

Name: _____ Date: _____ Team: _____

Lab Experiment # 12

Focused Grid Positioning Errors 1

Direct Radiography

Purpose

This experiment is designed to demonstrate the effect of off-level error, off-center error, off-focus error, and upside-down error on grid cutoff; as well as, how each affects radiographic brightness, visibility of detail, and radiographic quality.

Learning Objectives

After completing this lab, you should be able to:

1. Use the laboratory equipment properly.
2. Set up the control console and ceiling tube mount correctly.
3. Function effectively in group work.
4. Perform the experiment independently.
5. Evaluate the effects of grid positioning on radiographic brightness and quantum noise.
6. Describe the relationship between grid positioning and visibility of detail.
7. Summarize the grid positioning error's relationships to radiographic quality.
8. Predict the effect of changes in grid position on radiographic brightness, contrast, EI, DI, and overall radiographic quality.

Materials Needed

- Wireless FPD
- 14 x 17 CR IR
- Focused grid
- **Knee phantom**
- Set of lead numbers

Experimental Procedure

Digital (DR) Procedure
(Knee AP technique)

Direct Radiography

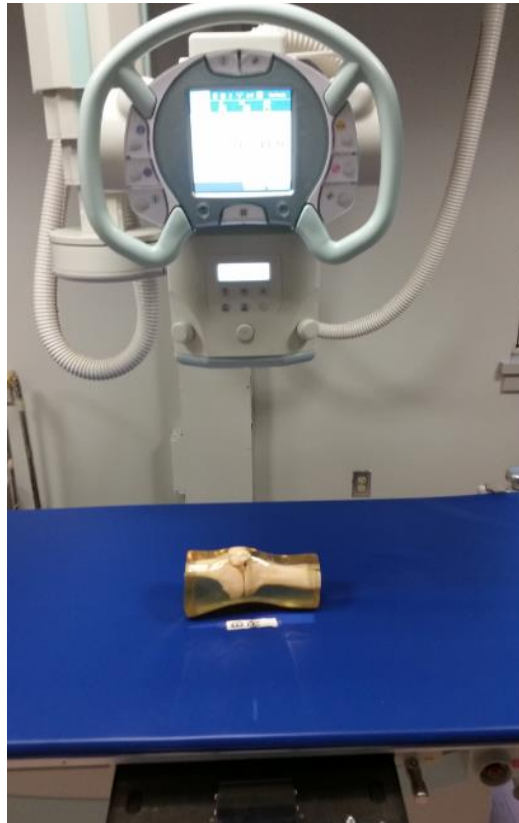


The wireless digital (FPD) image receptor can only be handled by an instructor!

Instructions for Exposure 1

1. Place a 14 x 17 inch **wireless digital image receptor in the bucky.**
2. Place the knee phantom on top of the table.
3. Tape the appropriate lead markers onto the image receptor.
(The room, side and exposure number should be labeled on **all** radiographs.)
4. Center the knee to the **middle** of the image receptor.
5. Direct the central ray **perpendicular** to the **center of the grid in the bucky at 40" SID.**

6. Collimate the field size to the anatomy of interest..
7. Expose the **wireless digital image receptor** using the technique in the worksheet provided.



Instructions for Exposure 2

1. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.

Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.

2. Set up the knee and focused grid in the **exact same orientation** as exposure one.
3. Direct the central ray **21° cephalic** to the **center of the grid**.
4. Use a **tape measure** to verify the SID needed to compensate for the central ray angle.
5. Collimate the field size to the anatomy of interest.
6. Expose the **wireless digital image receptor** using the technique in the worksheet provided.

(Rule of Thumb: To maintain the correct SID, the distance from the x-ray tube to the tabletop must be reduced by 1 inch for every 7 degrees of angulation.

Use a tape measure to verify the change in SID.



Instructions for Exposure 3

1. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.
2. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.
3. Set up the knee in the **exact same orientation** as exposure one.
4. Direct the central ray **35° “transverse”** to the **center of the grid**.
5. Use a **tape measure** to verify the SID needed to compensate for the central ray angle.
6. Collimate the field size to the anatomy of interest.
7. Expose the **wireless digital image receptor** using the technique in the worksheet provided.

(Rule of Thumb: To maintain the correct SID, the distance from the x-ray tube to the tabletop must be reduced by 1 inch for every 7 degrees of angulation.

Use a tape measure to verify the change in SID.



Instructions for Exposure 4

1. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.
2. Set up the knee the **exact same orientation** as exposure one.
3. Direct the central ray **perpendicular** to the **RIGHT EDGE (5" off the center)** of the **grid at 40" SID**.
4. Collimate the field size to the anatomy of interest.
5. Expose the **wireless digital image receptor** using the technique in the worksheet provided.



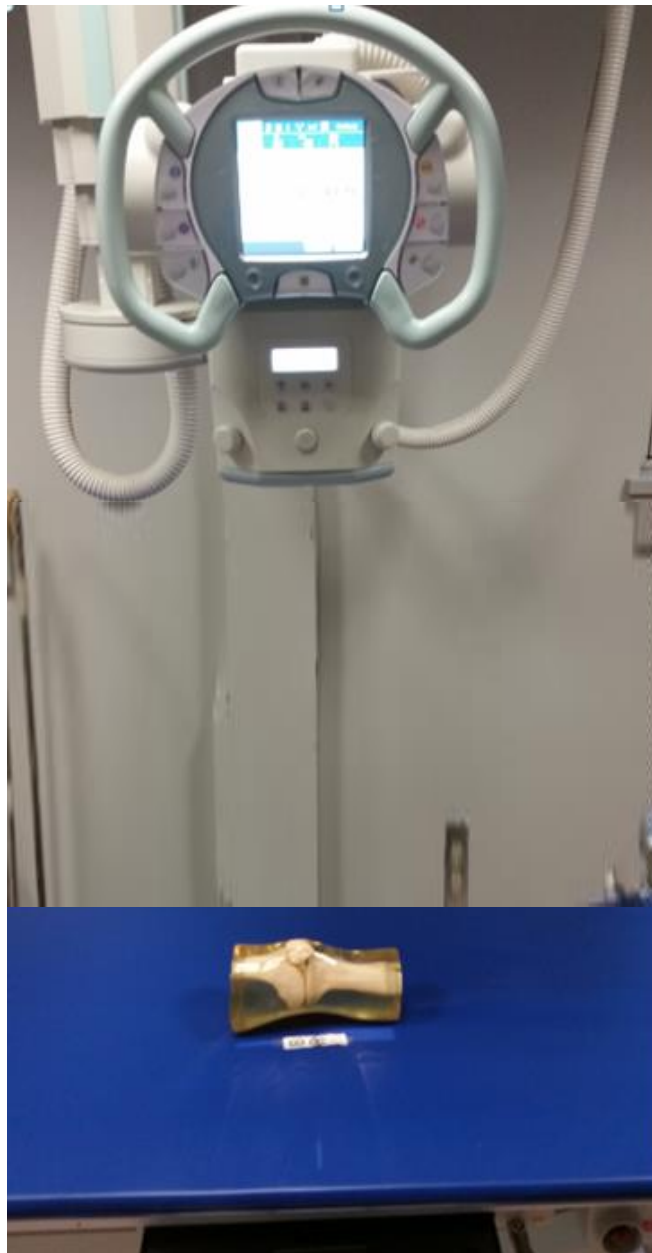
Instructions for Exposure 5

1. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.
2. Set up the knee the **exact same orientation** as exposure one.
3. Center the knee to the **middle** of the image receptor.
4. Direct the central ray **perpendicular** to the **center of the grid at (min) 20" SID**.
5. Collimate the field size to the anatomy of interest.
6. Expose the **wireless digital image receptor** using the technique in the worksheet provided.



Instructions for Exposure 6

1. Place an unexposed 14 x 17 inch **wireless digital image receptor** in the **bucky lengthwise**.
2. Set up the knee the **exact same orientation** as exposure one.
3. Direct the central ray **perpendicular** to the **center of the grid at maximum SID (>44")**.
4. Collimate the field size to the anatomy of interest.
5. Expose the **wireless digital image receptor** using the technique in the worksheet provided.



Instructions for Exposure 7

1. Place a 14 x 17 inch **CR image receptor on the tabletop lengthwise.**
2. Cover the image receptor with a 14 x 17 inch focused cap grid that has a 36-44 inch focal range.
3. Place the grid so the side marked “**TUBE SIDE**” is **not** facing the tube; the grid must be **upside down.**
4. Align the grid’s lead strips so they are **parallel** to the table’s long axis (**lengthwise**).
5. Place the kneeon top of the grid, in the AP position.
6. Tape the appropriate lead markers onto the image receptor.
(The room, side and exposure number should be labeled on **all** radiographs.)
7. Center the knee to the **middle** of the image receptor.
8. Direct the central ray **perpendicular** through the **center of the grid at 40” SID.**
9. Collimate the field size to the anatomy of interest.
10. Expose the **CR image receptor** using the technique in the worksheet provided.

Technique Worksheet Rooms – A, B, C, & D

	EI	TEI	DI	kV	mA	Time	Radiation Detectors	Density Selector	Grid	SID	mAs
Test							N/A	N/A	bucky	40”	

Refer to technique chart

Use radiograph Test as the standard image for comparison.

Adjust technique as necessary to obtain **DI < 0.5**

	EI TEI DI	kV	mA	Time	Radiation Detectors	Density Selector	Grid	SID	mAs
1					N/A	N/A	bucky	40"	
2					N/A	N/A	bucky		
3					N/A	N/A	bucky		
4					N/A	N/A	bucky	40"	
5					N/A	N/A	bucky	20"	Use direct square law
6					N/A	N/A	bucky	max	

Worksheet

Digital Radiography

TEI EI DI Igm	Briefly describe the overall brightness, contrast and noise level of each image. Describe appearance of artifacts. Did you observe grid cutoff?
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3		
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