

# **CLASSIFICATION OF DENTAL RELATERS AS OCCLUDERS AND ARTICULATORS COURSE #40600 :: Supplement**

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## **Introduction:**

Classifications should facilitate the use or understanding of the classified items. This applies to the classification of articulators and related instruments as well. The purpose of this supplement is to bring clarity and simplicity to understanding and selection of these instruments.

## **Goal:**

In this course one simple classification of articulators is introduced. This is a new approach based on symmetry and simplicity. The Dental Relater Classification System is introduced as a new term

## **Objectives:**

We will show various classification methods. The student may then select the classification of choice as they all have advantages. It is hoped that the student will be able to use the classifications in understanding their use, subtleties, the selection and have the vocabulary for discussion with others.

## **Method:**

Classifications are presented to show by example that there are various interpretations of the array of instruments which have been developed. Descriptive text, images and videos are used to emphasize the nuances.



Gysi adaptable instrument:  
This represents an early adjustable articulator (1912)



CEREC in-office direct milling system:  
This represents an adjustable occluder with virtual reality capability and CAD/CAM machining

**STANDARD CLASSIFICATION:**

The standard approach for articulator classification is based on the Glossary of Prosthodontic Terms, which classifies articulators into four types: Class I through Class IV.

**Class I**

This is a simple holding instrument capable of accepting a single static registration. Vertical motion is possible.

**Class II.**

This is an instrument that permits horizontal as well as vertical motion but does not relate the motion to the temporomandibular joints.

**Class III.**

This is 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 cast relative to the joints and may be arcon or non-arcon instruments.

- Arcon articulator - An articulator that maintains anatomic guidelines by the use of condylar analogs in the mandibular element and fossa assemblies in the maxillary element.

**Class IV.**

This is an instrument that will accept three-dimensional dynamic registrations. These instruments allow for orientation of the cast to the temporomandibular joints and replication of all mandibular movements.



Class I: Simple hinge cast holder



Class II: Monson Maxillomandibular instrument based on geometry



Class III: Hanau non adjustable condyle movement instrument



Fully adjustable condylar simulating instrument which will accept dynamic registrations

## **OPEN-END DENTAL RELATER CLASSIFICATION:**

This is an alternative classification system. It is comprehensive but complex. For our discussion here is an alternative classification of articulators. Advantages of this system allows for organization of instruments based on a historical and heuristic relationship. It is open-ended and further allows for development of methods beyond today's current technology. This includes cast relaters as articulators.

### **Class A**

This is a holding device for relating casts with a fixed intermaxillary relationship with the possibility of a hinge opening only function. Frequently there was a hinge stop to enable the operator to see and use the intermaxillary space if no teeth were available to stop further closure of the intermaxillary space. There was no orientation of the motion to the TM joints and there was no relation to excursive function of the mandible



Simple hinge with vertical stop from the Whip Mix Co. historical collection

### **Class B**

These instruments relate one working cast and two opposing casts. The opposing casts have an anatomical representation and the other is a functional representation of chewing.

This is a holding device with a fixed relationship. They had either a vertical or hinge opening only function. They had a vertical stop similar to the class A instrument. There was no correlation to the motion to the TM joints.



Hanau Twin Stage Occluder



Jelenco Verticator

**Class C**

This is an instrument, similar to a Class A, which also permits horizontal motion to match tooth facets during cast articulation. Occasionally they have vertical stops but that is the exception rather than the norm.

Some of the original instruments are of this type and date back to the 19<sup>th</sup> Century.

This type of instrument is widely used today for fabrication of simple restorations like single crowns. The disposable plastic instrument is very low in cost and provides a credible value.



Bonwill 1858



Spring hinge, reusable, metal



Spring hinge, disposable plastic

**Class D**

This is an instrument, similar to a Class A, which also permits horizontal and vertical motion based on classical geometry. They are completely unrelated to the movements of the mandible in the envelope of motion except for simple opening and closing. These movements are not at all related to the TM joints.



Balancer Jr, Hagman



Mandibulomaxillary instrument,  
Monson, 1925



**Class E**

This is an instrument, similar to a Class A, which also permits horizontal motion. This motion is based on a simulation of the function of the TM joints. Class E articulators simulate condylar pathways by using average mechanical equivalents for all or part of the motion.

Gysi, Simplex



Hanau, 147-I



Stephan



Denture tripod, Stansberry



Phillips, Student



Steele's





**Class F**

This is an instrument, similar to a Class E, which also permits horizontal motion. This action simulates condylar pathways movement by using adjustable mechanical equivalents for all or part of the motion.

Orientation of the cast relative to the joints and may be arcon or non-arcon instruments. An arcon articulator is an instrument which maintains anatomic guidelines by the use of condylar analogs in the mandibular element and fossa assemblies in the maxillary element. Non arcon instruments simulate mandibular movement where the condyle analog is attached to the mandibular member of the instrument.

Non-Arcon Articulators



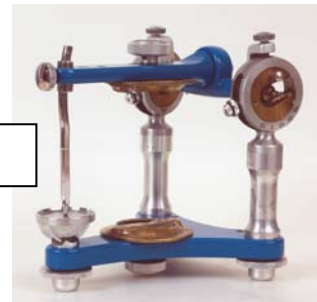
Hanau, 96H20



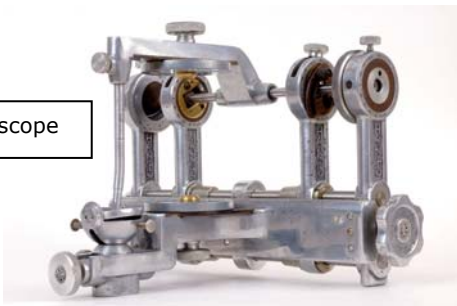
Hanau, University



Gysi, Adjustable



Dentatus, ARL



Hanau, Kinscope



House, Rotary Grinder

**Class F:**

Arcon

These illustrations show a variety of articulators. Other instruments are shown in the class G group which have similar condyle analog relationships.



Whip Mix, 8500



Hanau, H2 Arcon



Dentatus, ARA



**Class G**

This is an instrument, similar to a Class F. These instruments allow for orientation of the cast to the temporomandibular joints and replication of all mandibular movements. They permit:

Acceptance of three-dimensional dynamic registrations



Hanau, Adjustable



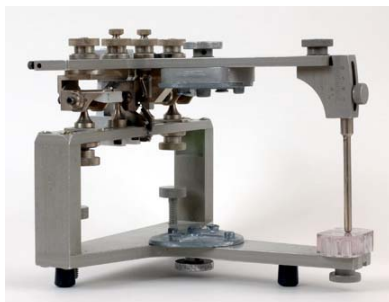
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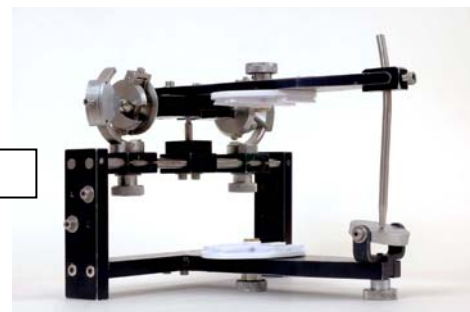
TMJ



Denar, D5A



Stewart, Gnathological Computer



Granger, Gnatholater

Digitally adjusting  
the anatomy

## Class H

These are not analog instruments. These representations do not permit the mounting of casts. A virtual representation permits:

- CAD/CAM fabrication of dental restorations without analogs

There are two sub-classifications to this type including:

### Sub-class 1 (H<sub>1</sub>)

This is a digital representation similar to a class G. This permits CAD diagnosis of malocclusions and representations of TM joints.

### Sub-class 2 (H<sub>2</sub>)

This is a digital representation similar to a class C.



Optical  
Scanne

Milling  
Tool

Digital  
Interphase



## Class I

This is like no other articulator system. The potential for this concept lies in the future but it should now be considered. This is a biologic representation of the functional demands of a given stomatognathic system. The purpose of this would be to replace all or part of the dentition using agents to promote or retard the the metabolism of the individual. Directing the replacement of missing structures will be based on cellular engineering. This representation would allow for development of the "True Determinants of Occlusion". These would include the genetic coding of RNA for protein synthesis. Additionally it would include mapping of the growth centers and the functional matrix. Humeral agents, not yet discovered, would be the activators of this development.

A developmental plan would include replacement of the dental complex of bone, periodontium, teeth innervation and vascularization. This plan would direct the "True Determinants of Occlusion" to design of replacement anatomy including the coordination of development within the "Functional Matrix". It would incorporate a stimulation of growth center control and introduction of genetically engineered cells strategically implanted to permit functional unit system generation or regeneration. RNA could be guided in selective protein synthesis creating a biologic matrix. As yet unknown media would cause selective differentiation of a stem cell like complex with selective mineralization within a biologic matrix. This system also generates a response in the form of biologically compatible remodeled or replaced exact tissue types, functioning in a normal fashion.

## **CONSEQUENCES OF THE OPEN-END ARTICULATOR CLASSIFICATION SYSTEM**

### **Historical value**

In this system there is an apparent sequential development in the design of these instruments. This apparent sequential development is a false interpretation as there is no real historic merit to this interpretation.

### **Selection value**

Understanding the influence of the determinants of occlusion and articulation in biomechanics can direct the operator in the selection of the appropriate instrument. As the articulator classification increases the end control adjustment sophistication increases. This may signal a challenging learning curve. With increasing sophistication in instruments and the related jaw relation records there is a concomitant demand on the operator in understanding, using, supplying and maintaining the instrument.

As the classification increases, the relative effectiveness of the TM joint interpretation in the instrument increases. When there are few anatomic landmarks available from the patient, understanding and appropriately using the instruments will help in designing the appropriate occlusal and articulation scheme. This understanding can also allow the operator to alter the settings of the variable elements to gain a restorative or prosthodontic result that is beyond a simple reproduction of functionally generated occlusions.

A higher classification may suggest a benefit / value gradation however without understanding of the consequences of the end control factors this is a false indicator. The possibility of peer pressure in instrument use is a dangerous interpretation.

While we are still in the age of industrialization and modernism, understanding of biomechanics of the stomatognathic system, will allow us to develop future systems beyond a mechanical approach to articulation.

## **Grouping of the Dental Relater classifications via biomechanical interpretation**

Instruments can also be grouped on the basis of their biomechanical functions. There is basis for three groups. These include geometry, tm joint analog and functionally generated pattern instruments. This can be grouped from the open ended system of classification.

The Geometry basis includes instruments from Class A, D. These instruments are derived from Classical geometric shapes which are used as references for orientation of the plaster casts in these instruments.

The TM joint analog basis includes instruments from Class C, E, F, G, H<sub>1</sub>. They all have intra-cast relationships based on a centric position. The design components have upper plate that holds the maxillary cast and a lower plate that holds the mandibular cast. They have a vertical stop that delimits closure progress. The posterior frame supports the vertical dimension of occlusion through a tm joint analog and together with the anterior vertical stop relates the upper and lower plates in the three dimensional framework.

Functionally generated pathways of articulation include instruments/representations which match the wear facets of teeth opposing a working cast of tooth analogs. These include instruments of Class B, C, H<sub>2</sub>. This instrument group is designed to facilitate a relationship of a working cast to an opposing functionally generated surface.

### Type H<sub>1</sub>:

This is a digital representation similar to a class G. These are not analog instruments. These representations do not permit the mounting of casts. This virtual representation is based on matching faceted occlusal anatomy of existing teeth and possible combination of occlusal shapes to act in harmony without consideration of joint function

## **DENTAL RELATER CLASSIFICATION SYSTEM**

The classification of instruments in the remainder of the courses is based on the very simplest of terminology. There is a four terminology that defines all instruments. These terms include:

**Relater**

This is an instrument which simulates an analogy of oral dental anatomy.

**Occluder**

Is a mechanical instrument designed to relate analogs of dental occlusal anatomy in a specific position. Usually this position is maximum intercuspation or centric relation occlusion.

**Articulator**

Articulators are mechanical designed to relate the position of the maxillary and mandibular opposing plaster casts of teeth to one another and to other determinants of occlusion.

**Adjustable**

The term suggests that some aspects of these instruments are adaptable or modifiable. The end control factors may represent either positional check bite positions or adjustable end control factors such as the determinants of occlusion.

**Fixed**

These instruments are very simple and rigid. They capture an unchangeable relationship.

We will base this classification on the simple term "Relater". All relaters are a combination of occluders or articulators which may be either fixed or adjustable.

The term Fixed Occluder incorporates all standard classification instruments of Class I. For example simple hinge, Verticulators, Twin Stage hinges, and even denture duplicators.

The term Adjustable Occluder incorporates open end classification instruments Class H and I. For example the CAD/CAM devices like the Cerec

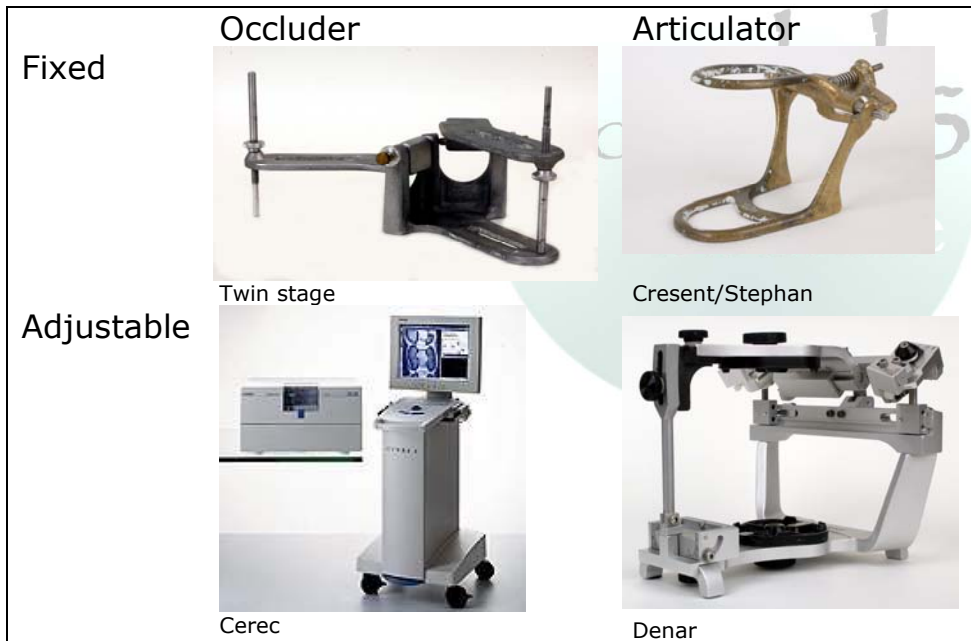
The term Fixed Articulator incorporates most of the instruments which are used today. In the standard classification this would include Class II and III. For

example this may vary from the Bonwill to the Steel's or the Monson to the disposable plastic.

The term Adjustable Articulator incorporates all of the fully adjustable articulators which are listed in the Standard Classification IV. Examples of this include the Gysi Adjustable, the Whip Mix, the Denar and the Stewart. This disregards the concept of arcon or non arcon instruments or the idea of semi or fully adjustable.

The Dental Relater Classification could be pictured in this simple grid.

Click on the photograph of each of the analog instruments in the grid to see video clips of instrument action only if you are enrolled in course 40600



The value of this classification is in its simplicity and ability to include instruments which do not fit into any of the previous classifications. It combines two aspects of dentistry by implying TM joint related variables to functionally related variables and the clinical need for opposing casts of natural teeth.

**Conclusion:**

The classification system which this author believes delivers the best value is the simplest. The historic argument of geometric based instruments vs. TM joint range of motion instrument suggests a lack of vision. The real argument lies in the dichotomy of functionally based interpretations of occlusion contrasted against the biometrically derived schemes.



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