8.4. Send Patient Records

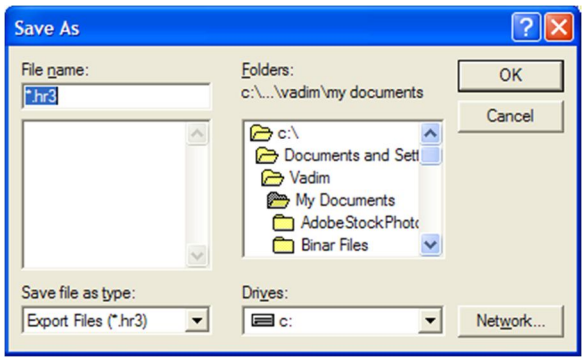
If you have the **Heart Rhythm Scanner** system installed on different computers you may need to exchange selected patient records data between different locations.

You can put selected patient records in whole into a special exchange (HRS format) file and then read its content using the Heart Rhythm Scanner on other PC.

To send the test data to the exchange file do the following steps:

1. Select an appropriate patient name from the list of patients. You may select multiple patients by pressing and holding the **Ctrl** button and clicking respective patient names in the list. All selected patients will become highlighted.

2. Click the **Send** button below the list of patients.



3. The following window opens.

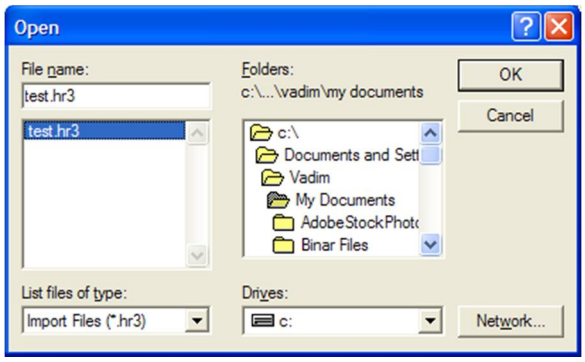
4. Using this standard file tool input the file name where to put data in and its location.

5. Click **OK**.

8.5. Receive Patient Records

To read selected patient records in whole or selected test data from the exchange (HRS file) file created as described in the previous section do the following steps:

1. Click the **Receive** button below the list of patients.



2. The following window opens.

3. Using this standard file tool choose the file name and its location from where to read the test data.

4. Click OK.

5. The program will confirm reading the data and adding it to the database.

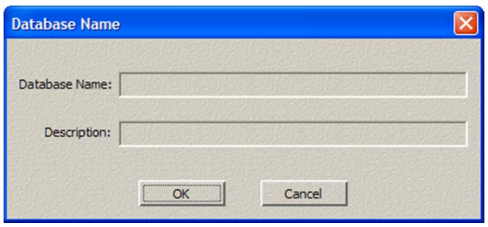
9. Manage Databases

9.1. Create New Database

The Heart Rhythm Scanner allows for creating and supporting multiple databases. You may want to keep different groups of patients in separate database to handle them separately.

To create a new database, do the following steps:

1. Select the **Database** menu option.
2. Select the **New** menu option. The following windows opens:

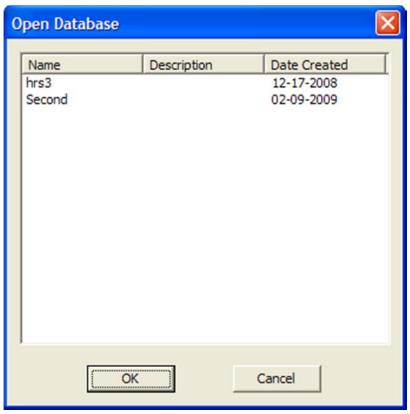


3. Enter a name for the new database.
4. You may want to input a database description here.
5. Click **OK** when done.

9.2. Open Database

To open other database, do the following steps:

1. Select the **Database** menu option.
2. Select the **Open** menu option. The following windows opens:



3. Select the database name you want to open from the list.
4. Click **OK**.

9.3. Rename Database

If you want to rename the currently open database, do the following steps:

1. Select the **Database** menu option.
2. Select the **Rename** menu option. The following windows opens:

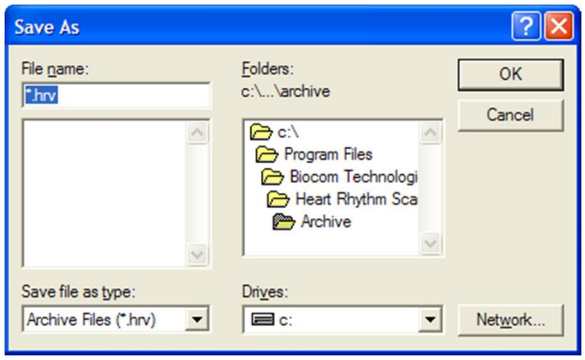
3. Enter the new name for this database.
4. Click **OK**.

9.4. Backup Database

It is recommended to create backup copies for your databases to ensure data safety and integrity.

To create a backup copy of your current database, do the following steps:

1. Select the **Database** menu option.
2. Select the **Backup** menu option. The following windows opens:

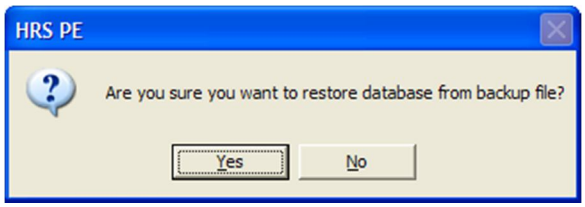


3. Use this standard save file tool to specify the file name and location of your database backup copy.
4. Click **OK** to create the backup copy.

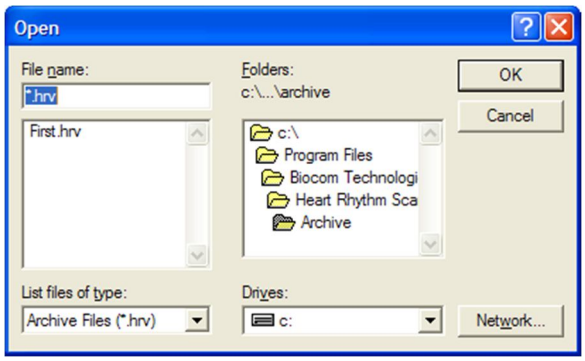
9.5. Restore Database

To restore database content from its backup copy, do the following steps:

1. Select the **Database** menu option.
2. Select the **Restore** menu option. The following window opens:



3. Click **Yes** to confirm restoring the database. The following window opens:



4. Use this standard open file tool to specify the file name and location of your backup copy from where you want to restore the database.
5. Click **OK** to complete restoring the database.

9.6. Compact Database

When using the database extensively it becomes cluttered with fragments of deleted records. This increases its size and thus reduces performance.

It is recommended to compact your database from time to time.

To compact the database, do the following steps:

1. Select the **Database** menu option.
2. Select the **Compact** menu option. The following window opens:
3. Click **Yes** to confirm compacting the database.

4. Depending on the size of your database it might take a few minutes to complete. Be patient waiting for completion.

5. The program will inform you when compaction is done.

10. Printing Reports

The program lets you print practically any view you see on the screen when reviewing test results.

10.1. Printing

To print current view use one of the following options.

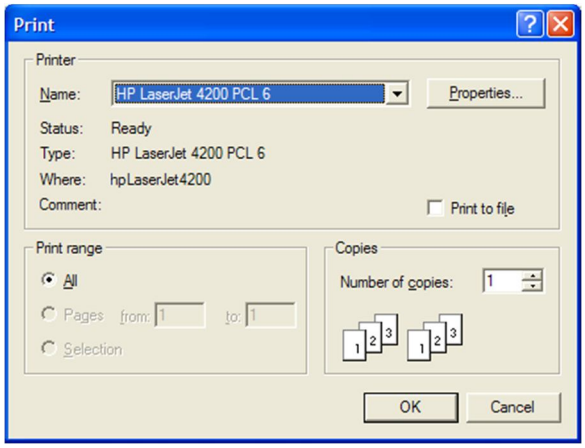
Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Select the **Report** menu option.
2. Select the **Print** menu option.

The following window opens:



Use this standard print tool to select desired printer, its settings, number of copies, etc.

Click **OK** to begin printing.

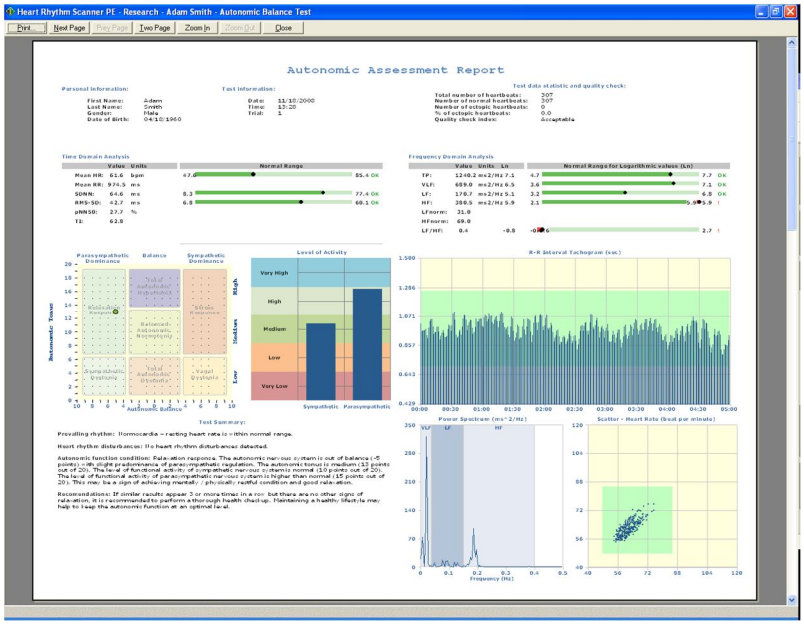
10.2. Print Preview

It may be helpful to see a printed document on the screen in s-called "preview" mode before actual printing.

To show a print preview, do the following steps:

1. Select the **Report** menu option.
2. Select the **Print Preview** menu option.

A print preview window opens:



Click **Print** to print the view as described in the previous section.

If more than one page are created for printing, you may click the **Next Page** or **Prev Page** buttons to go from one page to another.

Click the **Zoom In** or **Zoom Out** buttons to enlarge or reduce the scale of viewed image.

Click the **Close** button to close the preview and return to the main report view.

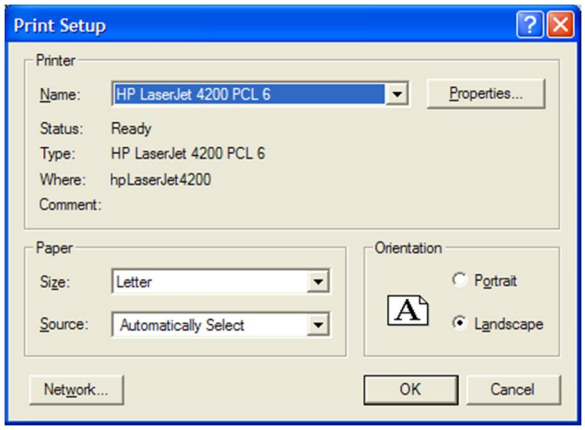
10.3. Print Setup

You may specify various settings for your default printer.

To do that, do the following steps:

1. Select the **Report** menu option.
2. Select the **Print Setop** menu option.

The following window opens:



Use this standard print tool to select desired printer, its settings, paper size and source, orientation, etc.

Click **OK** to save print settings.

11. Exit the Program

To exit the program use one of the following options.

Option 1:

1. Click this button on the top toolbar.

Option 2:

1. Click this button in the top right corner of the main program window.