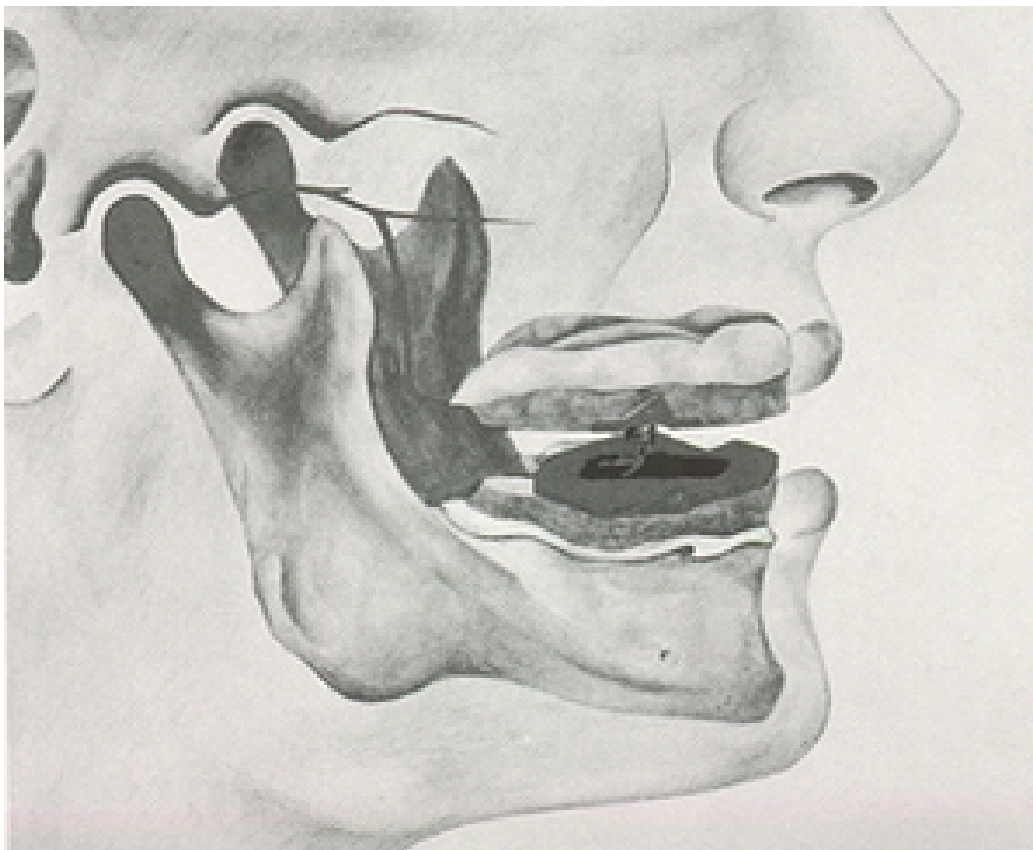


# The Gerber Articulator and System of Full Denture Construction

Part 2(a)

The Impression Technique and Jaw Registration

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# The Gerber Articulator and System of Full Denture Construction

## Introduction

Full dentures should restore the patient's appearance, allow him to masticate his food efficiently and speak naturally. Accordingly, dentures must be stable in use with good adaptation to the underlying tissues and be in harmony with the temporomandibular joints. Whilst all the factors governing alveolar bone resorption are not fully known, most authorities agree that unstable dentures are certainly more destructive than stable ones. The Gerber system has as its main objective the preservation of denture supporting tissues by making the dentures as stable as possible during function.

An impression technique is used which produces a closer adaptation of the mucosa to the underlying alveolar bone and which establishes at the outset the correct peripheral shape of future dentures. Craddock (1949) observed that Christensen's method of determining the angle of the sagittal condylar path is unreliable and for this reason Gerber prefers to use a modified version of the kinematic face bow, originally designed by Spreng. Simple styli and tracing plate apparatus enables a reliable intra-oral Gothic arch tracing method of locating centric occlusion to be used with conventional wax and shellac occlusal blacks. Like Fish (1952), Gerber is concerned that the "polished surfaces" of dentures should be shaped so that the buccinator muscle and the muscles of the lips and cheeks will act on prepared areas of the denture to increase stability. Unlike Fish, however, Gerber does not

advocate flanges on the lower denture which extend under the tongue. Gerber gains a great deal of extra denture stability by very carefully limiting the number and position of the posterior teeth to those areas of alveolar ridge which are best fitted, by virtue of their shape, to receive pressure from dentures. This means that mouths with well-formed alveolar ridges, which are best fitted, by virtue of their shape, to receive pressure from dentures. This means that mouths with well-formed alveolar ridges, which will provide a good denture foundation will have a different posterior tooth arrangement from those mouths which have, for example, the much less favourable flat lower ridge.

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The stability produced when full dentures work smoothly together without cuspal interference during mastication (anatomical articulation) is, of course, lost when the occlusal surfaces of the teeth are separated by food, i.e. "entry food-exit balance". Gerber has given thought to this problem and he provides stability in the teeth apart situation by abandoning conventional compensating curves for the posterior teeth, and, instead, arranges the teeth so that they follow the curve of the lower ridge. By this means the forces of mastication are always applied at right angles to the alveolar processes. This simple mechanical principle, coupled with an occlusal table which is restricted in size to the "flatter" or more stable areas of the alveolar processes, ensures that the forces of mastication tend to locate and

seat the dentures rather than dislodge them.

A special feature of the system are the Gerber Condyliform posterior teeth, which have a normal anatomical appearance and work on a mortar and pestle principle to enable the anatomical articulation described by Fenn, Liddelow and Gimson (1961) to be easily achieved.

### The Impression Technique

The impression technique is designed to adapt relaxed mucosal tissue more closely to the underlying alveolar bone in the denture-bearing areas, so that the forces of mastication acting on the denture can be transmitted more directly to the alveolar bone rather than to the soft mucosal tissue. (Fig. 1.)



**A**



**B**

Fig. 1. Drawing A shows the denture (shaded area) fitting the surface of a "relaxed" mucosa. B shows how the impression technique described has "smoothed" the mucosa so that the denture now fits the shape of the alveolar bone more closely. Small folds of mucosal tissue at the periphery improve the peripheral seal.

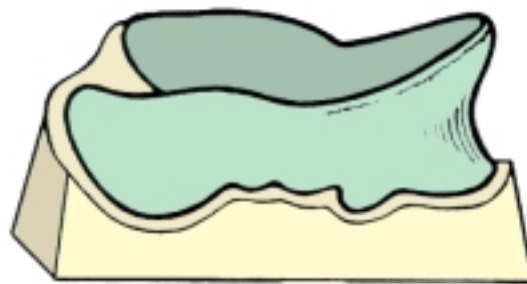


Fig. 2. Close fitting resin trays with anterior hollows for the orbicularis oris muscle.



Gerber uses shallow metal stock trays (Schreinamakers) for the primary impressions, and an alginate wash carried on a trimmed alginate impression technique which minimises over-extension and distortion of the soft tissues of the mouth. Models are cast and self-curing acrylic resin special trays made which fit directly to the surface of the models. The resin extends into and fills the sulcus. Short resin "fins" arise from the trays in the anterior neutral zone to serve as handles. The trays are about 2 mm thick and both have anterior recesses to accept a relaxed orbicularis oris muscle. (Fig. 2.)

The dentist now checks the tray in the patient's mouth for retention as if they were finished dentures. The trays are ground away at the chairside if they are found to be over-extended and any deficiencies made good by adding green stick composition. This is carried out until both trays are retentive. The trays are then "re-lined" with a thin wash of zinc oxide-eugenol impression paste. Whilst the impressions are being taken the dentist manipulates the patient's lips, cheeks and in case of the lower, raises the floor of the mouth by finger pressure under the patient's chin. This produces a special form of "muscle trimming" which ensures that only areas which are capable of supporting dentures without muscular displacement are recorded, together with a sulcus shape which determines the shape of the denture periphery. Model are cast.

### **Jaw Registration**

Conventional wax and shellac occlusal blocks are made and these are used by the dentist to establish the vertical height of the bite (vertical dimension). The blocks are not sealed together at this time but the vertical dimension is recorded by dividers which are used to record the distance between marks made on the labial surfaces of the upper and lower blocks or, alternatively, between marks

made on the patient's upper lip and chin. A layer a wax 5-6 mm thick is now cut away from the *upper* wax rim. This is to provide space for a plate carrying a stylus which is adjustable for length, which is attached to the upper rim with hot wax. A tracing plate is attached to the rim of the lower block so that the two parallel rods project anteriorly. (Fig. 3.)

The blocks and plates are returned to the mouth and the stylus adjusted to restore the vertical dimension previously obtained. The blocks and plates now allow (a) the sagittal condylar path angle to be determined with a kinematic face bow and protractor and (b) a Gothic arch tracing location of centric occlusion.

### **(a) Measurement of the Sagittal Condylar Path Angle**

Because intra-oral check-bites can be so unreliable for determining the paths taken by the condyle heads during protrusion, Gerber prefers to use extra-oral tracings made with a modified Spreng face bow. The face bow used is conventional in that it acts as a calliper to record the relationship between the position of the condyle heads and the jaw to which it is attached, but has the added facility of two writing points which are adjusted to be opposite the condyle heads to follow them when the patient protrudes his jaw and records the path they take on a card.

The face bow is attached to the lower block by sliding it on to the two rods from the tracing plate which now project from between the patient's lips. The lateral arms of the bow are adjusted to bring the writing points opposite each condyle head, which the dentist has previously located by palpation and marked on the surface of the patient's face, using an eyebrow pencil. A card is placed between a writing point and the surface of the patient's face so that when the patient is asked to protrude his mandible the writing

point follows the condyle and records the path taken on a card. (Fig. 4A.)

Two or three tracings are usually made for each condyle and protractor measurements of the paths recorded determines the angle of the sagittal condylar path. (Fig. 4B.) The face bow is removed from the patient and fixed to its stand for use later in the laboratory.

**(b) Location of Centric Occlusion**

Gerber asserts that the physiologically correct position for the mandible for full

dentures is when both condyles are at their highest in the glenoid fossae, with the head upright and when the vertical dimension is correct. Fenn, Liddelow and Gimson (1961), Craddock (1956) and most other authorities agree that the Gothic arch tracing is the only scientific method of establishing centric occlusion. Despite this, the method has never enjoyed popularity in this country, due partly perhaps to the absence of simple intra-oral tracing plates and styli apparatus on the market.

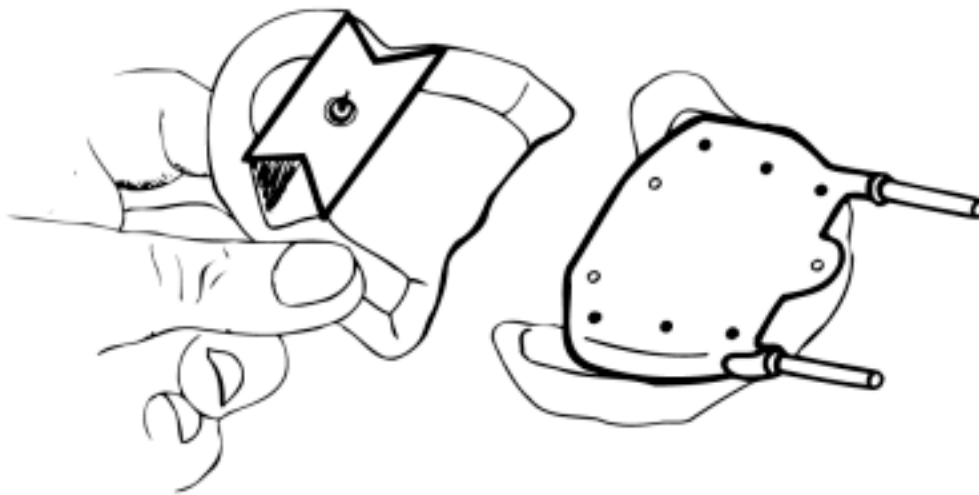


Fig. 3. Occlusal blocks carrying an upper stylus and lower tracing plate.

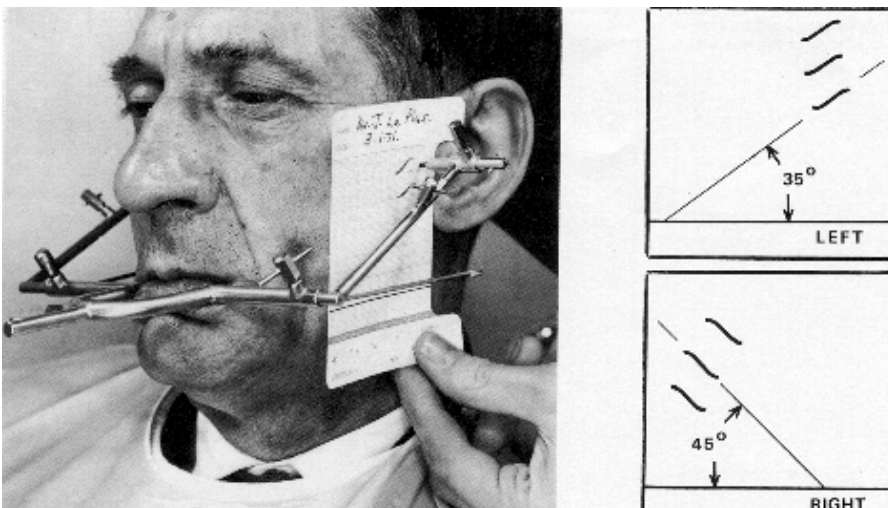


Fig. 4. The left sagittal condylar path being recorded with the Gerber face bow. Tracings are made for both condyles and the angles determined with a protractor.

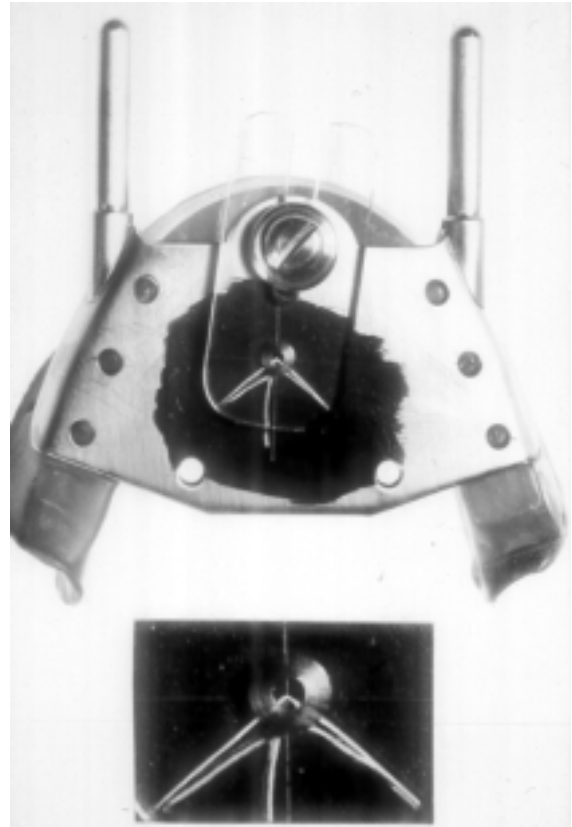
The recording of centric occlusion with conventional blocks is a difficult and largely intuitive task for the dentist. He has to establish a retruded and yet

unstrained mandibular position by asking the patient to "bite on the back teeth" or to close the mouth with the tongue at the roof of the mouth. Once the blocks have

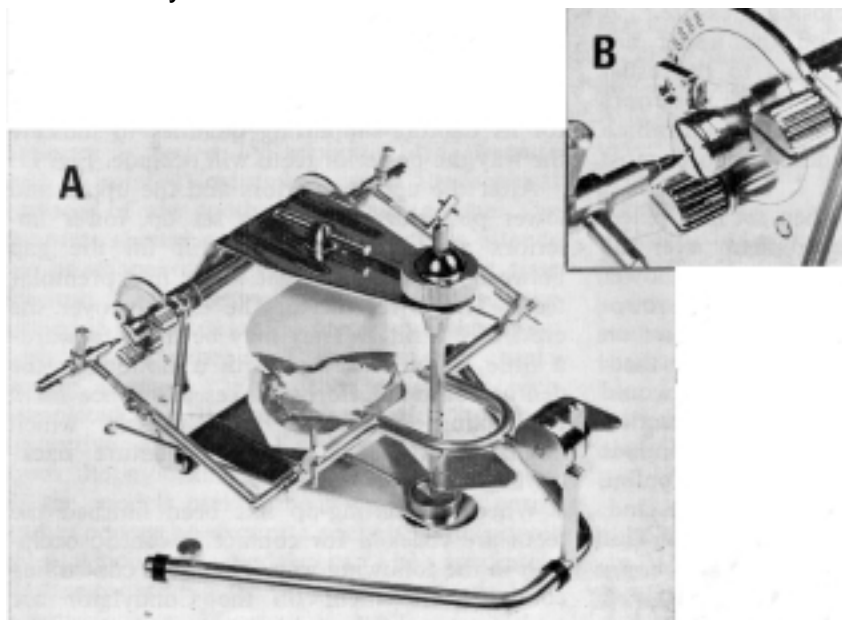
been sealed together, the dentist cannot easily check the recording to confirm that he has in fact obtained a retruded mandibular position. In addition to this the dentist has the problem that any premature contact of the rims or a uneven softening of the wafer material can produce a localised displacement of the mucosa under the blocks. This can produce a unilaterally open "bite" which, like an incorrect occlusion, can only be discovered later at the try-in, when all the teeth have been set up.

Gerber uses simple and re-usable intra-oral stylus and tracing plates to obtain the Gothic arch tracing. This prevents uneven pressure on the wax rims on the right and left hand sides of the mouth. There is gentle pressure from the muscles of mastication acting through the lower tracing plate to the centrally placed stylus which seats the blocks securely, even in unfavourable ridge forms. A coloured wax crayon is used to coat the middle of the tracing plate. The blocks are returned to the mouth and the patient asked to make forwards and backwards and left and right jaw movements, keeping the stylus in contact with the lower plate. These movements produce an arrow point or Gothic arch tracing in the coloured wax coating the plate. The apex of the tracing is the position of centric occlusion for that patient (condyle head in the highest part of the glenoid fossae). With this technique it is an easy matter to confirm that the

position of habitual closure (centric occlusion) has been located. A small plastic slide containing a hole is screwed to the tracing plate so that the hole is exactly over the apex of the tracing. (Fig. 5.)



**Fig. 5.** The Gothic arch tracing has been made and a hole in a clear resin plate is positioned exactly over the apex.



**Fig. 6.** Using the face bow the models are located in the same position relative to the hinge axis of the articulator as the patient's jaws are to the condyle heads.

When the patient is now asked to close, the stylus should enter the hole over the apex point without difficulty. This check may be repeated as many times as the dentist wishes before he seals the blocks together. The Gothic arch method has the very great advantage of reproducibility, so that when other dentists attempt the same tracing with the same patient the apex is always in the same place. The final stage of jaw registration is to unite the upper and lower blocks with a thin mix of impression plaster, introduced between the blocks whilst the patient keeps the stylus in the "apex hole". With this method of jaw registration the upper and lower rims are separated at all times, including the sealing together, so removing the possibility of uneven rim contact.

### **Mounting the Models on the Condylator Articulator**

(Fig. 6A) shows the models, blocks and tracing plate fixed to the face bow and supported by its stand ready for mounting on the articulator.

The sides of the models have been tapered towards their base and the face bow adjusted on its stand so that the two writing points are opposite the hinge axis of the articulator. (Fig. 6B.) The models are then attached to the articulator using plaster of Paris and the face bow removed.

**To be continued in part 2b**