



Intraoral  
Radiography  
with RINN  
XCP®/XCP-DS®  
Instruments

**DENTSPLY**  
RINN

**ALARA Principle** “As Low As Reasonably Achievable”: a safety principle aimed at minimizing exposure to radiation.

**Angulation** The direction or angle at which the central ray and PID of the x-ray machine are aimed at the teeth and media.

**Anode** The positively charged side of the dental x-ray tube. It contains the tungsten target at which the electrons are aimed and from which x-rays are emitted.

**Anterior** Front teeth of either jaw; *i.e.* the incisors and cuspid teeth.

**Apex** The point or extremity of the tooth root. Plural: apices.

## Bisecting Angle Technique (BAI)

A technique in which the media is positioned close to the teeth and the central ray is directed vertically at an imaginary line that bisects the angle formed by the long axis of the tooth and media.

## Bitewing Radiographs (BMX)

Intraoral images that show only the crown portions of opposing teeth in the biting position. Also called interproximal radiographs.

**Buccal** Surface of the tooth towards the cheek.

**Central Ray** The theoretical center of the x-ray beam as it leaves the tube head; the most direct line of radiation.

**Cone** The pointed or open-ended cylinder (PID) through which the x-rays travel after leaving the tube.

**Cone-cutting** Failure to center the x-ray beam on the media, leading to unexposed areas.

**Contrast** Difference in densities between adjacent areas on the radiograph.

**Definition** Distinctness and sharp demarcation of the image.

**Density (Media)** The degree of blackness on a radiograph.

**Density (Object)** The resistance of an object to the passage of the x-ray beam which makes it appear either lighter or darker in the image.

**Detail** Quality of sharpness or unsharpness of the images on the radiograph.

**Distortion** Deviation of a radiographic image from the true outline or shape of an object or structure, such as elongation and foreshortening.

**Distal** Surface of the tooth towards the back of the mouth, away from the midline.

**Dosage** The amount of radiation delivered to the body.

**Elongation** The distortion on a radiograph that results in lengthening of the image in one dimension.

**Exposure Time** The amount of time, in seconds or fractions, during which x-rays are produced by the x-ray machine.

**Extraoral Films** Radiographs that are taken with the media outside the patient’s mouth.

**Film Speed** The amount of exposure necessary in terms of seconds, milliamps and kilovolts. Films are classified in six speed groups, from A through F with each step equal to a two-fold increase in film speed.

**Focal-Film Distance (FFD)** Also called Source-Image Distance (SID). The distance from the focal spot (target) on the anode of the x-ray tube to the media. It is usually expressed in inches; *ex.*: 8 inches FFD.

**Focal Spot** That area of the anode or target bombarded by the electron stream when the tube is in action. It is important for the focal spot to be as small as possible.

**Foreshortening** The distortion of a radiograph in which the image is shorter than the object in one dimension.

## Full Mouth Survey or Series (Complete Mouth Series)

A series of intraoral radiographs that gives diagnostic information for all teeth and desired bony areas. It may be composed of periapical as well as bitewing images. Also called FMX or CMX.

**Gag Reflex** The coughing or retching reflex caused by contact of the media, operator’s fingers or holding device with the patient’s palate or other intraoral tissues.

**Horizontal Angulation** The aiming of the x-ray beam in the horizontal plane.

**Incisal Edge** The cutting edge of the anterior teeth.

**Interproximal Radiograph** See bitewing radiograph.

**Intraoral Radiograph** Media placed in the oral cavity and lingual to the teeth.

**Ionizing Radiation** Radiation, including x-rays, that produces ions when interacting with matter, therefore capable of harming living tissue.

**Kilovolt Peak (kVp)** Used in dental radiology to describe the kilovoltage setting on the control panel.

**Labial Surface** Surface of the tooth towards the lips.

**Lingual Surface** Surface of the tooth towards the tongue.

**Mandible** Lower jaw.

**Maxilla** Upper jaw.

**Media** The film or digital sensor used to capture an image produced by x-rays.

**Medial** Pertaining to the middle.

**Mesial Surface** Surface of the tooth towards the front; closest to the midline.

## Mid-sagittal Plane (Midline)

An imaginary vertical line or plane passing through the center of the body that divides it into a right and left half.

**Milliampere-Seconds (mAs)** The number of milliamperes of tube current multiplied by the number of seconds of exposure.

**Millisieverts (mSv)** A measure of biologically-effective ionizing radiation dosage, one thousandth of a Sievert. A Sievert is equal to one joule per kilogram.

**Occlusal Surface** Surface of a bicuspid (premolar) or molar that meets the opposing teeth in the closure of the jaws.

**Overlapping** Superimposition of the image of one tooth over part of another, produced when the central ray is not perpendicular to the media and teeth in the horizontal plane.

**Paralleling Technique** Also referred to as long cone technique and XCP technique. It involves placing the media parallel to the longitudinal axis of the tooth and directing the central ray perpendicular to tooth and media.

**Periapical Radiograph** An intraoral x-ray that shows the entire tooth and surrounding anatomy. Commonly referred to as PAX.

## Position Indicating Device (PID)

Any device attached to the tubehead at the aperture to direct the useful beam of radiation.

**Posterior** Teeth of either jaw behind the incisors and cuspids, *i.e.* bicuspid (pre-molars) and molars.

**Primary Radiation** X-rays produced on the target of the anode.

**Radiation** The emission of energy through space or substance in the form of waves or particles.

**Radiograph** A roentgenogram, x-ray film. An image produced on a sensitized media by roentgen rays.

**Radiolucent** Permeable to x-rays, producing black areas on radiographs.

**Radiopaque** Impermeable to x-rays, producing light areas on radiographs.

**Right Angle Technique** See Long Cone Technique.

**Roentgen (R)** The international unit of ionizing radiation.

**Roentgenogram** See Radiograph.

**Safelight** A red light used to illuminate the darkroom which does not affect the film emulsion.

**Scattered Radiation** Radiation that has been deviated in direction during passage through matter. It is one form of secondary radiation.

**Secondary Radiation** Radiation produced from any substance on being struck by primary radiation.

**SSD** Source to Surface Distance.

**Vertical Angulation** Angle made between the x-ray beam and a line parallel to the floor.

**XCP** Extension Cone Paralleling Instrument (RINN).

Professor Wilhelm Conrad Roentgen discovered x-rays in November, 1895, and within two months Dr. Otto Walkhoff had taken the first dental radiograph. Approximately 90 years after Roentgen's and Walkhoff's pioneering efforts, the work of Dr. Frances Mouyens brought about the advent of digital radiography. While the technologies involved will likely continue to change and improve, the primary goal of dental radiography always has been, and still is, to provide diagnostic images.

Accurate and adequately detailed radiographs are required to evaluate oral disease states such as caries, periodontal disease, and periapical pathology. The image quality must be sufficient to provide for proper interpretation. Both analog film-based and digital sensor-based dental radiographs require the use of careful positioning technique and effective patient management, with an increased focus on reducing patient radiation exposure.

The key objectives of any radiographic examination should be to:

- Maximize the diagnostic value of radiographs
- Minimize patient exposure to radiation

Since its first incarnation over four decades ago, the RINN XCP® system has defined the paralleling technique for intraoral radiography, and has become an essential, integral part of teaching effective and accurate radiographic technique.

In line with the advances in digital imaging, XCP-DS® extends these capabilities to virtually all digital sensors.

This guide discusses the techniques recommended for taking periapical and bitewing images. Accurate positioning is a key step in maximizing the value of the image and in reducing retakes, which helps minimize patient exposure.



ROENTGEN



WALKHOFF

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## Quick Reference

### Exposure Factors

|                   |                    | 65kV, 8mA |           | 70kV, 8mA |           |
|-------------------|--------------------|-----------|-----------|-----------|-----------|
|                   |                    | D Speed   | F Speed   | D Speed   | F Speed   |
| <b>Maxillary</b>  | Anterior, Bitewing | 0.67 sec. | 0.32 sec. | 0.54 sec. | 0.25 sec. |
|                   | Premolar           | 0.90 sec. | 0.40 sec. | 0.72 sec. | 0.32 sec. |
|                   | Molar              | 1.00 sec. | 0.45 sec. | 0.80 sec. | 0.36 sec. |
| <b>Mandibular</b> | Anterior           | 0.56 sec. | 0.25 sec. | 0.45 sec. | 0.20 sec. |
|                   | Premolar           | 0.63 sec. | 0.27 sec. | 0.50 sec. | 0.22 sec. |
|                   | Molar, Bitewing    | 0.67 sec. | 0.32 sec. | 0.54 sec. | 0.25 sec. |

2-2.5mm aluminum filtration.

12" (30cm) Anode to Film Distance

Exposure time for digital sensors will be less than F speed film. Consult your sensor manufacturer for proper settings with your tubehead.

### Milliamperage(mA)

If radiographs are taken of the same area using a fixed exposure time and kilovoltage BUT VARYING THE MILLIAMPERAGE, the overall density will be increased as the milliamperage is raised.

### Exposure Time (Seconds)

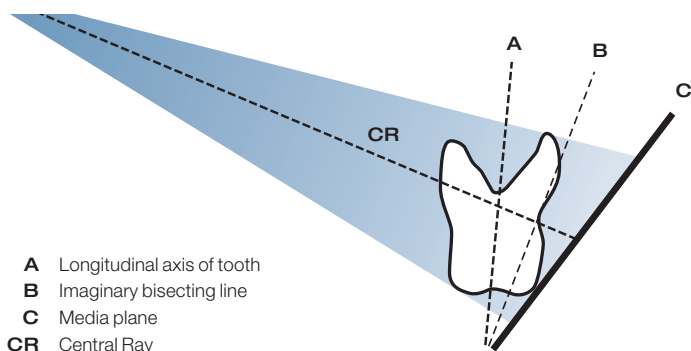
If two radiographs are taken of the same area using a fixed milliamperage and kilovoltage BUT VARYING THE EXPOSURE TIME, the one taken at the longer exposure time will display a greater overall density.

### Cleaning and Sterilization Instructions

1. Disassemble instrument(s). Separate holders, arm and ring for steam autoclaving.
2. Remove debris from components with hot water and soap.
3. Put components in sterilization pouches, and place in the middle tray of the autoclave, away from autoclave walls and heating element. Plastic parts must be in a separate pouch from metal arms to avoid melting or warping.
4. Cycle steam autoclave at 270°F (132° C) for 10 minutes at 30 PSI (206.8 kPa). Do not exceed 273°F (134°C).



## Bisecting Angle Technique



The Bisecting Angle (short cone) Technique for dental radiography is based on the principle of projecting the x-ray beam at right angles to an imaginary plane bisecting the angle formed by the longitudinal axis of the tooth and the plane of the media (Cieszynski, 1907). The vertical angulation of the x-ray beam is based on this principle. The horizontal angulation is determined by directing the x-ray beam (central ray) at right angles to the tooth and media. The beam must be aimed through the interproximal spaces to avoid overlapping of tooth structures.

Both angulations are dependent on specific positioning of the patient and correct media placement.

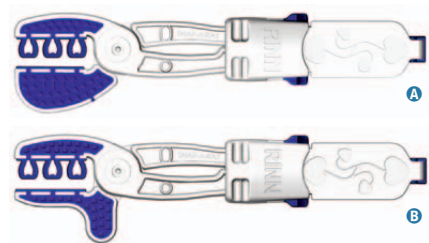
When considering these variables, as well as the different anatomic characteristics of each patient, the limitations of this procedure from the standpoints of performance, standardization and reproduction can be readily understood. Regardless of the technical precision of the operator, it is impossible to avoid dimensional distortion in radiographic images using this technique.

Three-dimensional objects (teeth and surrounding structures) projected at an angle onto a two-dimensional surface (film or sensor) following the bisecting principle, results in the parts of the object farther from the media displaying greater evidence of angulation than the area more adjacent to the media.

Dimensional distortion is an inherent characteristic of the Bisecting Angle Technique. This is eliminated in the Extension Cone Paralleling Technique, for which the RINN XCP instruments are designed.



## Instruments for Bisecting Angle Technique



### **A Snap-A-Ray® DS Sensor Holder** **B Snap-A-Ray® DS Endo Sensor Holder**

The Snap-A-Ray DS holders allow you to quickly load and place digital sensors for accurate periapical radiographs.

- Work with all sensors.
- Endo version has cut out bite surface to allow room for your work.
- Autoclavable.



### **Snap-A-Ray® Xtra** **Film & Phosphor Plate Holder**

Anterior and posterior bisecting angle technique radiographs with an extra measure of comfort.

- Cushioned media grips for secure hold
- Angled anterior bite area and backing plate for bisecting angle radiographs
- Media can be angled
- Autoclavable



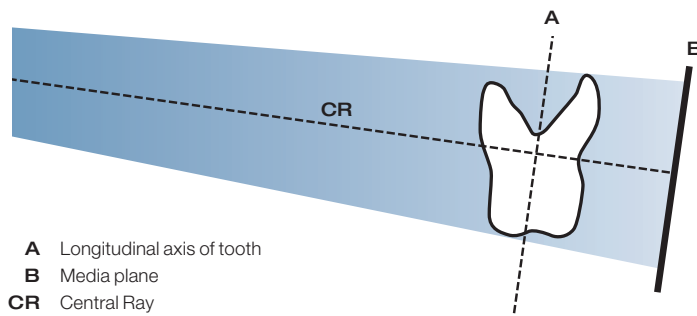
### **Snap-A-Ray®** **Film & Phosphor Plate Holder**

Take quick and precise anterior and posterior bisecting angle radiographs.

- Eliminates manual retention of film packet by patient
- Autoclavable

**TIP** For thin phosphor plates, fold over the bottom of the envelope for greater thickness. Or use an autoclavable instrument such as the RINN Flip-Ray® System.

## Extension Cone Paralleling Technique



Although important to understand, the Bisecting Angle Technique produces certain undesirable results. The most objectionable is Dimensional Distortion, which cannot be avoided when the bisecting angle principle is utilized even by the most skillful operators.

Extension cone paralleling is a practical technique for periapical radiography which will minimize dimensional distortion and present the objects being radiographed in their true anatomical relationship and size. The x-ray beam is directed perpendicular to the recording plane of the media, which has been positioned parallel to the long axis of the tooth. By aligning media, object and beam in this manner, the angulation inherent in the bisecting technique, and the distortion caused by it, are eliminated. This technique, known variously as Paralleling Technique, Right Angle Technique, Long Cone Technique, Paralleling Extension Tube Technique and XCP (extension cone paralleling), is based on the following principles:

1. Paralleling the media with the long axes of the teeth to minimize dimensional distortion.
2. Increasing the anode (source)-media distance to avoid image enlargement and adumbration.
3. Directing alignment of the x-ray beam to assure correct vertical and horizontal angulation.

The XCP instruments illustrated in this manual, when used as directed, will accomplish objectives 1 and 3. Using long (12" or 16") Position Indicating Devices (PIDs) on the x-ray unit in place of short cones will accomplish objective 2.



### Advantages of the extension cone paralleling technique:

**Simplicity** — Eliminates the need for pre-determined angulation and positioning of patient's head.

**Adaptability** — Can be used in most offices, regardless of space requirements, by rotating the chair and/or the patient's head.

**Reliability** — Anatomic accuracy of tooth size, length of canals, etc., is assured. Radiographs can be accurately duplicated at subsequent visits.

**Results** — Radiographs which reproduce anatomic structures in their normal size and relationship, free of distortion with minimal superimposition of the zygomatic shadow and exhibiting maximum detail and definition.

## Instruments for Extension Cone Paralleling Technique



### XCP® Film Holding System

Film holding system designed for patient comfort and practitioner ease-of-use. For precise anterior, posterior, bitewing and endodontic radiographs.

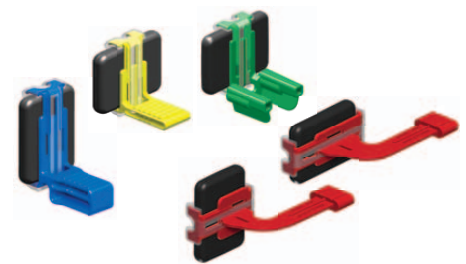
- Quickly align x-ray cone to media
- Prevents cone cutting
- Color-coded arms, rings and biteblocks
- Autoclavable



### XCP-ORA® One Ring and Arm System

Multi-position ring and arm take the place of three rings, three arms.

- Work with all RINN biteblocks (analog or digital)
- Prevents cone cutting
- Color-coded for easy assembly
- Compatible with all intraoral x-ray units
- Autoclavable



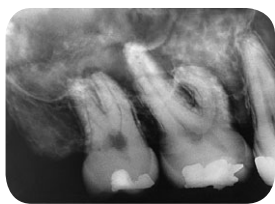
### XCP-DS FIT® Universal Sensor Biteblocks

Universal holders provide a custom fit for any size sensor.

- Adjustable for Size 1 and Size 2 Sensors
- Rigid support for less flexing
- Silicone-cushioned for patient comfort
- Autoclavable

**TIP** Arms and rings are universal to all RINN systems and biteblocks, whether analog or digital.

## Anode (Source) to Film (Media) Distance



### Bisecting Angle (Short Cone)

The anode-film distance is relatively short (5-8 inches), since the object-image distance is small, with the media placed up against the teeth and lingual arch.

For machines of 50 kVp or less, short cone provides 5" AFD (4" SSD).  
For machines of 65 kVp or more, short cone provides 8" AFD (7" SSD).

SSD = Source to Surface Distance



### Paralleling (Short Cone)

To position the media parallel to the tooth, it must be moved away from the tooth. This increase in object-film distance creates an enlarged, distorted image with serious loss of detail due to adumbration.



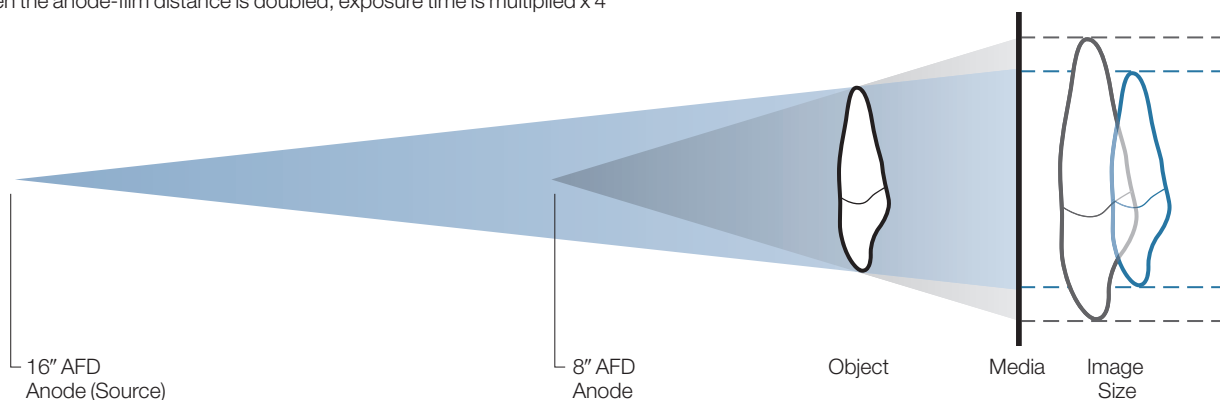
### Paralleling (Long Cone)

To compensate for the increased object-film distance, the anode-film distance must also be increased to 16-20 inches (long cone technique). This effectively eliminates enlargement, distortion and adumbration of the image.

For machines of 50 kVp or less, long cone provides 8" AFD (7" SSD).  
For machines of 65 kVp or more, long cone provides 16" AFD (14" SSD).

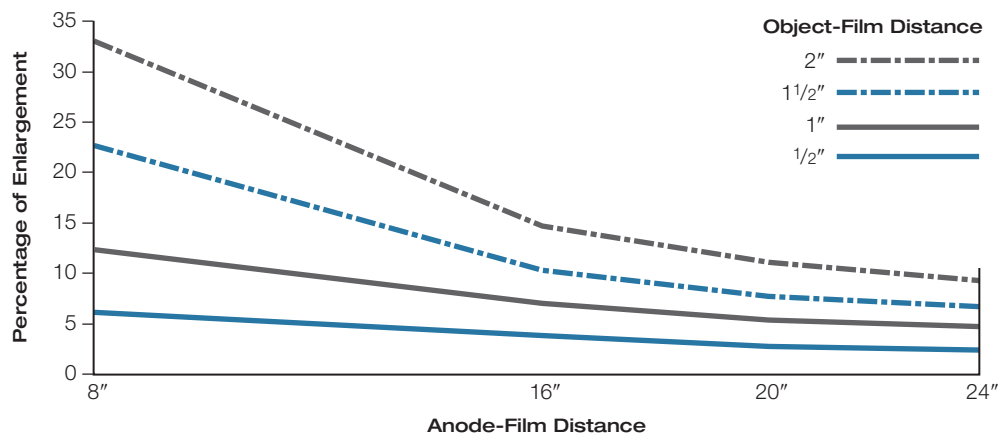
## Comparison of 8" to 16" Anode-Film Distance

Note: When the anode-film distance is doubled, exposure time is multiplied x 4



## Relationship of Object-Film Distance, Anode-Film Distance, and Image Size

Increasing the distance between the media and the subject tooth enlarges the image size; the shorter the Anode-Film distance, the more pronounced the effect. Use of a long cone will minimize this distortion.



**TIP** Use long-cone technique to ensure capture of the complete anatomy.

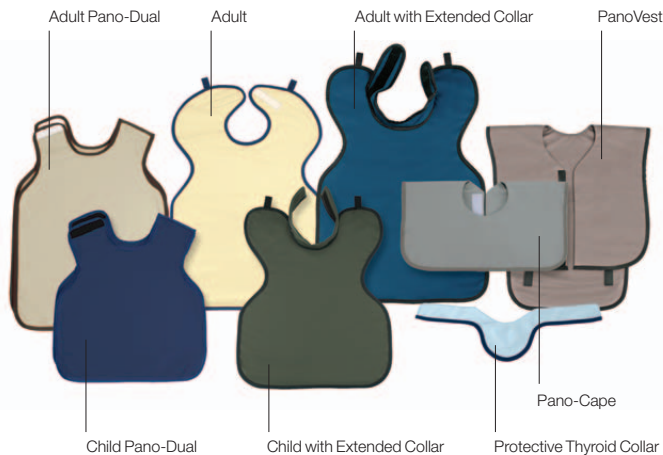
## Radiography Aprons

Always place a protective radiography apron on your patient. Because the thyroid is particularly sensitive to radiation, use an apron with an attached collar; for aprons without collar, a separate protective collar should also be used.

Have patient remove eyeglasses, dentures, partials, earrings, and any other removable metal objects which might scatter radiation or block images.

Have all factors (kVp, mA, time) set for each exposure before placing the media in the patient's mouth.

Panorex and cone beam x-ray machines are not compatible with collared aprons due to the central beam path.



## Collimators

A collimator, such as the RINN Universal Collimator (shown), blocks divergent radiation and prevents radiation leakage. In addition, it helps align the beam and prevents misfocusing of x-rays.

The RINN Universal Collimator:

- protects patients by limiting the size of the primary x-ray beam to #2 film
- quickly applies into open end of round PID
- can be used vertically or horizontally
- complies with NCRP Report 145



**TIP** NCRP Report 145 requires children wear a protective apron with thyroid collar and recommends it for adults too.

1. Assemble instrument. Be sure the biteblock is centered in aiming ring.
2. Place appropriate size media in instrument. Film should be with imprinted side away from tube head. Digital sensor should be flat side towards tube head.
 

“White toward light” — place plain or white side of film toward x-ray tubehead.
3. Position instrument in patient's mouth.
 

*Refer to instructions for each position, pages 8-13.*

“Lean and tip” — lean the chair back just a little and/or tip the patient's chin up to facilitate placement of the XCP instrument into the center of the patient's mouth. For exposure, the occlusal surface should be parallel to the ground.
4. Instruct patient to slowly close. A cotton roll can be placed between the biteblock and the opposite teeth for added comfort and stability.
 

“Gentle; breathe” — ask the patient to gently close and then take several breaths; it gives them something to concentrate on other than the radiograph procedure.
5. Position tubehead parallel to indicator arm and centered on aiming ring. Adjust tubehead if media is not parallel to teeth and aiming ring.
6. Make exposure.

## Troubleshooting

### Poor placement

Improper area recorded; crowns or apices cut off

Place the active area of the receptor according to placement guidelines to cover structures.

### Foreshortening

Image foreshortened or smaller than the actual object

Decrease the vertical angulation of the PID.

### Elongation

Image stretched and longer than the actual object

Increase the vertical angulation of the x-ray beam.

### Overlapping

Proximal surfaces of the teeth are closed

Direct the x-ray beam between the contacts of the teeth.

### Cone cutting

White area where the x-rays did not strike the receptor

Center the x-ray beam over the image receptor.

### Underexposure

Light or low density images

Increase exposure factors.

### “Tire tracks” on films

Film used backwards. Remember “white towards light”.

### Blurred image

Caused by patient movement.

### Black lines on film

Caused by bending or mishandling film. Fingernail damage appears as half-moon shapes.

# Anterior Regions

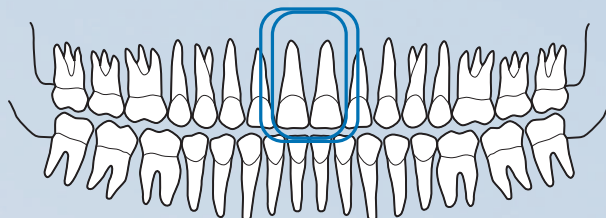
Assemble instruments as shown:



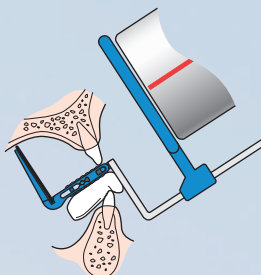
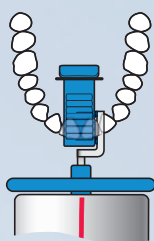
**TIP** For patient comfort, corners of the film packet may be softened by slightly rolling interfering edges. For film, PSP or corded digital sensors, a RINN Cover-Cozee® cushion can be applied.

## Maxillary Central Incisor Region

Center media on central incisors. Entire horizontal length of biteblock should be utilized to position media in center of mouth.



**Central x-ray entry point:**  
Tip of the nose.



#2 Film

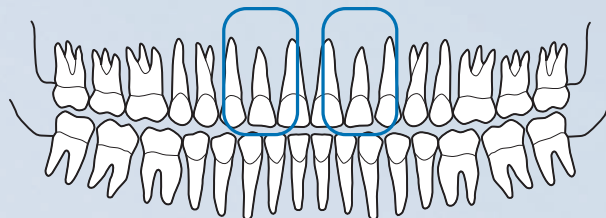


#1 Film

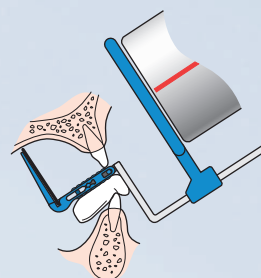
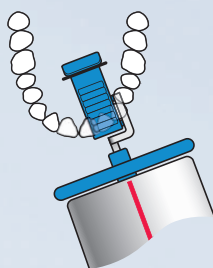


## Maxillary Lateral Incisor Region

Position instrument in center of patient's mouth, away from the teeth and in the mid-palatal or mid-tongual area. Center media on the maxillary lateral incisor.



**Central x-ray entry point:**  
Nares (nostril) of the nose.



#1 Film



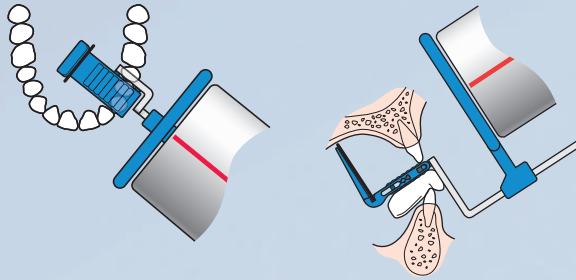
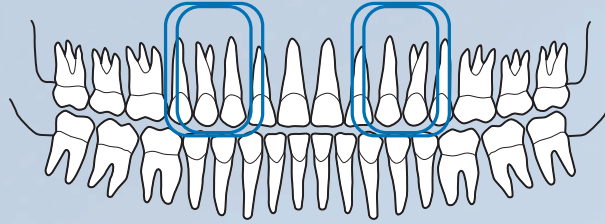
**TIP** A cotton roll can help the patient be more comfortable, and can help ensure the media is parallel.



## Maxillary Cuspid Region

Position media with cuspid and first bicuspid (premolar) centered on media. Entire length of biteblock should be utilized to position media in center of mouth.

**Central x-ray entry point:**  
Ala (corner) of the nose.



#2 Film



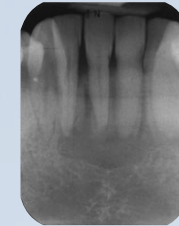
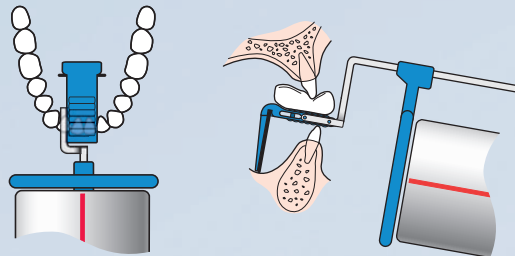
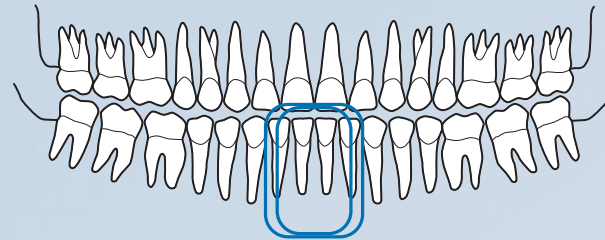
#1 Film



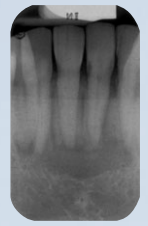
## Mandibular Central Incisor Region

Center media on the central mandibular incisors.

**Central x-ray entry point:**  
Point down from the tip of the nose to the center of the chin.



#2 Film



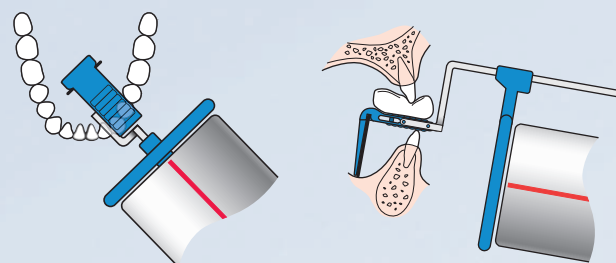
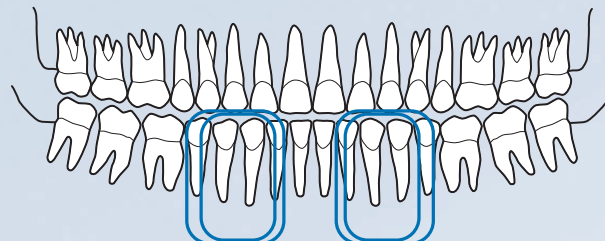
#1 Film



## Mandibular Cuspid Region

Position media with cuspid and first bicuspid (premolar) centered on media. Lingual placement of media should be in center of mouth.

**Central x-ray entry point:**  
Point down from the ala (corner) of the nose to the chin corner.



#2 Film



#1 Film



# Posterior Regions

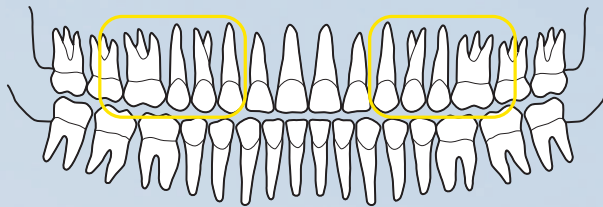
Assemble instruments as shown:



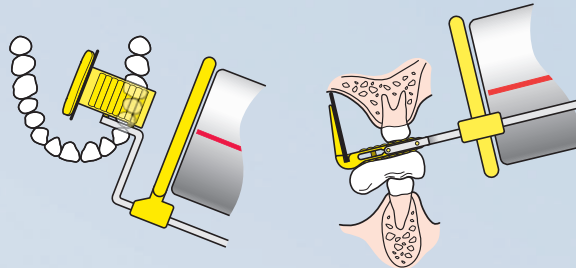
## Maxillary Bicuspid (Premolar) Region

Place the receptor toward the midline, with the biteblock under the second premolar, and align the mesial edge of the biteblock between the first and second premolar contact point.

**Central x-ray entry point:**  
Point down from the pupil of the eye to mid-cheek area.



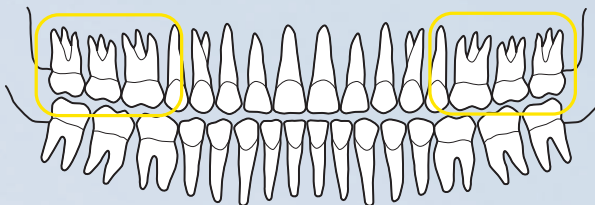
#2 Film



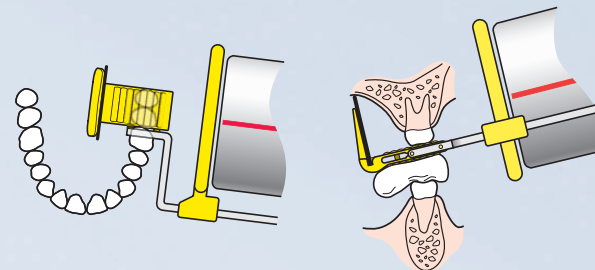
## Maxillary Molar Region

Position instrument in patient's mouth away from the teeth and in the mid-palatal or mid-tongual area. Place biteblock on second molar with mesial edge between first and second molar contact.

**Central x-ray entry point:**  
Point down from the outer canthus (corner) of the eye to mid-cheek area.



#2 Film

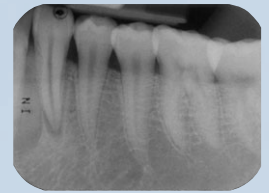
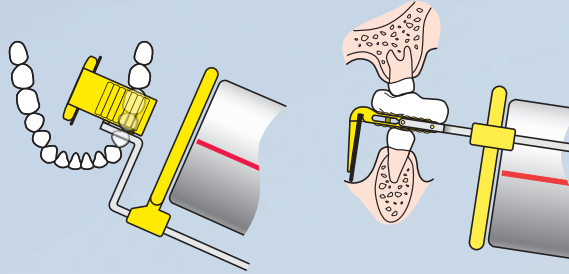
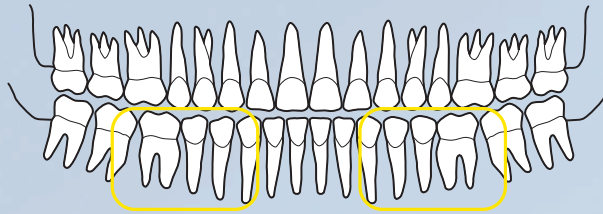


## Mandibular Bicuspid Region

Position media with second bicuspid (premolar), centered on film. Align the mesial edge of biteblock between the first and second premolar contact point.

### Central x-ray entry point:

Point down from the pupil of the eye to mid-mandible area.



#2 Film

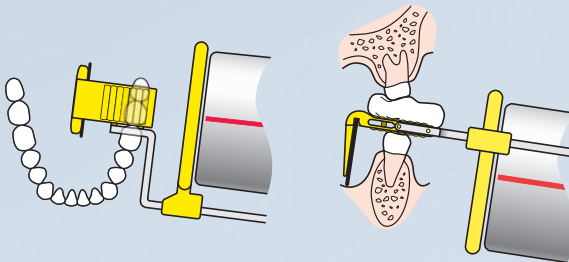
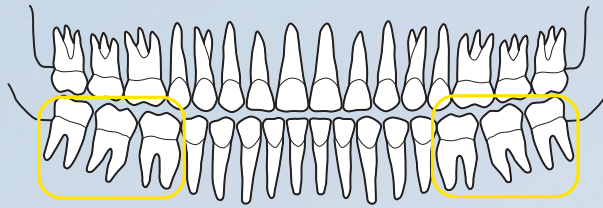


## Mandibular Molar Region

Position media toward the tongue, place the biteblock on the second molar crown, and align the mesial edge of the biteblock between the first and second molar contact point.

### Central x-ray entry point:

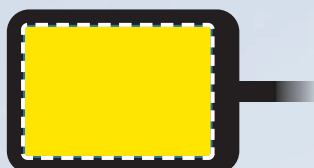
Point down from the outer canthus (corner) of the eye to mid-mandible area.



#2 Film



**TIP** If using a digital corded sensor, the active area of the sensor is smaller than the hard outside case. Adjust positioning to capture the required anatomy, depending on the active area.





# Interproximal (Bitewing) Technique

For bitewing exposures, the patient should be biting on the same arch as the teeth being radiographed. When assembled correctly, the bitewing instrument should hold the media so that the white side of the film, or the flat side of the sensor, is facing the biteblock's bite surface and the x-ray tubehead.

Assemble instruments as shown:



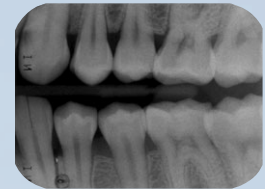
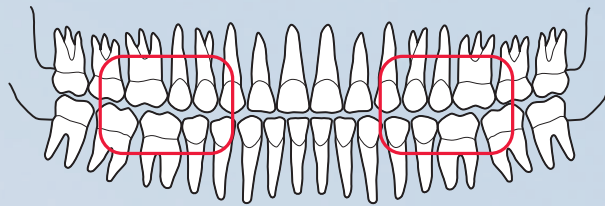
**TIP** Vertical biteblocks are available to capture more bone, if desired.

## Interproximal Bicuspid (Premolar) Region

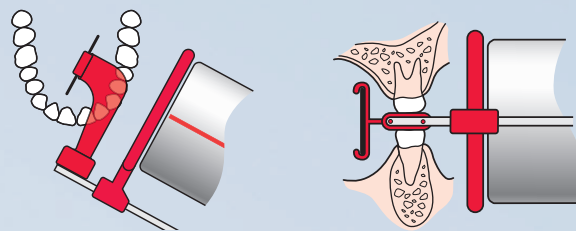
With biteblock resting on occlusal surfaces of mandibular teeth, align anterior border of media with distal portion of mandibular cuspid.

### Central x-ray entry point:

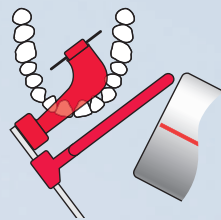
Point down from the pupil of the eye to the occlusal plane.



#2 Film



**TIP** If patient anatomy does not allow alignment behind the distal of the maxillary canine, reposition media by moving it across the midline and pulling it forward. Central ray angulation should be parallel to interproximal spaces and may not be parallel to aiming ring.

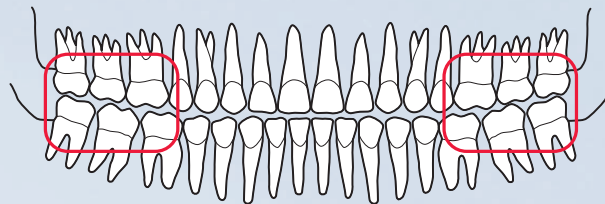


## Interproximal Molar Region

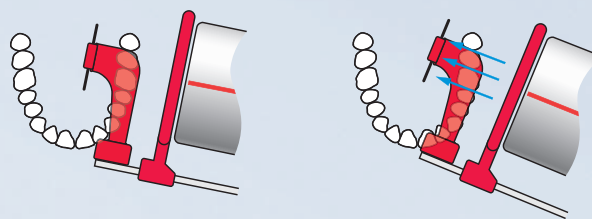
With biteblock resting on occlusal surfaces of mandibular teeth, align anterior border of media with distal portion of second bicuspid.

### Central x-ray entry point:

Point down from the outer corner of the eye to the occlusal plane.



#2 Film



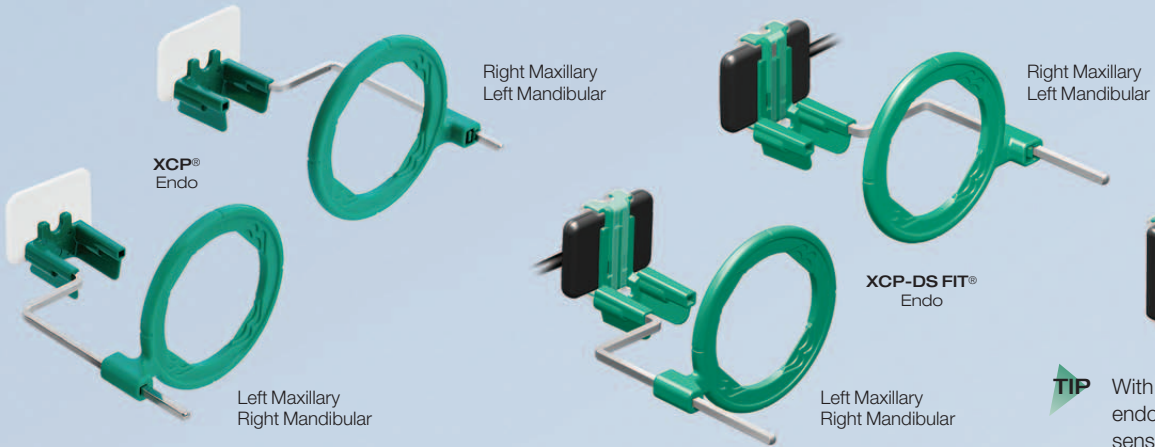
Conventional

Recommended





Assemble instruments as shown:



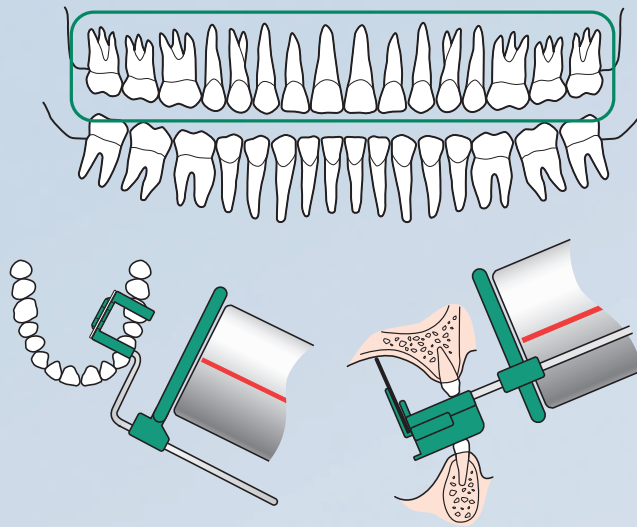
**TIP** With the XCP-DS FIT® endo biteblock, the Size 1 sensor can be used vertically and the Size 2 used horizontally.

For endodontic images, place the instrument over the tooth, files and clamps, resting on the adjacent teeth. If using a rubber dam, release the opposite side of the dam from the frame. The dam and frame do not need to be removed. The holder is designed to work with wingless dam clamps only.

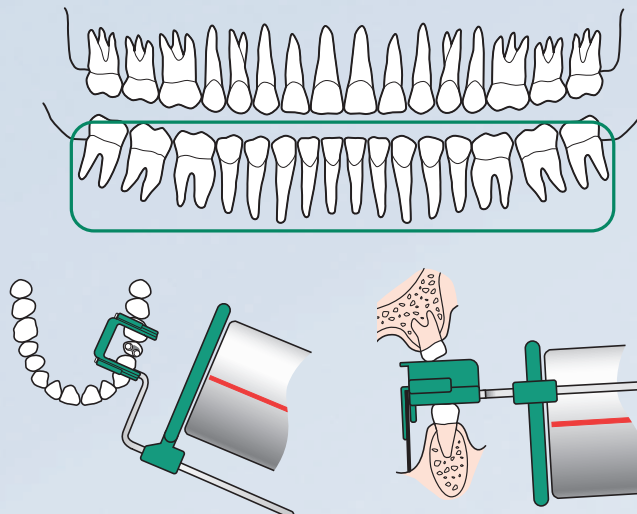
**Central x-ray entry point:**  
Follow the standard procedure for anterior and posterior periapicals.

**TIP** For endo or implant images, the Snap-A-Ray® DS Endo provides another option for easy images (see page 4).

## Maxillary Region



## Mandibular Region

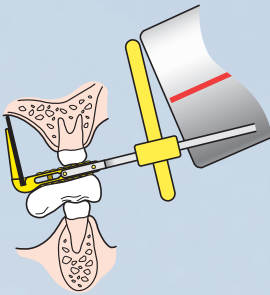


Technique adaptations may be required due to anatomical considerations or to avoid patient discomfort. These anatomical considerations include shallow palates, narrow arches, the presence of tori, and loss of alveolar bone (endentulous ridges). Adaptations may also be required in the presence of endodontic files

when radiographs are taken during treatment. Selecting the bisecting angle technique instead of the paralleling technique is useful in the case of shallow palates; careful placement of media or the use of special media instruments (endodontic imaging) are necessary to accommodate all the listed anatomical variations.

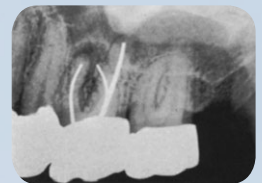
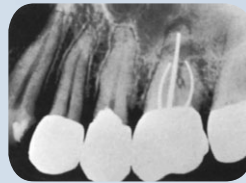
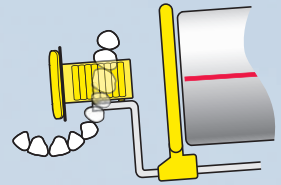
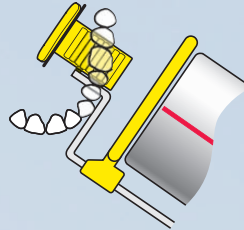
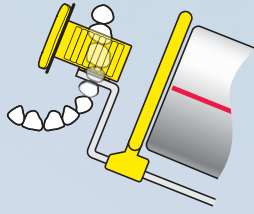
## Increasing Periapical Coverage

Greater periapical coverage than can be obtained with the conventional technique may be desired in certain instances. This can be accomplished by increasing the vertical angulation (tipping the x-ray head and cone) 5 to 15° from what the instrumentation indicates.



## Visualizing Multiple Roots

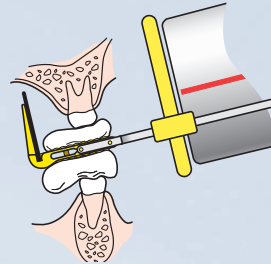
By altering the relationship of the media to the teeth on the horizontal plane, various aspects of multi-rooted teeth can be projected onto the radiograph.

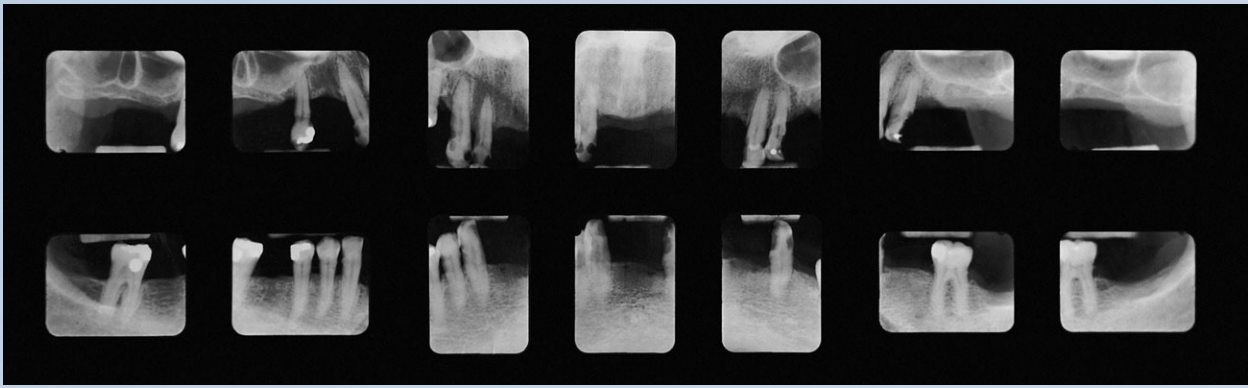


## Low Palates

Absolute parallelism between the media and long axes of the teeth is difficult to achieve in patients with low palatal vaults. If the discrepancy from parallelism does not exceed 15°, the resulting radiograph is usually acceptable. By using a two cotton roll technique (one above and one beneath the biteblock), the media can be paralleled with the long axes but the area of periapical coverage will be reduced. This may prove adequate in many instances, particularly if the teeth have short roots.

Moving from Size 2 media to Size 1 media can also aid in achieving parallelism. This may increase the number of images required to capture all required anatomy — the benefits should be weighed against the increased radiation exposure.

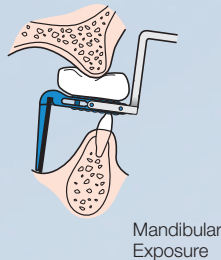
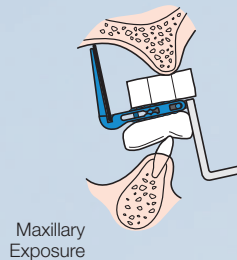




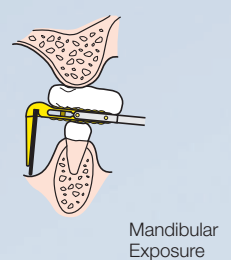
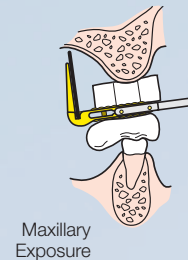
## Partially Edentulous Technique

XCP/XCP-DS instruments can be used in the radiography of partially edentulous mouths by substituting a cotton roll or block of styrofoam (or a similar radiolucent material) for the space normally occupied by the crowns of the missing teeth and then following the standard procedure.

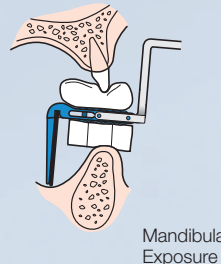
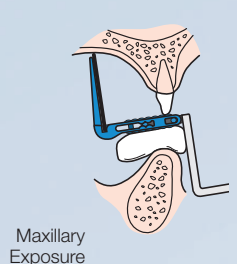
### Edentulous Maxillary Anterior Region



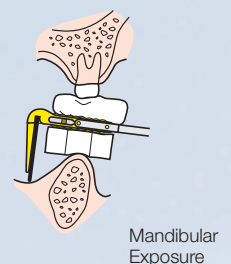
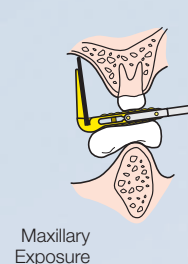
### Posterior Region



### Edentulous Mandibular Anterior Region



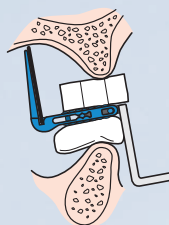
### Posterior Region



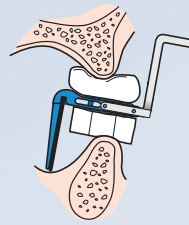
## Completely Edentulous Technique

When all the teeth are missing, cotton rolls, blocks of styrofoam or a combination of both can be used with the XCP instruments, as illustrated. The thickness of the cotton rolls or styrofoam will determine how much of the edentulous ridges are imaged. The instrument is positioned in the mouth with the media parallel to the ridge area being examined. The patient closes to hold the media in position, and the standard procedure is followed.

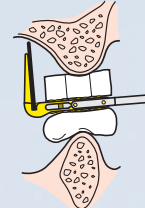
### Maxillary Anterior Region



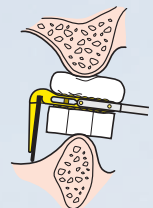
### Mandibular Anterior Region



### Maxillary Posterior Region



### Mandibular Posterior Region







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Central Ray Entry Points courtesy  
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90821 Rev. 3 11.2014