

SimXray (2.5.1-7)

Instructor Instructions

SimXray

(2.5.1-7)

Forward:

SimXray(2.5.1-7) is a computer simulation designed to provide students with a platform in which they may manipulate the technical factors necessary for the production of the radiographic image. SimXray is implemented in the Windows environment, with a graphics display of 1024 x 768-pixel resolution with a True Color display. The system, on which SimXray is operated, **must** be set up for the display of at least True Color (24 bit) colors.

Radiographic images and photographs have been digitized for incorporation into the program. The GUI (Graphical User Interface) allows the user to select and manipulate the technical factors necessary to produce a radiographic image. Utilizing the mathematical interrelationships of milliamperage, seconds, kilovolts peak, source-image detector-distance, object-image detector-distance, screen speed and grids, to radiographic density, contrast, patient exposure, and patient thickness, the user may produce and visualize the results.

The program design allows for the simulated manipulation of technical x-ray factors enabling the user to select from over 100 different radiographic projections, requiring a variety of technical factor manipulations. The user is presented with the Ideal radiographic image, to match through the selection of correct (acceptable) factors. This display allows the user to make visual comparisons of the effects of manipulating radiographic technical factors and their effect on the radiographic image.

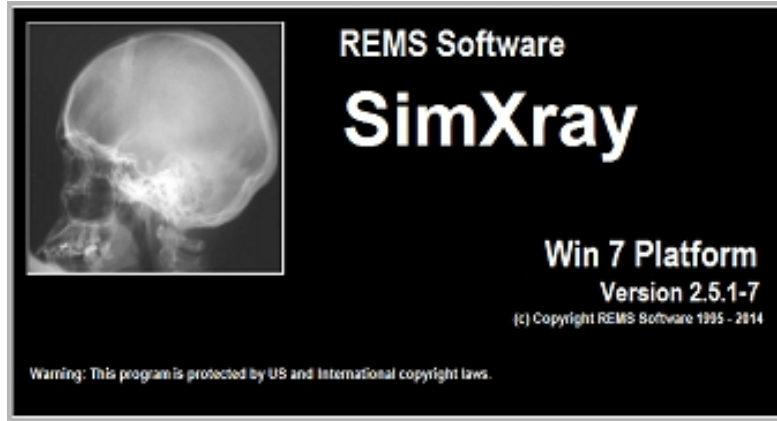
This computer simulation is an effective tool in the education of the user of diagnostic x-ray equipment. It allows the user to practice changing technical factors for the production and manipulation of radiographic images without the expense and supervision required in an energized laboratory or clinical setting.

HOW TO USE SimXray

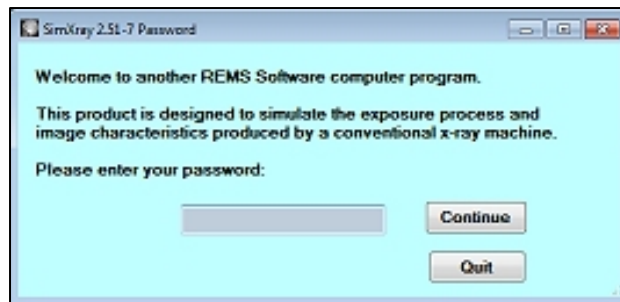
1. Get started by double clicking the **SimXray** icon.



2. Next, the SimXray splash screen is displayed, followed by the Title window.



3. When the program Title window opens the user is presented with the Password window.



4. The user must enter the correct password utilizing the keyboard.
The letters of the password, when typed, appear as #### symbols, for security.

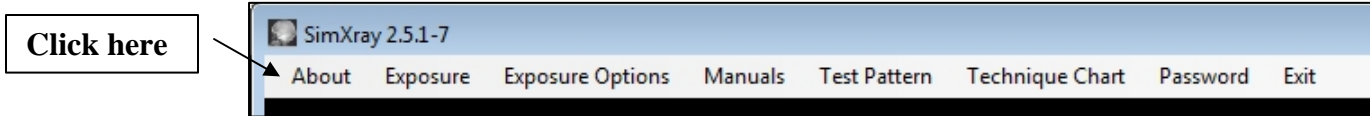
After entering the password, click the **Continue**. The password is required to access the Technique Chart.

Instructor Password = **EgBdF25**

*Student Password = **simxray**

*students do not have access to the Technic Chart

2. Move the mouse cursor (arrow) to the word **About**. Click on the word.

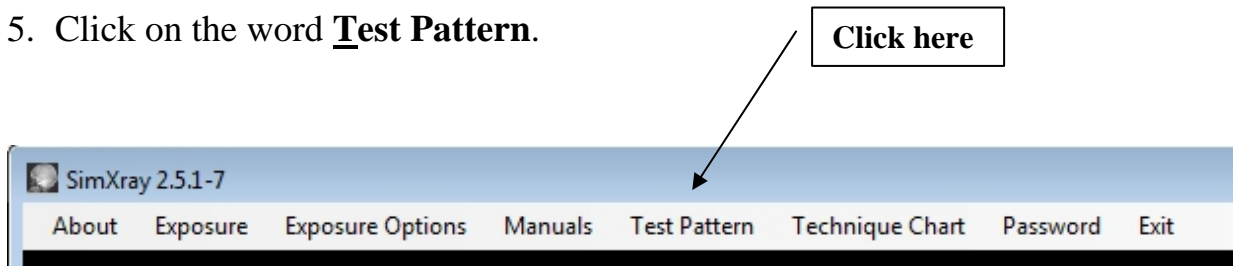


The copyright notice and information about REMS Software are shown.

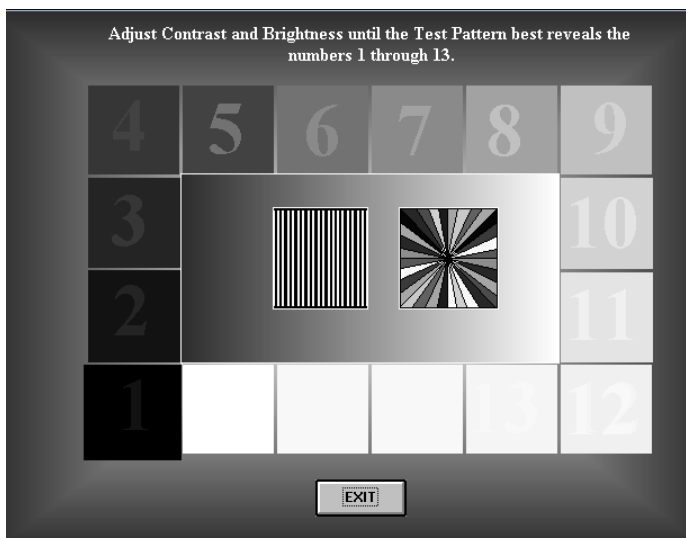


Move the mouse cursor to the **OK** button, and click the mouse.
The message window closes.

5. Click on the word **Test Pattern**.



The SimXray Test Pattern window opens.



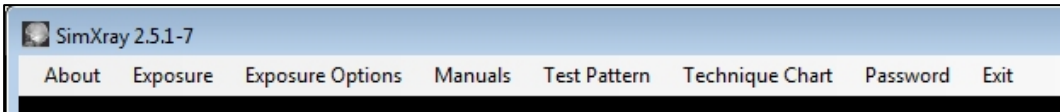
This screen allows the user to adjust the contrast and brightness of the monitor in order to optimize the visualization of the radiographs. This usually means decreasing the contrast and increasing the brightness of the display. It is advisable to perform this optimization process each time the program is run.

6. Click on the **EXIT** button when the adjustments have been made.

How to Use the Technique Chart

1. From the SimXray title screen, click on the **Technique Chart** in the top menu

Click Here



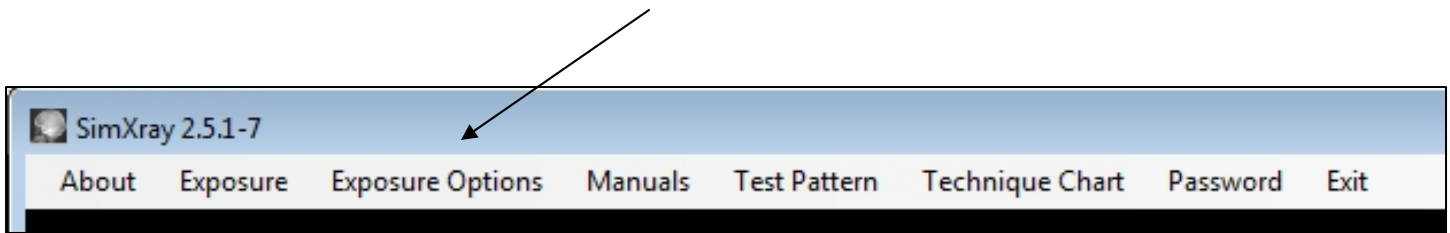
2. The Technique Chart is loaded with the SimXray Ideal default technical factors which come with the program.

A screenshot of the 'Technique Chart' window in SimXray 2.5.1-7. The window title is 'SimXray 2.5.1-7'. The main title is 'Technique Chart' in blue. Below it, the subtitle reads 'Technical Factors based upon centimeter measurements of average (sthenic) patients.' There is an 'Exit' button in the top right corner. The main content is a table with 11 columns: ID, Projection, Average Cm, mA, mSec, kVp, SID, Screen, Screen Factor, Grid, and Grid Factor. The table lists 23 different X-ray projections with their corresponding technical factors.

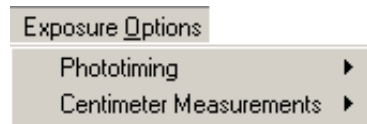
ID	Projection	Average Cm	mA	mSec	kVp	SID	Screen	Screen Factor	Grid	Grid Factor
1	ABDOMEN SUPINE	20	400	25	75	40	400 RE	4	12:1 L/F	1.2
2	ABDOMEN SUPINE (GAS)	20	400	25	70	40	400 RE	4	12:1 L/F	1.2
3	ABDOMEN UPRIGHT (GAS)	22	400	25	70	40	400 RE	4	12:1 L/F	1.2
4	ABDOMEN AP (PEDIATRIC)	12	400	25	85	40	400 RE	4	12:1 L/F	1.2
5	ANKLE AP	9	100	15	58	40	400 RE	4	NONE	6
6	ANKLE OBL	9	100	15	58	40	400 RE	4	NONE	6
7	ANKLE LAT	9	100	15	56	40	400 RE	4	NONE	6
8	BARIUM ENEMA AP	20	400	30	110	40	400 RE	4	12:1 L/F	1.2
9	BARIUM ENEMA OBL(1)	24	400	40	110	40	400 RE	4	12:1 L/F	1.2
10	BARIUM ENEMA SIGMOID	28	400	60	110	40	400 RE	4	12:1 L/F	1.2
11	BARIUM ENEMA LAT (RECTUM)	32	400	60	110	40	400 RE	4	12:1 L/F	1.2
12	BARIUM ENEMA PA (AIR)	20	400	30	110	40	400 RE	4	12:1 L/F	1.2
13	BARIUM ENEMA AP (AIR)	22	400	30	110	40	400 RE	4	12:1 L/F	1.2
14	BARIUM ENEMA OBL(1) AIR	24	400	40	110	40	400 RE	4	12:1 L/F	1.2
15	BARIUM ENEMA OBL(2) AIR	24	400	40	110	40	400 RE	4	12:1 L/F	1.2
16	BARIUM ENEMA DECUB (AIR)	20	400	30	110	40	400 RE	4	12:1 L/F	1.2
17	BARIUM ENEMA ERECT (AIR)	22	400	30	110	40	400 RE	4	12:1 L/F	1.2
18	BARIUM ENEMA POST EVAC	20	400	30	110	40	400 RE	4	12:1 L/F	1.2
19	BARIUM ENEMA RECTUM LAT (AIR)	32	400	60	110	40	400 RE	4	12:1 L/F	1.2
20	BARIUM ENEMA SIGMOID	28	400	60	110	40	400 RE	4	12:1 L/F	1.2
21	BARIUM ENEMA SIGMOID (AIR)	28	400	60	110	40	400 RE	4	12:1 L/F	1.2
22	BREAST CRANIOCAUDAD	12	100	250	23	24	MIN-R	1.9	NONE	6
23	BREAST LMO	12	100	250	25	24	MIN-R	1.9	NONE	6

Exposure Options: Phototiming

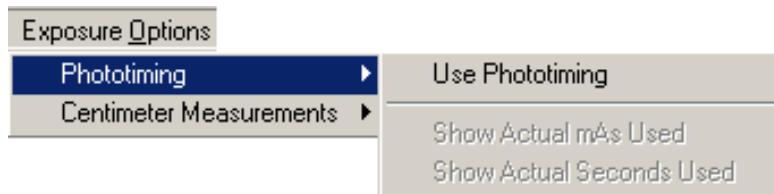
1. From the Main Menu, click on 'Exposure Options'



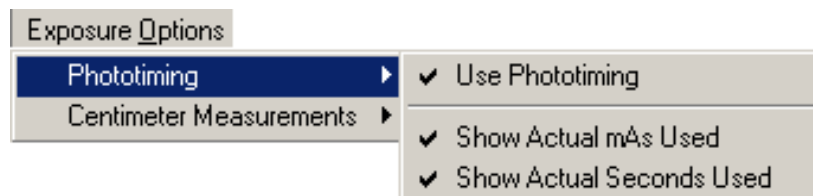
2. The Options for Phototiming and Centimeter Measurements are shown in a submenu.



1. Moving the mouse cursor over the Phototiming choice produces another submenu.
 - a. 'Use Phototiming' option is illuminated.
 - b. Show Actual mAs Used and Show Actual Seconds Used are not available until Phototiming is selected.



2. Clicking the 'Use Phototiming' choice selects Phototiming to be used in the Exposure window.
3. Clicking Exposure Options again and moving the mouse cursor over Phototiming shows that 'Use Phototiming' has been selected and illuminates the mAs and Seconds choices. They may now be selected to appear on the Exposure window.



Exposure Options: Centimeter Measurements

1. Follow the procedure on the previous page to open the Exposure Options menu.



2. The default setting for Centimeter Measurements is 'Use Average Centimeter Measurements'
3. To change to 'Use Random Centimeter Measurements' click that choice. The selection will change to the new setting

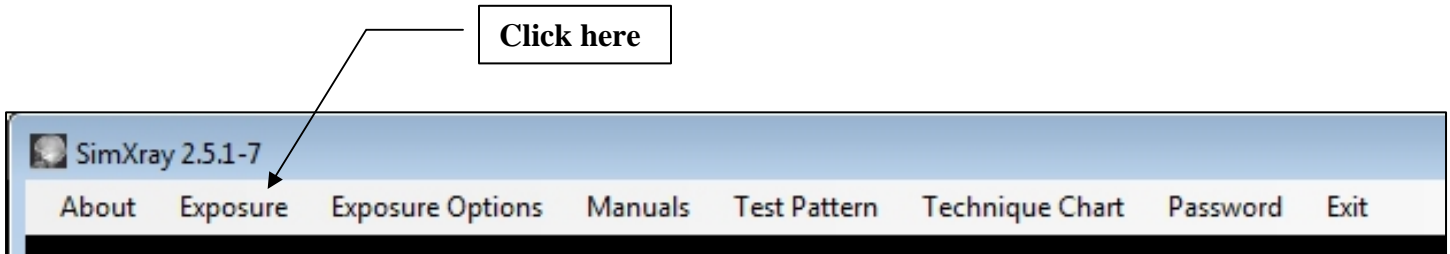


Average Centimeter Measurements are taken from the Technic Chart for the selected projection.

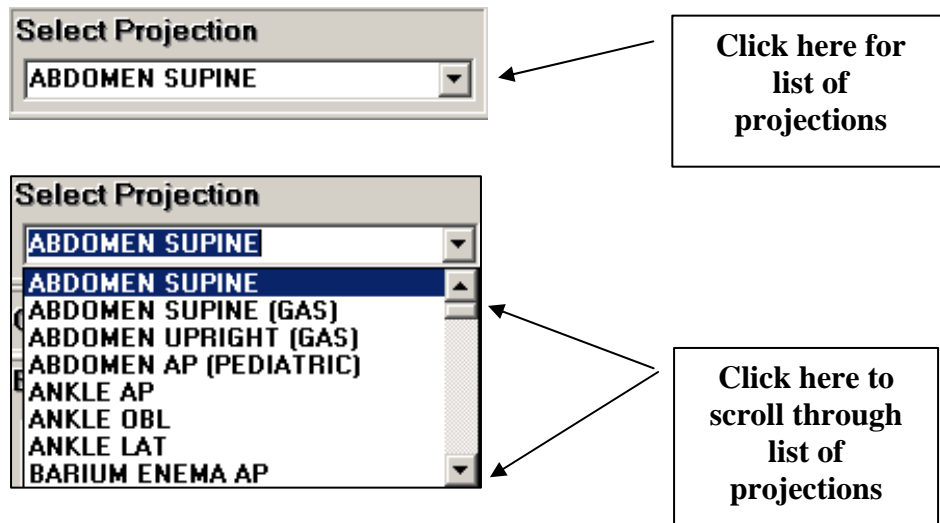
Random Centimeter Measurements are calculated within a range of plus or minus 25% of the Average Centimeter Measurement

HOW TO USE THE SIMULATOR

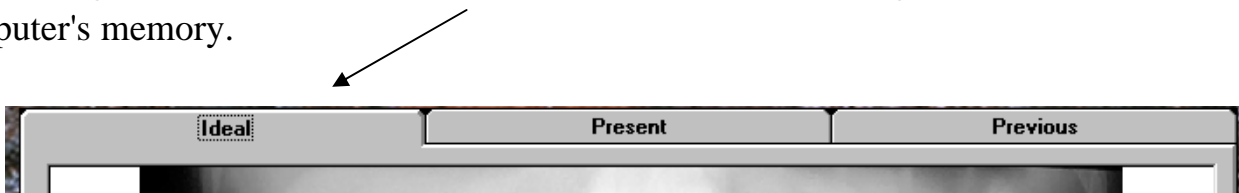
1. From the Title window, click on the word **Exposure**, in the top menu. Exposure Selection window opens, the main working window for SimXray.



2. A patient or projection must be selected first. Move the mouse cursor to click **the Select Projection** drop-down box. Scroll through the choices to select the desired projection. Once the projection is selected, the image is loaded into the **Ideal** tab window.



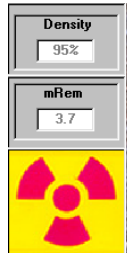
3. The images are loaded onto the **Ideal** tab window and the image's data is loaded into the computer's memory.



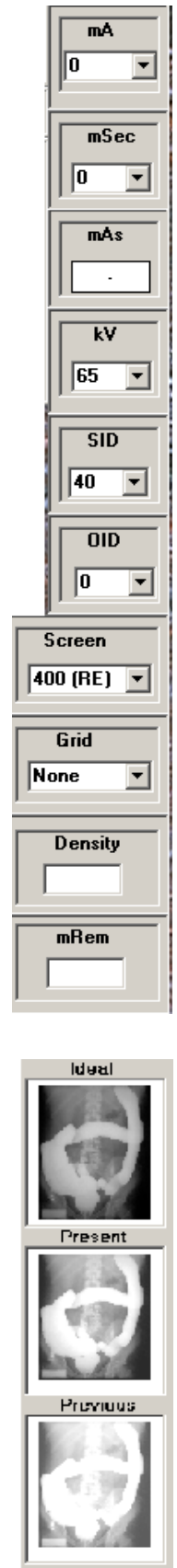
4. In the selection panel on the right, the technical choices may be made by the user. By clicking drop-down boxes for **mA**, **mSec**, **kVp**, **SID**, **OID**, **Screen** and **Grid**, their values may be changed by small increments.

5. Once appropriate exposure selections have been made, click on the red **Exposure** button. The following events occur:

- a. Calculated radiographic **Density** (as a percentage of the Ideal) and the simulated **mRem** skin exposure dose are displayed.



- b. Image processing begins in the **Present** tab window. The progress of the image processing is very fast and usually will not require waiting.
- c. The new image becomes the **Present** tab image and the old image becomes the **Previous** tab image.
- d. Each of the images, **Ideal**, **Present**, and **Previous** are displayed as thumbnail pictures adjacent to the Technical Factors panel.
- e. Selecting (clicking) any small image will change the view to that image in the tabbed window.



Focal Spot Sizes

Selection of the milliAmperes is accompanied by a choice of Focal Spot Sizes.

There are three available Focal Spots; Small, Large, and Extra Large

- Small mA choices only have Small and Large Focal Spots (S, L).
- Middle mA choices have all three Focal Spots (S, L, X).
- Large mA choices have only Large and Extra Large Focal Spots (L, X).



The standard Focal Spot for SimXray 2.5.1 is Large.

The Small Focal Spot will produce an increase in radiographic image resolution (sharpness)

The Extra Large Focal Spot will produce a decrease in radiographic image resolution (sharpness)

Magnify

Clicking the **Magnify** button produces a small magnifying glass over the image..

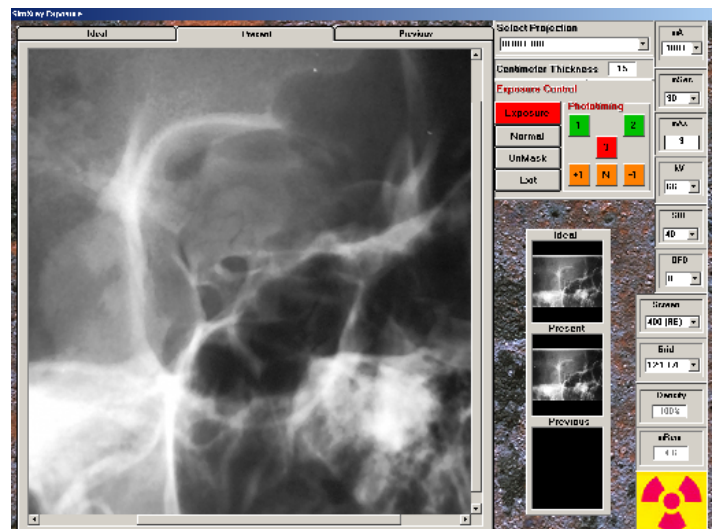
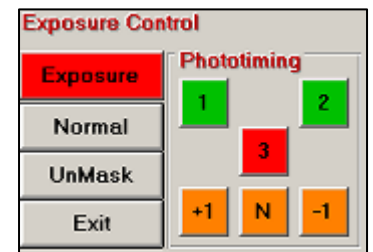
Left-mouse clicks, on the image, will increase the magnification.

Right-mouse clicks will decrease magnification.

Generally, the place on the image where the click is made, will be centered to the panel.

When the **Magnify** button is clicked, its caption changes to **Normal**.

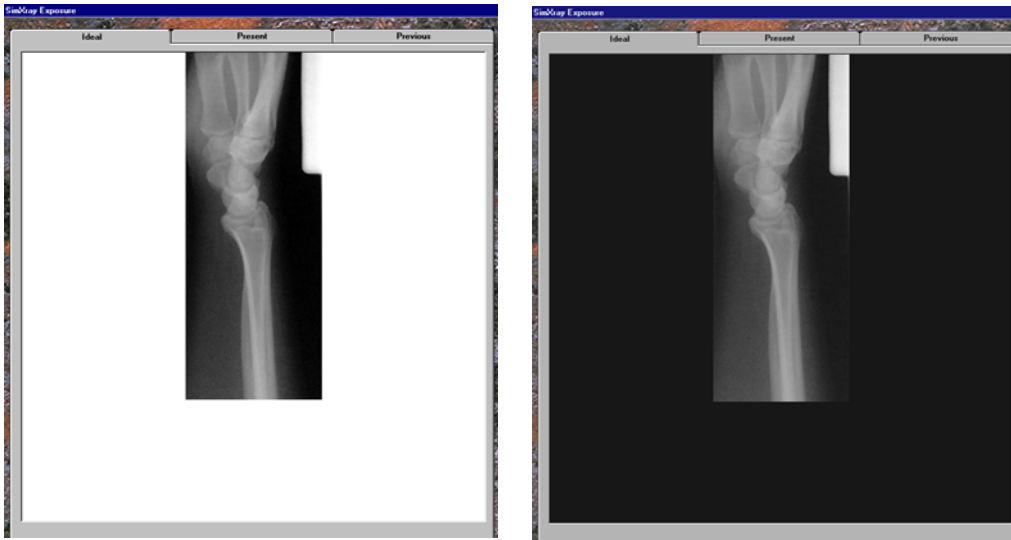
When the **Normal** button is clicked, all of the images return to the normal view. Magnification can be performed on any of the three large images.



Mask

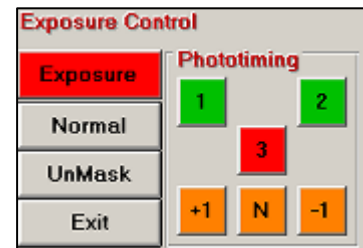
Clicking the **Mask** button produces a black mask around the radiographic images on **Ideal**, **Present**, and **Previous** tab images.

This makes the radiographic image characteristics easier to interpret.



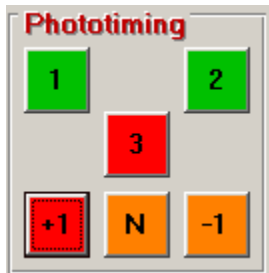
Once the **Mask** button is clicked, its caption changes to **UnMask**.

Clicking the **UnMask** button, removes the black mask.

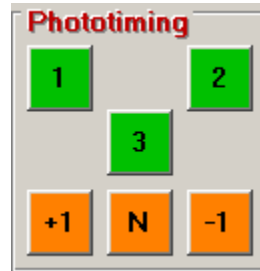


Phototiming Fields

1. When Phototiming is selected from the Main Menu, the Phototiming fields are illuminated and active in the Exposure Control of the Exposure Window.



Phototiming Selected



Not Selected

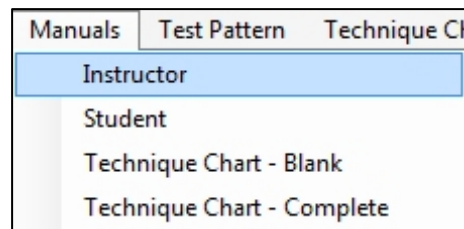
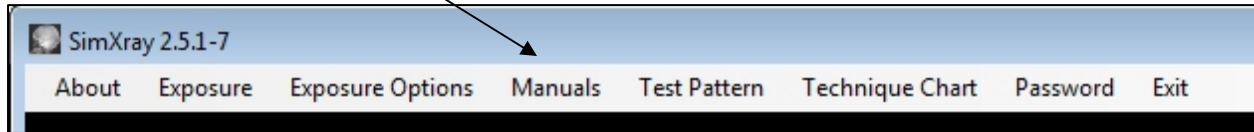
3. Any combination of fields may be selected.
4. Selected fields appear with a red background.
5. Selection of the +1 button increases the radiographic density to 150%
6. Selection of the -1 button decreases the radiographic density to 85%
7. Selection of the "N" button sets the radiographic density to 100%
8. Selection of the correct field(s) may be critical to the radiographic density of the image.
9. If a field is selected which is outside the 'shadow' of the body part, the image will exhibit a decrease in radiographic density.
10. If the selection of fields is within the 'shadow' of the body part, but is incorrect for the selected projection, the image may exhibit either increased or decreased radiographic density for the selected projection.

Exit

Clicking the **Exit** button, closes the Exposure window and returns the user to the **Title** window.

Manuals

Selecting the **Manuals** menu item produces a submenu.



All **Manual** items are available to the Instructor.

Only the Student Manual and Technique Chart – Blank are available to the Student.

Selecting a Manual item will open the choice in either a Word or PDF document. *Microsoft Word and/or Acrobat Reader must be installed to view the documents.*

Image Processing Speed:

With the addition of the high-speed graphics engine in SimXray 2.5.1-7 the user may not notice any waiting period for the images to be processed.

However, with slower computer processors or when used on a network, the user may experience a momentary hesitation in the processing of the image.

