Articulators and facebow transfer

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What's an articulator?

A mechanical instrument that represents the temporomandibular joints and jaws, to which maxillary and mandibular casts maybe attached to simulate some or all mandibular movements.

Classification

Class I articulator: a simple holding instrument capable of accepting a single static registration. Vertical motion is possible.

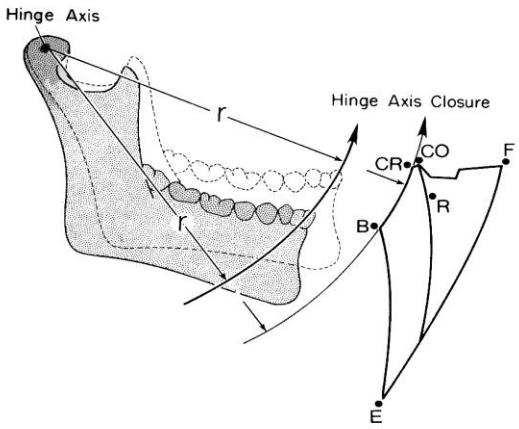
Class II articulator: an instrument that permits horizontal as well as vertical motion but does not orient the motion to the temporomandibular joints.

Class III articulator: an instrument that simulates condylar pathways by using averages or mechanical equivalents for all or part of the motion. These instruments allow for orientation of the casts relative to the joints and may be arcon or nonarcon instruments. (Semiadjustable articulators)

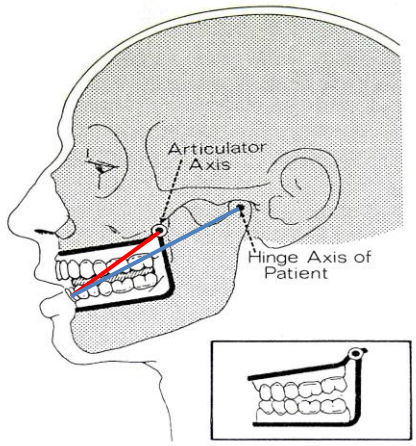
Class IV articulator: an instrument that will accept three dimensional dynamic registrations. These instruments allow for orientation of the casts to the temporomandibular joints and simulation of mandibular movements. (Fully adjustable articulators)

Class I, simple hinge articulator

Radius of the hinge movement :



Shorter radius from the center of rotation to the lower incisors = more curved are of closure.



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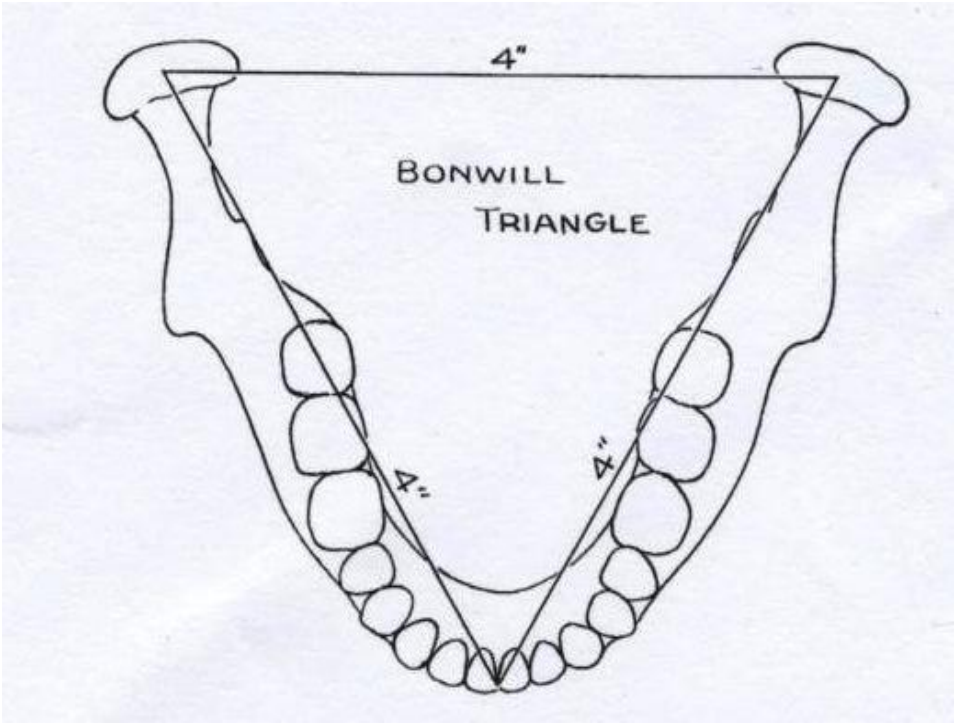
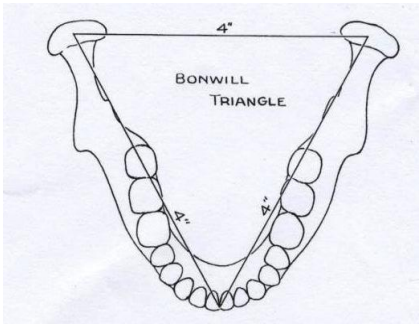
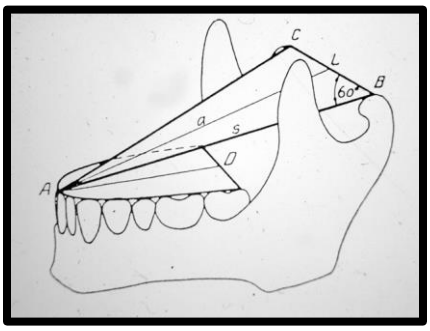
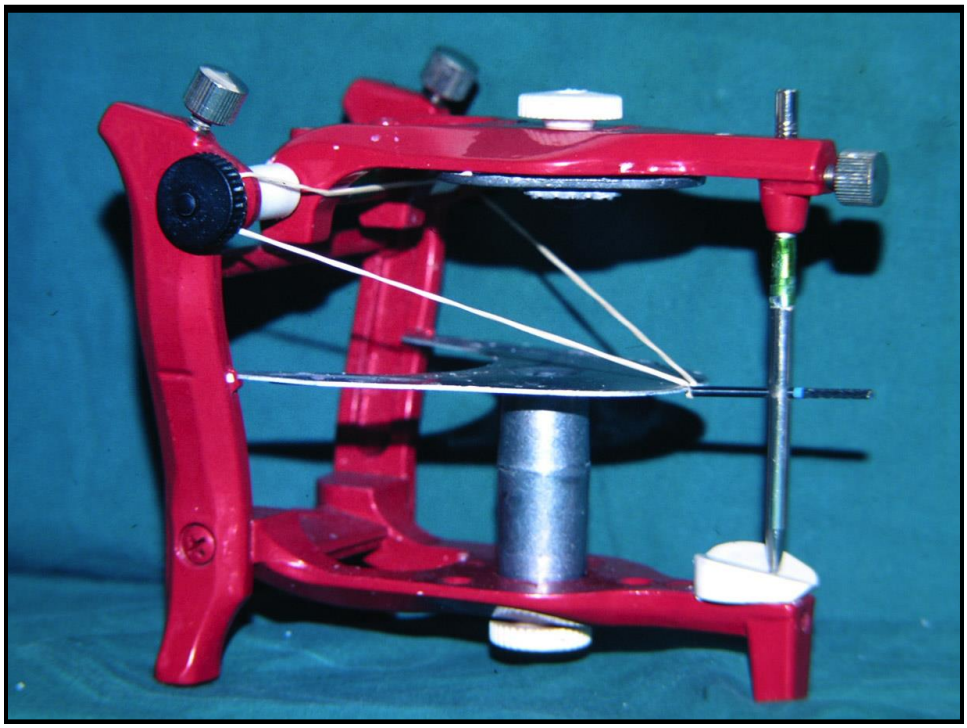


Average Value Articulators

- ✓ **Average radius for the hinge movement, as the casts are mounted according to Bonwill's triangle.**







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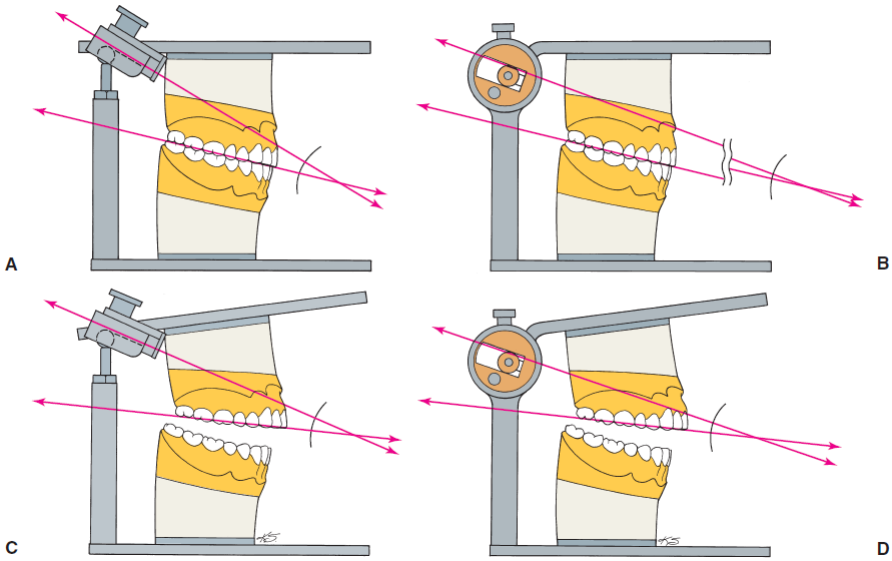
There are two basic designs of the semiadjustable articulator:

1) **arcon** (for **ar**ticulator and **con**dyle)

2) **nonarcon**

In an arcon articulator, the condylar spheres are attached to the lower component of the articulator, and the mechanical fossae are attached to the upper member of the instrument. Thus, the arcon articulator is anatomically “correct,” which makes understanding of mandibular movements easier.



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Fully Adjustable Articulators

A fully (or highly) adjustable articulator has a wide range of positions and can be set to follow a patient's border movements.

Rather than relying on wax records to adjust the instrument, special pantographic tracings are used to record the patient's border movements in a series of tracings.

The armamentarium used to generate these tracings is then transferred to the articulator, and the instrument is adjusted so that the articulator replicates the tracings, essentially reproducing the border movements of the patient. The ability of fully adjustable instruments to track irregular pathways of movement throughout entire trajectories

facebow transfer

What is it?

Why do we need it?

facebow

a caliper-like instrument used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this relationship to an articulator; it orients the dental cast in the same relationship to the opening axis of the articulator. Customarily the anatomic references are the

mandibular condyles transverse horizontal axis and one other selected anterior point.

Even the most perfect centric relation bite record is inaccurate if used without relating it to the condylar axis. A facebow is necessary for accuracy

Transverse Horizontal Axis

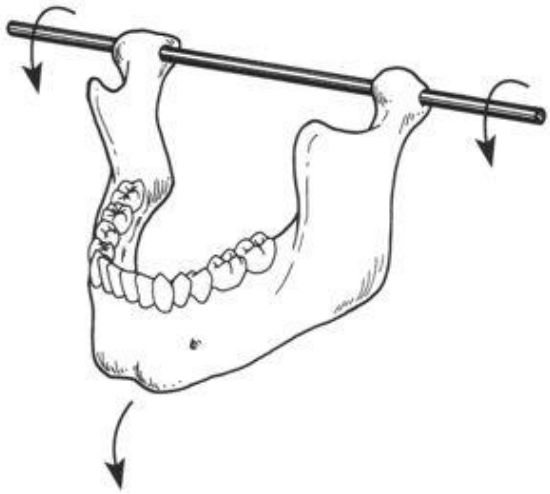
The mandibular hinging movement around the transverse horizontal axis is repeatable.

Facebows relate the upper cast to the transverse opening and closing axis (condylar axis).

The facebow is then attached to the articulator to transfer the recorded relationship of the maxilla by ensuring that the corresponding cast is attached in the correct position in relation to the hinge axis of the instrument.

After the maxillary cast has been attached to the articulator with mounting stone or plaster, the mandibular cast is subsequently related to the maxillary cast with an interocclusal record. If the patient's casts are accurately transferred

Two types of facebows are recognized: arbitrary and kinematic.



Kinematic facebow

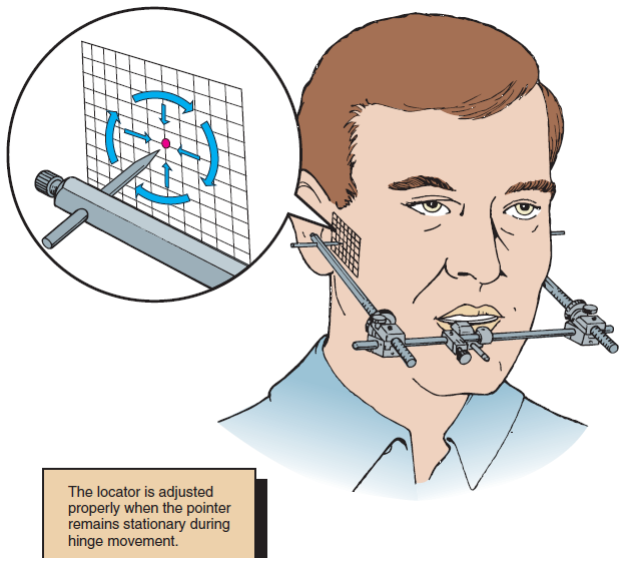
Hinge axis recording

The hinge axis of the mandible can be determined to within 1 mm by observing the movement of kinematic facebow styli positioned immediately lateral to the temporomandibular joint.

The kinematic facebow consists of three components: a transverse component and two adjustable side arms.

The mandible is manipulated to produce a terminal hinge movement, and the stylus locations are adjusted with thumbscrews (superiorly and inferiorly, anteriorly and posteriorly) until they make a purely rotational movement.

When this purely rotational movement is verified, the position of the hinge axis is marked with a dot on the patient's skin, or it may be permanently tattooed if future use is anticipated or required.



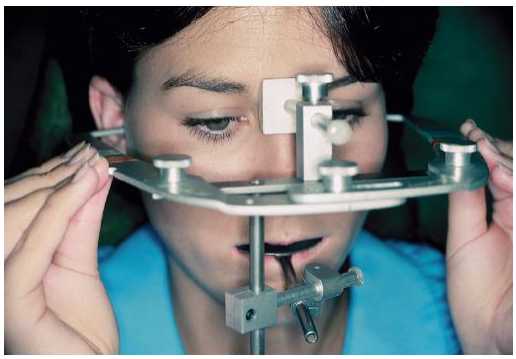
The locator is adjusted properly when the pointer remains stationary during hinge movement.

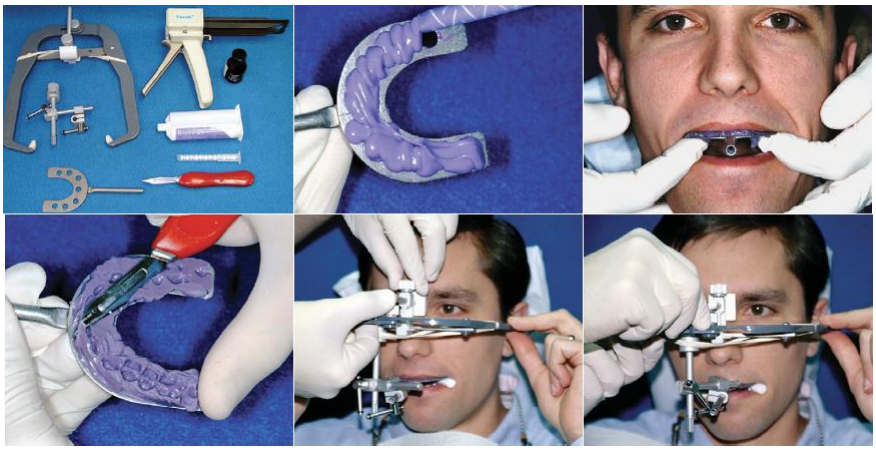
The kinematic facebow technique is time consuming, so it is generally limited to extensive prosthodontics, particularly when a change in the occlusal vertical dimension is to be made. A less precisely derived transfer would then lead to unacceptable errors and a compromised result.

Arbitrary facebow

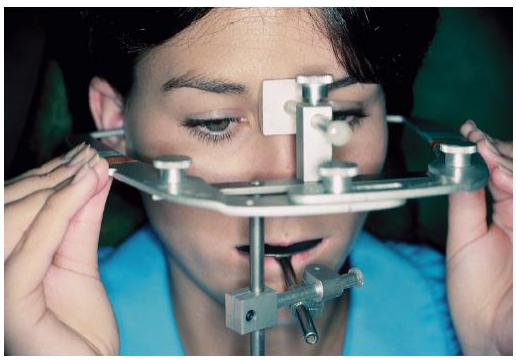
Arbitrary hinge axis facebows approximate the horizontal transverse axis and rely on anatomic average values. Manufacturers design these facebows so the relationship to the true axis falls within an acceptable degree of error. Typically, an easily identifiable landmark such as the external acoustic meatus is used to stabilize the bow.

They give a sufficiently accurate relationship for most diagnostic and restorative procedures. However, regardless of which arbitrary position is chosen, a minimum error of 5 mm from the axis can be expected





Anterior reference point



Conclusions

If an articulator closely reproduces the actual border movements of a given patient, chair time is significantly reduced because the dental laboratory can then design the prosthesis to be in functional harmony with the patient's movements. In addition, less time is needed for adjustments at delivery.