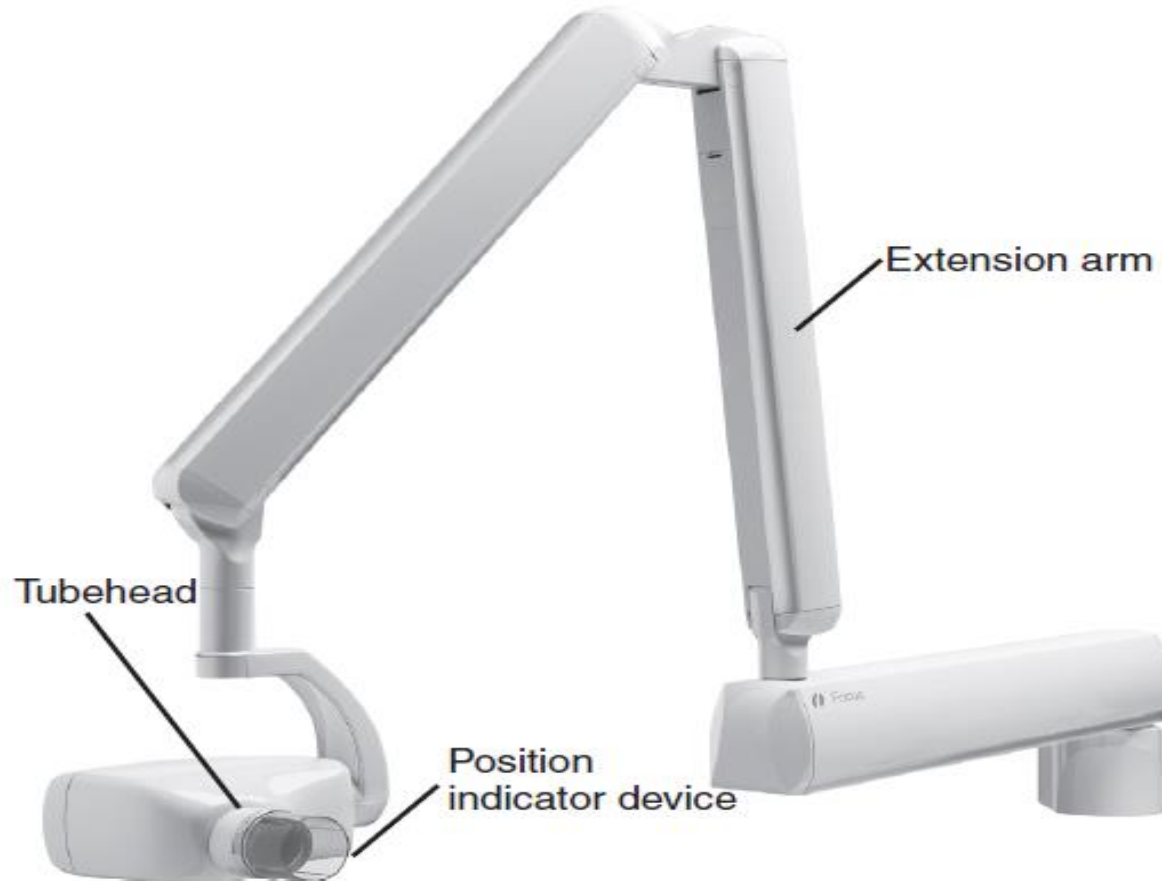


Dental Radiology Study Guide

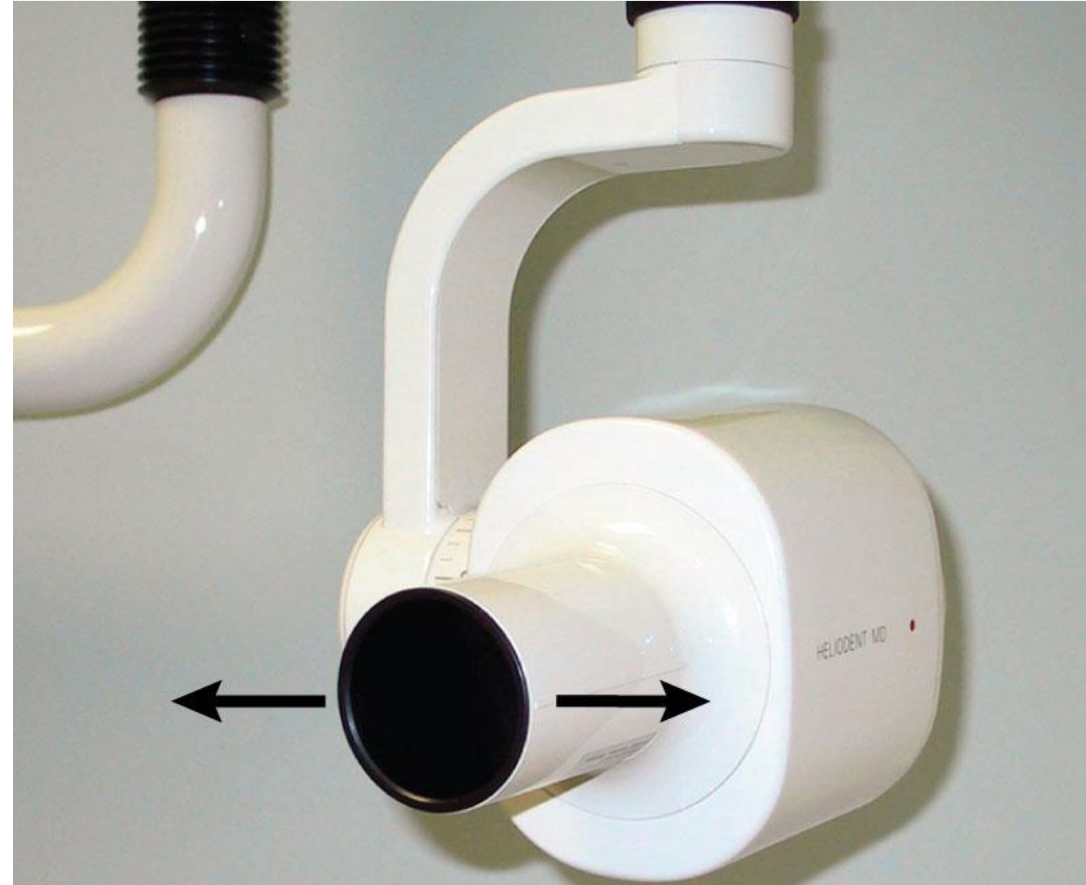


DENTAL X-RAY MACHINE



X-RAY TUBEHEAD

The x-ray tubehead is tightly sealed; heavy metal housing contains the x-ray tube that produces dental x-rays.

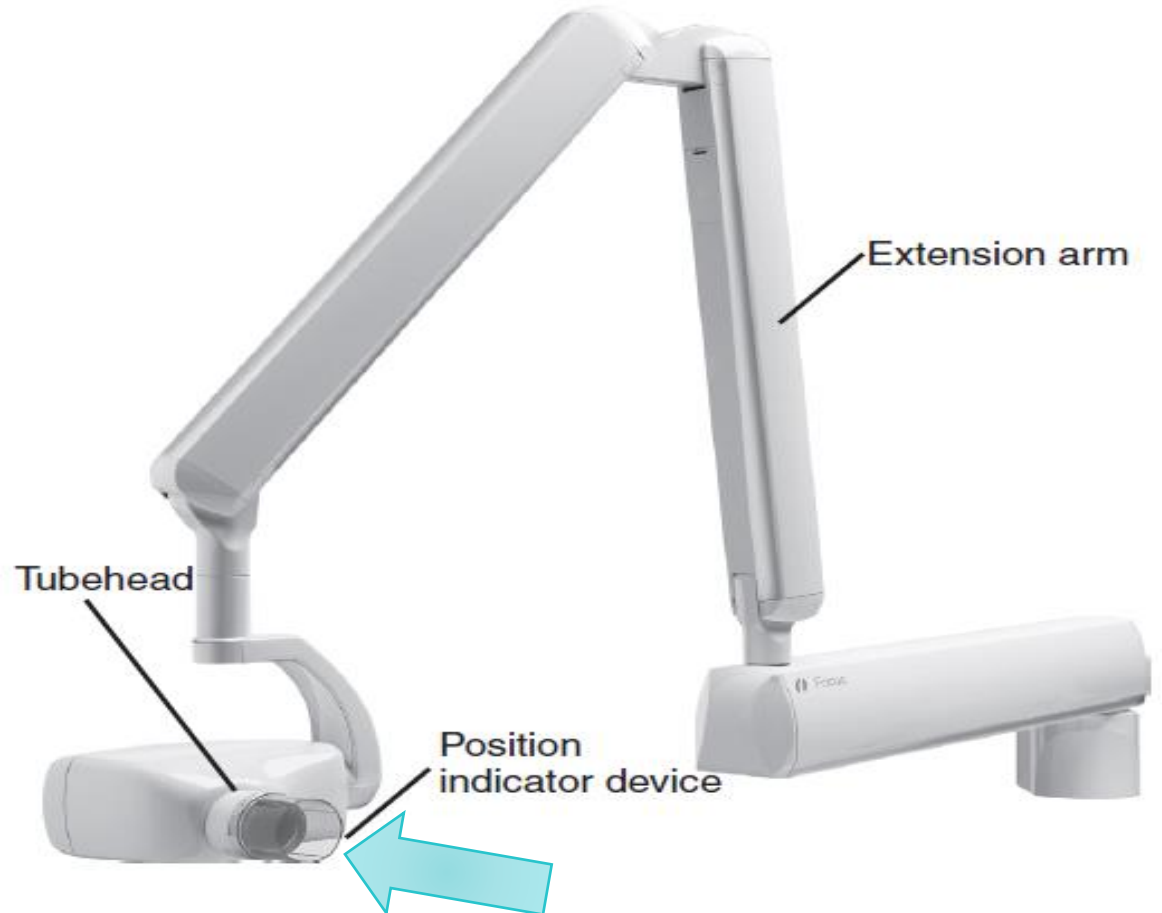


COMPONENTS OF THE TUBEHEAD

- The metal body of the tubehead that houses the x-ray tube is called the *metal housing*, which is filled with insulating oil.
 - The tubehead seal is made of leaded glass or aluminum, keeps the oil in the tubehead, and acts as a filter for the x-ray beam.
 - The X-ray tube is where X-rays are produced.
 - The transformer alters the voltage of the incoming electrical current
- The aluminum filter is an aluminum sheet 0.5 mm thick.
 - The lead collimator is a metal disc with a small opening in the center to control the size and shape of the x-ray beam as it leaves the tubehead.
 - The PID is the open-ended, lead-lined cylinder that extends from the opening of the metal housing of the tubehead and is used to aim the x-ray beam.

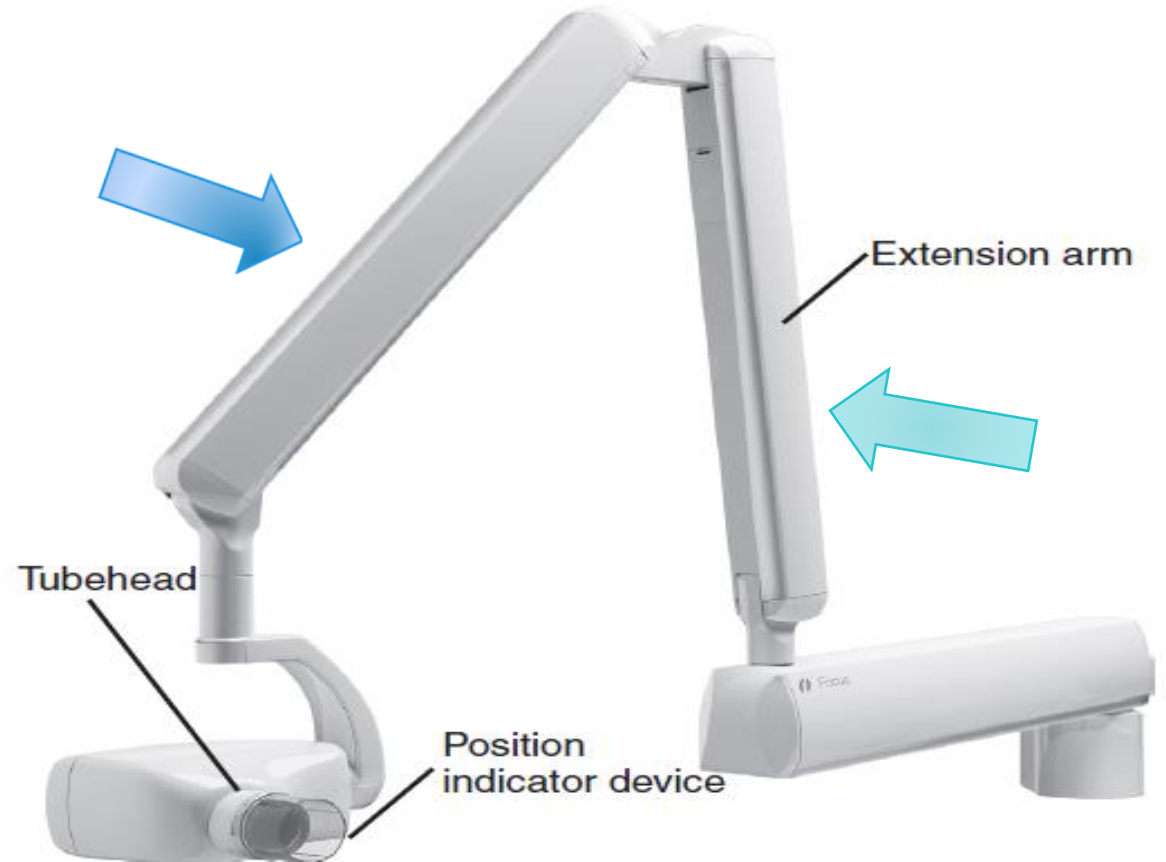
POSITION INDICATOR DEVICE (PID)

- ❖ The lead-lined PID is used to aim the x-ray beam at the film in the patient's mouth.
- ❖ The open end of the PID is placed against the patient's face during film exposure.
- ❖ The PID may be cylindrical or rectangular.



EXTENSION ARM

- ❖ Encloses the wire between the tubehead and the control panel.
- ❖ Has an important function in positioning the tubehead.
- ❖ The extension arm folds up and can be swiveled from side to side.
- ❖ The dental assistant or the patient must never hold the tubehead to keep it in place during exposure.



CONTROL PANEL

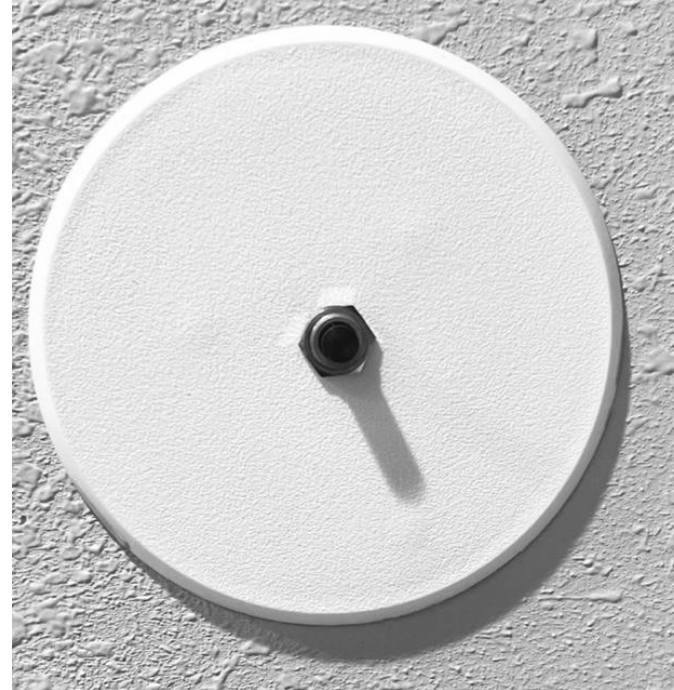
The control panel of an X-ray unit contains:

- Master switch
- Indicator light
- Selector buttons
- Exposure button
 - Control devices (time, milliamperage [mA] selector, and kilovoltage [kVp] selector)



EXPOSURE BUTTON

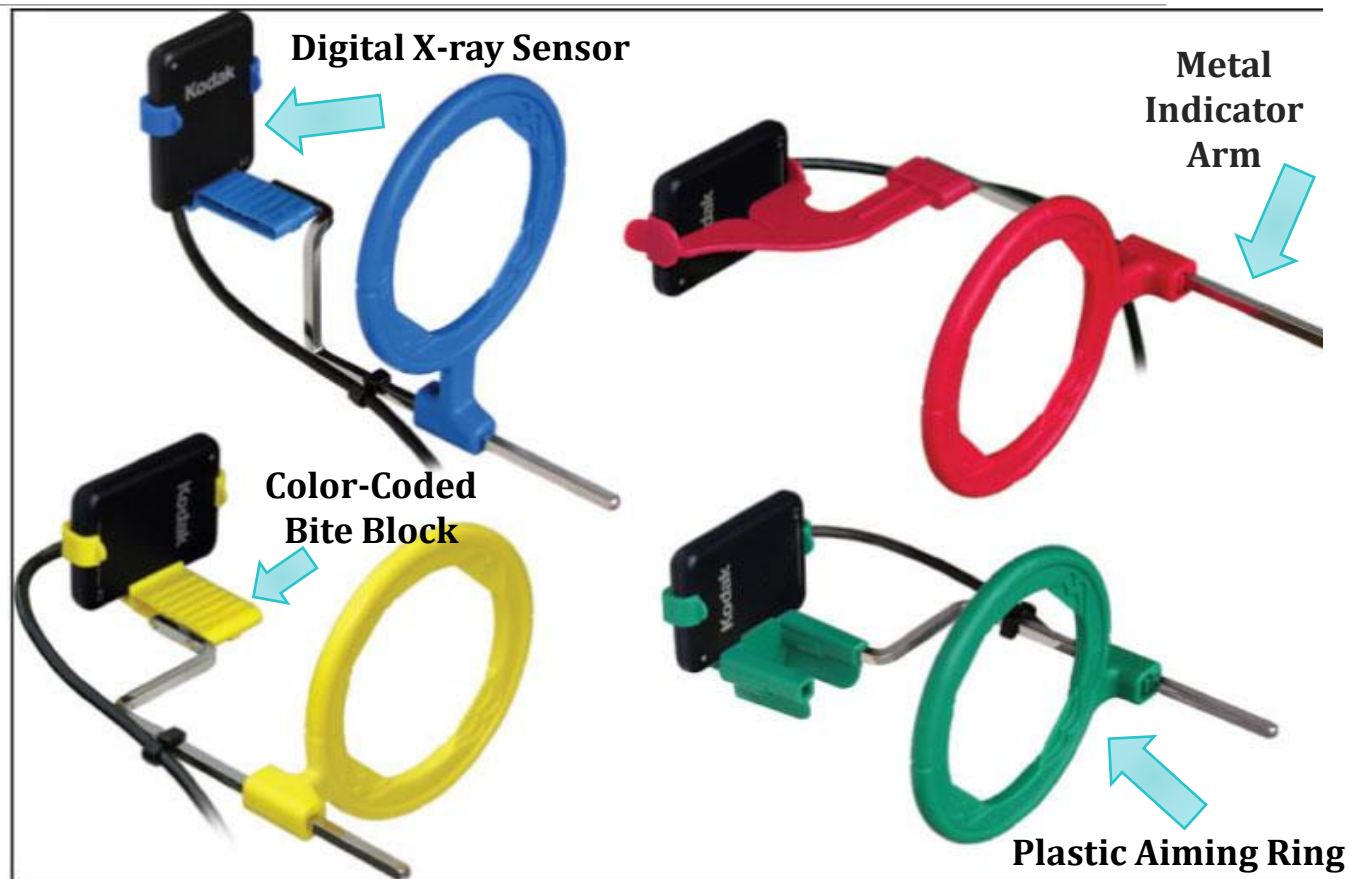
- ❖ The Exposure button can be found on the Control Panel with a cord to walk outside the room and press to expose the X-ray sensor.
- ❖ Or mounted on a wall outside the x-ray room to walk outside the x-ray room to press to expose the x-ray sensor.
- ❖ The image of the tooth will not show if the Exposure Button is not pressed for the correct amount of time (Until the beeping sound stops).



DENTAL X-RAY RINNS X-RAY BEAM ALIGNMENT DEVICES

- Blue- Anterior Rinn
- Yellow- Posterior Rinn
- Red – Bitewing Rinn
- Green – Endodontic Rinn

- ❖ The beam alignment device assists in the positioning of the PID in relation to the tooth and sensor
- ❖ Rinn XCP instruments use color-coded plastic bite-blocks, plastic aiming rings, and metal indicator arms for film-based techniques
- ❖ Rinn XCP-DS are for holding digital sensors

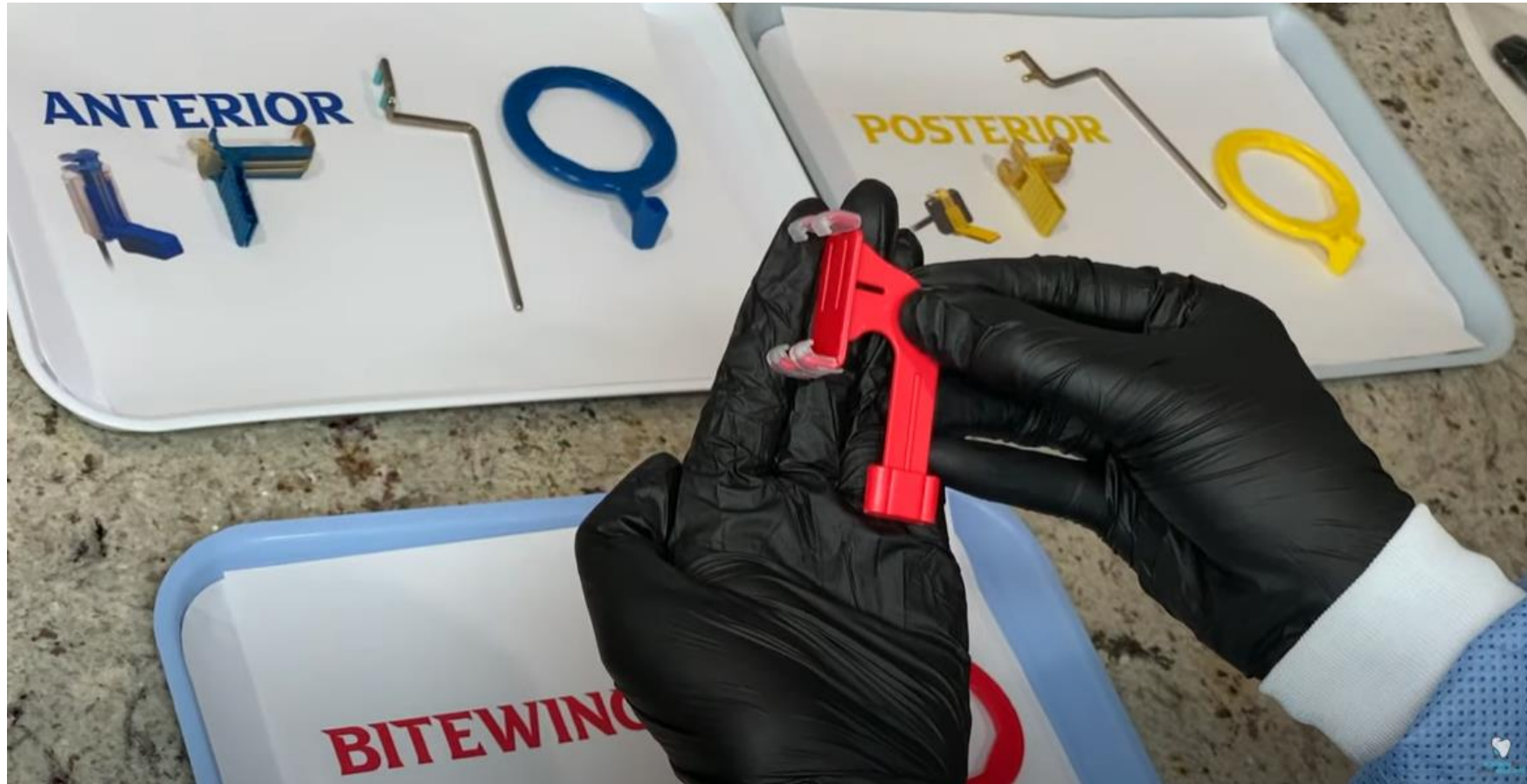


Courtesy Dentsply Rinn, Elgin, IL.

Unn Fig. 41-3. Extension-cone paralleling (XCP-DS) instruments for digital sensors.

How to Assemble the X-ray Rinns Video

Click Link for Tutorial: <https://www.youtube.com/watch?v=Xb9BpOEFK-Y&list=PLbFPoLfHyYCvYj7XocqSDZ7CiRFCC0fzT&index=1>

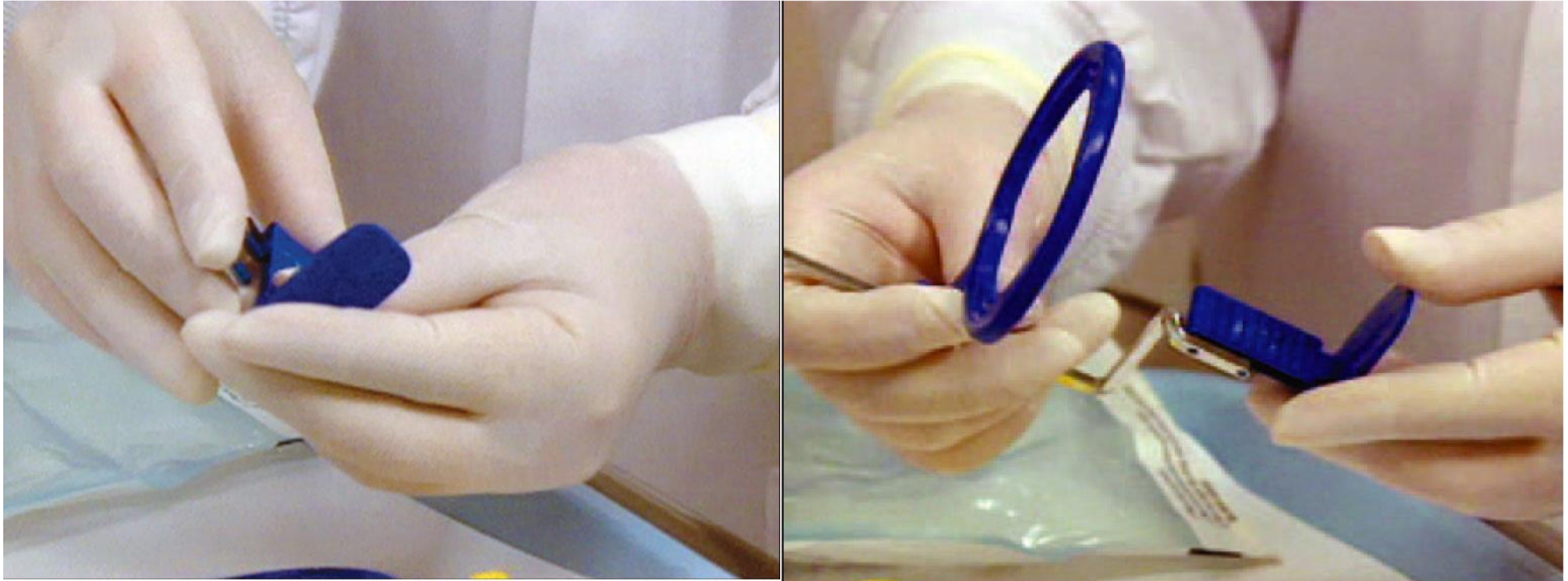


Bitewing X-ray (BWX) Rinn Set Up

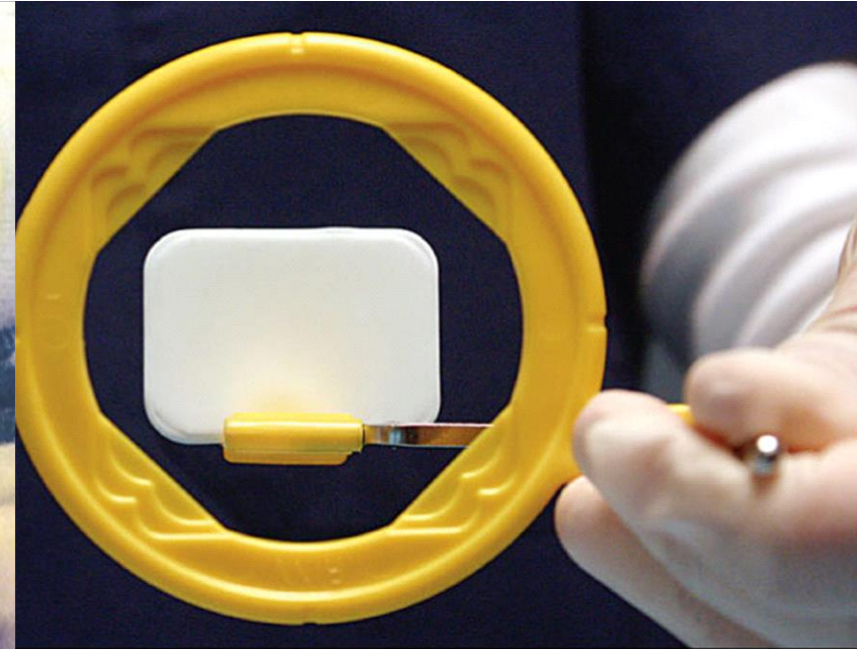
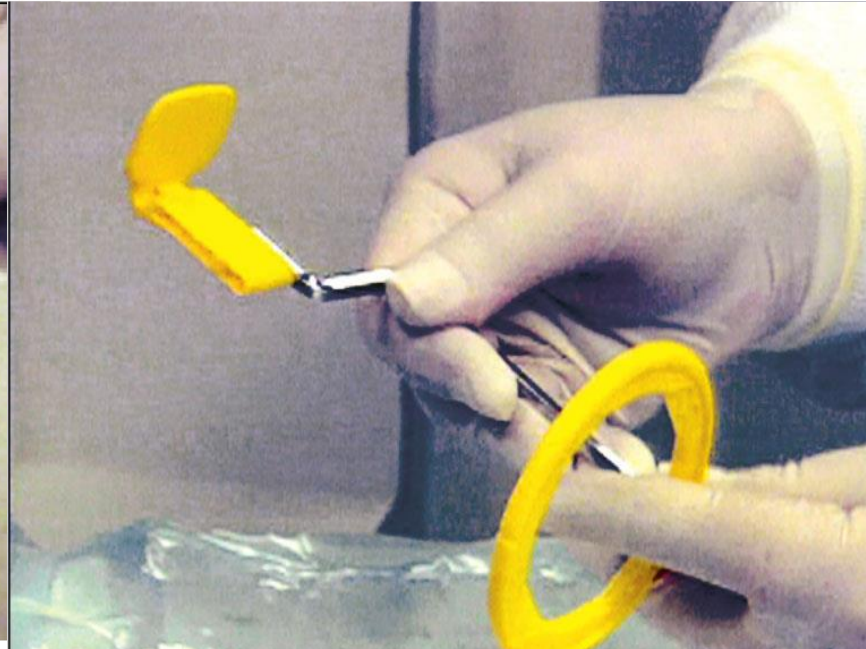
BiteWing X-ray Rinn Set Up



Anterior Rinn Set Up



Posterior Rinn Set Up



Utilizing an X-ray RINN will line up the X-ray sensor to get the idle image

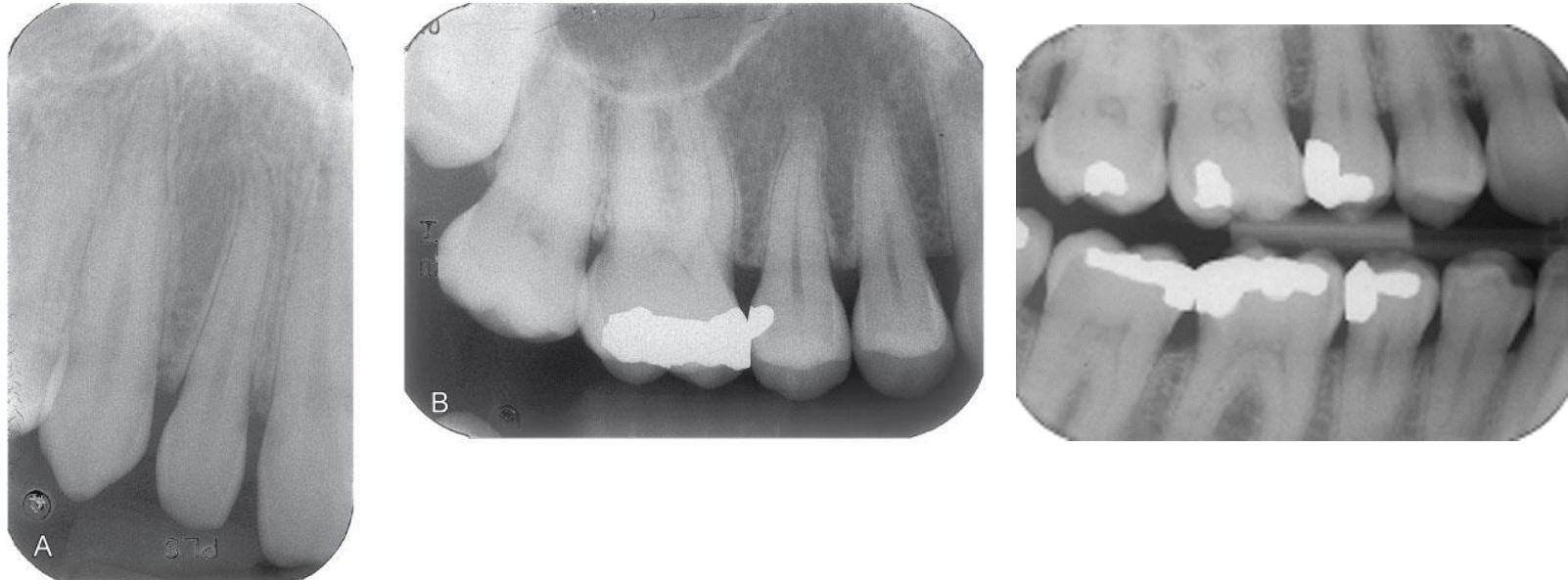


Fig. 41-3. **A**, Anterior periapical. **B**, Posterior periapical. Note that the entire tooth and surrounding bone are visible on the radiograph.

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Angulation of the Tubehead

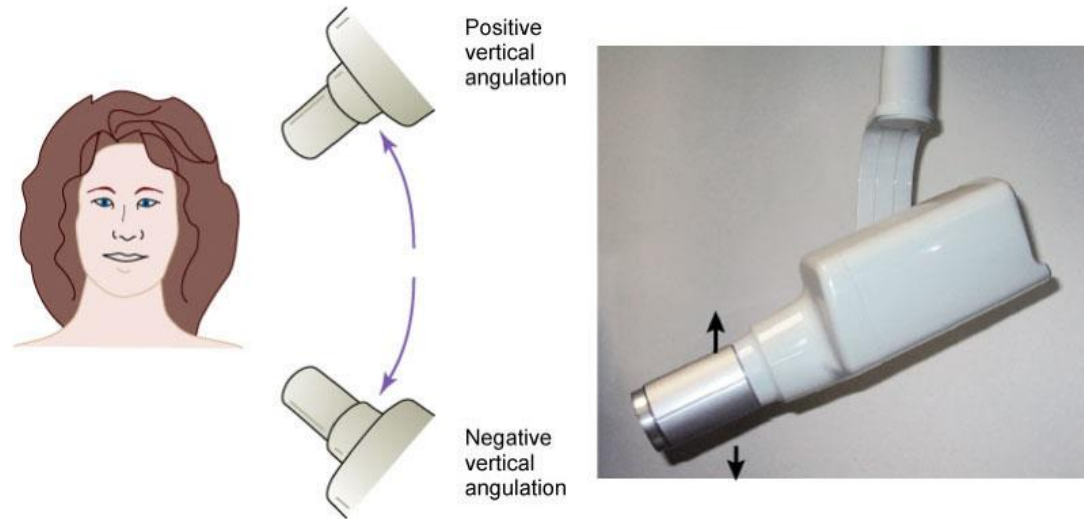
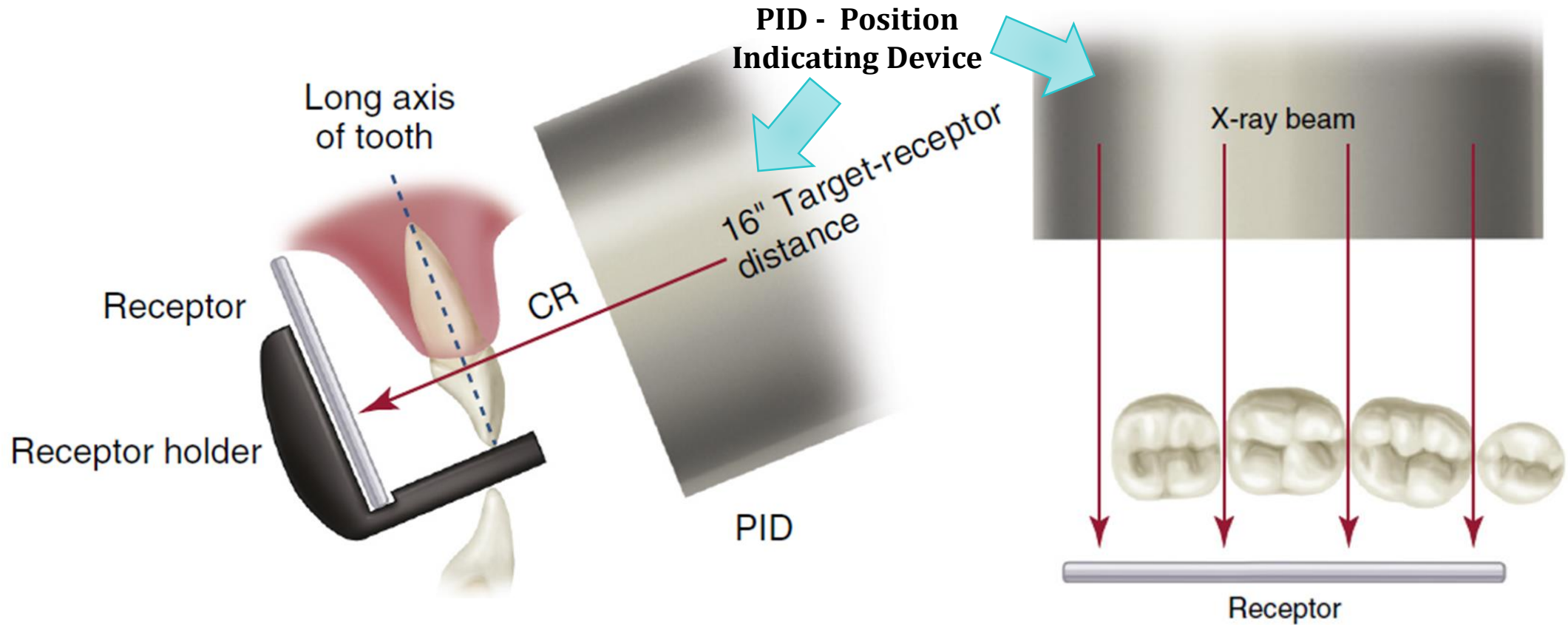


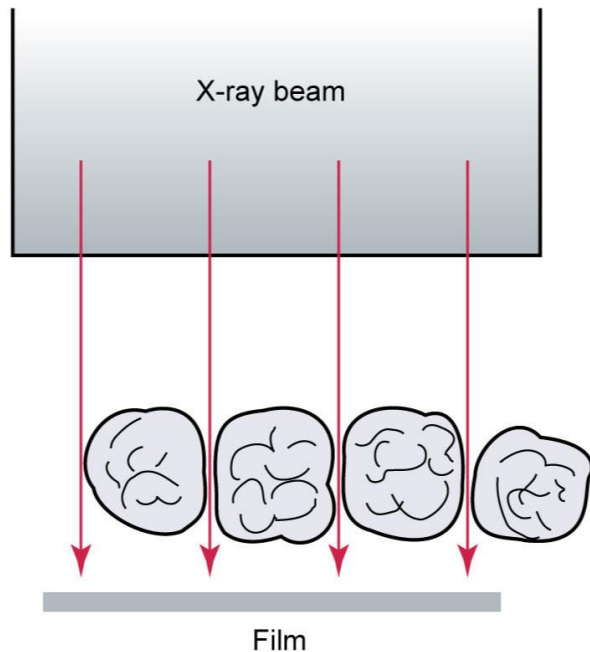
Fig. 41-19. Vertical angulation of the position indicator device (PID) refers to PID placement in an up-and-down (head-to-toe) direction.

ALIGNING THE TUBEHEAD

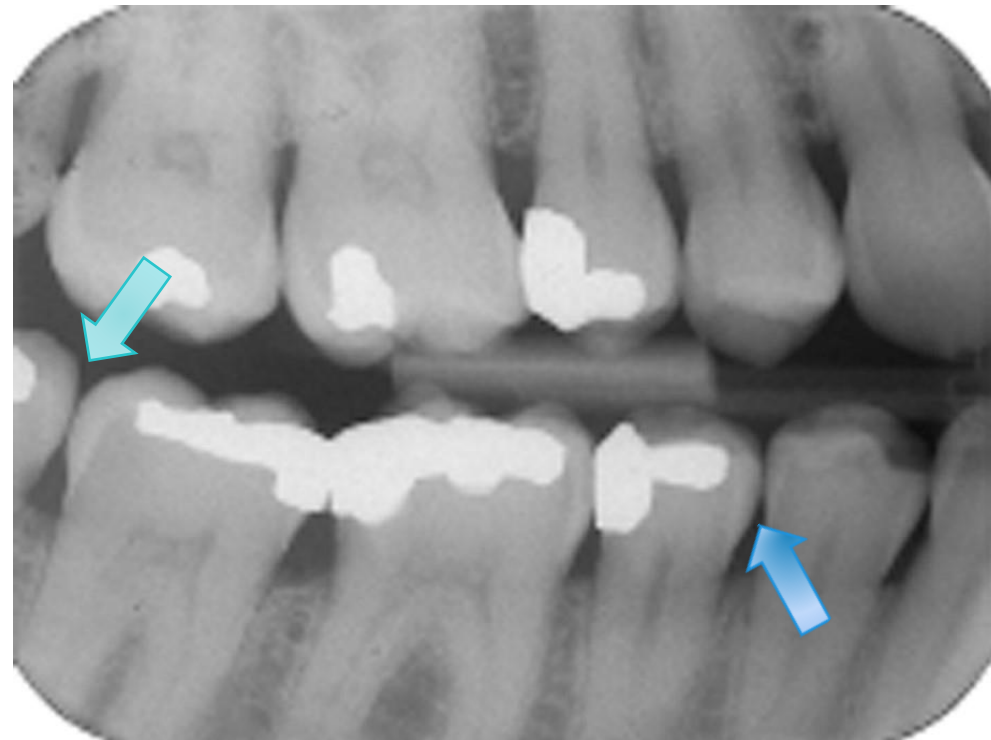
With correct horizontal angulation, the central ray is directed perpendicular to the curvature of the arch and through the contact areas of the teeth



CORRECT HORIZONTAL ANGULATION= OPEN CONTACTS



From Iannucci J, Jansen Howerton L: Dental radiography: principles and techniques, ed 4, St Louis, 2012, Saunders.
Fig. 41-16. Correct horizontal angulation.

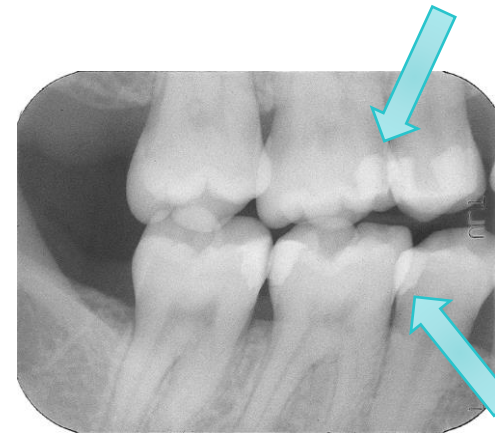
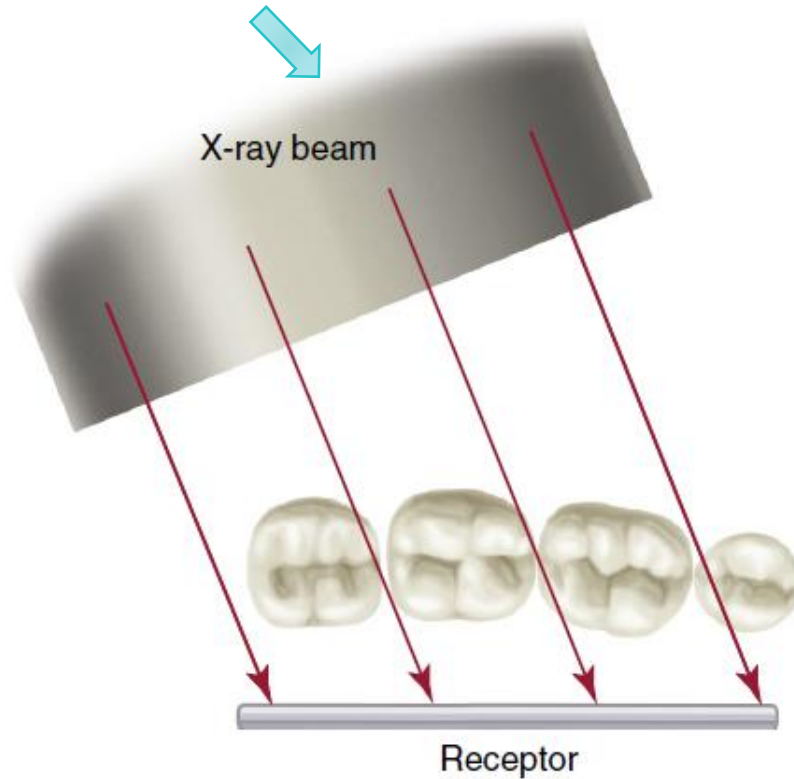


**Open Contact Areas
between the teeth so Dr
can see between teeth to
check for cavities.**

INCORRECT ANGULATION OF THE PID/TUBEHEAD

If angled incorrectly, the x-ray will show overlapped contact areas, which cannot be used to examine the interproximal areas of the teeth.

PID - Position Indicating Device



Overlapping of the teeth due to incorrect angulation of the PID/Tubehead - Dr won't be able to see if there is a cavity between the teeth

BITEWING X-RAYS & ALIGNMENT OF TUBEHEAD

- ❖ A bitewing view shows the crowns and interproximal areas of the maxillary and mandibular teeth
- ❖ Bitewing views are used to detect interproximal caries (tooth decay)

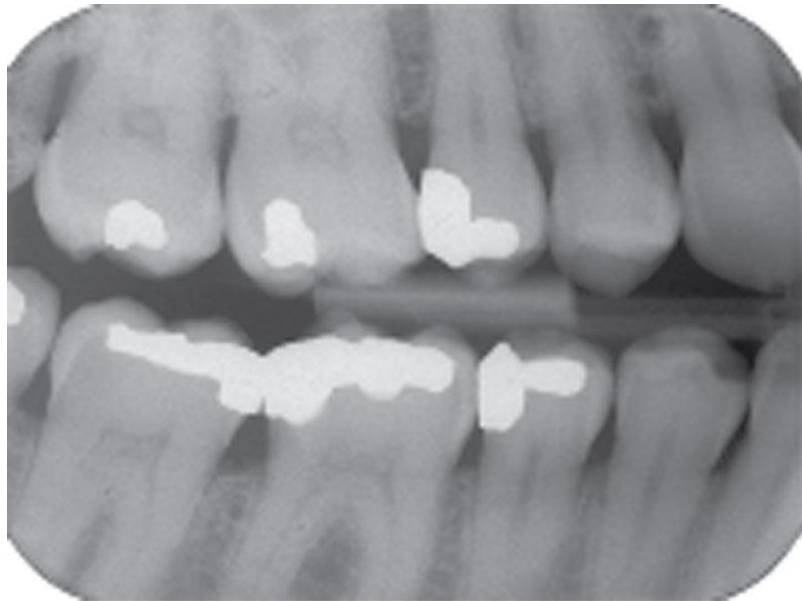
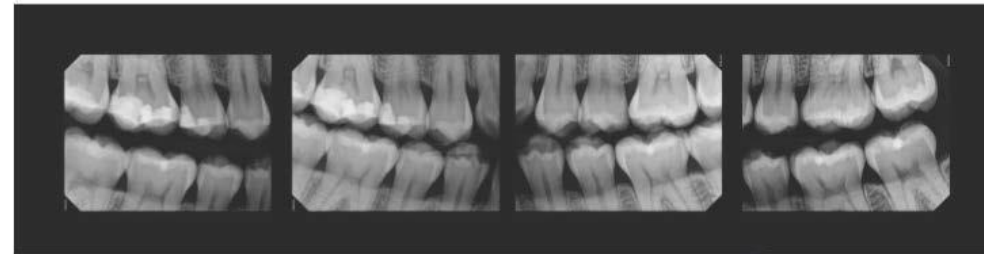


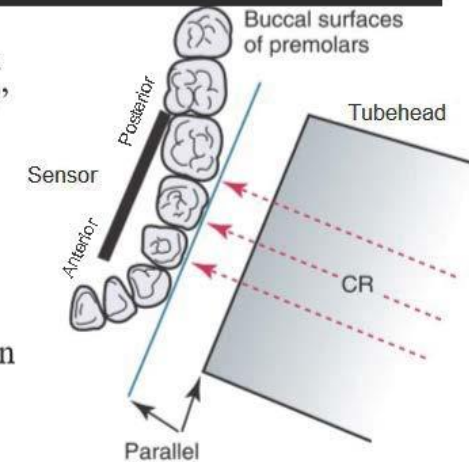
Fig. 41-2. Bitewing radiograph. Note that only the crowns and the alveolar ridge are visible, but not the entire root.
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BITEWING X-RAYS



When placing the bite block into mouth “open the anterior portion of bite block” in the patient’s mouth to avoid overlapping.

TIP: DO NOT place bite block up against teeth, place/rest the bite block on the patients tongue for patient comfort.

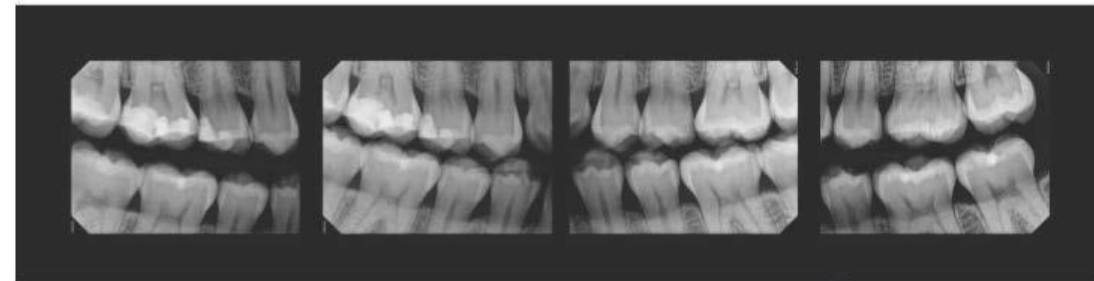


BITEWING X-RAYS & ALIGNMENT OF TUBEHEAD

- ❖ A bitewing view shows the crowns and interproximal areas of the maxillary and mandibular teeth.
- ❖ Bitewing views are used to detect interproximal caries (tooth decay).

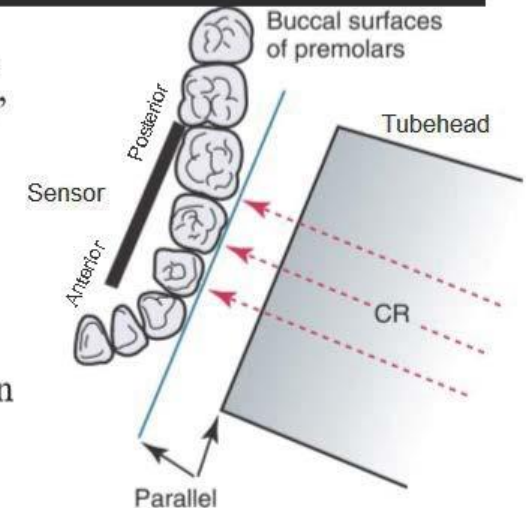
RIGHT MOLAR BWX #1 - 3 #32 - 30	RIGHT PREMOLAR BWX #4 - 6 #29 - 27	LEFT PREMOLAR BWX #12 - 13 #22 - 20	LEFT MOLAR BWX #14 - 16 #19 - 17
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BITEWING X-RAYS

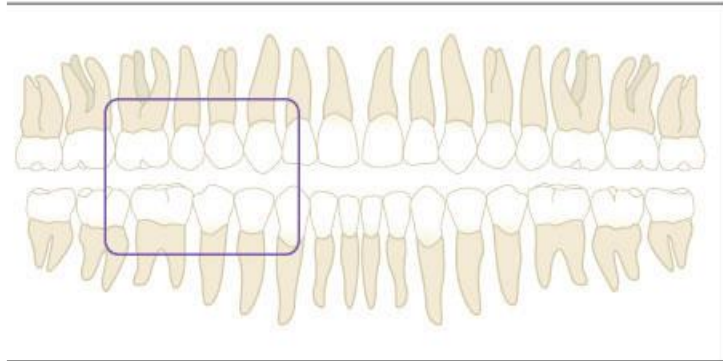


When placing the bite block into mouth “open the anterior portion of bite block” in the patient’s mouth to avoid overlapping.

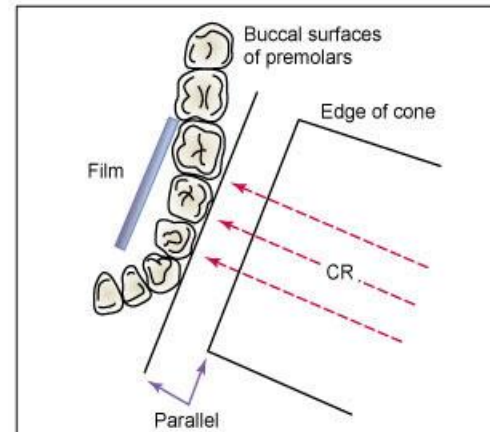
TIP: DO NOT place bite block up against teeth, place/rest the bite block on the patients tongue for patient comfort.



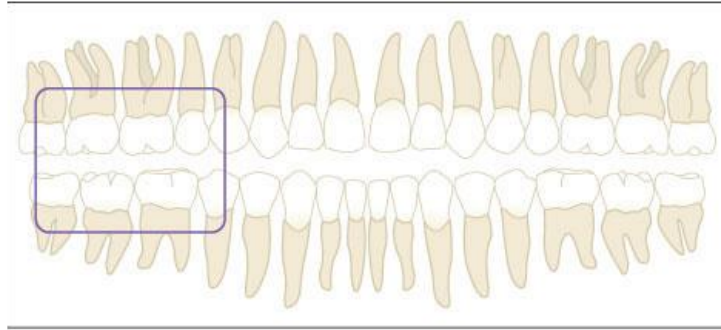
BITEWING ANGULATION OF THE XCP RINN - PREMOLAR X-RAY



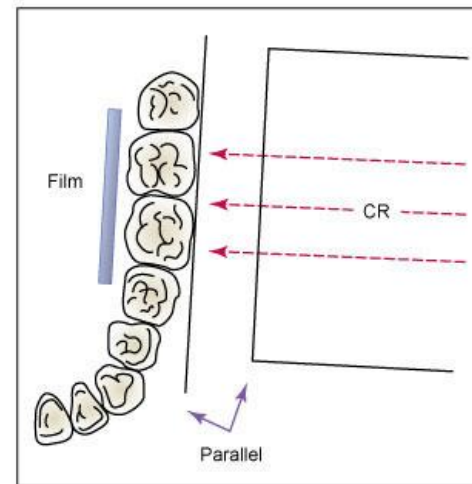
**PLACE THE
XRAY RINN to
open the
contacts**



BITEWING ANGULATION OF THE XCP RINN - MOLAR SHOT

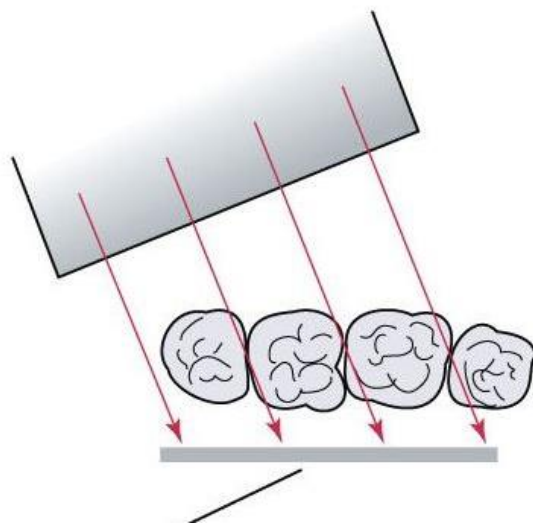


**PLACE THE XRAY
RINN to open the
contacts**

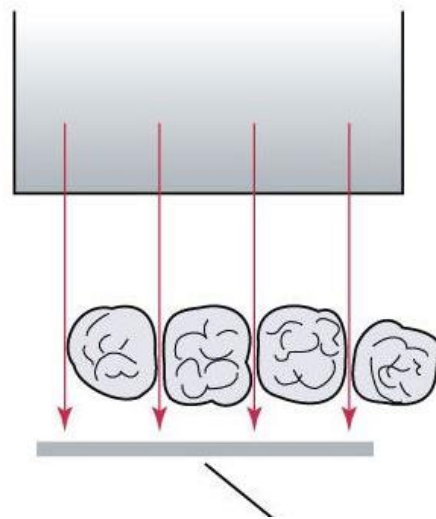


ERROR- OVERLAPPED X-RAY

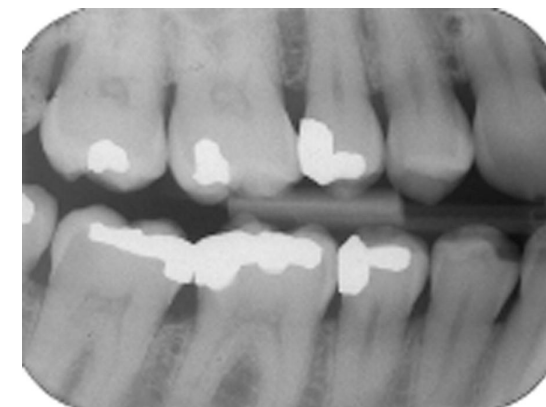
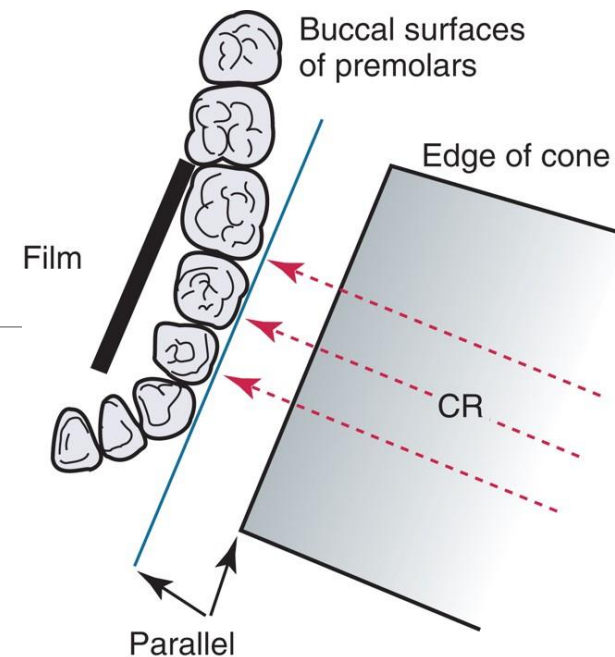
**THE TEETH ARE
OVERLAPPING AND CAN'T
SEE THE CONTACT AREAS (IN
BETWEEN TEETH) TO LOOK
FOR DECAY**



**Incorrect Angulation
of Tubehead =
Overlapping of Teeth**

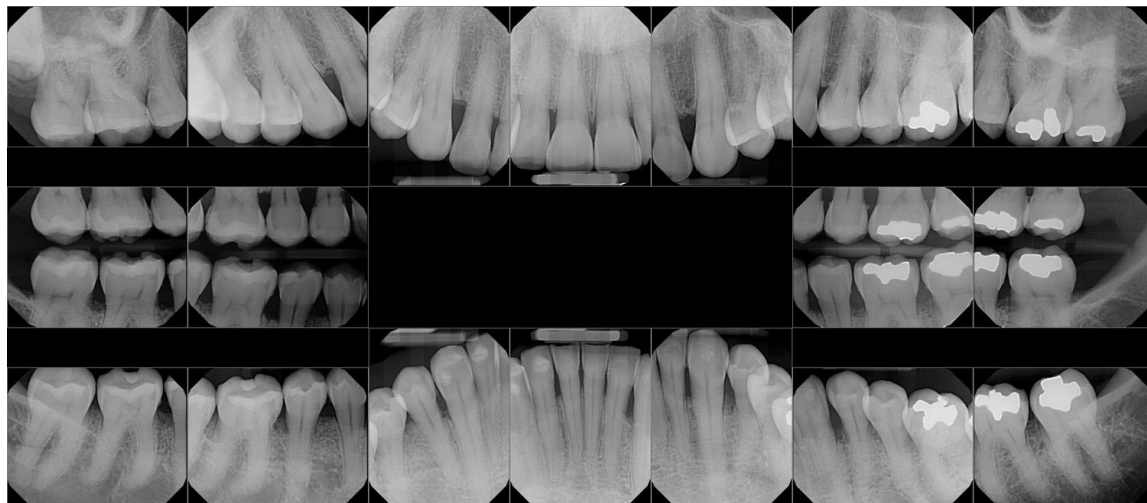


**Correct Angulation of
Tubehead = Open
Contacts (can see
between the teeth for
cavities)**



**FMXs can be
made up of 18
or 20 films**

DIGITAL FULL MOUTH X-RAYS (FMX)

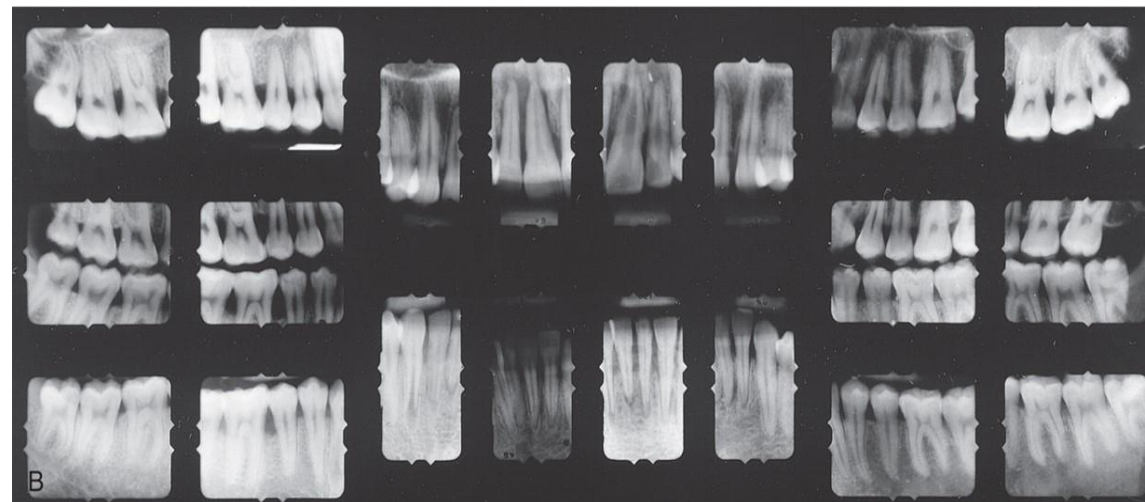


18 Film FMX

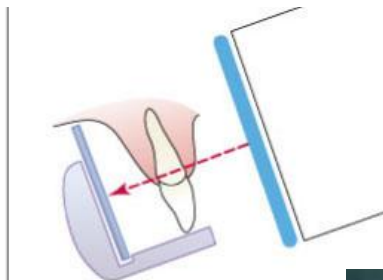
- 8 Posterior PA's (Molars and Premolars)
- 6 Anterior PA's (Canines and Incisors)
- 4 Bitewings (2 Molars, 2 Premolars)

20 Film FMX

- 8 Posterior PA's (Molars & Premolars)
- 8 Anterior PA's (Canines & Incisors)
- 4 Bitewings (2 Molars, 2 Premolars)



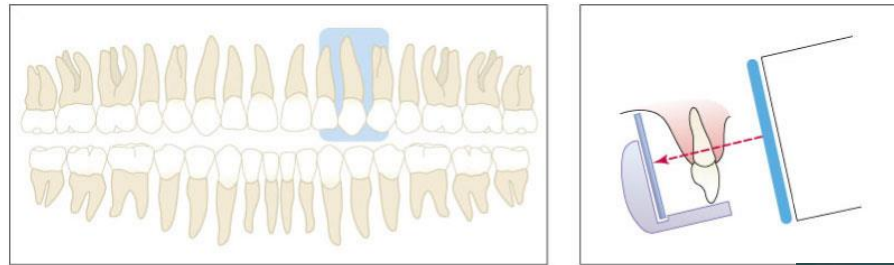
Anterior Rinn Placement for the Maxillary Central



		NAME: _____ DATE: _____			
		DR.: _____ NO.: _____			
RIGHT MOLAR #1 - 3	RIGHT PREMOLAR #4 - 5	RIGHT CANINE #6 - 7	CENTRAL #8 - 9	LEFT CANINE #10 - 11	LEFT MOLAR #14 - 16
RIGHT MOLAR BW #1 - 3 #32 - 30	RIGHT PREMOLAR BW #4 - 6 #29 - 27				LEFT MOLAR BW #14 - 16 #19 - 17
RIGHT MOLAR #32 - 30	RIGHT PREMOLAR #29 - 28	RIGHT CANINE #26 - 27	CENTRAL #24 - 25	LEFT CANINE #22 - 23	LEFT MOLAR #19 - 17
				LEFT CANINE #22 - 20	LEFT MOLAR #19 - 17

DENTSPLY RINN #22-6160

Anterior Rinn Placement for the Maxillary Canine



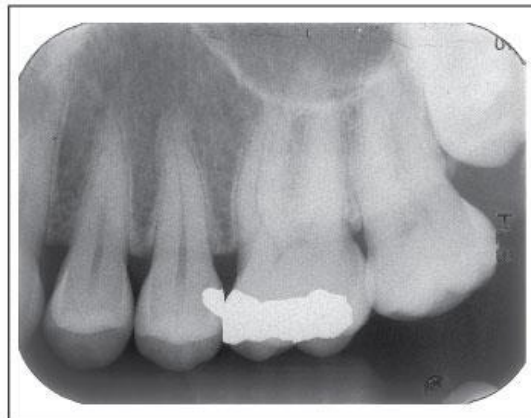
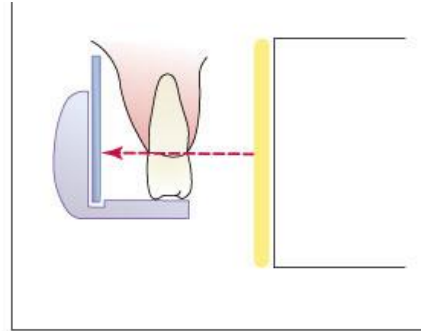
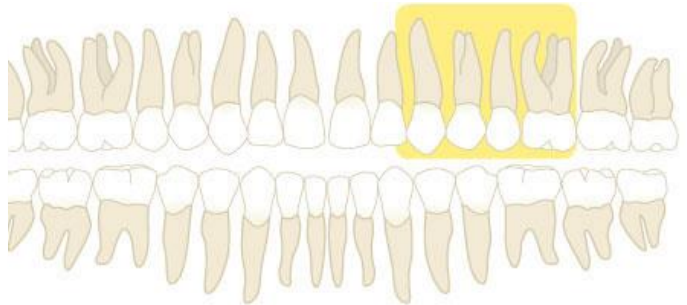
Unn Fig. 41-16.

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RIGHT MOLAR #1 - 3		RIGHT PREMOLAR #4 - 5		NAME: _____ DATE: _____ DR.: _____ NO.: _____		LEFT PREMOLAR #12 - 13		LEFT MOLAR #14 - 16	
RIGHT MOLAR BWX #1 - 3 #32 - 30		RIGHT PREMOLAR BWX #4 - 6 #29 - 27		RIGHT CANINE #6 - 7		CENTRAL #8 - 9		LEFT CANINE #10 - 11	
RIGHT MOLAR #32 - 30		RIGHT PREMOLAR #29 - 28		RIGHT CANINE #26 - 27		CENTRAL #24 - 25		LEFT CANINE #22 - 23	
						LEFT PREMOLAR #22 - 20		LEFT MOLAR #19 - 17	

DENTSPLY RINN #22-6180

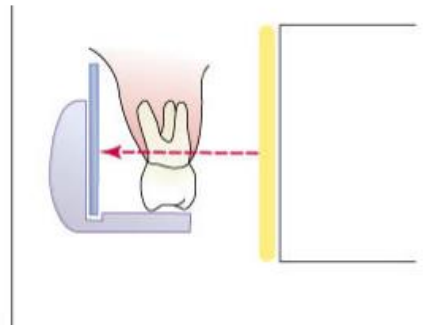
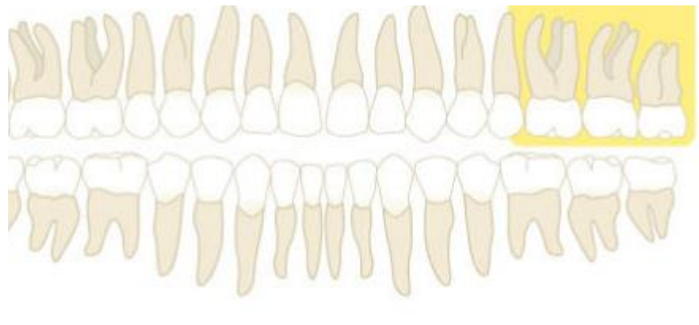
Posterior Rinn Placement for the Maxillary Premolars



NAME: _____ DATE: _____ DR.: _____ NO.: _____						
RIGHT MOLAR #1 - 3	RIGHT PREMOLAR #4 - 5	RIGHT CANINE #6 - 7	CENTRAL #8 - 9	LEFT CANINE #10 - 11	LEFT PREMOLAR #12 - 13	LEFT MOLAR #14 - 16
RIGHT MOLAR BWX #1 - 3 #32 - 30	RIGHT PREMOLAR BWX #4 - 6 #29 - 27	RIGHT CANINE #26 - 27	CENTRAL #24 - 25	LEFT CANINE #22 - 23	LEFT PREMOLAR BWX #12 - 13 #22 - 20	LEFT MOLAR BWX #14 - 16 #19 - 17
RIGHT MOLAR #32 - 30	RIGHT PREMOLAR #29 - 28				LEFT PREMOLAR #22 - 20	LEFT MOLAR #19 - 17

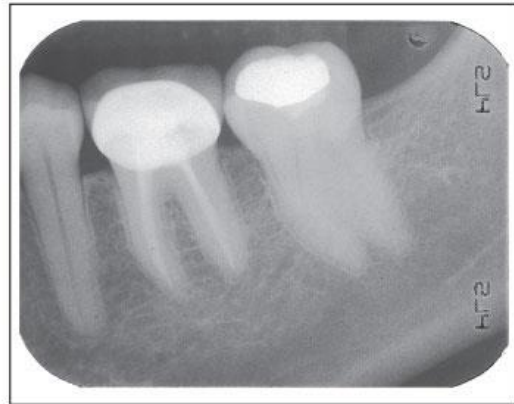
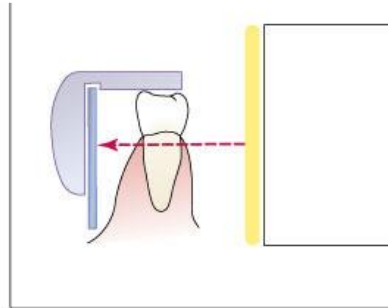
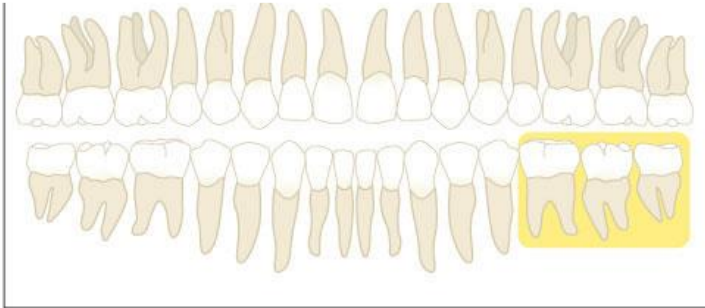
DENTSPLY RINN #22-6180

Posterior Rinn Placement for the Maxillary Molars



<p>NAME: _____ DATE: _____ DR.: _____ NO.: _____</p>						
<p>RIGHT MOLAR #1 - 3</p>	<p>RIGHT PREMOLAR #4 - 5</p>	<p>RIGHT CANINE #6 - 7</p>	<p>CENTRAL #8 - 9</p>	<p>LEFT CANINE #10 - 11</p>	<p>LEFT PREMOLAR #12 - 13</p>	<p>LEFT MOLAR #14 - 16</p>
<p>RIGHT MOLAR BWX #1 - 3 #32 - 30</p>	<p>RIGHT PREMOLAR BWX #4 - 6 #29 - 27</p>				<p>LEFT PREMOLAR BWX #12 - 13 #22 - 20</p>	<p>LEFT MOLAR BWX #14 - 16 #19 - 17</p>
<p>RIGHT MOLAR #32 - 30</p>	<p>RIGHT PREMOLAR #29 - 28</p>	<p>RIGHT CANINE #26 - 27</p>	<p>CENTRAL #24 - 25</p>	<p>LEFT CANINE #22 - 23</p>	<p>LEFT PREMOLAR #22 - 20</p>	<p>LEFT MOLAR #19 - 17</p>
<p><small>DENTSPLY RINN #22-6180</small></p>						

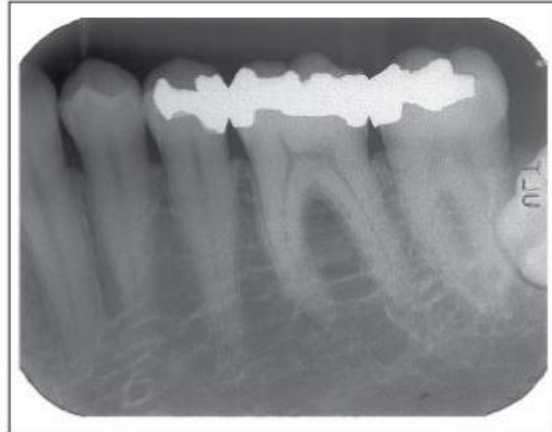
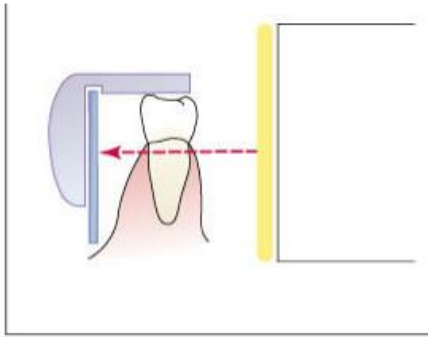
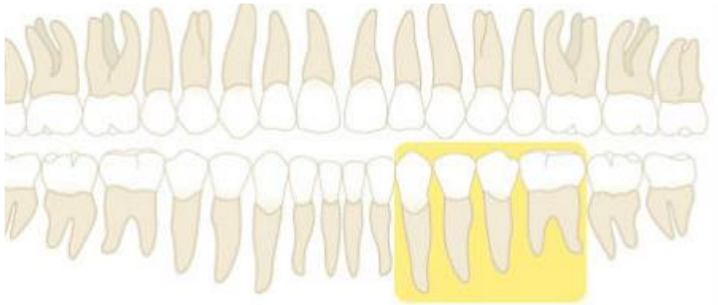
Posterior Rinn Placement for the Mandibular Molars



RIGHT MOLAR #1 - 3		RIGHT PREMOLAR #4 - 5		NAME: _____ DATE: _____ DR.: _____ NO.: _____		LEFT PREMOLAR #12 - 13		LEFT MOLAR #14 - 16	
RIGHT MOLAR BWX #1 - 3 #32 - 30		RIGHT PREMOLAR BWX #4 - 6 #29 - 27		RIGHT CANINE #6 - 7		CENTRAL #8 - 9		LEFT CANINE #10 - 11	
RIGHT MOLAR #32 - 30		RIGHT PREMOLAR #29 - 28		RIGHT CANINE #26 - 27		CENTRAL #24 - 25		LEFT CANINE #22 - 23	
						LEFT PREMOLAR #22 - 20		LEFT MOLAR #19 - 17	

DENTSPLY RINN #22-6180

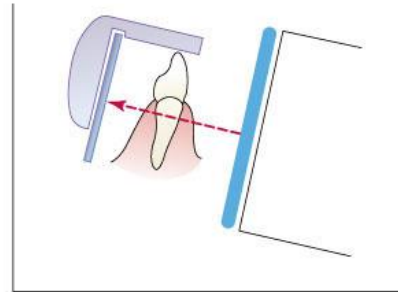
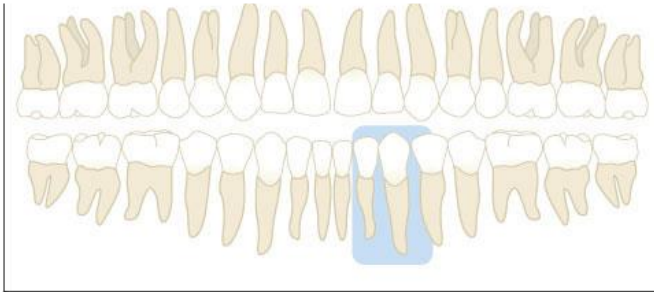
Posterior Rinn Placement for the Mandibular Premolars



RIGHT MOLAR #1 - 3		RIGHT PREMOLAR #4 - 5		NAME: _____ DATE: _____ DR.: _____ NO.: _____		LEFT PREMOLAR #12 - 13		LEFT MOLAR #14 - 16	
RIGHT MOLAR BWX #1 - 3 #32 - 30		RIGHT PREMOLAR BWX #4 - 6 #29 - 27		RIGHT CANINE #6 - 7		CENTRAL #8 - 9		LEFT CANINE #10 - 11	
RIGHT MOLAR #32 - 30		RIGHT PREMOLAR #29 - 28		RIGHT CANINE #26 - 27		CENTRAL #24 - 25		LEFT CANINE #22 - 23	
						LEFT PREMOLAR #22 - 20		LEFT MOLAR #19 - 17	

DENTSPLY RINN #22-6180

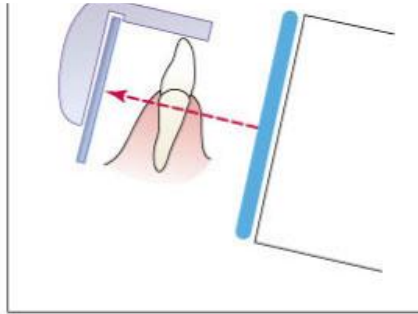
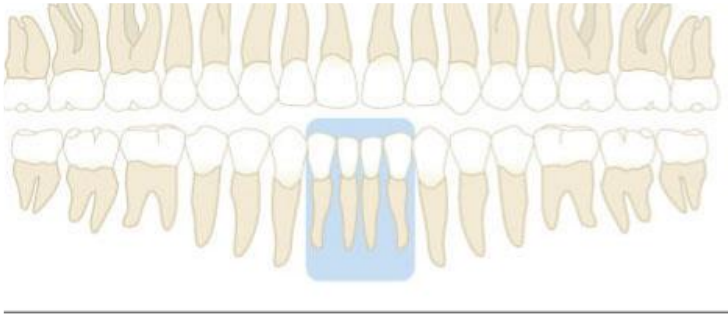
Anterior Rinn Placement for the Mandibular Canine



RIGHT MOLAR #1 - 3		RIGHT PREMOLAR #4 - 5		NAME: _____ DATE: _____ DR.: _____ NO.: _____		LEFT PREMOLAR #12 - 13		LEFT MOLAR #14 - 16	
RIGHT MOLAR BWX #1 - 3 #32 - 30		RIGHT PREMOLAR BWX #4 - 6 #29 - 27		RIGHT CANINE #6 - 7		CENTRAL #8 - 9		LEFT CANINE #10 - 11	
RIGHT MOLAR #32 - 30		RIGHT PREMOLAR #29 - 28		RIGHT CANINE #26 - 27		CENTRAL #24 - 25		LEFT CANINE #22 - 23	
						LEFT PREMOLAR BWX #12 - 13 #22 - 20		LEFT MOLAR BWX #14 - 16 #19 - 17	
						LEFT PREMOLAR #22 - 20		LEFT MOLAR #19 - 17	

DENTSPLY RINN #22-6180

Anterior Rinn Placement for the Mandibular Centrals



RIGHT MOLAR #1 - 3		RIGHT PREMOLAR #4 - 5		NAME: _____ DATE: _____ DR.: _____ NO.: _____		LEFT PREMOLAR #12 - 13		LEFT MOLAR #14 - 16	
RIGHT MOLAR BW #1 - 3 #32 - 30		RIGHT PREMOLAR BW #4 - 6 #29 - 27		RIGHT CANINE #6 - 7		CENTRAL #8 - 9		LEFT CANINE #10 - 11	
RIGHT MOLAR #32 - 30		RIGHT PREMOLAR #29 - 28		RIGHT CANINE #26 - 27		CENTRAL #24 - 25		LEFT CANINE #22 - 23	
								LEFT PREMOLAR #22 - 20	
								LEFT MOLAR #19 - 17	

DENTSPLY RINN #22-6180

What You Want to See on an Anterior Film



- Entire crown and root of the canine, including the apex and surrounding structures.
- Interproximal alveolar bone and mesial contact of the canine.
- Lingual cusp of the first premolar usually obscures distal contact of the canine.



- Entire crown and root of the canine, including the apex and surrounding structures.
- Interproximal alveolar bone and mesial and distal contacts.



- Entire crown and root of one lateral and one central incisor, including apices of teeth surrounding structures.
- Interproximal alveolar bone between central and lateral contact areas, mesial and distal contact areas, and surrounding regions of bone.
- Mesial contacts of adjacent central incisor and adjacent canine.

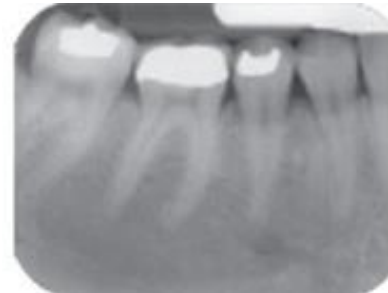


- Entire crown and root of four mandibular incisors, including apices of teeth surrounding structures.
- Contacts between central incisors and between central and lateral incisors.
- In most cases, not necessary to see distal contacts of lateral incisors.

What You Want to See on a Posterior Film



-All crowns and roots of the first and second molars and premolars including apices, alveolar crests, contact areas, and surrounding bone.



-All crowns and roots of the first and second molars and premolars including apices and surrounding bone
-Distal Contact of mandibular canine.



-All crowns and roots of the first, second, and third molars including apices, alveolar crests, contact areas, surrounding bone, and tuberosity region.



-All crowns and roots of the first, second, and third molars including apices and surrounding bone.

COMMON ERRORS WHEN TAKING AN X-RAY



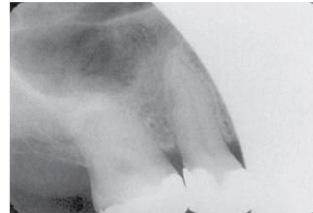
Cause: Underexposed
Correction: Check exposure settings & increase as needed



Cause: Overexposed
Correction: Check exposure settings & decrease as needed



Cause: Movement
Correction: Stabilize patient/x-ray tubehead before exposure



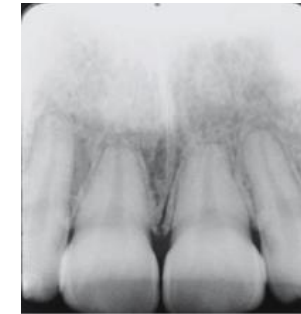
Cause: Cone-Cut
Correction: Align tubehead to be positioned with the XCP Target



Cause: Overlapping – Incorrect angulation
Correction: Align tubehead to be aligned w/ contact of the teeth



Cause: Occlusal Plane Misaligned
Correction: Reposition the XCP for the patient to be able to bite properly



Cause: Foreshortened – angle too steep
Correction: Ensure the X-ray beam is perpendicular (90 degrees) to the long axis of the teeth



Cause: Elongated – angle too shallow
Correction: Avoid directing the beam at an angle that is too shallow.