

Simul-G

User Manual

Software Version 7.0

Nasan Medical Electronics Pvt. Ltd.

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For any working days 9.30a.m to 6 p.m

Dear customer,

We take this opportunity to thank you once again for your patronage. We reiterate our commitment to live up to the confidence you have shown in us. Our continued endeavor is to exceed your expectation by offering you products that have optimum features and reliable, high-quality performance backed by prompt technical support.

It is our pleasure to give you this user manual. Please study the same thoroughly before using the system.

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User manual for
Simul-G

**The complete Windows based 12 Lead ECG Machine with
measurements.**

1.Introduction-

Nasan Medicals has pioneered PC based medical equipments in India. We thank you for purchasing our Simul-G, an ECG machine with measurement.

Intended Use:

Simul-G is a 12 lead resting, real-time monitoring ECG machine with facility of Measurement and Interpretation. It connects with PC through USB interface, with simultaneous acquisition with DSP technology. It is suitable on adult, pediatric.

The system records and enables review of electro-cardiogram, arrhythmic disorders and diagnosis. The device displays 4 second ECG on screen with medians next to each lead.

Features:

- ❖ Display 12 lead, 4 second ECG on screen with medians next to each lead are displayed.
- ❖ Gain of ECG waveform (0.5, 1, 2) with standardization pulse.

- ❖ Facility to relearn median template.
- ❖ Facility to change long lead, QRS detection Lead, Amplify QRS.
- ❖ Facility to enter BP.
- ❖ Automatic detection of P+ start, P+ end, P – end, Q start, R Start, R end, S end, r' end, s' end, T Start, T End, U start, U end points on the median once.
- ❖ Facility to display and print interpretation
- ❖ Facility to review data from hard disk or from floppy disk.
- ❖ Facility to view 12 medians or Last 2.5 sec ECG with medians and long lead.
- ❖ Facility to change P+ start, P+ end, P – end, Q start, R Start, R end, S end, r' end, s' end, T Start, T End, U start, U end points.
- ❖ Display ST levels
- ❖ Facility to draw grid and print
 - Resting ECG report
 - 12 leads measurement Report
 - 5 seconds ECG report
- ❖ Facility to edit fiducial points (E, J, Post J) of selected lead
Create the bitmap (GIF) of the selected report/s and save at selected location

2. System requirements-

Minimum Requirement of PC for Simul-G system:

- | | |
|--------------------------------------|---|
| 1. Operating system | : Windows 10 professional 64bit |
| 2. Motherboard | : Intel corei3 |
| 3. RAM | : 4 GB |
| 4. USB port | : working USB port for Simul-G unit connection. |
| 5. Monitor | : Color monitor. |
| 6. Hard disk | : minimum 500 GB. |
| 7. Display Settings | : Resolution - 1024X 768. |
| 8. Keyboard | : with 101 keys. |
| 9. Mouse | |
| 10. 1 OR 2 KVA UPS | |
| 11. Independent earthing connection. | |

3. Configuring the Simul-G system-

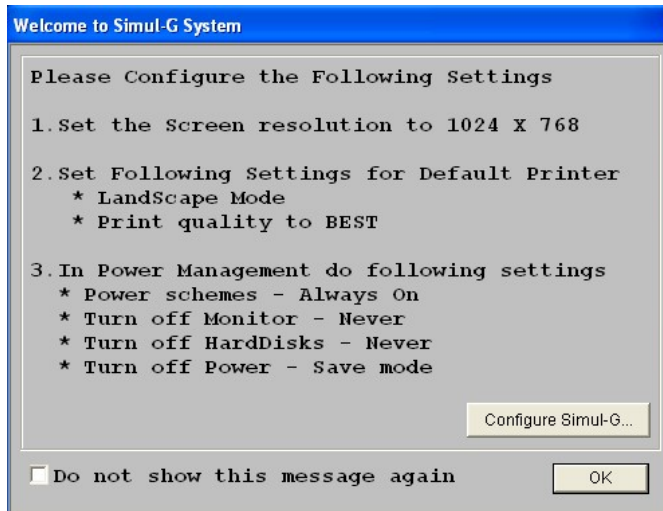


Fig. 3.1: Installation dialog box.

- **For setting monitor resolution to 1024 x 768 use the procedure given below:**
 1. Go to the Windows "**Start**" menu.
 2. Then select "**setting**" folder.
 3. Select "**Display**" option.
 4. Select the required **Display resolution** from dropdown.
- **Use following procedure to set the printer**
 1. Control Panel\Hardware and Sound\Devices and Printers
 2. Set following properties for the printer
 - LANDSCAPE
 - Page size to 'A4'.

Restart the PC and check that required setting are set.

Configuring the System

For configuring the Simul-G system go to '**Configure**' menu or press '**Configure Simul-G**' button on '**Welcome to Simul-G system**' dialog box which provides allows following tools listed as in fig.3.2,

1. Hospital configuration.
2. Simul-G configuration.
3. Printing details.
4. Referrer Doctor.
5. Standard Comments.

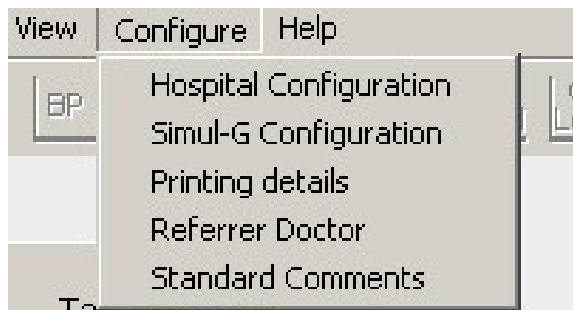


Fig.3.2: Configure Menu.

1. **Hospital configuration-**

This option from the '**Configure**' menu provides facility of storing the list of doctors and the consultant doctors attached to your hospital. This list gets popped up in the Patient details entry dialog

box, from where you can select the concerned doctor for the patient.

For entering the details follow the steps given below--

1. Select the '**Hospital configuration**' option from the '**Configure**' Menu.
2. A window will appear on the screen as shown in fig. 3.3.
3. Enter hospital name in the upper edit box.
4. Enter the name and designation of a doctor you want to add to your list and click the '**Add**' button.

Configure hospital details

Hospital Name :

Doctor's Name :

Doctor's Designation :

Sr.No	Doctor's Name	Doctor's Designation
1	Dr. Mehta	M.D
2	Dr. Samant	M.D

Double Click on the Record you wish to "Modify" or "Delete"

Fig.3.3: Hospital Configuration.

5. To delete any doctor from the list, select the corresponding Sr.No. and click the '**Delete**' button.
6. Double-click on Sr.No. to change or modify any doctor's details.
7. After entering the entire information click on "**OK**" to save the contents in the list.
8. Press "**Cancel**", the information will not get saved.

2. Simul-G Configuration.

A dialog box as shown in fig.3.4 will be displayed.

An option is provided to print the QT/Qt values on the Resting ECG Report. User can check this check box on the Configure Simul-G Setting dialog box for getting QT/Qt values on the Resting ECG report.

An option is provided to select border for printout. User can check this check box on the Configure Simul-G Setting dialog box for getting border on printout.

An option to select the 'Technician Name' for printout, when checked the technician's name as entered in the 'Print Technician Name As' edit box, will be printed on the reports.

An option is provided on this dialog box to print the 'Instrument ID' on the reports. When this option is checked, the instrument ID entered on the 'Patient Details' dialog box will be printed on the reports.

The 'Patient Name' text printed on the reports will be printed as the text entered in the 'Print Patient Name As' edit box.

An option is provided to print the Patient ID or Referred by doctor name on the report.

Configure Simul-G settings...

Print

- ☒ QT/QTc on Resting ECG Report
- ☐ Border
- ☐ Technician Name
- ☐ Instrument ID
- ☐ Patient ID
- ☐ Referred by

Duration Units For Print

- ☒ milliSec
- ☐ Sec

Select Long Lead

LEAD_II

Print 'Patient Name'

Patient Name

Print 'Technician Name'

ECG Taken By

- ☐ Print Interpretations on 'All lead Measurement report'
- ☐ Print 'Interpretation' instead of 'Comments' on 'Resting ECG report'
- ☐ Print 'Interpretation' instead of 'Comments' on '5 Seconds ECG report'

OK Cancel

Fig.3.4: Simul-G configuration

An option 'Select Long Lead' is provided to select the default long lead.

An option to print the 'Interpretation' for printout, when checked the interpretation will be printed on 'All lead measurement report', Resting ECG report and 5 seconds ECG report. When unchecked the comments will be printed on Resting ECG report and 5 seconds ECG report.

3. Printing Details.

To have the printouts of the required report, printing details option is provided. This configuration is used while printing the reports with the required titles, fonts and their sizes and alignments. You can set following details-

- Report title.

- Hospital Name alignment (either left or center).
- Fonts for report title, hospital name and Patient details.
- Color or black and white printing.
- Administrative details with gray background.

For this purpose, select the '**Printing Details**' option from '**Configure**' menu. A dialog box as shown in fig 3.5 is displayed.



Fig.3.5: Printing Details.

- To set the font, click the '**Font**' button. A dialog box as shown in fig.3.6 will appear where you can configure
 - Font,
 - Font color,
 - Font style,
 - Font size,
 - Underline the text.

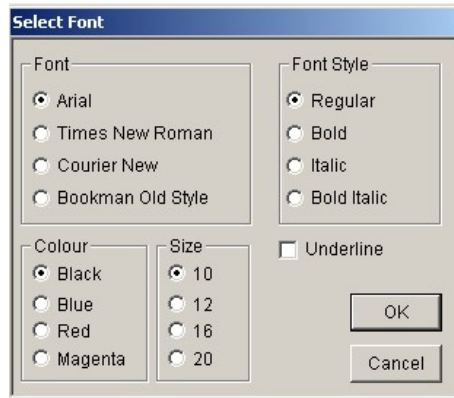


Fig.3.6: Select font.

- Press '**OK**' to save the settings and exit.
- Press '**Cancel**' to exit without saving.

4. Referrer Doctor

This option from the '**Configure**' menu provides facility of storing the list of referrer doctors attached to your hospital. This list gets popped up in the Patient details entry dialog box, from where you can select the concerned doctor for the patient

For entering the details follow the following steps.

1. Select the "**Referrer Doctor**" option from the '**Configure**' Menu.
2. A window will appear on the screen as shown in fig. 3.7.
3. Enter the name and designation of a doctor you want to add to your list and click the '**Add**' button.

Configure Referrer Doctor Info

Sr.No	Reference Doctor's Name	Reference Doctor's Designation
1	Dr. ABC	M.D
2	Dr. XYZ	M.D

Double Click on the Record you wish to "Modify" or "Delete"

Add Modify Delete OK Cancel

Fig.3.7: Referrer Doctor.

4. To delete any doctor from the list, select the corresponding Sr.No. and click the '**Delete**' button.
5. Double-click on Sr.No. to change or modify any doctor's details.
6. After entering the entire information click on "**OK**" to save the contents in the list.
7. Press "**Cancel**", the information will not get saved.

5. Standard Comments

To enter the standard comments, click on the '**Standard Comments**' option from '**Configure**' menu. A dialog box as shown in figure 3.8 will be displayed.

Enter the Comment title and Comments and press the '**Add**' button. The comment title will be added in the '**Comment Title List**'. To delete the comment title from the standard comment list, select the comment title from the list and press the '**Delete**' button. The selected title will be deleted from the list after confirmation.

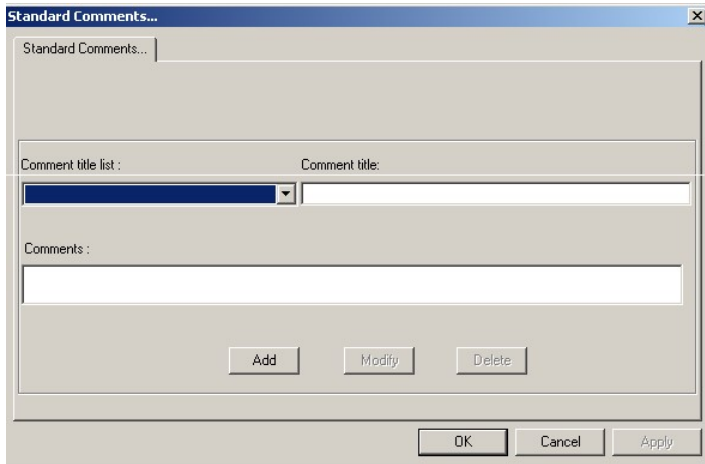
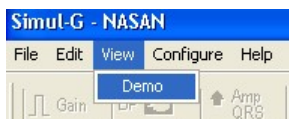


Fig.3.8: Standard Comments

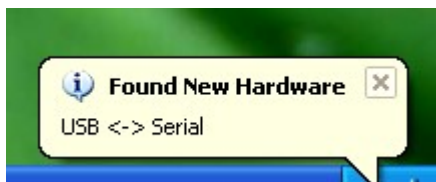
To modify the comments, select the comment title from the 'Comment Title List', then the selected title and its comments will be displayed in the '**Comment Title**' and '**Comments**' edit box. Make the changes and press the 'Modify' button. The changes will be saved in the list after confirmation. Press the '**OK**' button to save the changes.

4. Conducting (Installation Procedure) a test-

1. Initially install software on your PC or LAPTOP.



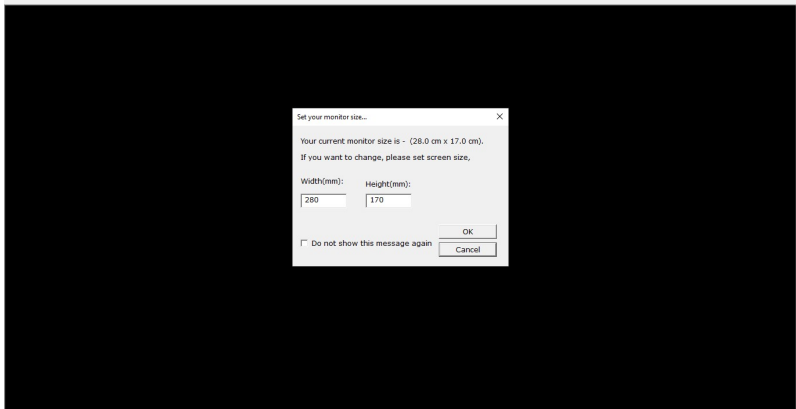
2. To start a DEMO test, click "demo" under "view" option to run the in-Demo mode.
3. To start a LIVE test, Connect unit to USB Port of LAPTOP or PC.
4. Power ON LED on the UNIT will glow.
5. Following message will be displayed at the bottom right-side corner on the PC screen. Refer Appendix C for installation procedure.



6. Follow the instruction on wizard to continue the driver installation. Refer Appendix-C
7. Prepare the patient refer Appendix-A from this manual for patient preparation
8. Connect Patient cable to unit.

9. Double click on the icon on the desktop to run the software.
10. Enter the monitor width and height in mm, so that all software screens will be set according to your monitor size. Click on ok.

ECG12VIEW
File Edit View Configure Help



To start a new test for a patient, click on the '**Take an ECG**' button or go to '**File**' menu and select '**Take an ECG**' option in live mode.

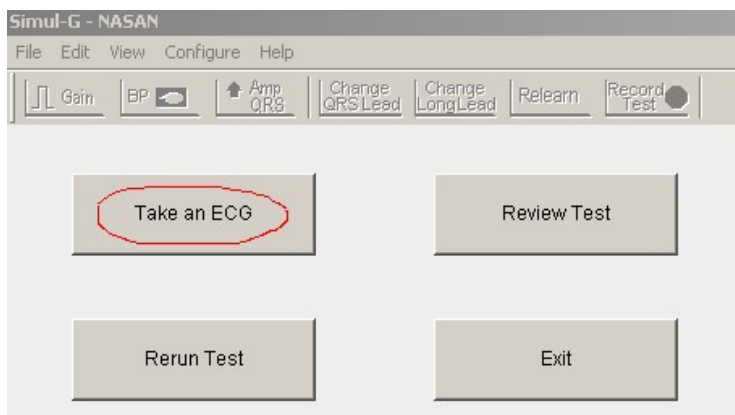
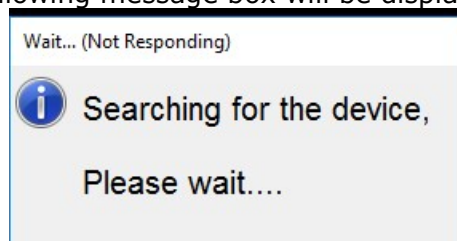
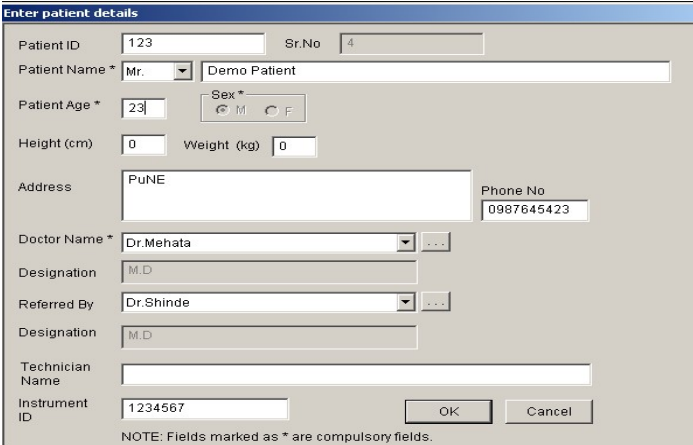


Fig.4.1: Main screen.

Following message box will be displayed,



The patient information dialog box as shown in fig. 4.2 is displayed for entering the patient details.



Enter patient details

Patient ID Sr.No

Patient Name *

Patient Age * Sex * ☒ M ☐ F

Height (cm) Weight (kg)

Address Phone No

Doctor Name * ...

Designation

Referred By ...

Designation

Technician Name

Instrument ID

NOTE: Fields marked as * are compulsory fields.

Fig.4.2: Patient Information dialog box.

1. Above patient detail dialog box is displayed with patient prefix combo box adjacent to patient name edit box. As per selection in this combo box, the 'Male' or 'Female' radio button under gender is set accordingly.
2. To edit the doctor list, click '...' push button near Doctor Name edit box. 'Doctor Details' dialog box will be displayed with details as shown in fig 3.3. Edit the doctor list as per requirement and press OK button. The doctor list on the patient details dialog box will be updated accordingly.
3. To edit the referring doctor's list, click '...' push button near Referred By edit box. 'Doctor Details' dialog box will be displayed with details as shown in fig 3.7. Edit the doctor list as per requirement and press OK button. The 'Referred By' list on the patient details dialog box will be updated accordingly.

4. After entering the details press **"OK"** button to start the acquisition
5. An acquisition screen is displayed as shown in fig 4.3.

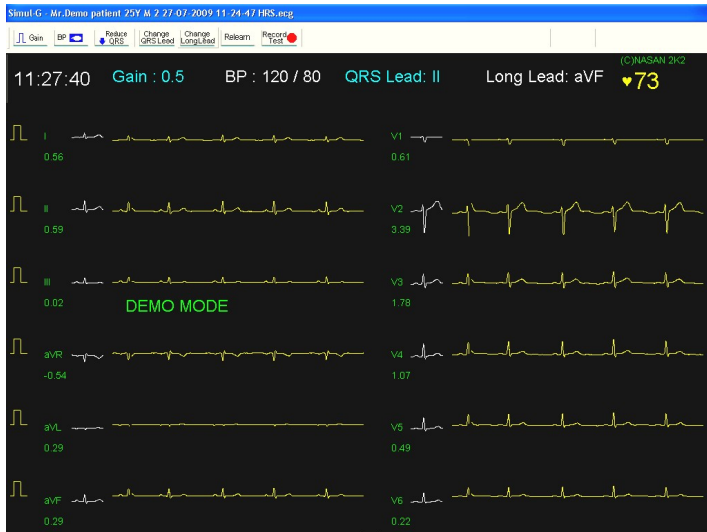


Fig.4.3: Acquisition screen.

You will see following details on Acquisition screen

- Toolbar at the top of screen.
- 12 Leads medians.
- 12 running ECG traces of 12 sec.
- All other parameters like Phase time, Gain, Blood pressure, Long Lead, QRS Detection Lead and HR.
- Menu bar.

By pressing the 'Record test' button you can view following message on acquisition screen. Press 'OK' button.



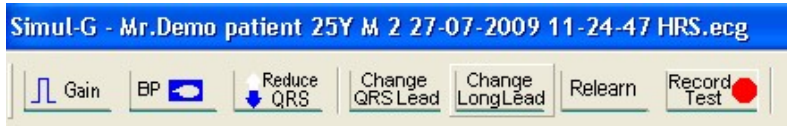
Review screen shown in fig 5.3 will be displayed. Click on 'main menu' button on review screen following screen will be displayed.

To Exit(Shut down) from Simul-G software:



Click on Exit button as shown in above figure, Simul-G software will get closed.

Menu bar consists of following buttons:



1. Gain



Press the '**Gain**' button to change the gain of the traces. The gain value will be toggled between 0.5, 1.0 and 2.0 when you press the gain button. Current gain value is displayed on the screen as shown in fig 4.5. ECG traces and median are drawn with new value of gain.



Fig.4.5: Gain.

2. **BP**



You can enter the BP of the patient when the test is going on by pressing the '**BP**' button as shown in fig. A dialog box as shown in fig 4.6 will appear on the screen. Enter the Systolic and Diastolic values and press OK button to save the values.

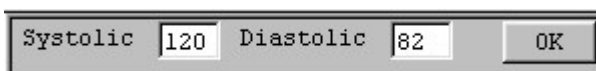


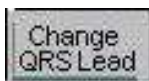
Fig.4.6: BP dialog box.

3. **Amp QRS** (Amplify QRS)



In case of short R-waves, heart rate calculations go wrong. Press '**Amp QRS**' button to amplify the QRS-lead for calculations (Display gain will not change).

4. **Change QRS Lead.**



This button is provided to change the lead for QRS detection.

5. **Change Long Lead.**



This button is provided to change the lead name of the Long Lead. The changed lead name is displayed on the screen.

6. Relearn.

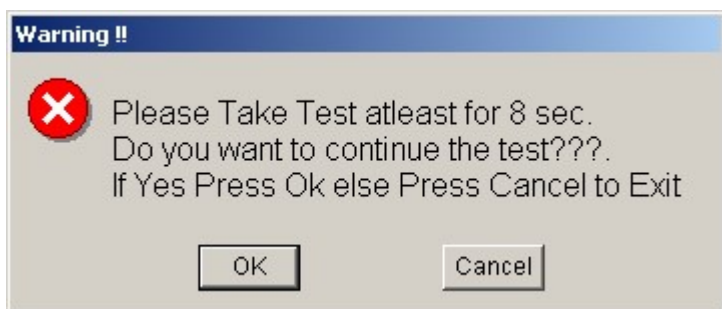


If there is noise on ECG traces because of loose electrode or some other reason, median calculations go wrong. Press electrode; wait till traces get stabled and then press '**Relearn**' button to recalculate the medians.

7. Record test.



By pressing the '**Record test**' button you can directly go to review screen by completing the test. If this button is pressed before completing 8 sec of the test a message is displayed as shown in the fig 4.7.



Fg.4.7: Warning.

Press '**OK**' button to continue the test being conducted and to stop press '**Cancel**' button. If '**Cancel**' button is pressed this test will return to main screen and test will not be saved.

5. Reviewing a test-

To analyze the recorded data, select '**Review test**' from '**File**' menu or click on '**Review Test**' button on main screen. Refer (Figure 5.1).

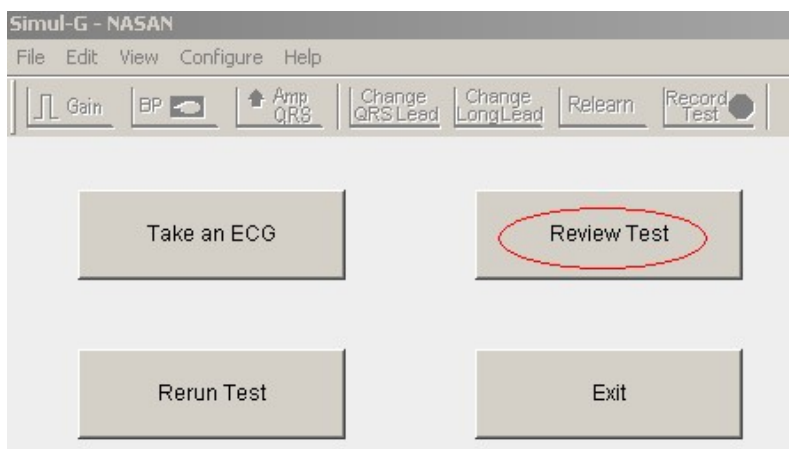
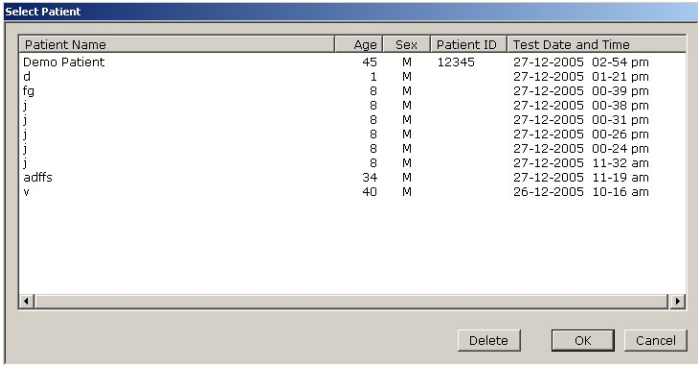


Fig.5.1: Main Screen.

Patient list as shown in fig. 4.2 is displayed. Select the patient to review and press '**OK**' button. Review screen as shown in fig. 5.3 is displayed.

You can delete the test by selecting the patient from the list and pressing '**Delete**' button. For multiple tests selection, select the patients using 'SHIFT' or 'CTRL' keys and then press the '**Delete**' button. The application will ask for confirmation before deleting the test.

If you click on '**Patient name**' button, then the patient files are sorted alphabetically (ascending or descending). If you click on '**Age**' button, then the patient files are sorted in either ascending or descending order according to age of the patient. Similarly, you can sort the patient files according to sex, ID and date by clicking on respective buttons.



The screenshot shows a window titled "Select Patient" containing a table with patient information. The table has five columns: Patient Name, Age, Sex, Patient ID, and Test Date and Time. The data is as follows:

Patient Name	Age	Sex	Patient ID	Test Date and Time
Demo Patient	45	M	12345	27-12-2005 02:54 pm
d	1	M		27-12-2005 01:21 pm
fg	8	M		27-12-2005 00:39 pm
j	8	M		27-12-2005 00:38 pm
j	8	M		27-12-2005 00:31 pm
j	8	M		27-12-2005 00:26 pm
j	8	M		27-12-2005 00:24 pm
j	8	M		27-12-2005 11:32 am
adffs	34	M		27-12-2005 11:19 am
v	40	M		26-12-2005 10:16 am

At the bottom of the window are three buttons: "Delete", "OK", and "Cancel".

Fig.5.2: Select Patient Screen.

Review screen has the following details,

- Medians of all 12 leads with ST levels.
- Median buttons with lead names to display zoom medians.
- Review control panel.

Review control panel displays the following information: -

- Cursor position time in mm: hh (Hours and Minutes) format.
- Heart rate in bpm.
- Blood pressure in mmHg.

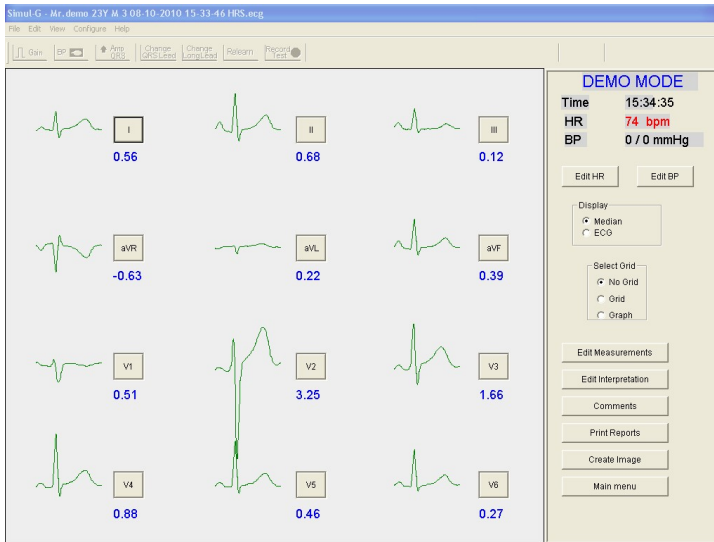


Fig.5.3: Review Screen.

Review control panel has the following buttons on it: -

1. Edit HR

'**Edit HR**' button to enter the heart rate at current time position.
Dialog box as shown in fig 5.4 is displayed. Enter new Heart rate and press ok to save.

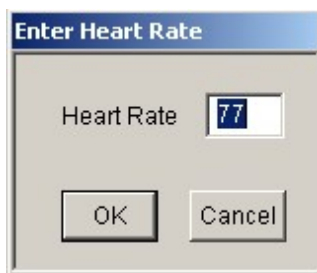


Fig 5.4: Edit heart rate.

2. Edit BP

Use this button to edit the blood pressure at current time position. Dialog box as shown in the figure 5.5 is displayed. Enter systolic and diastolic BP values and press OK to save values.



Fig 5.5: Edit BP.

3. ECG

To view ECG, press the button '**ECG**' present on control panel. A screen as shown in the fig 5.6 will appear.



Fig.5.6: ECG.

4. Grid or Graph.

To draw the grid or graph on the screen, click on the 'Grid' or 'Graph' buttons respectively, provided on the control panel. It draws grid or graph on the medians if '**Median**' screen is selected or on '**ECG**' screen.

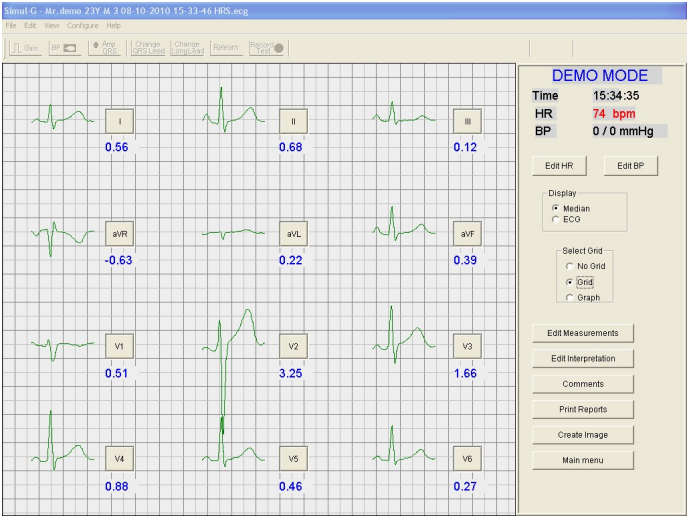


Fig.5.7: Grid.

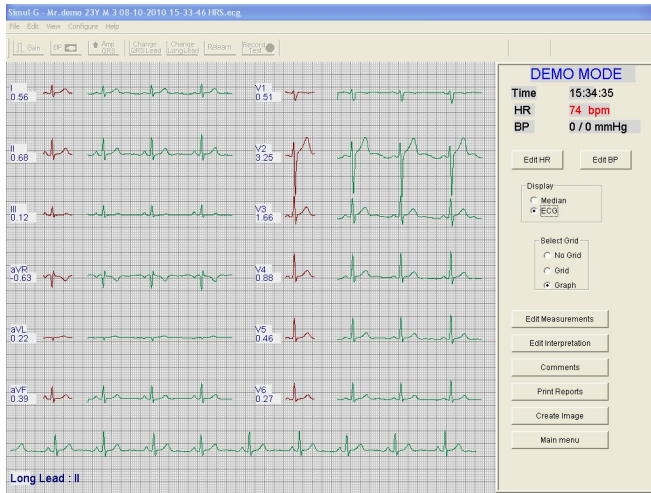


Fig.5.8: Graph

5. Edit Measurements

Press the 'Edit Measurements' to edit the information of axis and duration button on the review panel. '**Edit Duration and Axis**' dialog box will be displayed as shown in figure 5.9.

Edit the required values and press the 'OK' button to save the changes. After editing the P-QRS-T values, if we want to display the original values calculated by software then press 'Reset Measurement' button it will display the original value.

Fig. 5.9: Edit Duration and Axis

6. Edit Interpretation

Press the 'Edit interpretation' button. '**Edit Interpretation**' dialog box will be displayed as shown in figure 5.10.

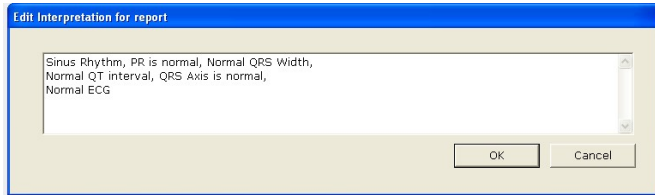


Fig.5.10: Edit Interpretation

Edit the required interpretation and press the 'OK' button to save the changes. This modified interpretation will be printed on report.

7. Comments

To enter the comments to be printed on the reports, press the '**Comments**' button on the review panel, the 'Comments' dialog box will be displayed as shown in the figure 5.11.

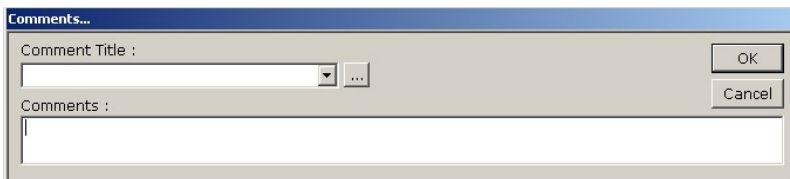


Fig.5.11: Comments

Enter the comments in the '**Comments**' edit box. If Comments must be added from the 'Standard Comments list' then select the title from the 'Comment Title', a dialog as shown in the figure 5.12 will be displayed.

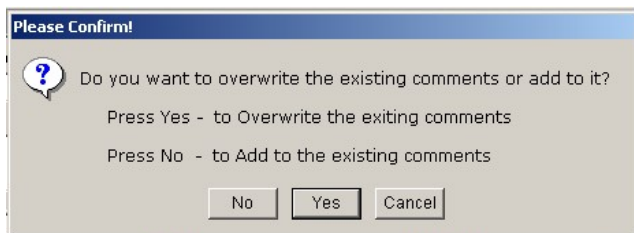


Fig.5.12: Confirmation

If '**Yes**' button, is pressed then the existing comments will be overwritten with the comments of the selected comment title.

If '**No**' button is pressed, then the new comments will be added to the existing comments.

8. **Print Reports**

For printing the reports go to the '**File**' menu and select the '**Print**' option or press the '**Print Reports**' button on the review panel. '**Select report for printing**' dialog box will appear on the screen.

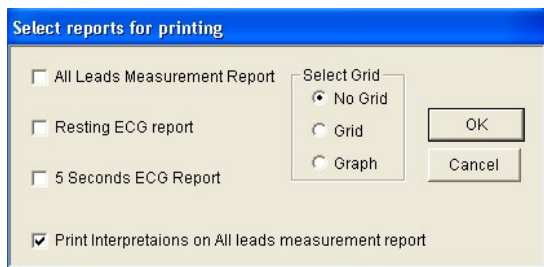


Fig.5.13: Select report for printing.

Select the report to be printed by checking the check boxes. Click on the desired grid option for printing grid on the report. Interpretation printing status selected in configuration will be shown here. You can select or deselect this option for current reports. Press the '**OK**' button to print the report.

9. Create Image

When the '**Create Image**' button is pressed the 'Create Image' dialog box will be displayed as shown in the figure 5.14.

Select the report and desired grid option. Press browse button to select the location to save the GIF image. Press OK button. Then GIF image file of the selected report at selected location will be created.

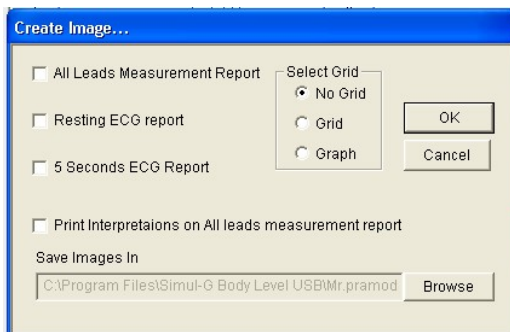


Fig.5.14: Create BMP

10. Zoom Median

To view the zoom median screen, press the zoom median lead button of the respective lead, which you want to measure. A Zoom median screen as shown in the figure 5.15 will appear on the screen.

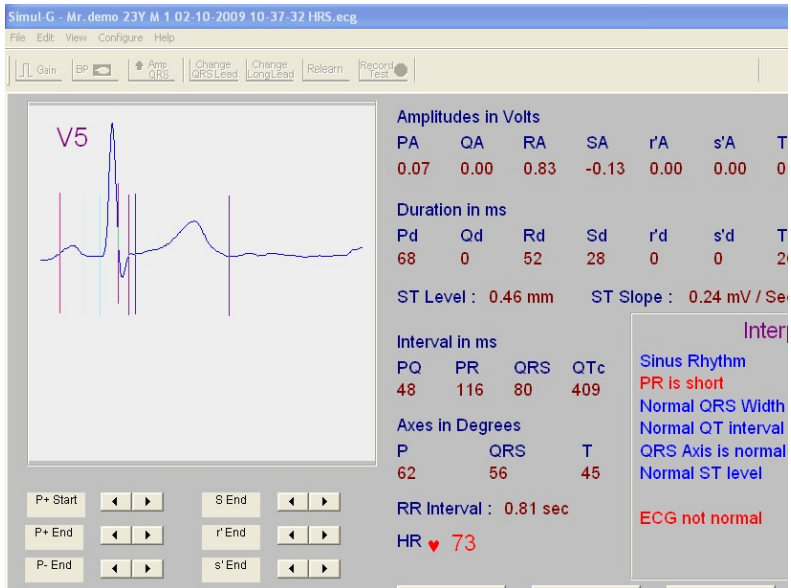


Fig.5.15: Zoom median

This screen contains measurement of the selected leads such as

- Amplitude in mV,
- Duration in ms,
- ST Level,
- ST Slope,
- Intervals in ms,
- Axes in degrees,
- RR Interval,
- Heart rate,
- Spin buttons to move the different cursor to mark the fiducial points. The voltage at that corresponding point is displayed at the right corner of the ECG window, while moving the spin button.

- Save radio buttons to save the changes made for the Current Lead or All Leads,
- Grid, Graph or No Grid option to draw grid, graph or no grid respectively, on the median.
- Displays following Interpretation results
 - Rhythm statements
 - Sinus Rhythm / Junctional or NonSinus Rhythm suspected / Sinus Bradycardia / Sinus Tachycardia
 - PR interval statements
 - PR is normal / PR is long / PR is short
 - QRS interval statements
 - Normal QRS Width / Wide QRS
 - QT interval statements
 - Normal QT interval / QT Interval is prolonged / QT Interval - Little clinical significance
 - QRS Axis statements
 - QRS Axis is normal / Right axis deviation / Left axis deviation / QRS Axis is indeterminate
 - ST abnormalities statements
 - Normal ST level / ST Elevation / ST Depression
 - T wave inversion
 - Lead names of leads showing T wave inversion

➤ RR Interval button.

When this button is pressed long lead 8 sec of ECG data of selected Long Lead will appear on the screen as shown in the figure 5.16 below.

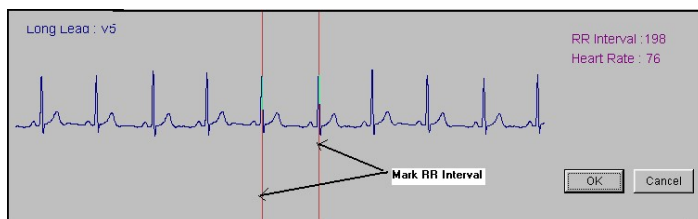


Fig.5.16: RR Interval.

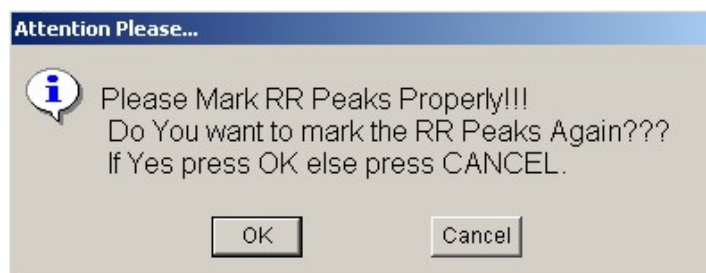


Fig.5.17: Error in marking RR peaks.

Press OK button to mark RR Peaks again from the screen, cancel button cancel the RR Interval calculations.

➤ If the median complex displayed is not proper, then press the '**Select Complex**' button. The ECG of the lead will be displayed as shown with cursor. Select the complex and press the OK button.

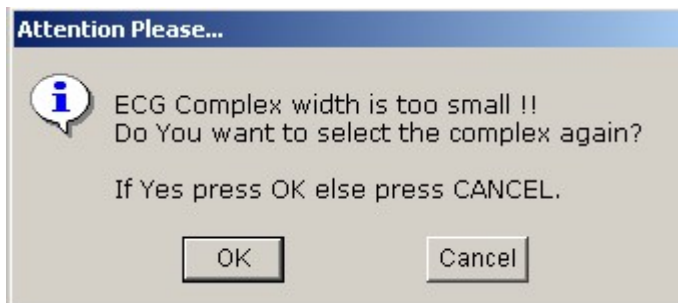


Fig.5.18: Error in selecting the complex

Press OK button to select the complex again, cancel button to exit the screen without saving the changes.

- Fiducial point button: When this button is pressed following dialog box will be displayed as shown in figure 5.19

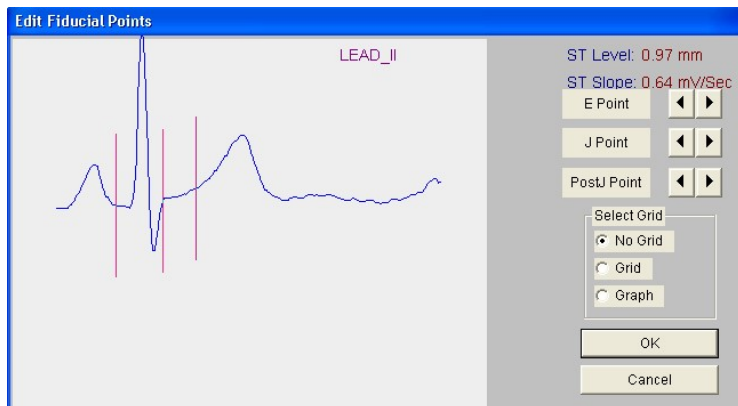


Fig.5.19: Edit fiducial point

- E, J and post-J points can be edited using arrow keys on the screen.
- Click on the Grid or Graph or No Grid buttons to display the Grid or Graph or No Grid on the screen.
- Press OK to view zoom median screen.

- OK button to exit from zoom median screen by saving the changes in the test.
- Cancel button to exit the screen without saving the changes.

11. Main Menu.

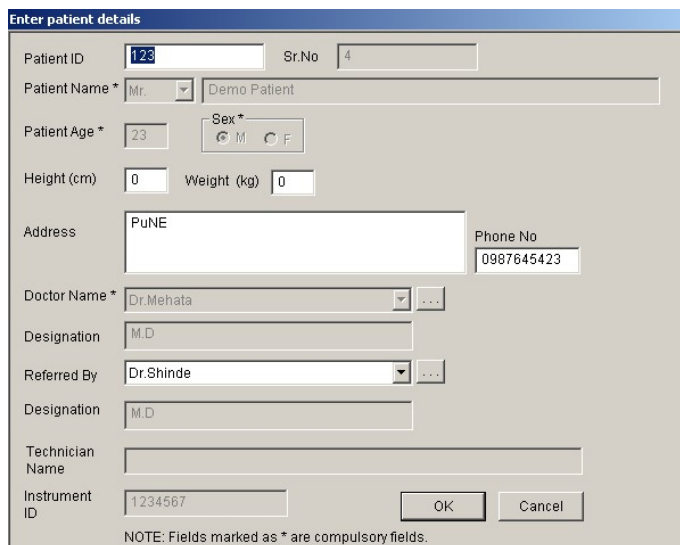
To move to main screen press the '**Main Menu**' button.

12. Edit Patient Details.

To alter patient details go to '**Edit**' menu and press '**Patient details**' option. A dialog box as shown in fig.5.20 is displayed on the screen.



Fig.5.20: Edit Menu.



Enter patient details

Patient ID Sr.No

Patient Name *

Patient Age * Sex * ☐ M ☐ F

Height (cm) Weight (kg)

Address Phone No

Doctor Name * ...

Designation

Referred By ...

Designation

Technician Name

Instrument ID

NOTE: Fields marked as * are compulsory fields.

Fig.5.21: Patient detail dialogue box.

Press 'OK' button to save the changes.

13. Help



Simul-G version can be view from Help option.

14. Save test for back up

You can save the test for backup with the help of 'Save test for back up' option from 'File' menu. The test can be saved on the hard disk for later referring purpose. On clicking this option the screen as shown in

fig 5.22 is displayed. Select the folder in which you want to save the test, edit the name of the test and press the '**Save**' button to save.

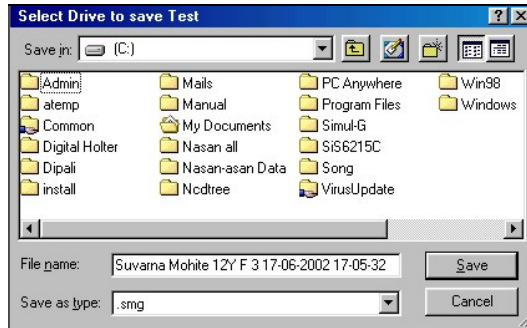


Fig.5.22: Save test.

9. Review saved test.

To review saved test, go to file menu and press 'Review saved test' option. A dialog box as shown in the fig 5.23 will appear on the screen.

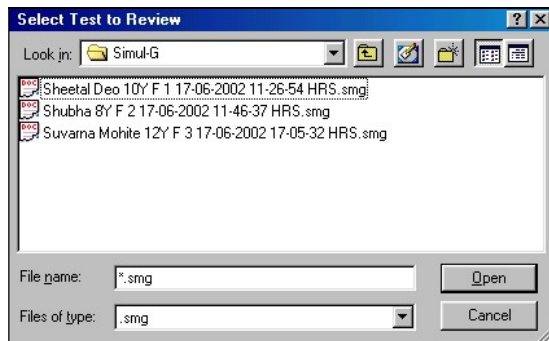


Fig.5.23: Select test to review dialog box.

Select the test you have saved and press '**Open**' button of the dialog box.

11. Print setup.

For setting the properties of the printer go to '**File**' menu and then select '**Printer setup**' option.

- Set following properties for the printer-
 1. Landscape Mode
 2. Print quality to 'BEST'
 3. Page size to 'A4'.

- To set the printer-
 1. Go to Windows "**Start**" menu.
 2. Select "**control Panel**" option.
 3. Select "**Printer**" option.
 4. Right click on the printer icon and select '**Properties**' option.

6. Rerun test-

If the test was unfortunately terminated by power failure or any other reason press the '**Rerun test**' button on the main menu screen or select '**Rerun test**' option from '**File**' menu. It is demonstrated in the fig 6.1.

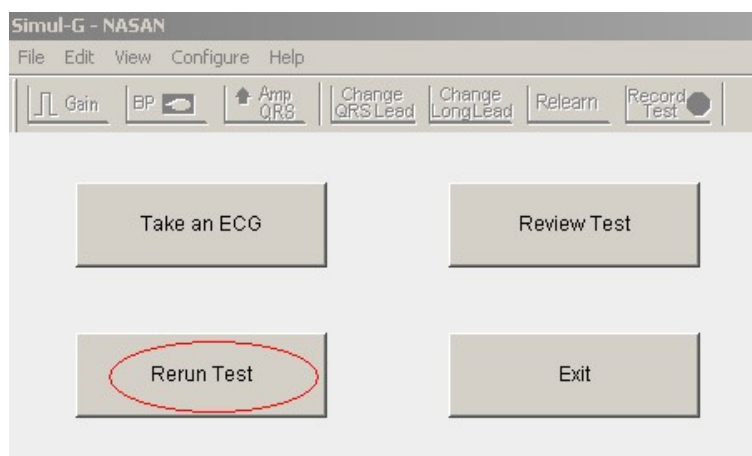
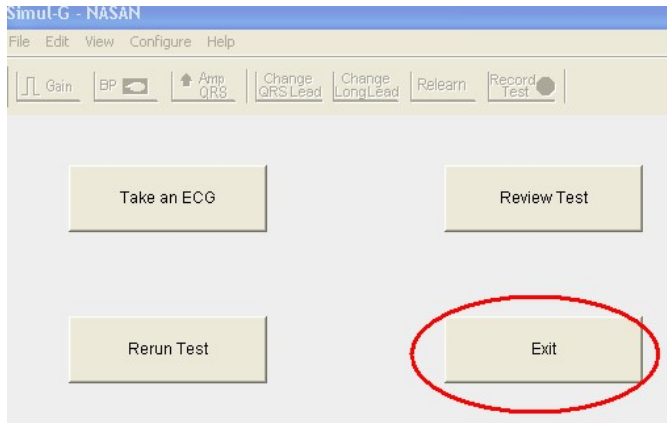


Fig. 6.1: Main screen.

Press '**OK**' button to start same test again.

7. Exit test-

To exit from software press '**Exit**' button on the main menu screen or select '**Exit**' option from '**File**' menu.



8. Trouble shooting-

❑ **Traces are not coming?**

Restart the system. Check all the connections. Contact the NASAN service engineer.

❑ **Traces coming as straight lines?**

Check if the patient cable connection is proper or not.

❑ **Medians are coming as straight lines?**

This will happen if the QRS detection lead is having very short R waves. Click '**Amp QRS**' button in toolbar to amplify QRS lead for calculations.

❑ **Heart rate not coming?**

This will happen if the QRS detection lead is having small R waves. Click '**Amp QRS**' button in toolbar to amplify QRS lead for calculations.

❑ **Printouts not coming or printing junk?**

Check if proper printer driver is installed and do the printer settings as described in installation dialog.

- ❑ **If Unit is not connected to USB port of PC, following message is displayed**



Check if unit is connected properly or not,

Remove USB cable from PC and reconnect it to another port or same port.

Check driver required for Simul-g unit is installed properly or not? If not Refer driver installation procedure,10 Appendix-C

- ❑ **When 'Record Test' button on acquisition screen is pressed following message is displayed**












After pressing 'OK' button, Review screen will be displayed.

9. APPENDIX-A


Note: This product should be used by trained person only.

A. SYMBOL description

Symbol	Description
 CAUTIONS:	Cautions indicate conditions which may damage or malfunction of the device.
WARNINGS:	Warnings indicate a potential harmful condition that can possibly lead to injury or death.
Note:	Note: Alert the user to pertinent fact and conditions.
Mfg. .Lic.No	Manufacturing license number
	Manufacturer symbol,
	Medical Device
	Type CF applied part
	Serial number

	Keep dry
	Dispose of in accordance with the requirements of your state
	Instruction for use
	Medical device that has not been subjected to a sterilization process.

Classification Of Applied parts

Applied part	Degree of protection against electric shock
Patient Cable 10 Lead	CF 

B. EARTHING-

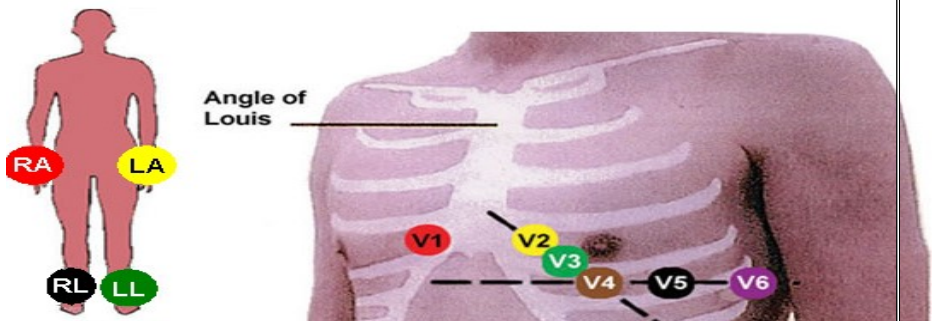
The Earthing for the system should be proper. This is to ensure patient's safety and for no interference of line voltage fluctuations. For correct earthing procedure, get it done and approved from licensed electrician only. If the earthing is not proper, leakage currents may pass from the amplifier to ground through the patient. If the current magnitude is large, it can be harmful for the patient.

C. Patient preparation -

Proper patient preparation is the most important factor in obtaining proper results from a Simul-G system. If electrodes are applied to improperly prepared skin site, it may result in excessive base line shift and severe artifact while obtaining an ECG. The skin at 6 chest leads and 4 limbs leads sites has to be prepared.

D. Electrode placement-

- Apply some jelly to the electrode site and thoroughly rub the site with gauze till it becomes slightly red. This removes the horny non-conducting layer of the epidermis enabling a good electric contact with the body fluids.
- Inspect both the limb clamp and Bulb electrodes to ensure that both are clean
- Ensure that the patient data cable and the lead wires are not twisted
- Apply a thin layer of electrolyte gel to the area of the skin where the electrode will be applied. The skin area covered by the electrolyte gel should not exceed the diameter of the electrode.
- The skin must be clean, dry and completely free of jelly for the electrodes to remain well in position till the end of ECG acquisition.



RA (Red)	Right Arm
LA (Yellow)	Left Arm
RL (Black)	Right Leg
LL (Green)	Left Leg
V1	Fourth inter costal space to the right of sternum
V2	Fourth inter costal space to the left sternum
V3	Directly between leads V2 & V4
V4	Fifth inter costal space at midclavicular Line
V5	Level with V4 at anterior axillary line
V6	Level with V5 at midaxillary line.



CAUTION:

When applying the precordial electrodes, do not overlap the electrolyte gel of adjacent electrode sites. Overlapping electrolyte gel will cause interaction between electrode sites, and may result in distortion of the ECG signal

WARNING: Always clean and disinfect reusable electrodes before patient use. Failure to properly clean and disinfect reusable electrodes before patient use may cause infectious materials to be transferred between patients.

WARNING:

Always clean and disinfect the ECG machine after patient use. Wipe the external surface of machine with soft cloth.

NOTE

NASAN recommends that only properly qualified service Personnel with the proper equipment attempt soldering on multilayer and surface mount circuit boards.

WARNING:

Report generated from Simul-G software must be reviewed by qualified physician before giving any treatment to patient

CAUTION

Refer servicing for equipment under warranty to NASAN authorized service personnel. Any attempt to repair equipment that is under warranty may void that warranty.

CAUTION

When handling printed circuit board, remember to take static precautions.

CAUTION

Solder multilayer and surface mount circuit boards at your own risk! Improper methods of repairing these boards may damage boards even further.



CAUTION

PROPER LEADWIRE CONNECTION —

improper connection will cause
inaccuracies in the ECG.

E. Cleaning Instruction:

To clean reusable electrodes and patient cable:

- a. prior to cleaning the patient data cable, inspect the patient data cable for any cracks or breaks in the cable insulation. If the integrity of the patient data cable is not assured, replace the patient data cable.
- b. Detach the rubber bulb from the metal cup by pulling. Wash the rubber bulb in warm water. Remove all electrolyte gel residue, check inside the rubber bulb to ensure that all residue is removed.
- c. Dampen a soft cloth with soapy water or with one of the disinfectants or cleaning agents listed below

Approved Cleaning Solutions

- a. Mild soap and water
- b. Isopropyl alcohol (consisting of 70% solution)

CAUTIONS: Do not use strong solvents or abrasive cleaning materials. Do not use any of the following to clean the machine:

- a. Acetone
- b. Iodine-based cleaners
- c. Phenol-based cleaners
- d. Ethylene oxide sterilization
- e. Ammonia-based cleaners

The Simul-g machine, bulb and clamp electrode and patient data cable should not be autoclaved, ultrasonically cleaned, or immersed.

F. Specification

1. Dimension and Weight

Dimension (in mm) (L x B x H) : 105X65X40 mm

Weight (in Kg) : 150gm

2. Environmental

Operating Temp : 0 °C to +50 °C

Operating & Storage : 0 to 95 % non-condensing
Humidity

3. Power supply

Input : USB powered

Power consumption : < 10 Watt

4. Performance

Display : 1024 x 768 pixels,

Language : English

5. Acquisition

Frequency response : 0.05 Hz to 100 Hz with
notch at 50Hz

Filter : DSP

Input impedance : 10 MΩ

Time constant : > 3.2 sec

A/D conversion : 12 bit

Noise	: < 20 μ V _{p-p}
Leakage current	: < 10 μ A
Patient isolation	: Optical isolation.
Gain	: 5, 10 & 20 mm/mV
selectable.	
CMRR	: > 120 dB
Sweep speed	: 25.0 mm/S.
Accuracy of HR	: +/- 2 BPM.
Sampling Frequency	: 250 samples per second
simultaneous	
Storage	: 12 lead unaveraged ECG,
10 second Rhythm strips	
	of 12 leads, Medians after
every 8 sec along	
	with HR, BP and fiducial
points,	
Printout	: Manual printing with grid
	On/Off facility, print Colour
	reports

Detailed features

❖ Acquisition

- Body level acquisition of 12 lead ECG
- Simultaneous acquisition of 12 Leads of ECG @ 250 samples per second per channel with ADC resolution of 12-bit.
- Frequency Response – DSP filter of 0.05 to 100Hz with notch at 50Hz

- Facility to store 12 lead Unaveraged ECG
- Facility to Rerun test
- Automatic detection of P+ start, P+ end, P – end, Q start, R Start, R end, S end, r' end, s' end, T Start, T End, U start, U end points on the median once.
-

❖ **Acquisition display**

- Display of 4 seconds of ECG traces of 12 leads with standardization pulse and corresponding medians next to each lead
- Display HR
- Display long lead, QRS detection Lead, BP and gain
- Leads-Off detection with a message indicating the lead during the test.

❖ **Acquisition settings**

- Relearn the median template
- Gain: 0.5, 1.0, 2.0 mV/cm
- Facility to change long lead, QRS detection lead and amplify QRS lead

❖ **Review display modes**

- Review data of selected patient
- 12 medians screen: 12 medians are displayed with ST-level
- Resting ECG display: 2.5 sec all leads with medians and 10 sec of long lead.
- Zoom Median:
 - Display the amplitude in volts of all fiducial points
 - Displays following **ECG interpretation**
 1. Rhythm statements
 - a. Sinus Rhythm / Junctional or NonSinus Rhythm suspected / Sinus Bradycardia / Sinus Tachycardia
 2. PR interval statements
 - a. PR is normal / PR is long / PR is short

3. QRS interval statements
 - a. Normal QRS Width / Wide QRS
 4. QT interval statements
 - a. Normal QT interval / QT Interval is prolonged / QT Interval - Little clinical significance
 5. QRS Axis statements
 - a. QRS Axis is normal / Right axis deviation / Left axis deviation / QRS Axis is indeterminate
 6. ST abnormalities statements
 - a. Normal ST level / ST Elevation / ST Depression
 7. T wave inversion
 - a. Lead names of leads showing T wave inversion
- Facility to edit fiducial points (E, J, Post J) of selected median
 - Display duration of P,Q,R ,S,T in ms
 - ST level and ST slope
 - Display intervals of PQ,PR,QRS,QTC in ms and axes in degree of P,QRS and T
 - Display RR interval and HR
 - Facility to change P+ start, P+ end, P – end, Q start, R Start, R end, S end, r' end, s' end, T Start, T End, U start, U end points.

❖ **Review settings**

- Grid/Graph/No grid option on all review screens
- Facility to edit HR and BP of any stage
- Facility to edit Patient Details
- Create the bitmap (GIF) of the selected report/s and save at selected location
- Facility to backup patient data and review saved data.
- Facility to Edit interpretation
- Facility select / deselect printing of interpretation

❖ **Reports**

- Resting ECG report

- 12 leads(All leads) measurement report with interpretation
- 5 seconds ECG report

❖ **Settings**

- Hospital details
- Referring Doctor list
- Standard comment
- Simul-G system configuration
- Printing details configuration

*Due to our continuous product improvement programme, features can be enhanced

G. Supplies and Accessories: List of Accessories

NOTE: Do not store any consumables after its expiry date.

Sr. No.	Material Name	Qty.	
1.	Patient Cable 10 Lead	1	Detachable
2.	Simul-G unit	1	-
3.	User manual	1	-
4.	ECG Bulb Electrode [Pack of 6Nos]	1	Detachable
5.	Clip-On Electrode [Pack of 4Nos]	1	Detachable

Warning:

Use only the patient cable and accessories as supplied. Substitutions may cause the ECG machine to function improperly. If you wish to replace the accessories, then contact our Service personnel (Refer Service Information)

H. Maintenance

Material name	Recommended frequency	Maintenance details reference
ECG Machine	weekly	Refer Appendix-A - Warning point E <u>Cleaning Instruction</u>
Reusable Patient cable	After each patient use	Refer Appendix-A and point E <u>Cleaning Instruction</u>
Reusable Electrode Cleaning	After each patient use	Refer Appendix-A Warning and point E <u>Cleaning Instruction</u>

I. Environmental protection

❖ **Disposal of the Equipment:**

Then dispose of the device and supplies in accordance with your state regulations.



NOTE:

Disposal of the product: The product described in this user manual must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

J. Servicing Information

Service life of machine is 7 years.

Warning:

Authorized personnel should only open this device as there are no user serviceable parts inside.

For servicing contact an authorized NASAN Medical Electronics Pvt. Ltd. Service Engineer.

Contact us:

All INDIA SERVICE (Mobile) : 09371039255

Email address : service@nasanmedical.com

Website : www.nasanmedical.com

10.Appendix -B

❖ Defragmentation

Defragmentation of the hard disk is a recommended job to do at least once in 3/4 months. This is because as the number of tests conducted get increased doctors starts deleting the tests.

The tests are stored randomly on the hard disk. This creates delay to open any of the applications. By Defragmentation of the hard disk all the files are arranged in sequence. Thus helps in making PC faster.

Following steps can do this,

- Click '**Start**' button
- Go to '**Program**' then '**Accessories**'
- Go to '**System Tool**'
- Select '**Disk Defragmentation**'

After selecting the Defragmentation option it asks for the drive to select. Select the drive as per your requirement and click the '**OK**' button of that screen. As soon as the button is clicked, Defragmentation starts and the dialog box as seen in the fig 9.1 below will appear on the screen.

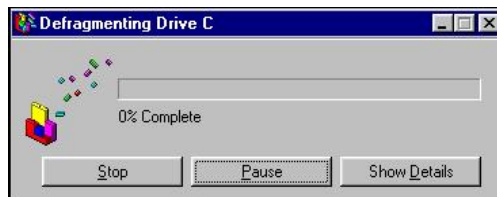


Fig.9.1: Defragmentation.

This will take several hours to complete as per the data stored in the Hard disk.

NOTE: - Please do not perform any application till Defragmentation is being done.


❖ Software Installation:

NOTE:

Software link on NASAN website is <https://nasanmedical.com/download-centre.html>
Whenever you download the software from NASAN website, ensure that WINZIP software is installed on customer PC.

After downloading the software from NASAN website, it is in zipped folder then unzip (For unzip WINZIP software is required) it, then install the software

To install the Software in PC, follow the steps mentioned below:

- Run '**Setup**'  **SimulGSetup Ver 7.0 10-3-2021** and follow the installation steps as shown below in figure

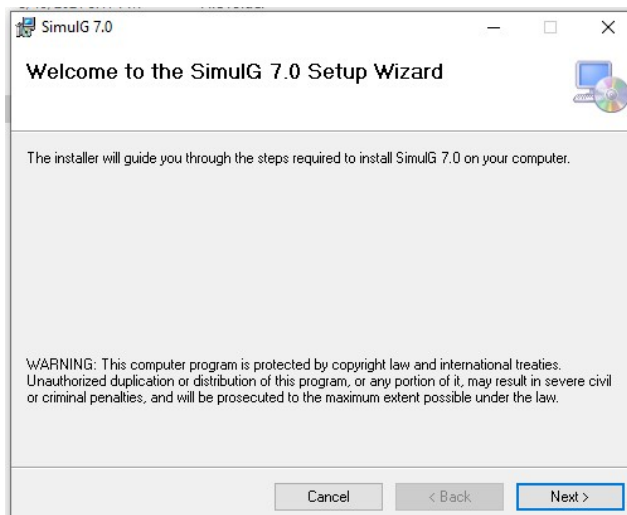
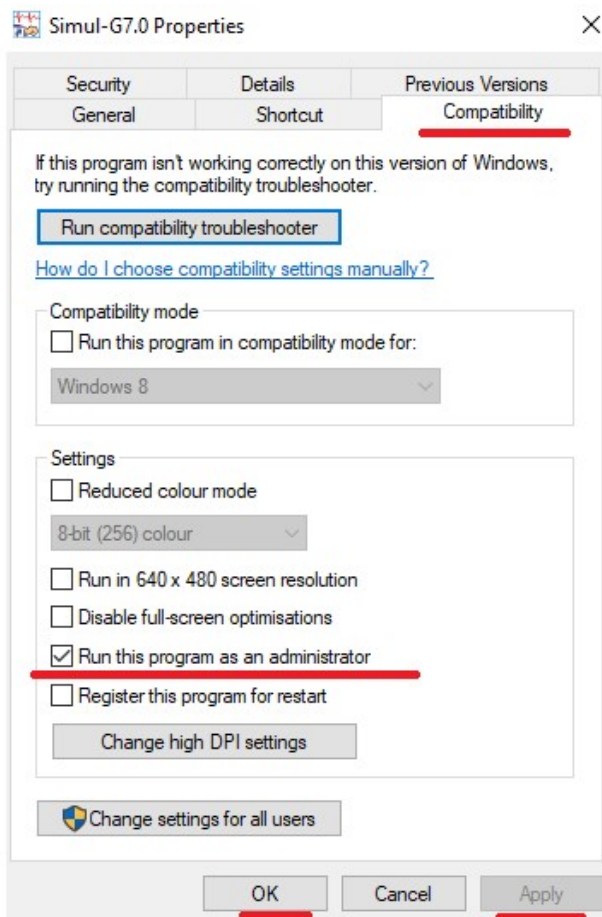


Fig: Installation setup.

Once installation is complete then right click on desktop icon Go to properties and select compatibility tab. Select Run this program as an administrator as shown below.



- Double click on the icon on the desktop to run the software.

11.Appendix -C

❖ Driver Installation Procedure

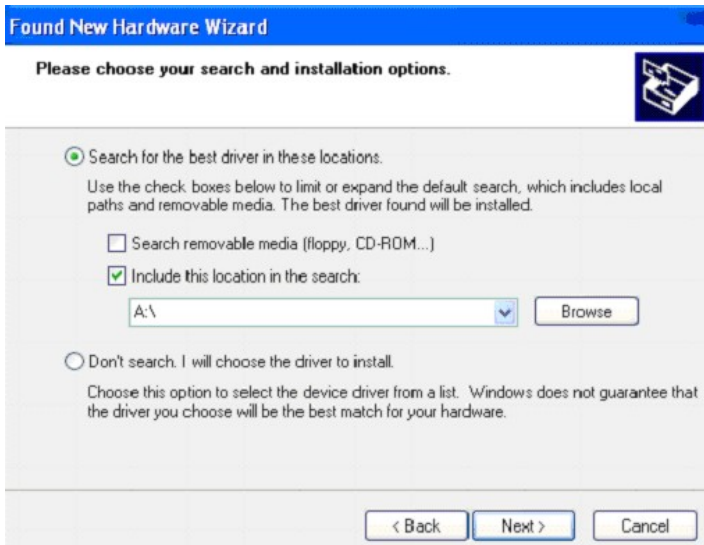
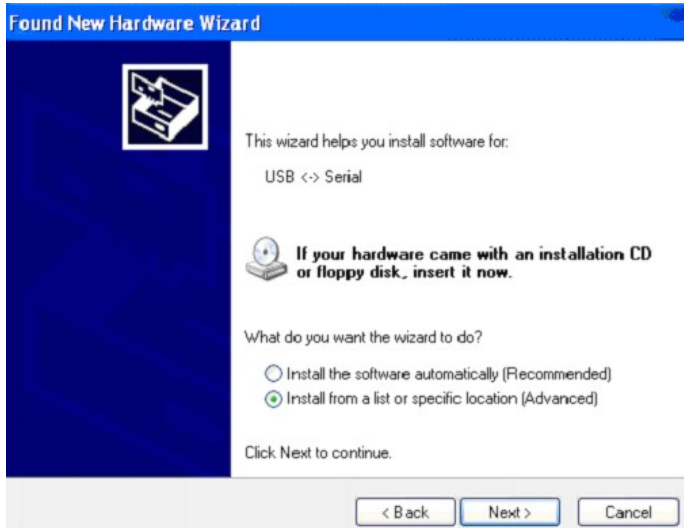
Note: copy SIMUL_G software and FTDI driver for all OS to desktop or any drive(drive D or drive E) from \Utility\FTDI driver for all OS to install it on PC

1. Initially install Simul-G USB software on your PC or LAPTOP.
2. Connect Simul-G(USB) unit to USB Port of LAPTOP or PC.
3. Power ON LED on the unit will glow.
4. Following message will be displayed at the bottom right side corner on the PC screen.



5. The following dialog box will be displayed on the screen.
6. Follow the instruction on wizard to continue the installation.



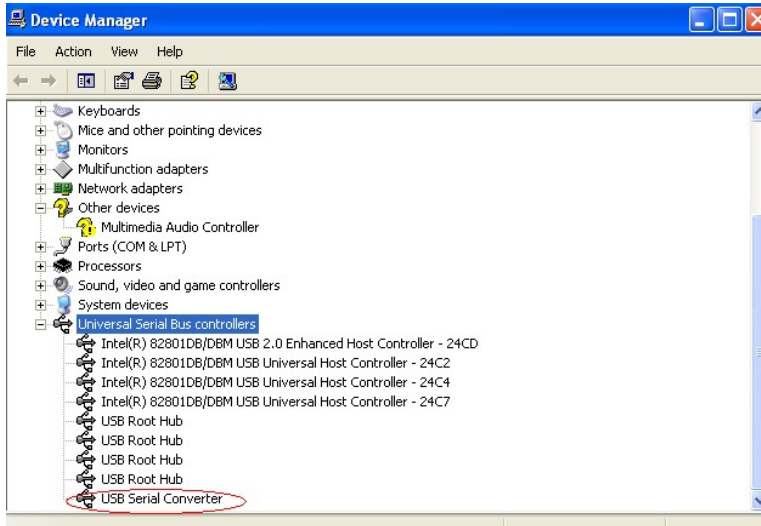


7. Click the Browse button and give the FTDI driver path **from copied drive** to install it on PC OR Laptop.
8. Click NEXT button.



9. By examining the **device manager** located in **control panel** then select the **Hardware** tab and click **device manager**. The

device appears as a “USB serial converter” as shown below. Thus driver installation is complete.



10. Double click on Simul-G (latest version software) U icon on the desktop. The acquisition screen will be displayed.