GRX Rev 4 – Updated per HII input – 11.22.06

IDG Updated UI Content for - Next Gen GRX 2

IS THIS THE LATEST REVISION OF THIS DOCUMENT?
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Figures:

1 DOCUMENT HISTORY

Rev	Date	Author	Change Description	Approver
1	10.16.2006	S Robinson	For GRX team and IDG leadership comment	NA
2	10.20.2006	S Robinson	Updated with comments from GRX team	NA
3	10.27.2006	S Robinson	Updated for review by business partners	NA
4	11.21.2006	S Robinson	Updated according to HII input	

2 REQUIRED REVIEWERS

CT	PET	CSEP
+Chris Proctor	* +Randy Culp	* +Pat Virtue
+Holly McDaniel	Dave Littlejohn	Phani Bidarahalli
+Mark Profio	+Sharon Hamblen	* +CB Guruprasad
Kathy Littlejohn	+Joni Hanson	+Tabb Patz
+Steven M Zanoni	IDG	
Jeffery Otto	Amy G	+Suzanne El Moursi
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Junko Sekiguchi	Kevin Lee	
Optional Reviewers		
Sheila Washburn	Debbie Zelnick	Ritu Sing
Linda Kohli		

* GRX team

+ Provided feedback for HII

3 GRX COMMONALITY WITH OTHER APPLICATIONS

GRX is on application that coexists with many others. The design detailed within this document will be impacted by future documents that specify user interface standards. This application shall be updated with the release of future user interface design specifications so that it is consistent with those new specifications. The goal is that GRX and the other applications that the users interact with throughout the workflow have a consistent look and feel. This section identifies some user interface needs that are likely topics of future user interface specifications.

3.1 TOOL CONTAINER

The GRX toolkit shall be compliant with future requirements governing toolkit specifications.

3.2 VIEWPORTS AND IMAGE CONTROL

GRX shall be compliant with future requirements governing the control palettes and behaviors of the viewports (e.g. such as techniques for navigating through images such as next and prior) and their related images. GRX show also implement common viewport border decorations.

3.3 RECON NAVIGATION

GRX shall utilize the recon navigation controls developed by the FCT program.

3.4 KEYBOARD COMMANDS AND FOCUS

GRX shall be compliant with future specifications for the behaviors associated with keyboard commands and keyboard focus.

3.5 MOUSE BEHAVIORS

GRX shall be compliant with current and future specifications that define user input using a mouse. This will include such behaviors as roam and zoom.

3.6 FONTS

GRX shall use a font size and style that is consistent with the fonts used for other applications within the workflow.

3.7 INTERNATIONALIZATION

GRX shall follow standards defining translation and user interface modifications that afford greater degrees of usability by persons of other cultures as defined by sales and marketing.

3.8 IN CONTEXT HELP

GRX shall adopt future specifications that define in context help.

4 PURPOSE

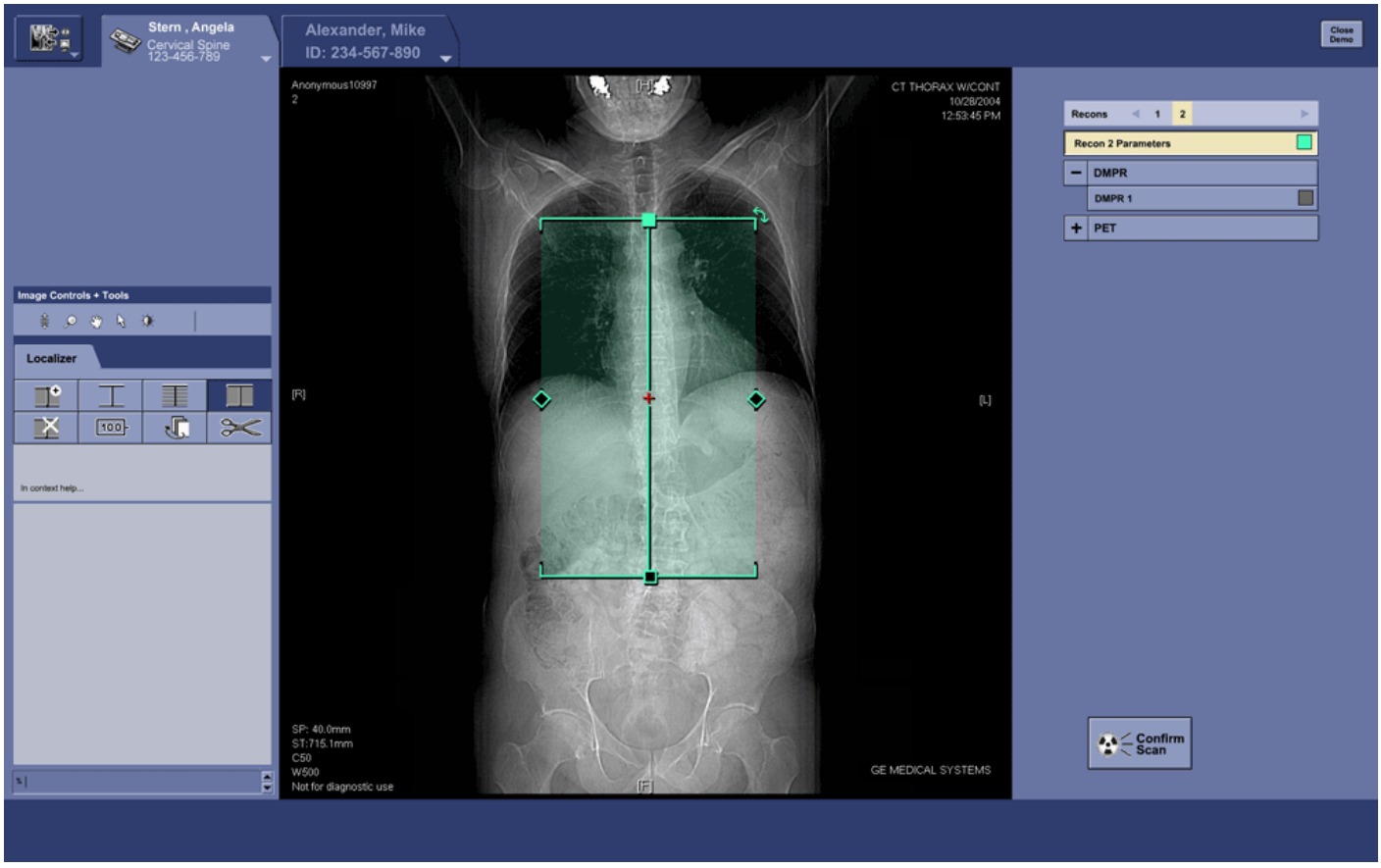
4.1 THE PURPOSE OF GRX

To allow users the ability to graphically identify the area to be scanned. The design defined in this document was developed and tested using a Flash prototype. A screen shot is shown for reference in the figure below:

4.2 THE PURPOSE OF THIS DOCUMENT

For UI design reference and multimodality review.
After review and approval, this content will be passed to the Bangalore team for inclusion in the next GRX SRS. Note: new requirements are not enumerated in this document so that they may be integrated with the numbering system of the SRS.

Figure 1 GRX 2 Flash prototype screen



5 OPEN ISSUES

Section	Brief Description of Issue	Person Responsible	Resolution Date
1	Right side navigation	FCT SUI team	
2	Image controls update	Tabb Patz	10.26.06 Common team will collaborate to document agreements
3	PET Line view	Scott & Randy	10.19.06 RC to provide Guru slide for graphics
4	Final Icons	Scott	

6 PRECURSOR DOCUMENTS

Date	Document
	GSP Productivity and Workflow Applications SOFTWARE REQUIREMENTS SPECIFICATION Next Generation GraphicRx File URL: http://alpharetta.folders.ge.com/download?fileid=6889136042&entity_id=951450042&sid=42
10.27.06	**CUI Version 4.2** http://data.supportcentral.ge.com/upload/15917/doc_667177.pdf

7 SCOPE

The GRX 2 project is an update of GRX 1. GRX 2 includes:

7.1 GRX TOOL CONTAINER

The previous tool container combines the display and GRX tools into one large tool palette. This design segregates the GRX tools away from the display tools so that a user can more easily find them.

7.2 CONFIGURATIONS OF THE GRAPHIC GRX TOOLSET

Depending on the type of graphic prescription the user is working with, they will have a slightly different toolset:

7.2.1 TOOLSET FOR CT RECON

graphic GRX toolset including the Split Group tool.

7.2.2 TOOLSET FOR DMPR

graphic GRX toolset including excluding the Split Group button and replacing it with the FOV and Scan Range button.

7.2.3 TOOL SET FOR CT/PET

graphic GRX toolset including unique icons for PET prescription modes (Hide Bed positions, Bed Positions – line View, Transparent View) Split Group button is replaced with the Scan Range button.

7.3 UPDATED GRX PRESCRIPTION GRAPHICS

7.3.1 BETTER IDENTIFICATION OF THE PRESCRIPTION IN FOCUS

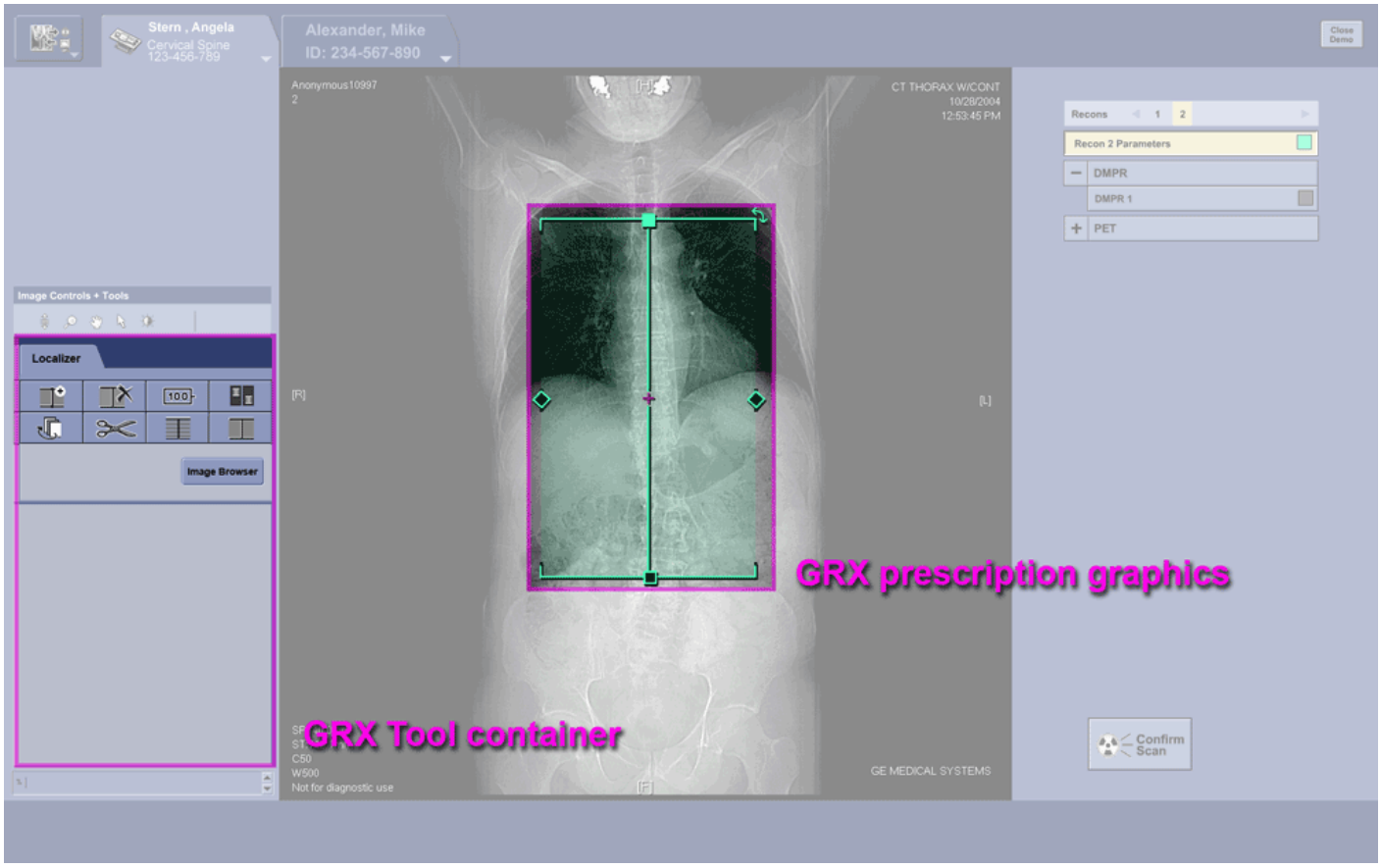
Handles are color coded to match the prescription.
The prescription in focus is brought to the top layer.

7.3.2 COMPLEMENTARY CT AND PET PRESCRIPTION GRAPHICS

Recon and PET graphics have been changed so that they are more easily differentiated from each other and are more easily identifiable when overlaid on top of each other.

The figure below shows the GRX tool container and the prescription graphics.

Figure 2 GRX tool container and prescription graphics



8 Initial Designs

The Initial GRX design was developed using Flash. Usability testing was conducted in using this interactive prototype. The prototype may be downloaded and used to better understand the functionality of the design. The prototype has functionality that was built to address the design issues that were in scope for this project. Many of the toolkit features are functional, however, the prescription graphic is not dynamically resizable, nor do onto the dimensions associated with the starting and endpoints dynamically update according to their respective positions.

See the Flash demo:
http://alpharetta.folders.ge.com/download?fileid=9093752042&entity_id=951450042&sid=42

1. Download the zip file
2. Unzip
3. Launch the player and use it to browse to, and then open, the GRX 2006 demo .swf file

Note: Demo will differ slightly from images in this document. Images in this document take precedence.

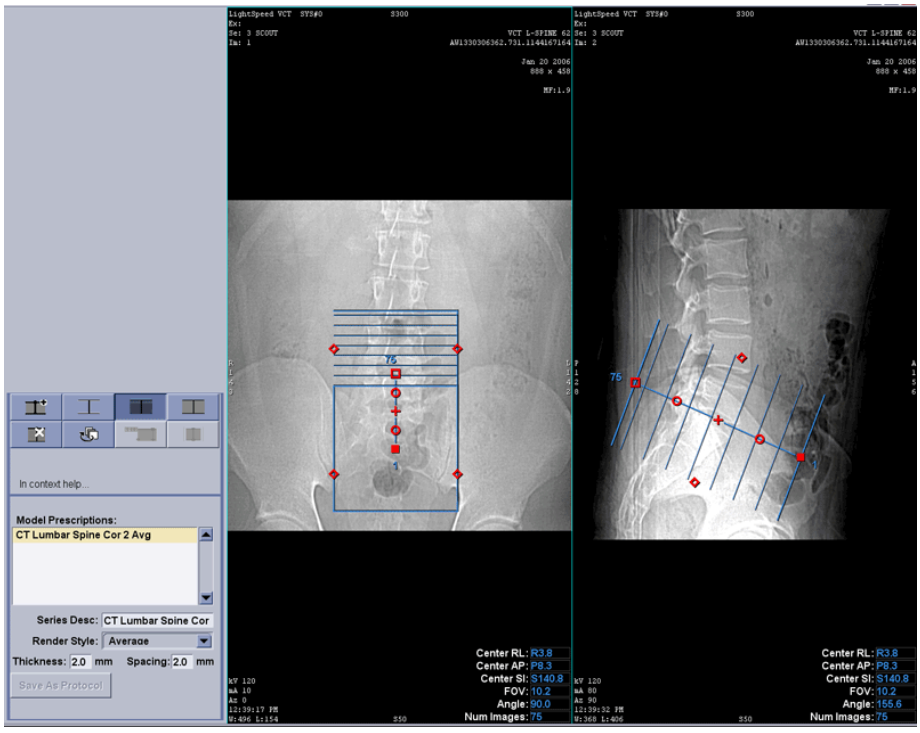
Users were also tested with an initial version of the DMPR software. Many of its design features were extrapolated from the initial Flash prototype design. please see this demo to better understand the process of selecting initial DMPR protocols and the selection of active models.

DMPR demo
http://gspnet.gso.med.ge.com/~virtuepa/dmpr/GraphicRxDemo_small.zip

1. Download and unzip the following file any where on you computer.
2. Double click any of the run Demo files to launch the demo for a particular Use Case.

Note: Demo will differ slightly from images in this document. Images in this document take precedence.

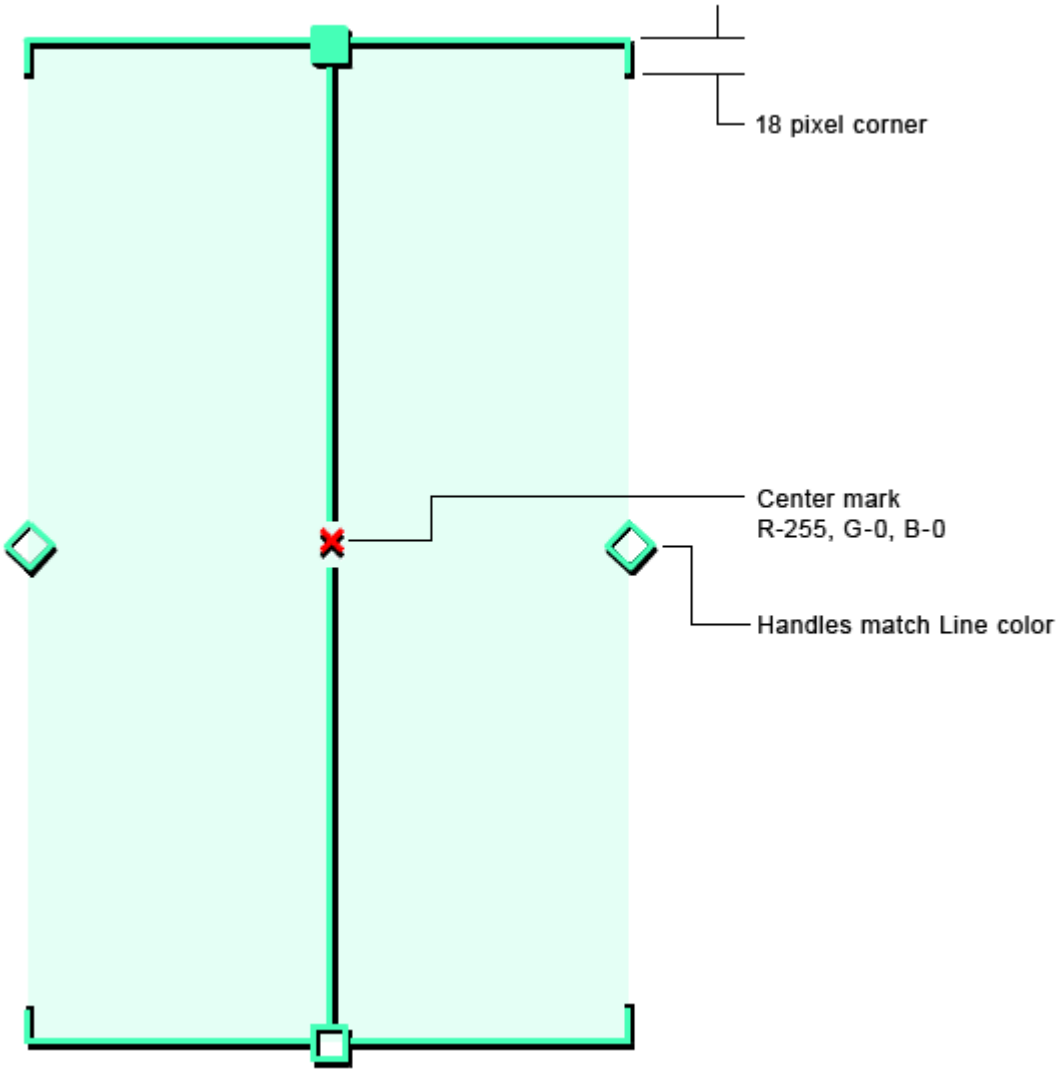
Figure 3 DMPR demo screen



9 TRANSPARENT VIEW

The graphics presented in the figure below update the existing GRX prescription graphics. These graphics enable users to differentiate and interact with prescriptions from multiple modalities. Center mark shall be the same as current GRX.

Figure 4 Transparent View Graphics with focus



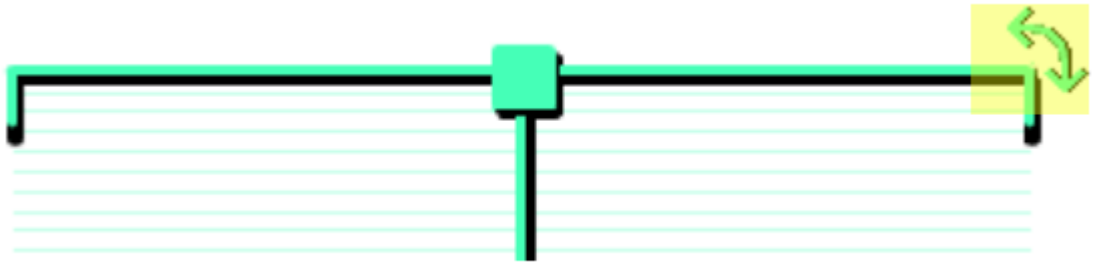
Standard Prescription		
GRX.U1	Prescription line color shall be R-69, G-255, B-183 (green)	Existing
	Prescription lines shall be 3 pixels wide	New
	Black shadow shall be 2 pixels wide	New
	Black shadow shall be offset 2 pixels to the right and 2 pixels down	New

	The shadow color shall be R-0, G-0, B-0 (black)	New
	Field color shall match the line color	New
	Field color shall be 20% transparent	New
GRX.U2	Handles will only be visible on the prescription in focus.	Existing
	Prescriptions without focus shall hide handles	New
	Handles shall be 20 x 20 pixels square	New
GRX.U3	Start handle shall be represented as a filled box	Edited
GRx.U4	End handle shall be represented as an open box	Edited
	End handle box lines shall be 3 pixels wide	New
	Handle color shall match the line color	New
	FOV handles shall be an open box rotated 45°	New
	FOV handle lines shall be 3 pixels wide	New
	Red center mark shall be R-255, G-0, B-0	New
	Red center mark shall be 20 pixels wide and 20 pixels high	New
GRX.U7	Prescription limitations are only as far as what you can see on the image. The prescription can be moved off the screen, but the active handles cannot be physically dragged off the screen.	Existing
GRX.U8	Users can manually put in an end location parameter on the left head that places the prescription off the screen.	Existing

10 THE SKEW ICON

The new skew icon has been added to the design (shown below), because it more explicitly communicates what will happen when the user manipulates the corner of the graphic. The skew behavior is only active in a lateral view. The 20 pixel transparent yellow square in the figure below indicates the location of the hit area.

Figure 5 Skew Icon



11 IMAGE VIEW

This feature enables users to hide and show individual images as needed. When images are shown the user can ensure that images will intersect the exact anatomy being visualized. The figure below shows the prescription graphic with and without the images.

The display of images will be dependent on the spacing that the user has selected and the degree of zoom relative to the graphic prescription. Images will merge into a transparent field as the user reduces the spacing and/or zooms out.

Figure 6 Transparent View **Image View**

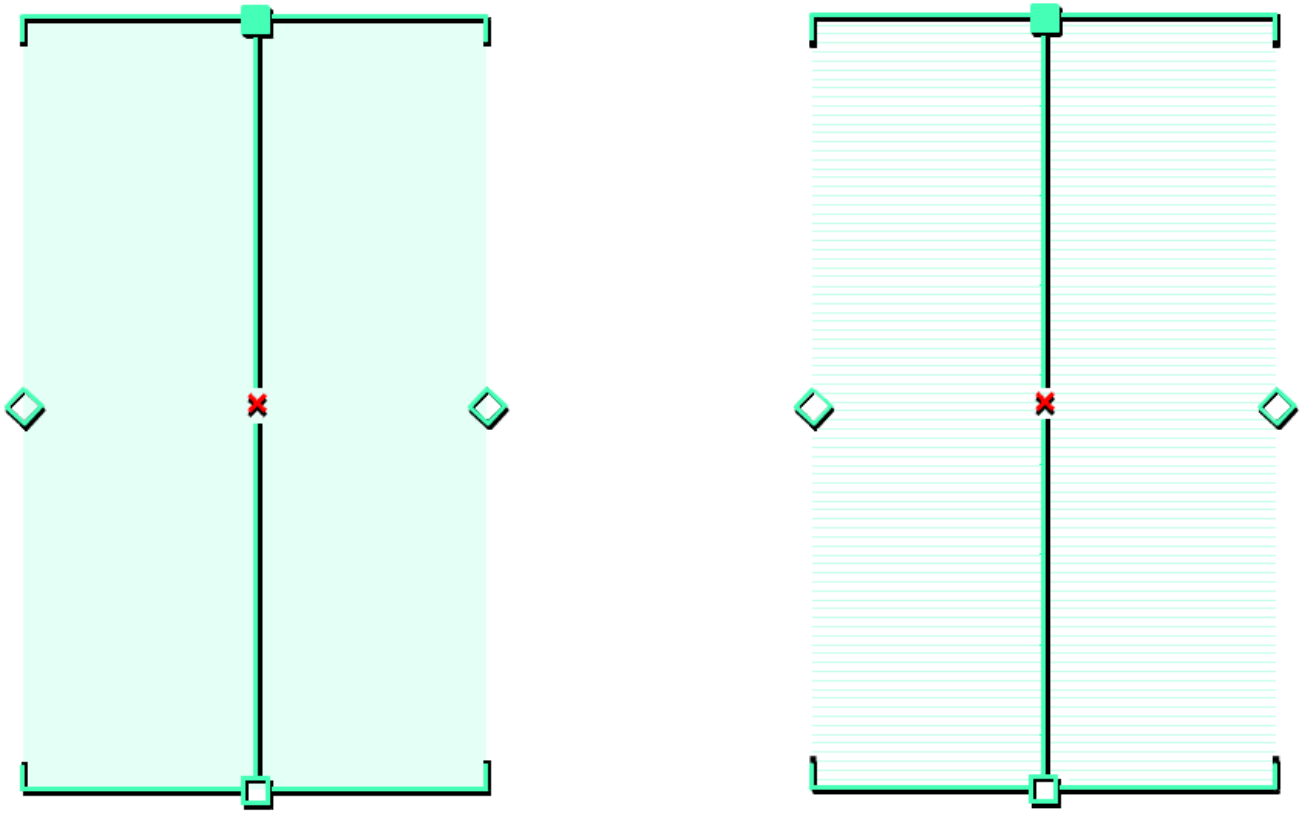


Image View		
	Transparent View shall be invoked when the Transparent View button is pressed in toolkit	New
GRX.U70	Releasing the Image View button replaces the image lines with the Transparent View	Edited
GRX.U64	Pressing the Image View tool displays the images.	Edited
	Images shall be represented by lines	New
	The degree of zoom shall determine how images are displayed.	New
		New
	Images in Image View shall match the prescription color	New

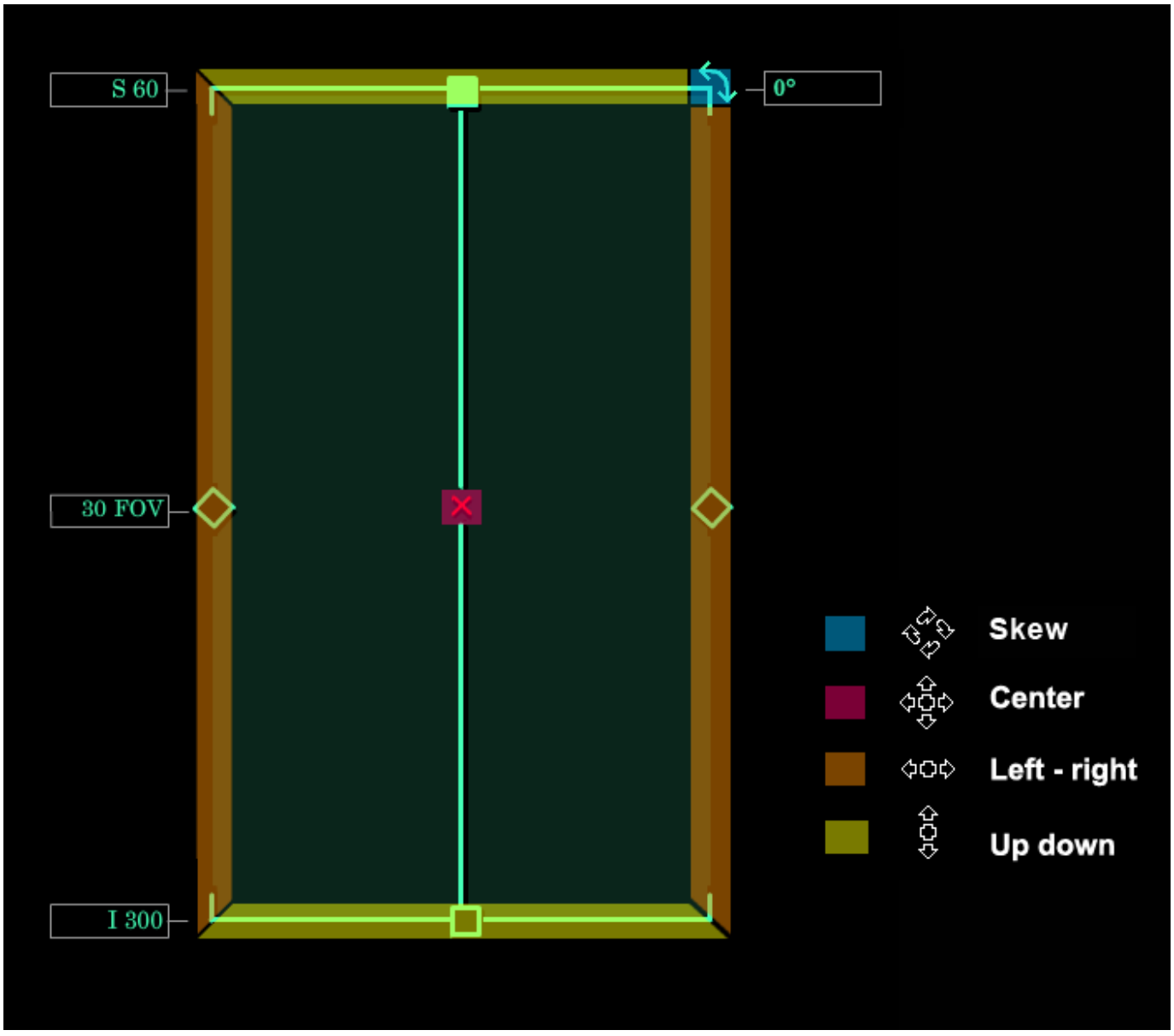
	Image View lines shall be 30% transparent	New
	The width of lines in show images shall equal the prescription FOV	New
GRX.U67	Releasing the Image View button turns on the Transparent View	Edited

12 HOT SPOTS

The image below shows the size and configurations of the roll over hot spots.

Orange	=	Left / Right	=	20 pixels wide
Yellow	=	Up/Down	=	20 pixels tall
Blue	=	Skew	=	20 pixels square
Red	=	Center	=	20 pixels square

Figure 7 Hot Spots

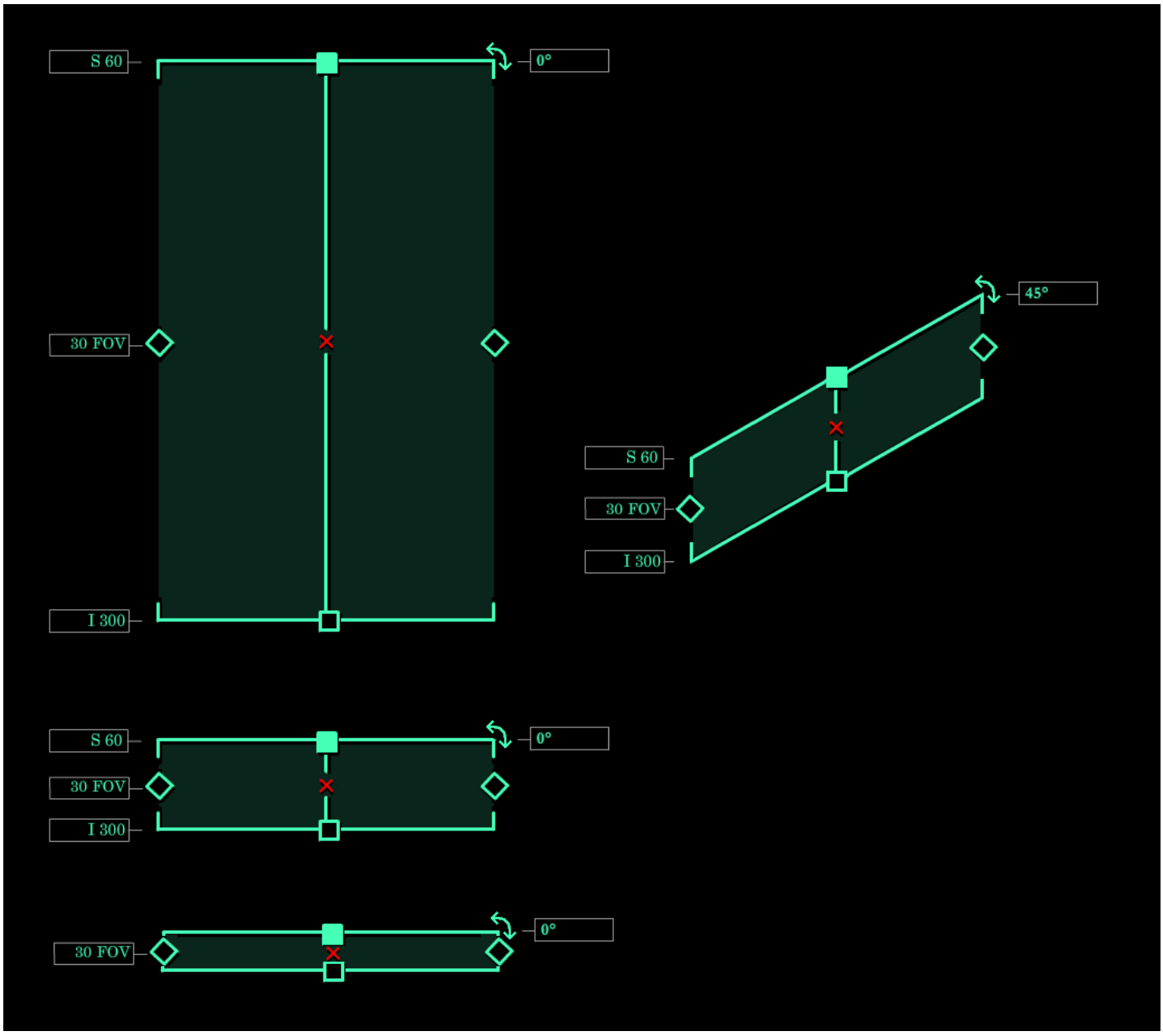


13 SHOW DIMENSIONS

The following images illustrate how dimensions behave as the user resizes the length of the scan.

	Dimensions persist until they come within 20 pixels of each other	New
	When dimensions are closer than 20 pixels of the FOV dimension they are hidden	New
	When dimensions are closer than 20 pixels of the FOV dimension they are hidden and the FOV dimension persists	New

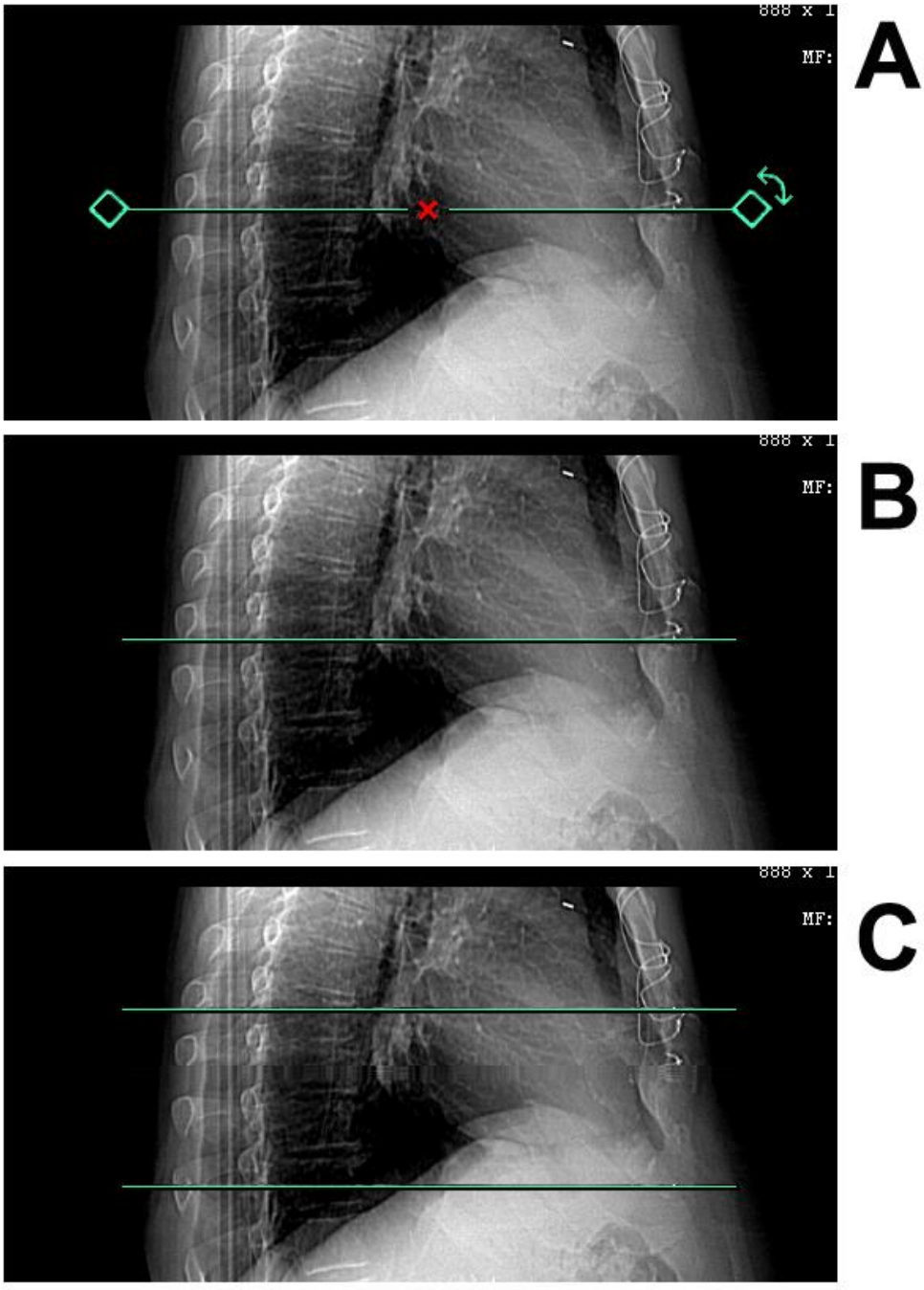
Figure 8 Show Dimensions behavior



14 SINGLE IMAGE VIEWS

The figures below show what a single image graphic prescription will look like depending on the editability of the prescription. If the image can be repositioned the center mark is shown. If the field of view (FOV) may be edited, the side handles are shown. If the angle may be adjusted, the angle skew icon is shown. The figure 6B below shows the single image prescription with and without editability. Figure 6C shows that multiple single images used as defined by the protocol.

Figure 9 Single Image GRX



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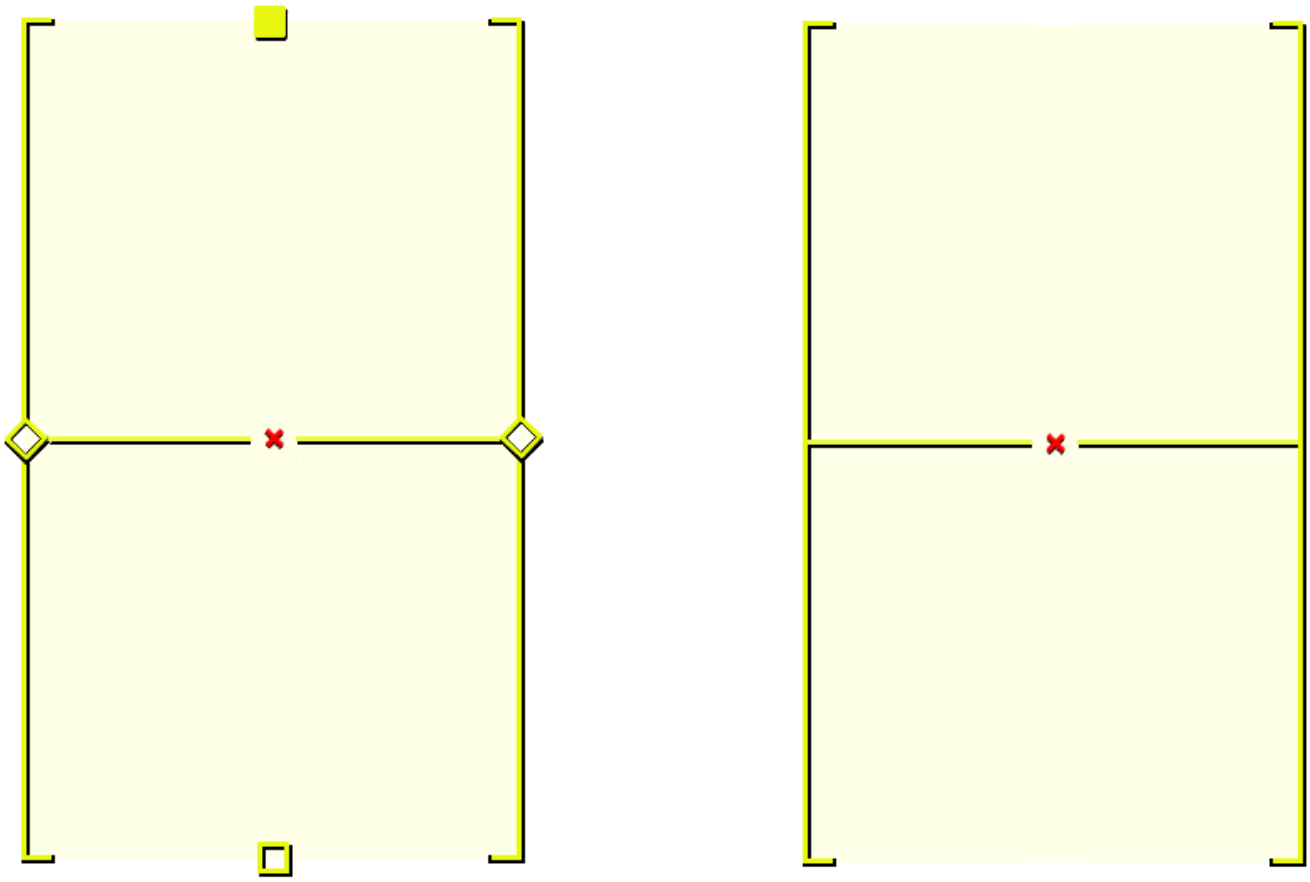
Single Image Prescription Graphics		
	Single Image prescription elements shall match the standard prescription's: Shadow size Shadow color Handle shape Handle line weight	New
	The single image line weight shall be 2 pixels	New
	Center mark shall be shown only if the image is movable	New
	FOV handles shall be shown only if the FOV is editable	New

15 PET PRESCRIPTION GRAPHICS

Figure 10 Transparent View with Focus **Without Focus**

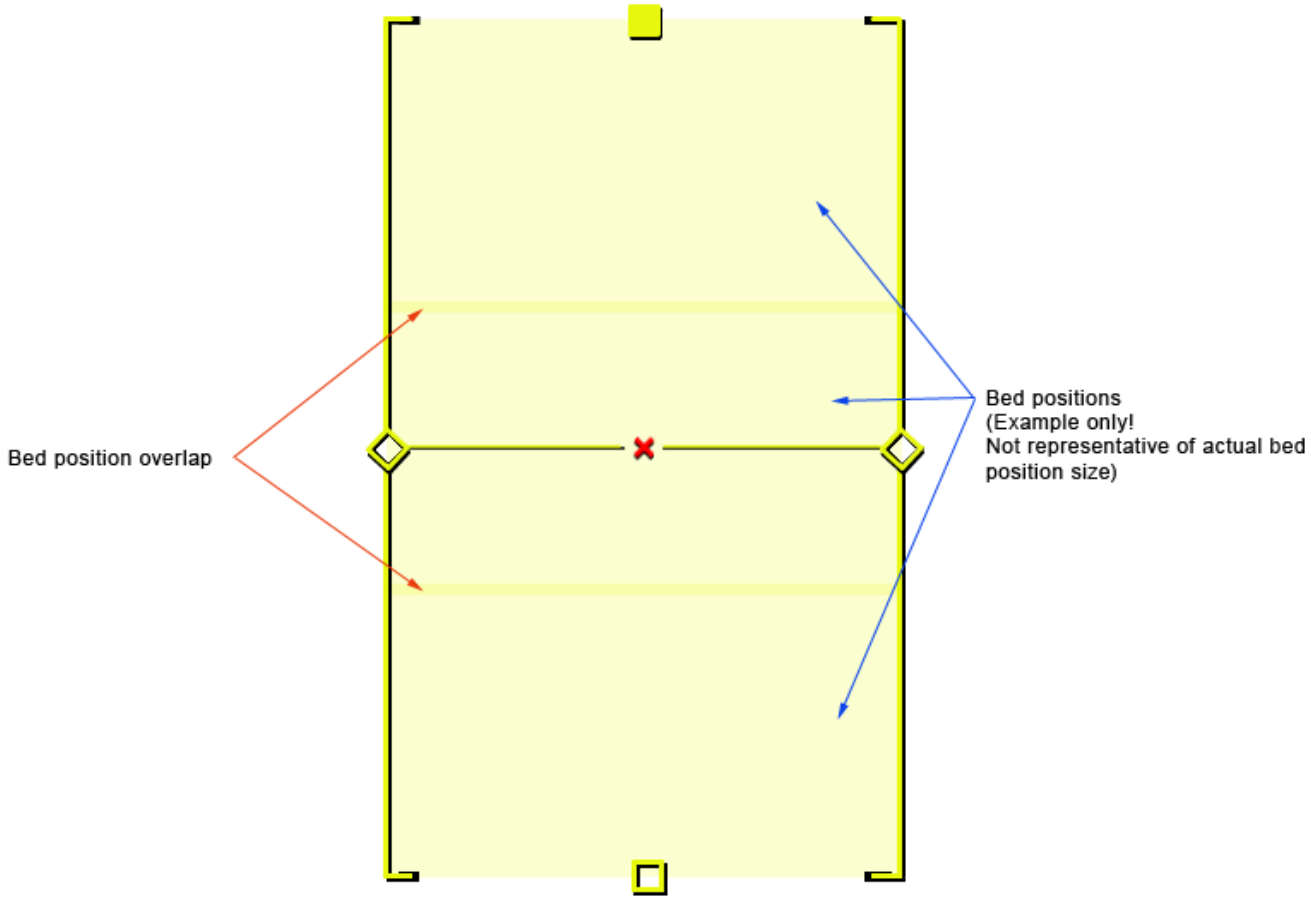


PET Prescription Graphics		
	PET prescription elements shall match the standard prescription's: Line weight Shadow size Shadow color Handle shape Handle line weight	New
	PET prescription line color shall be R-231, G-248, B-14	New
	PET transparent color shall match line color	
	PET transparent color shall be 30% transparent	

16 PET BED POSITIONS:

PET scans may have multiple bed positions that are represented in this prescription graphic as transparent rectangles. PET bed positions overlap and the graphics will overlap accordingly. The figure below shows three bed positions with slight overlap.

Figure 11 Bed position graphics



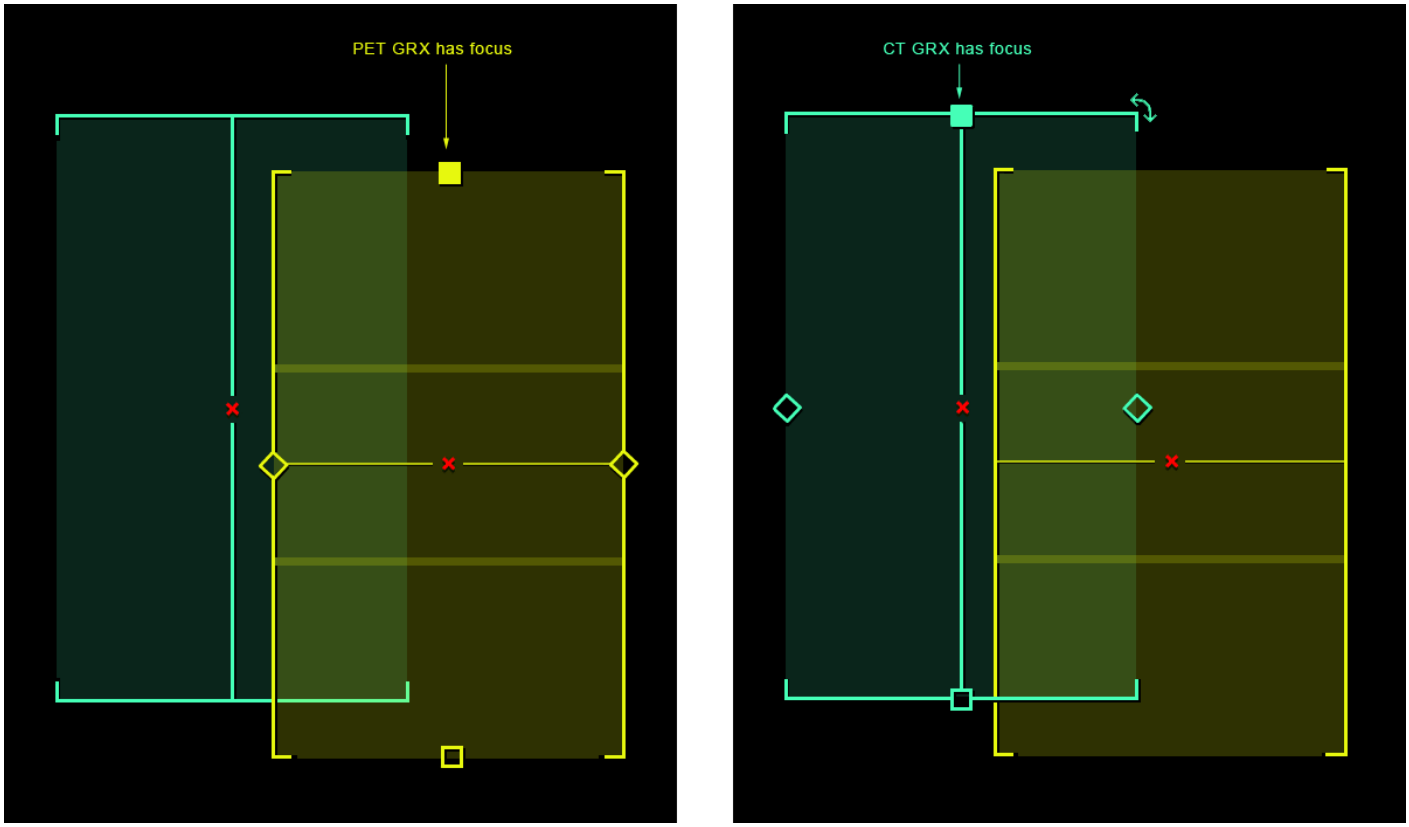
Note: the overlapping bed position shown are for example only.

PET Prescription Graphics – Bed Positions		
	PET prescription Transparent View shall show multiple bed positions if applicable	New
	Pet bed position graphics shall be positioned to show proportional bed position overlap	New
	Pet bed position overlap shall be 60% transparent	New

17 PET / CT PRESCRIPTIONS AND FOCUS

The design changes of the graphic prescriptions in this section are intended to better differentiate the graphic prescriptions for the user. The prescription in focus has handles that match its color, prescriptions without focus have no handles. The PET prescription graphics have been updated so that it is visible even when a CT or PET prescription is directly over top. The figure below illustrates how the system will indicate which prescription has focus.

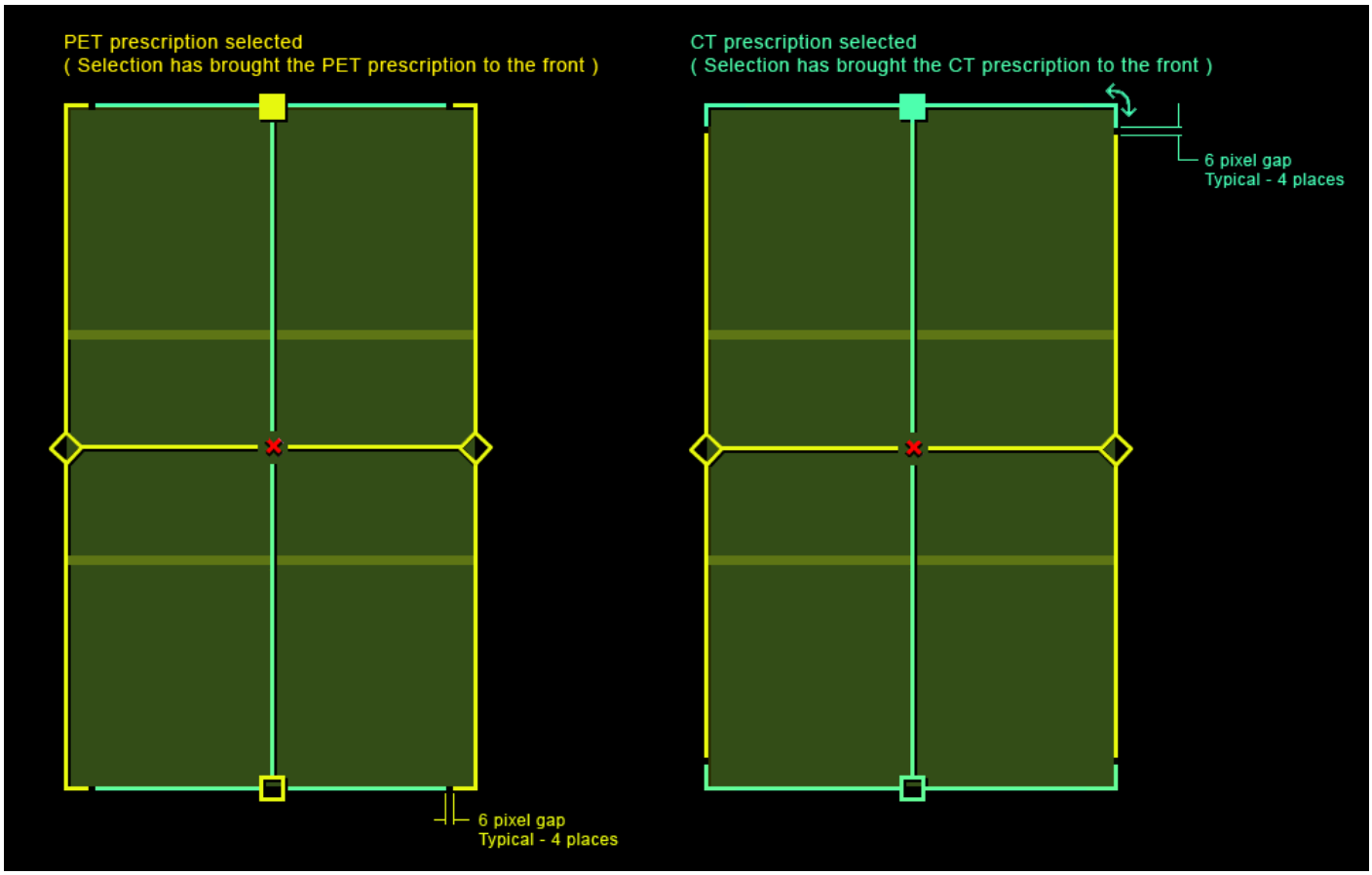
Figure 12 Changing focus example



18 PET AND CT PRESCRIPTIONS OVERLAID

Some protocols require that the CT and PET prescriptions occupy the same space. In those circumstances, it is still important to know which prescription has focus. The figure below shows how both prescriptions can be seen (even when one is over top of the other) and which prescription has focus.

Figure 13 Overlaid prescription examples



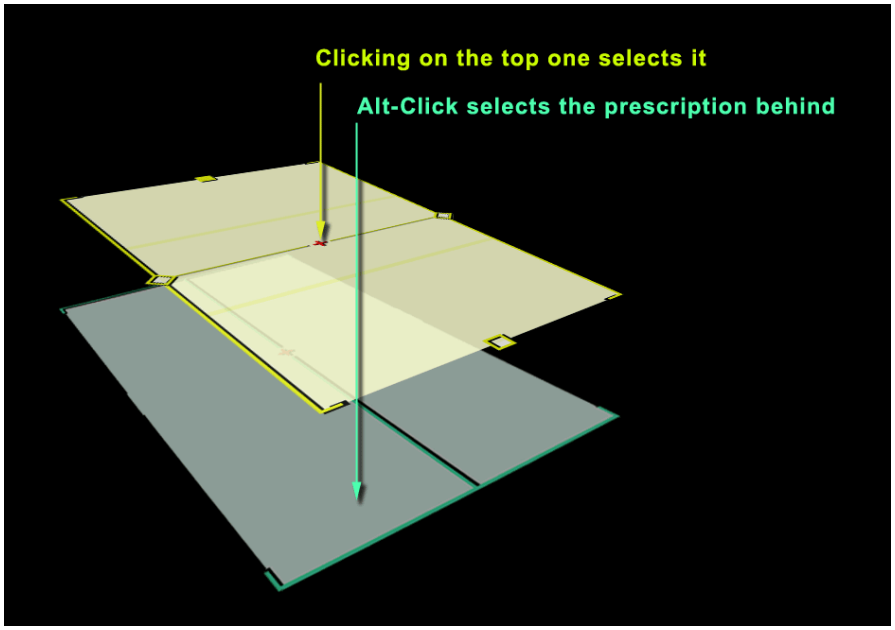
CT and PET Prescription Graphics Together		
	The prescription in focus shall display handles	New
	The prescription in focus shall be brought to the front of all other prescriptions	New
	Users may select a prescription by clicking on it	New
	The keyboard “Alt” key shall be used with left mouse click to select prescription below the top prescription	New

19 MANAGING MULTIPLE GROUPS

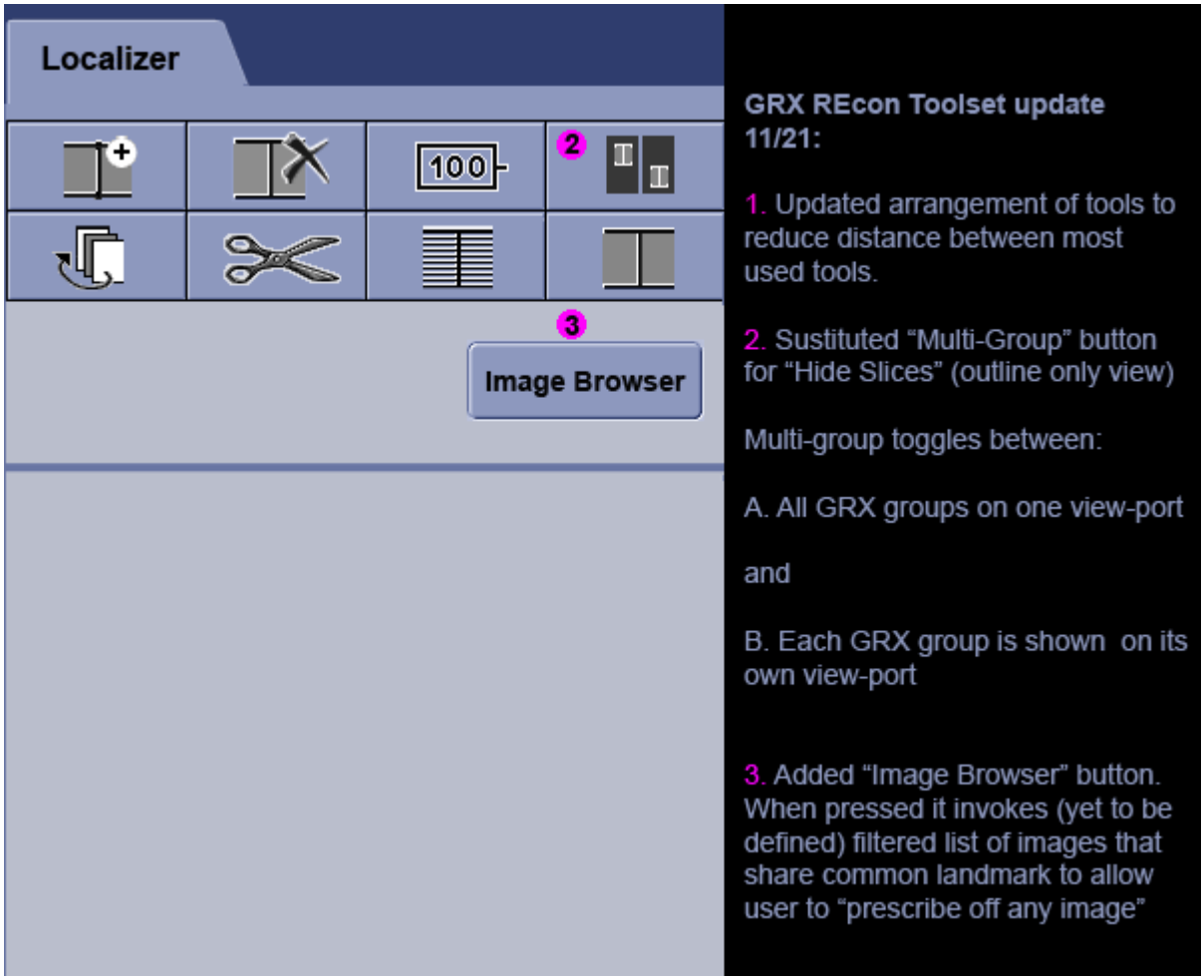
19.1 ALT+CLICK –

This feature will allow users to select the prescription they want regardless of what layer the prescription is on. Once the prescription is selected the system will bring it to the top.

Figure 14 "Alt" Click Illustration



19.2 MULTI-GROUP GRX OR MULTI-PHASE RX - MGP –

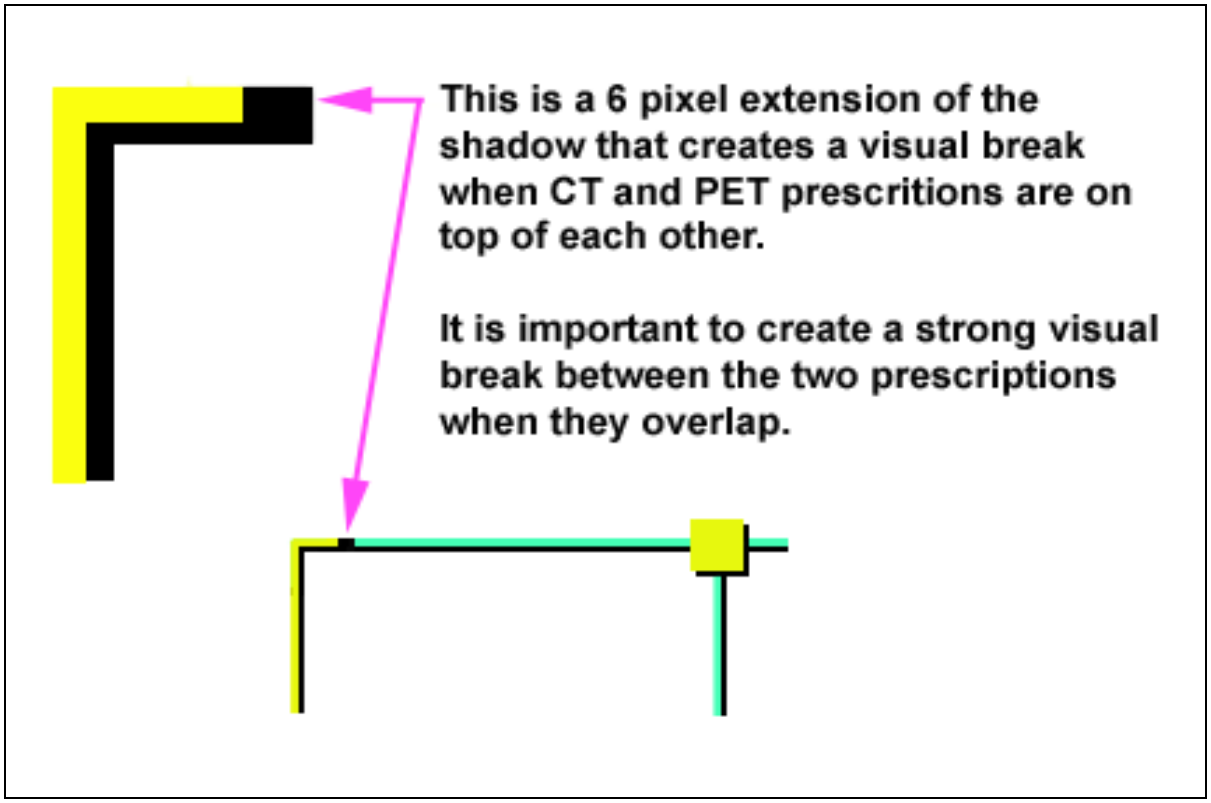


Protocols will define the default arrangement of multiple prescriptions. When multiple groups are in one view-port, the user may separate them into their own view-ports by pushing the Multi-Group button. Future design specifications will define alignment lines that will show how groups relate to each other across views.

MGP - This feature will be more fully defined in a future release.

20 SHADOW DETAIL

When CT and PET prescriptions are overlaid this shadow detail will help the user to differentiate which prescription is on top. This shadow detail creates a visual break between the CT and PET prescription lines. The figure below shows an enlarged example of the shadow detail, along with a standard prescription.

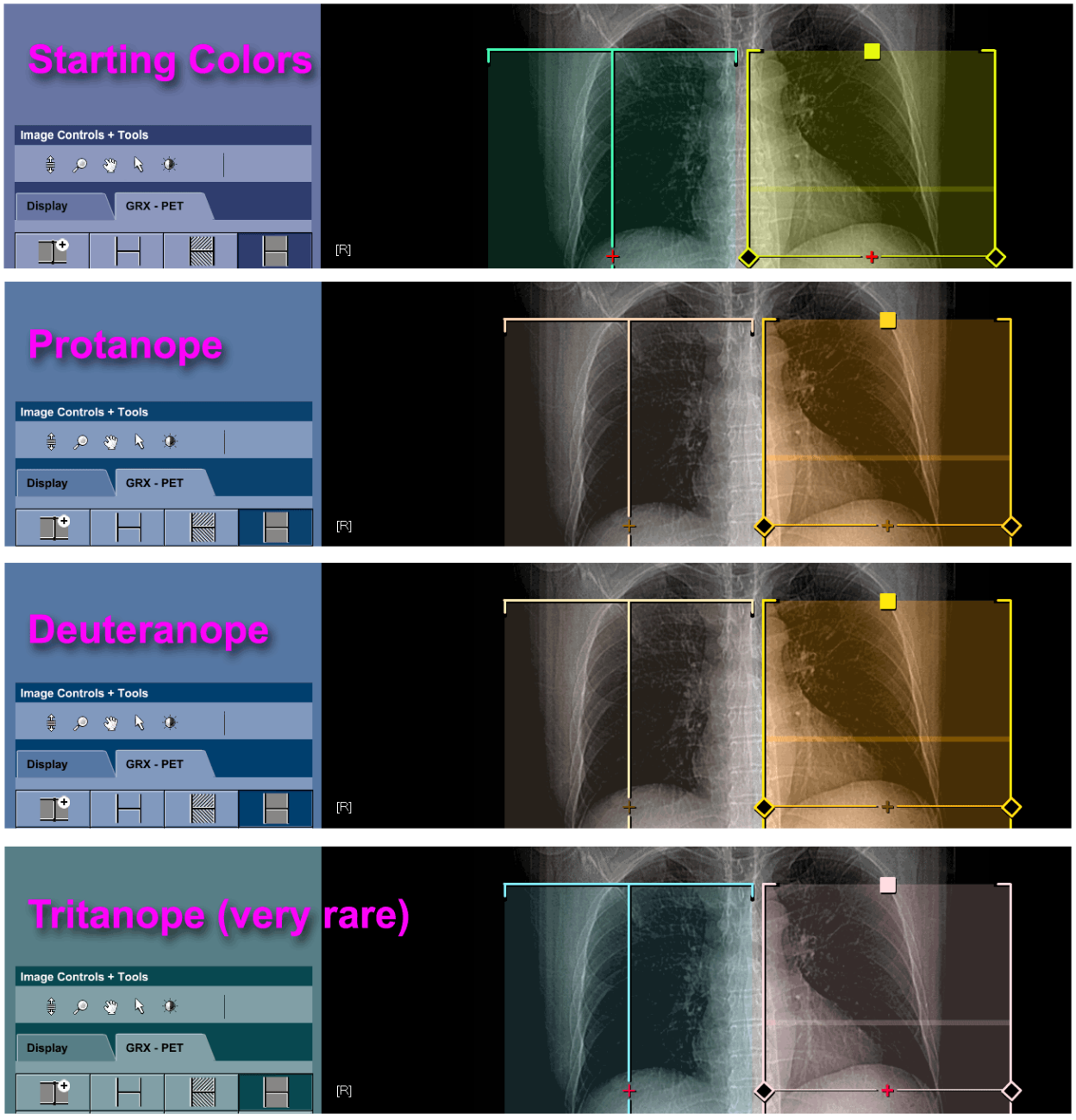


21 COLOR BLINDNESS

The figures below show how the colors of the graphic prescriptions are perceived by viewers with the color deficits labeled on the left. These samples were created with Vischeck color deficit simulation software.

http://www.vischeck.com/

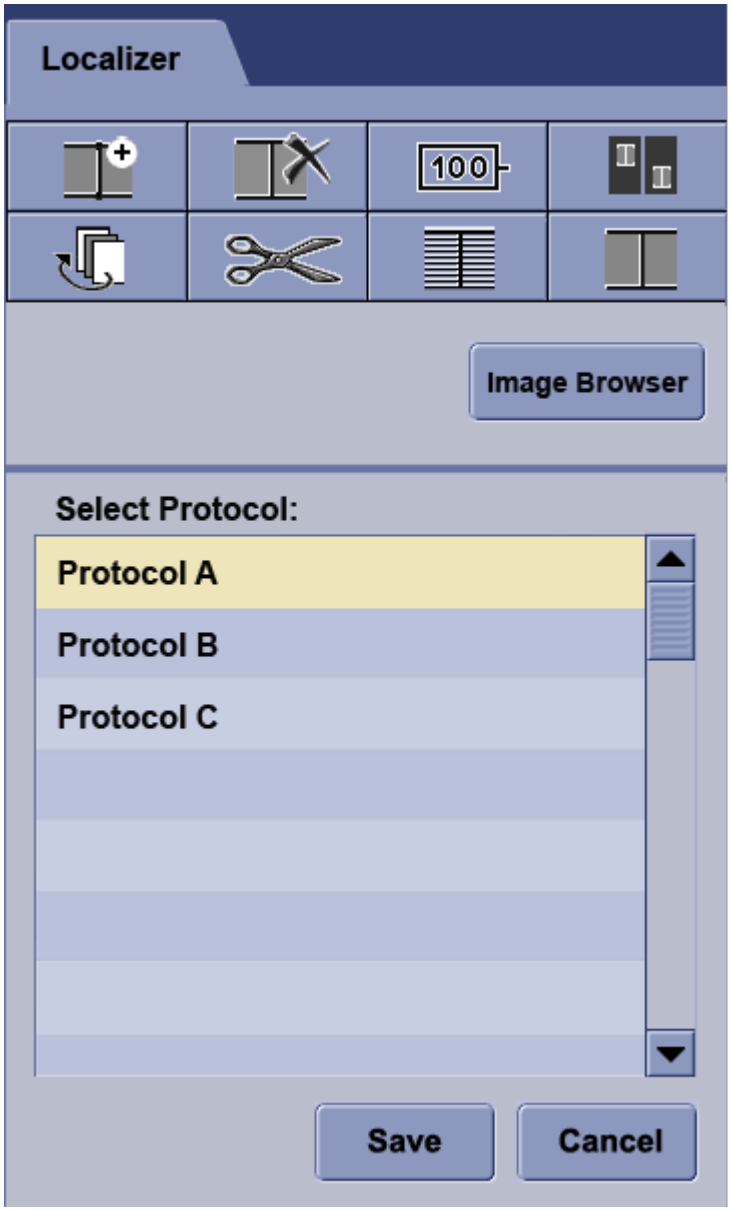
Figure 15 Color deficit perception and the GRX colors



22 GRX TOOL CONTAINER

The figure below shows the tool container area that is specifically detailed in this document.

Figure 16 GRX tool container



GRX Tool Container		
	The GRX Tools Tabs shall comply with current CUI standards (10.27.06 - CUI version 4.2 page 111 horizontal tabs in a tool palette)	New
	The GRX Tools Tab shall be labeled “Localizer”	New

23 GRX TOOLSET CONFIGURATIONS

Figure 17 GRX Toolset – Recon Config

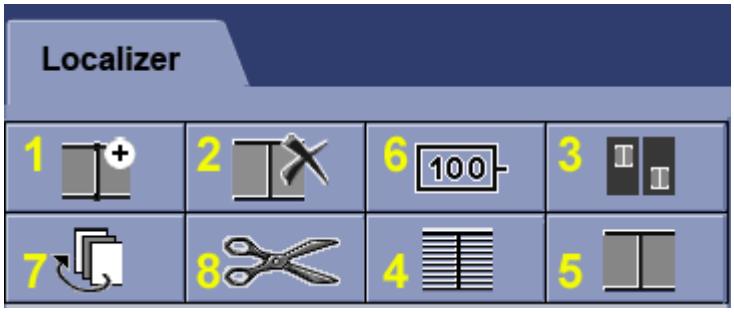


Figure 18 GRX Toolset – DMPR Config

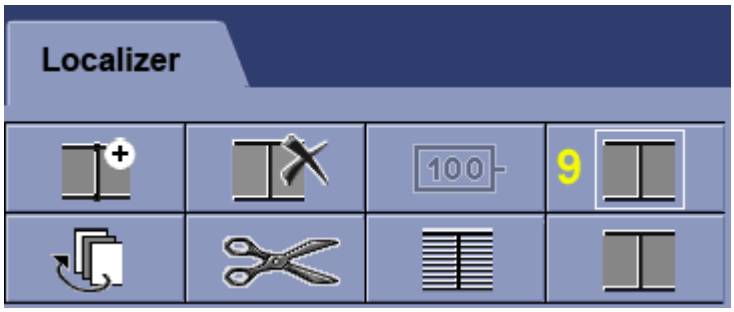
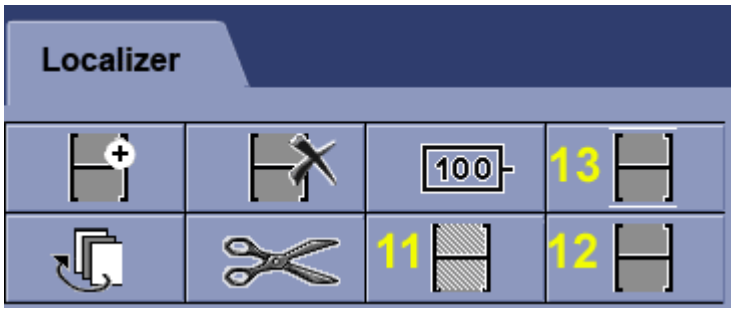


Figure 19 GRX Toolset – PET Config



Button Names:

1. Add Group
2. Delete Group
3. Multi-Group
4. Image View
5. Transparent View
6. Show Dimensions
7. Display Normal
8. Split Group
9. FOV & Scan Range
10. (Hide Images deleted)
11. PET – Bed Positions - Line View
12. PET – Transparent View
13. PET – Scan Range

24 GRX TOOL SPECIFICATIONS

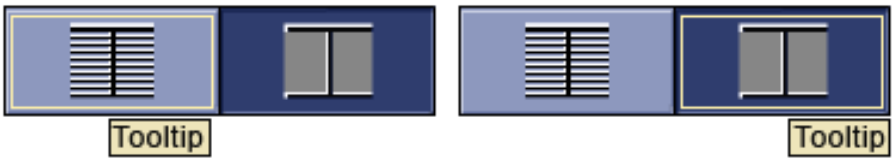
GRX Tools		
General		
	Scan range lines shall be 3 pixels wide	New
	Scan range lines shall be red (R-255, G-0, B-0)	New
	Scan range lines shall have a black shadow shall be offset 2 pixels to the right and 2 pixels down	New
	Scan RX recon 2 shows the Scan range lines of recon 1 automatically	New
	GRX Toolset buttons shall conform to the latest Common User Interface specifications regarding shape, color, focus, tooltips.	New
	GRX Toolset buttons shall be 45 pixels tall	New
	GRX buttons shall be 90 pixels wide	New
	GRX buttons shall use the icons provided by IDG	New
	Momentary buttons will have descriptive tool-tips on upstate rollover	New
	Toggle buttons will have descriptive tooltip on upstate and pressed state rollover	New
	The “default” view may be changed at the administration level (e.g. the default view may be changed to Show Images)	New
	Toggle buttons stay in the pressed state until their task is completed, or anther control is selected, or the toggle button is released.	New
1 Add Group		
GRX.U96	The new group GRX will take the focus	Existing
2 Delete Group		
GRX.U98	Pressing the Delete Group tool deletes the prescription that has focus	Existing
GRX.U99	The system will only delete a GRX graphic that has focus	Existing
GRX.U101	User shall not be able to delete the last prescription. The view will have a minimum of 1 prescription	Edited
3 Multi-Group		
	Pressing Multi-Group gives each prescription its own view-port	New
	Releasing Multi-Group combines all of the prescriptions into one view-port	New
4 Image View		
	Error! Reference source not found.	

5 Transparent View		
	The Transparent view shall be shown when GRX is invoked	New
	Transparent View, Image View, are mutually exclusive, toggle buttons.	New
6 Show Dimensions		
	Show Dimensions shall invoke the dimensions for the prescription that is in focus	
7 Display Normal		
GRX.U71	Removes zoom in or out	Existing
GRX.U72	Removes roam	Existing
GRX.U73	The view type is retained: Single, Dual or Quad	Existing
GRX.U74	The images are retained	Existing
GRX.U75	The GRX prescriptions are retained	Existing
8 Split Group		
GRX.U102	Pressing the Split Group tool changes the cursor to the scissor icon.	Existing
GRX.U103	Clicking a prescription with the Split Group cursor cuts the group perpendicular to the centerline, at the nearest image in the prescription.	Edited
GRX.U104	The cut location snaps to the nearest image	Existing
GRX.U105	The cut will run perpendicular to the GRx center line	Existing
GRX.U106	After making the cut, the Split Group button returns to its normal state	Existing
	The tool shall only cut a group when the cursor touches an area within the FOV, otherwise nothing will happen.	New

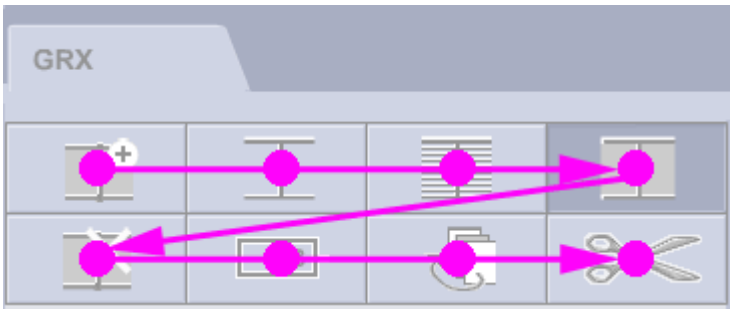
9 FOV & Scan Range		
	DMPR shall show the Scan Range and FOV as a rectangle	New
	DMPR Scan Range and FOV lines shall be red (R-255, G-0, B-0)	New
10 PET - Hide Bed Positions		
	Error! Reference source not found.	
11 PET – Line View		
	Open item	
12 PET – Transparent View		
	PET – Transparent View	
13 PET- Scan Range		
	PET shall show the Scan Range as 3 pixel lines	New
	PET Scan Range and FOV lines shall be red (R-255, G-0, B-0)	New

25 FOCUS AND TOOLTIP

Figure 20 on up state and toggle down state:



26 TOOL TAB ORDER:



27 KEYBOARD FOCUS

Keyboard Focus		
	The keyboard Tab key shall cause the focus indicator to traverse the GRX tools in a standard left to right, top to bottom order.	New

28 TOOLTIPS

Tooltips		
	Each control and field in the GRX tool container will have a tooltip	New
	Tooltips shall be exposed on mouse over	New
	Tooltips shall use the PTK delay time	New
	Tooltips shall use the standard PTK font size	New
	Tooltips shall use the standard graphic box	New
	Focus line will precede the appearance of the Tooltip	New

29 TOOL CONFIGURATION DETAILS

GRX Toolset Config Details								
		Momentary	Toggle	GRX Config Tool Sets	Recon Config	DMPR Config	PET Config	Tooltip Text
1	Add Group	x			x	x	x	Add Group
2	Delete Group	x			x	x	x	Delete Group
3	Multi-Group		x		x			Multi-Group
4	Show Images		x	Recon Config & DMPR	x	x		Show Images
5	Transparent View		x	Recon Config & DMPR	Default	Default	Default	Transparent View
6	Show Dimensions		x		x	Disabled	x	Show Dimensions
7	Display Normal	x			x	x	x	Display Normal
8	Split Group		x		x			Split Group
9	FOV & Scan Range		x			x		FOV and Scan Range
10								
11	PET – Bed Positions		x	PET Config			x	Bed Positions
12	PET – Transparent View		x	PET Config			Default	Transparent View
13	PET- Scan Range		x				x	Scan Range

X-included

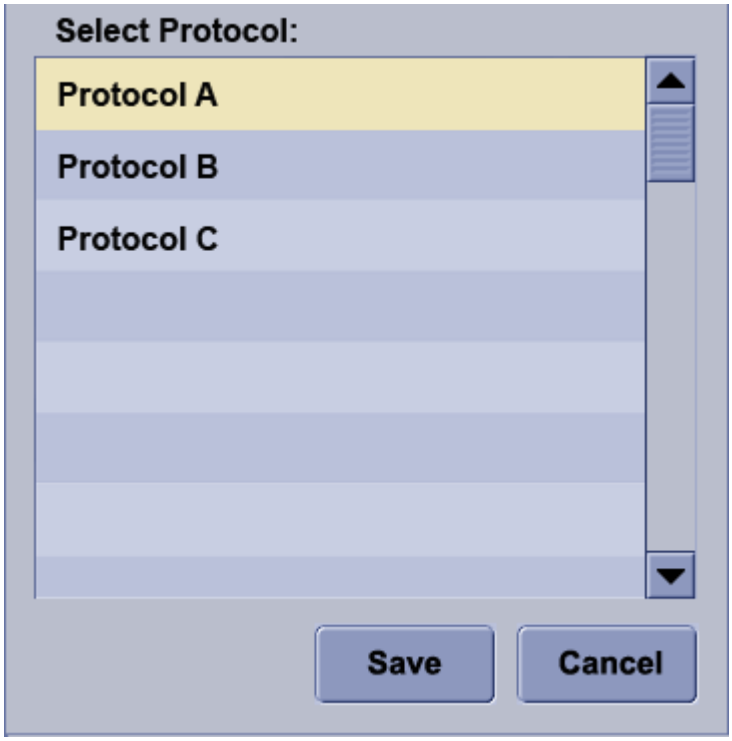
Disabled=disabled

Default - pressed state when toolkit is first invoked

Select Protocol

After invoking DMPR users are required to select from configured protocols. The figure below shows the protocol list box. Once the users have selected a protocol it is added to the Active Models list.

Figure 21 Select protocol panel

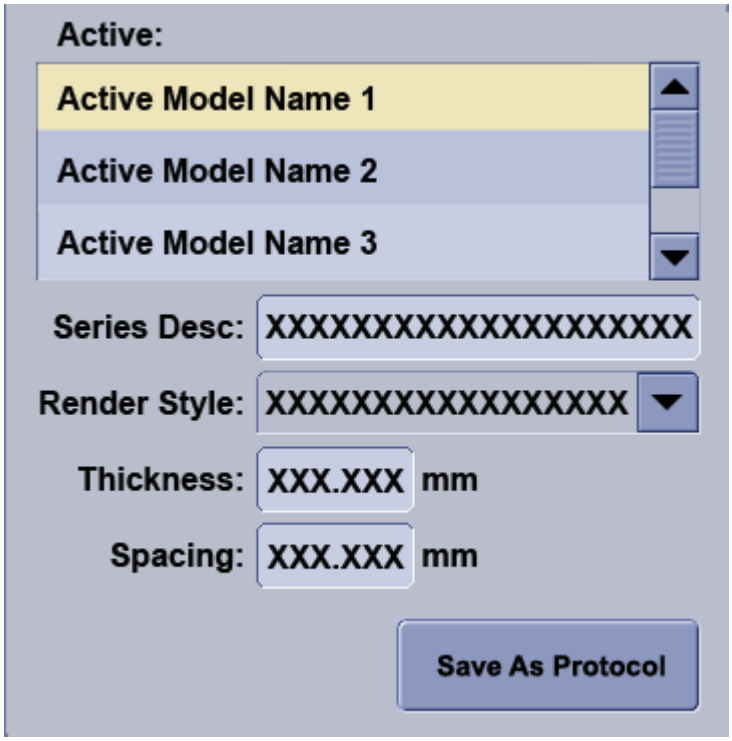


DMPR and PET Select Protocol		
	Add Group button in DMPR shall invoke the Select Protocol panel	New
	Single click a row shall highlight it CUI color P12	New
	Double click row to select	New
	Double click invokes “Active Models”	New
	Shift click to select contiguous rows	New
	Control click to select discontinuous rows	New
	Select button shall finish selection process, and replace the selection panel with the Active Models panel.	New
	Select button shall invoke the selected protocol(s) in the view port	New
	Cancel button will finish the selection process and hide the Select Protocol panel	New
	Select and Cancel buttons shall be 90 pixels wide and 45 pixels tall	New
		New

30 ACTIVE MODELS

the active models panel shown below communicates the models that are currently active and allows the user to set the parameters shown. Note: the “Save As Protocol” feature is not enabled in this version.

Figure 22 Active Model Panel



DMPR and PET Active Models		
	Single click a row shall highlight it CUI color P12	New
	Selection from the list changes the view in the viewport	New
	Series Desc: shall allow for entry of the DICOM string length	New
	Series Desc: shall allow 20 characters to be seen	New
	Render Style field shall be a non editable combo box field	New
	Render Style field shall display the default render style value	New
	Render Style pull down shall display the render style selections	New
	Render Style pull down shall allow the selection of one render style	New
	Render Style pull down shall allow 17 characters to be seen	New
	Thickness field shall allow entry of 3 numbers to the left and 3 numbers to the right of the decimal point	New
	Spacing field shall allow entry of 3 numbers to the left and 3 numbers to the right of the decimal point	New
	Save As Protocol button is 150 pixels wide by 45 pixels tall	New
	Save As Protocol button behavior is undefined, it shall be shown in the disabled state	MGP

31 MGP

- Virtual Exam Split
- PET CT prescription locking
- Configurable color
- Prescribe from any image (sharing a landmark UID) details