

Warning: X-CalibrR is only to be used by qualified radiographers following the method described below

## X-CALIBR MEASUREMENT PROTOCOL (AP PELVIC RADIOGRAPHS)

- Set Focal Film Distance (FFD) at 120cm
- Use X-CalibrR of correct type - see below (“XcalibrR models”)
- Position patient for a standard AP pelvic x-ray as practised in your own radiology department
- This should involve a method to bring the femoral neck parallel to the CR cassette, e.g.
  - Feet apart with toes touching, or
  - Using a foot box
- Identify the Greater Trochanter between finger and thumb (Fig 1)
- Place X-CalibrR vertically against the patient
  - For flat table tops: Place X-CalibrR directly on the table (see Fig 1, 4).
  - For dished tables, or for patient on mattress: Place X-CalibrR on the table edge (see Fig 5)
  - If patient lies directly on CR cassette, ie if cassette is between patient and table top place X-CalibrR on upper surface of cassette (see Fig 6)



Fig 1: Identify Greater Trochanter



Fig 2: Read off mid-point between finger and thumb

- Magnification is given by the marking on X-CalibrR's scale level with a point midway between the anterior and posterior margins of the greater trochanter (see Fig 2).
- Annotate the digital film with the magnification
  - i.e. 120RT = 120% over magnification, right hip

*X-CalibrR was originally developed for calculating the magnification of AP pelvic radiographs, however the principle will work for any body part*

## IMPORTANT PRODUCT INFORMATION

The X-Ray Calibration Ruler (X-Calibr) will **only** produce an accurate estimation of magnification when

- the described method is followed
- it is used with the x-ray table for which it was ordered (see Size of X-Calibr ruler)
- the Focal Film Distance on the table is set at 120cm

### CHOOSING THE CORRECT X-CALIBR MODEL

- There are 4 standard models of X-Calibr available, indicated at the top of the ruler: size 0, 6, 8 and 10 (see Fig 3).
  - X-Calibr 0 has been designed to be used when the patient lies directly on the CR cassette and X-Calibr is applied to the upper surface of the cassette
  - X-Calibr 6 has been designed for an x-ray table where the table top to mid-point<sup>1</sup> of the CR cassette is closest to 6 cm
  - X-Calibr 8 has been designed for an x-ray table where the table top to mid-point of the CR cassette is closest to 8 cm
  - X-Calibr 10 has been designed for an x-ray table where the table top to mid-point of the CR cassette is closest to 10 cm
- The table top to midpoint CR-cassette distance is calculated by measuring the table top to bucky distance TBD and subtracting  $\frac{1}{2}$  CR cassette thickness CTh (see Fig 4).
- If the table uses a mattress and/or has a recessed or dished table shape, the distance TBD should be measured from the table edge (see Fig 4 and 5).
- X-Calibr 0 is used by placing the ruler directly on the CR-cassette (see Fig 6).



Fig 3: X-Calibr 10

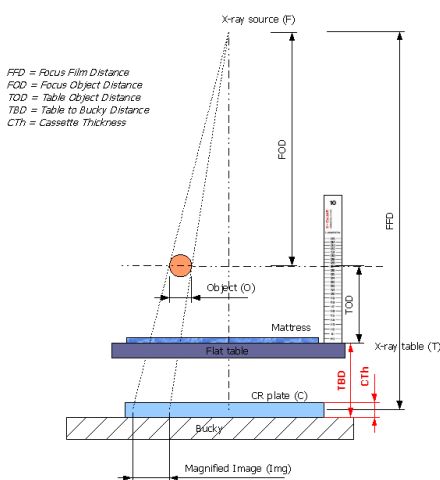


Fig 4:

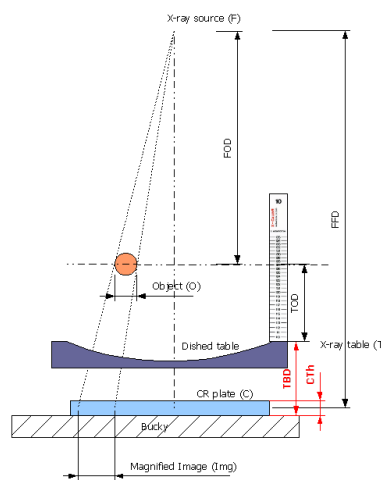


Fig 5:

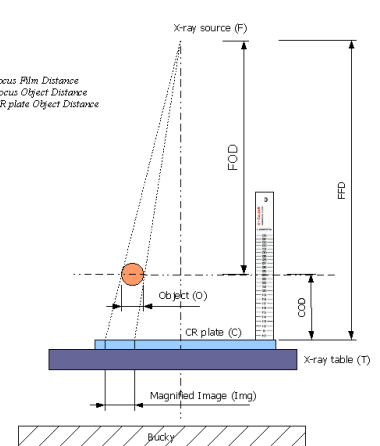


Fig 6:

Fig 4, Fig 5, Fig 6: Use of X-Calibr on flat table, dished table, and directly on CR-Cassette

<sup>1</sup> This assumes the phosphorus CR plate is suspended in the middle of the CR cassette. Measure the CR cassette thickness and divide by 2.

## **WHERE TABLE TOP TO MIDPOINT OF CR-CASSETTE DOES NOT EQUAL 6, 8 OR 10 CM**

- Where the table top to CR-cassette distance falls between X-CalibR sizes, a small error is incurred, as indicated by table 1
- In this example the real magnification is 124% and the anatomical femoral offset is 44 mm.
- An X-CalibR 8 ruler is used to estimate magnification (and femoral offset) on a range of x-ray tables with different table top to mid-point CR cassette distances.
- At 7.0 cm the table top to midpoint CR-cassette distance falls exactly between an X-CalibR 6 and X-CalibR 8. The magnification error is -1.27%. The effect on the measurement of femoral offset is only -0.6 mm. At 9.0cm the magnification is +1.29%, and the effect on the measurement of femoral offset is only +0.6mm
- When such an error is not acceptable, Wolverson Ltd can produce custom made rulers to suit most tables.

Table top to midpoint CR cassette distance (cm)	Estimate of magnification with X-CalibR 8 (%)	Magnification Error (%)	Derived value of femoral offset (mm)	Measurement error (mm)
7.0	122.7%	-1.27%	43.4	-0.6
7.2	123.0%	-1.02%	43.6	-0.4
7.4	123.2%	-0.76%	43.7	-0.3
7.6	123.5%	-0.51%	43.8	-0.2
7.8	123.7%	-0.26%	43.9	-0.1
8.0	124.0%	0.00%	44.0	0.0
8.2	124.2%	0.26%	44.1	0.1
8.4	124.5%	0.51%	44.2	0.2
8.6	124.7%	0.77%	44.3	0.3
8.8	125.0%	1.03%	44.5	0.5
9.0	125.3%	1.29%	44.6	0.6

Table 1: Errors introduced by using a X-CalibR 8 ruler with different table top to midpoint CR-cassette distances.

### **DISCLAIMER:**

- ✓ X-CalibR should only be used by a fully qualified radiographer
- ✓ X-CalibR should be used by the method described in this protocol. Any alteration of the method by the User might result in an incorrect assessment of magnification
- ✓ The User accepts and acknowledges that the value obtained by X-CalibR is an estimation of true magnification. It is for guidance purposes only and does not take the place of the surgeon's professional judgement and experience in determining the correct size of the prosthesis for arthroplasty
- ✓ The designers of X-CalibR will not be held liable for an incorrect assessment of magnification following use of X-CalibR
- ✓ The User agrees to utilise X-CalibR for the sole purpose of improving the accuracy of scaling radiographs and accepts that the designers cannot be held liable for errors in templating or implant selection