4-18. GENERAL

A long cone is used to take x-rays with paralleling exposure techniques. Periapical film is held parallel to the long axis of the tooth using film-holding instruments. The central ray is directed to pass at a perpendicular angle to both the tooth and the film. Since the slope and curvature of the dental arches and the alveolar processes will not permit the film to be held close to the teeth and still be parallel to their long axes, the film must be held away from the teeth. This method provides a target-film distance of approximately 16 inches, in contrast to 8 inches for the bisecting technique (see figure 4-1). The increase in the target-film distance is related to the size of the image produced. If the film is held away from the tooth and the target-film distance kept at 8 inches, enlargement of the image would be unavoidable. Enlargement is minimized, however, by increasing the target-film distance to 16 inches, thus using the parallel rays. An extension cone is used (see figure 4-18) to increase the target-film distance.

![Figure 4-18. Long cone on x-ray unit.](image)

4-19. ASSEMBLY OF FILM-HOLDING INSTRUMENTS

The instruments used to hold the film parallel to the teeth are plastic bite-blocks, indicator rods, and plastic locator rings.

a. *Anterior Instrument.* The anterior instrument (see figure 4-19) is assembled and used as follows.
Figure 4-19. Anterior instrument assemblage.

(1) The shielded or printed side of the film packet is placed against the backing support of the bite-block.
(2) It is inserted vertically into the slot by using a downward motion and, at the same time, placing slight pressure against the backing support to open the slot.
(3) There is an embossed dot on the corner of the periapical film. This embossed dot is always placed in a downward position when placing the film into the slot on the plastic bite-block.
(4) The offset position of the indicator rod is held away from the biting surface of the block. The pins are inserted in the proper holes.
(5) The plastic locator ring is fitted onto the indicator rod opposite the film packet.
(6) The assembly is then positioned in the mouth.

b. Posterior Instrument. The posterior instrument (see figure 4-20) is assembled and used as follows:

(1) The shielded, printed or broken side of the film packet is placed against the backing support of the bite-block.
(2) It is inserted horizontally into the slot by using a downward motion and, at the same time, placing slight pressure against the backing support to open the slot.
(3) The embossed dot on the corner of the film is also placed in a downward position when placed in the plastic bite-block.
(4) The right angle portion of the indicator rod is held anterior to the bite-block and away from the film.
(5) The pins are inserted into the proper holes. (The three holes allow a choice for the desired lingual positioning of the film.)
(6) The plastic locator ring is fitted onto the indicator rod opposite the film packet.
(7) The assembly is then positioned in the mouth.

4-20. MAXILLARY MOLARS

Position the posterior instrument assembly in the patient's mouth, with the plastic bite-block centered on the second molar (see figure 4-21). Be sure that the anterior edge of the film is adjacent to the distal of the second bicuspid. Parallel the film with the long axis of the molars. Place a cotton roll between the underside of the teeth and the block and have the patient close his teeth in order to maintain the film position. Move the locator ring along the indicator rod to approximately the skin surface and align the x-ray unit extension tube with the rod and the ring on horizontal and vertical planes.
4-21. MAXILLARY BICUSPIDS

Position the posterior instrument assembly in the patient's mouth with the bicuspids centered on the film parallel to the long axis of the teeth (see figure 4-22). Some patients have small mouths. Therefore, the bicuspids may not be centered on the film. The first priority is to parallel the film to the two bicuspids both vertically and possibly touching the anterior hard palate. Gently contour the anterior superior corner of the film to aid positioning. With the bite-block held on the occlusal surfaces of the maxillary bicuspids, insert a cotton roll between the underside of the block and the mandibular teeth. Have the patient close his teeth holding the film in place. Slide the locator ring along the indicator rod to approximate the skin surface and align the x-ray unit extension tube with the rod and the ring on the horizontal and vertical planes.
4-22. MAXILLARY CUSPIDS

Using the anterior instrument assembly, position the cuspid tooth on the film parallel to the long axis of the tooth and center it (see figure 4-23). Gently contour the anterior corner of the film to maintain position. With the block resting on the maxillary cuspid, insert a cotton roll between the block and the mandibular teeth. Have the patient close his teeth holding the film in place. Slide the locator ring along...
the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with the rod and the ring on the vertical and horizontal planes.

4-23. MAXILLARY INCISORS

Using the anterior instrument assembly, center the film parallel to the long axis of the incisors, ensuring that it is lined up with the midline (see figure 4-24). Use the full length of the block to position the film distally to the region of the first molar. With the block resting on the incisal edges of the teeth to be x-rayed, insert a cotton roll between the mandibular incisors and the block. Have the patient close his teeth holding the film in place. Slide the locator ring along the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with the rod and the ring on the vertical and horizontal planes.
4-24. **MANDIBULAR MOLARS**

Position the posterior instrument assembly with the plastic bite-block centered on the second molar (see figure 4-25). Assure that the anterior edge of the film is adjacent to the distal end of the second bicuspied. Ensure that the film is parallel with the long axis of the molar teeth. Place a cotton roll between the block and the opposing maxillary teeth and have the patient close his teeth holding the film in place. Slide the locator ring along the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with both the rod and the ring on the horizontal and vertical planes.
Position the instrument assembly in the patients mouth with the bicuspids centered on the film assuring that the film is parallel both vertically and horizontally. Centering the bicuspids may not be possible in patients with small mouths. Therefore, position the film in the center of the mouth as far forward as possible, touching the curvature of the lower arch (see figure 4-26). Parallel film placement is the key; it prevents dimensional distortion and overlapping. With the plastic bite-block held in place by the occlusal surfaces of the mandibular bicuspids, insert a cotton roll between the block and the maxillary teeth. Have the patient close his teeth holding the film in place. Slide the locator ring along the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with both the rod and the ring on the horizontal and vertical planes.
4-26. MANDIBULAR CUSPIDS

Using the anterior instrument assembly, center the cuspid on the film, parallel with the long axis of the tooth (see figure 4-27). With the bite-block resting on the mandibular cuspid, insert a cotton roll between the block and the maxillary teeth. Have the patient close his teeth, holding the film in place. Slide the locator ring along the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with the rod and the ring on the vertical and horizontal planes.
4-27. MANDIBULAR INCISORS

Using the anterior instrument assembly, center the film parallel to the long axis of the incisor teeth (see figure 4-28). Ensure that the film is situated along the midline of the teeth. The positioning can be accomplished by lingual placement of the film to the area of the second bicuspids. With the bite-block resting on the incisal edges of the maxillary incisor teeth. Have the patient close his teeth holding the film in place. Slide the locator ring along the indicator rod bringing it close to the skin surface and align the x-ray unit extension tube with the rod and the ring on the vertical and horizontal planes.
Figure 4-28. Mandibular incisor area.