

GREAT LAKES

Manual for
the SAM™3



Great Lakes
PROSTHODONTICS
A Division Of Great Lakes Orthodontics, Ltd.

Dear SAM Articulator Owner,

Congratulations on your purchase of a new SAM 3 articulator! You will find the SAM 3 superior in quality, accuracy, and ease of use when compared to any other articulator available today.

The SAM is engineered with meticulous precision and manufactured with the highest quality surgical-grade aluminum. **A case mounted on one SAM can be transferred to any other SAM with complete confidence and total split-cast accuracy.**

Prior to shipping, your SAM articulator was precision checked by the manufacturer and then by Great Lakes. A split-cast check was fabricated and shipped with the articulator so you too can verify its accuracy. ***The SAM is the only articulator shipped with its own split-cast accuracy check.***

We recommend that you conduct the split-cast check procedure outlined in this manual. Upon completion of the split-cast check, return the warranty card (shipped with the SAM 3) to Great Lakes. The warranty card certifies that you have conducted the split-cast check and your articulator is accurate.

As always, Great Lakes Product Customer Service representatives are available to provide you with additional SAM product information or to answer any questions you may have. Please feel free to call us at **1-800-828-7626** if you need assistance or would like to place an order. We are happy to help you.

Our Great Lakes Vision:

“Delight our customers. Respect and help our co-workers.”

SAM 3 MANUAL CONTENTS

SAM 3 Diagram	2-3
Split Cast Verification.....	4
Maintenance	5
Getting Started.....	6
Features of the SAM 3.....	6-11
Using the SAM 3 with the Axiomatic	
Transfer Fork Assembly (single toggle mechanism).....	12-21
Preparing and Placing the Facebow.....	12-13
Seating the Facebow	14-15
Removing the Facebow.....	15
Mounting the Maxillary Model.....	16-19
Mounting the Lower Model.....	20-21

Setting Horizontal Condylar Inclination & Bennett Angles

(H.C.I.).....22

(Bennett)23

Mandibular Position Indicator.....24-30

Using the MPI to Verify CR Bite Registration24-27

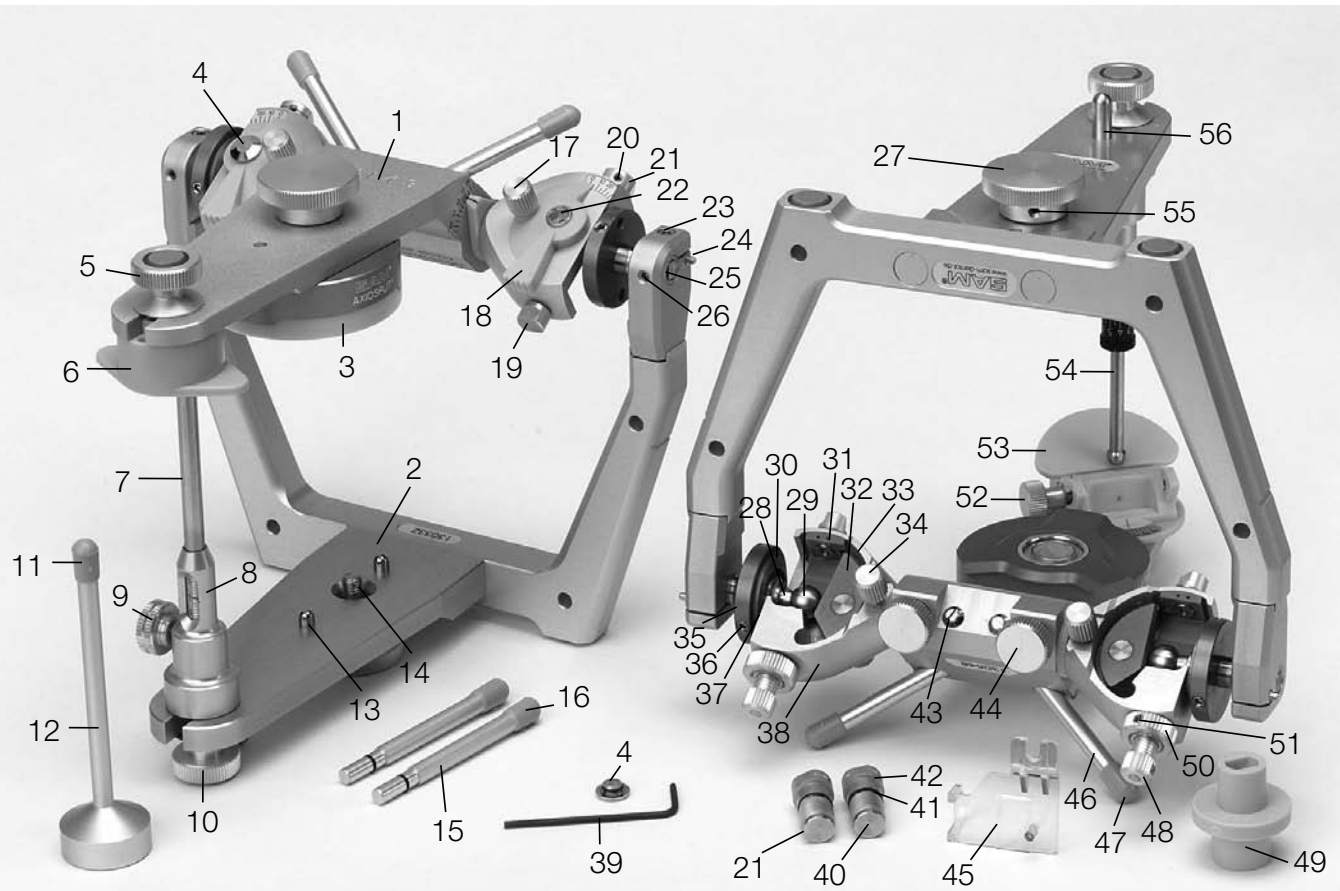
Using the MPI to Identify CR/CO Discrepancies27-30

Commonly Asked SAM 3 Questions31-32

SAM 3 Articulator Accessories.....33-34

Great Lakes Loaner Program.....35

How to Contact Us35



1	Articulator Upper Frame	29	Condylar Element
2	Articulator Lower Frame	30	Centric Locking Groove of Condylar Housing
3	Mounting Plate	31	Condylar Pathway Insert #1
4	Cap for Condylar Insert Adjustment Screw	32	Bennett Guidance Insert (metal, straight)
5	Thumb Nut for Incisal Table	33	Bennett Insert Screw
6	Flat Incisal Table	34	Thumb Screw for Condylar Housing Cover
7	Incisal Pin for SAM 3	35	Centric Locking Ring
8	Incisal Pin Sleeve	36	Centric Locking Ring Set Screw 2.0mm
9	Thumb Screw for Incisal Pin	37	Inner Groove of Centric Locking Ring
10	Thumb Screw for Incisal Pin Sleeve Assembly	38	Condylar Housing
11	Cap for Vertical Extension Rod	39	1.5mm Hex Wrench for screws #20 and #51
12	Vertical Extension Rod for Upper Member	40	Protrusion Posterior Wall Pin (Threaded)
13	Guide Pin for Mounting Plate	41	O Ring for #21
14	Screw for Mounting Plate	42	Posterior Wall Pin (non-threaded)
15	Tilt Support Rod	43	Slot Headed Condylar Housing Set Screw
16	Cap for Tilt Support Rod	44	Thumb Screw for Condylar Housing
17	Bennett Guidance Thumb Nut	45	Clear Condylar Housing Cover
18	Bennett Guidance Angle Indicator	46	Upper Member Foot
19	Condylar Insert Holding Screw	47	Cap for Upper Member Foot
20	Posterior Wall Pin Set Screw (1) 1.5mm	48	Protrusion Thumb Screw
21	Non-adjustable Posterior Wall Assembly	49	Yellow Wrench for screws #21 and #19
22	Condylar Insert Adjustment Screw 2.0mm	50	Retrusion Thumb Screw Collar
23	Condylar Shaft Collar Set Screw 2.5mm	51	Protrusion Collar Set Screw (1) 1.5mm
24	Mounting Pin for Anatomic Facebow	52	Thumb Nut for Universal Incisal Table
25	Condylar Element Shaft	53	Universal Adjustable Incisal Table
26	Condylar Shaft Collar Set Screw 2.0mm	54	Incisal Pin for SAM 3 Complete
27	Thumb Screw for Mounting Plate	55	Set Screw for Mounting Plate Screw 2.0mm
28	Grooved Condylar Shaft Collar	56	Lower Member Support Pin

Split-Cast Check Verification of your SAM 3 Articulator



Each SAM articulator goes through several accuracy checks before you receive it. We also fabricate a split-cast check for you to use in the office. **We recommend that you check the articulator when you receive it and return the warranty card (shipped with the SAM 3) to Great Lakes.** The warranty card certifies that the split-cast check has been conducted and that upon receipt, your articulator is accurate.

To perform the split-cast check:

- 1) Set the horizontal condylar inclination at 30° and the Bennett side shift at 5° (average setting) on each side.
- 2) The incisal pin should be at the zero mark or less.
- 3) Attach the metal portion of the split-cast to the lower member.
- 4) Attach the plaster portion of the split-cast to the upper member.
- 5) The two portions of the split-cast should fit together without any discrepancy.
- 6) If these two parts do not fit together, make sure the incisal pin is out of contact with the incisal table and check the articulator for wax or plaster debris under the split-cast or in the condylar housing area.

If this does not resolve the problem, call Great Lakes for further instruction.

Maintenance

Regularly clean the upper and lower member centric locking mechanism components with a soft cloth or paper towel.

Functional articulator surfaces normally do not wear unless abrasive materials are present.

Warning: Disinfection, ultrasonic or gypsum cleaning solutions are corrosive to aluminum. Prolonged immersion in these types of solutions will permanently damage the equipment surfaces and possibly void the warranty. Disinfection solutions should be applied with a moistened cloth or if sprayed on, the excess should be removed with a clean dry cloth.

Disinfection of Toggle Assembly: The Bite Fork must be disinfected after each use and is autoclavable. The Transfer Jig should be disinfected using only a disinfecting cloth such as CaviWipes (236-025). The Transfer Jig should not be autoclaved.

Articulators can be treated with a very small amount of SAM Liquid Metal Protector to help prevent gypsum from sticking to the metal surfaces. Remove gypsum from aluminum surfaces as soon as possible. Use the SAM Reference Centric Instrument (050-006) to prevent gypsum from coming in contact with condylar housings.

Getting Started



a

The following items are often recommended by clinicians for the facebow transfer and mounting procedure:

Once you have preformed your initial Splint Cast Verification you should replace the straight (grey) Bennett Inserts with the Green Bennett Inserts.*

- a. Loosen & Remove Lock screw for Bennett guidance.
- b. Remove Grey Insert.
- c. Replace with Green Insert.
- d. Replace Lock Screw.

* The manufacturer recommends that the grey inserts be re-inserted when the split cast verification procedure is performed.

Bitefork registration: compound bite tabs, compound sticks, or bite fork rims for dentures.

Mounting: Whipmix mounting stone.

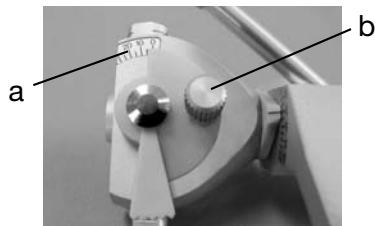
Centric Relation Interocclusal Records: Great Lakes wax or wafers, Moyco beauty pink wax (extra hard) or ACU-flow™.

Deprogrammers: Lucia Jigs, leaf gauges, or cotton rolls.

Features of the SAM 3

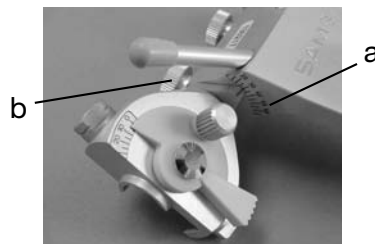


Upper member.



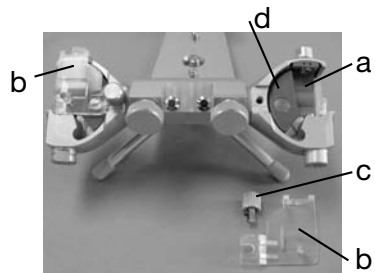
Top of condylar housing.

- a) Scale for Bennett guidance
- b) Lock screw for Bennett guidance



a) Graduated scale for condylar housing angle.

b) Lock screw for HCI angle setting

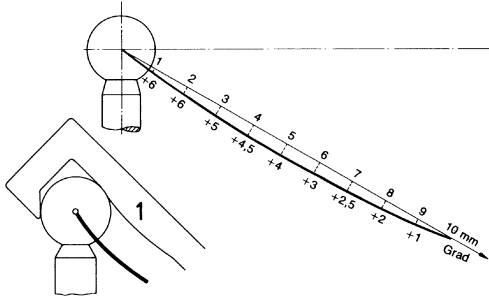


Bottom of condylar housing.

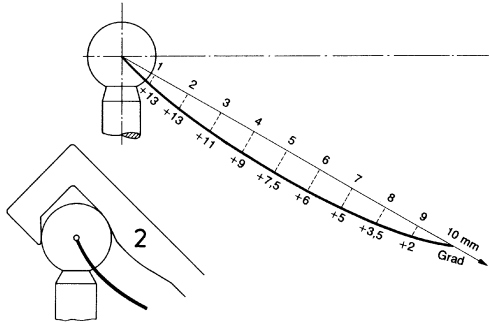
- a) Condylar pathway insert
- b) Condylar housing covers (helps keep the upper member attached to the lower member during eccentric movement)
- c) Screw to remove condylar housing covers
- d) Bennett guidance insert

Three condylar pathway curvatures and Bennett angulations are available. (see pg 8 & 9)
 The #1 curvature insert (white) is standard with the SAM 3.
 The selection of #1, 2 or 3 is determined from the axiograph recordings.

SAM[®] 3 Condylar Housing Pathway Inserts

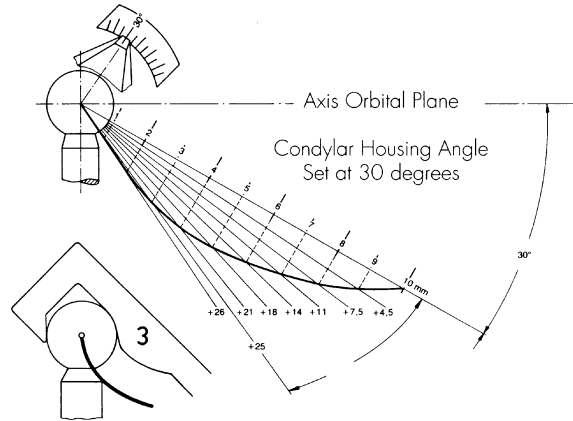


Condylar Housing Pathway Insert 1



Condylar Housing Pathway Insert 2

Relative increase in condylar pathway inclination for each millimeter of movement on a curved pathway.



Condylar Housing Pathway Insert 3

Curved condylar pathway angulation effect at 3 mm: $25^\circ + 30^\circ = 55^\circ$ degrees

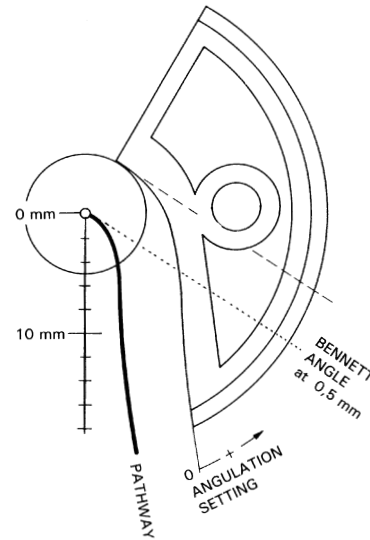
Bennett Guidance Inserts (Curved)

The graphic illustration on the right displays the tangential effect of using a curved Bennett Guidance insert in the SAM[®] articulators.

Curved Bennett Guidance Inserts, with an articulator setting of 0 degrees, have a straight Bennett Guidance Angle at 0.5 mm of mediotrusion movement of 54 degrees for the Green insert, 66 for the Blue and 78 for the Red. At 3 mm, the Bennett Guidance angle is 15 degrees for the Green insert, 27 for the Blue and 38 for the Red. And at 10 mm, the Bennett Guidance angle is 7.5 degrees for the Green, 10 for the Blue and 13 for the Red.

Dental research has shown that the maximum Bennett Guidance Angle at 10 mm is 7.5 to 10 degrees. The Green and Blue Inserts set at 0 degrees have the range from 7.5 to 10 degrees.

The Red Bennett Guidance Inserts, set at 10 degrees, have an initial straight Bennett Guidance angle of 88 degrees at 0.5 mm of mediotrusion movement. This is the so-called immediate side shift. Green Bennett Guidance Inserts, set at 0 degrees, is the average value. When used with a curvature 1 condylar housing pathway at 40 degrees, the SAM[®] articulator represents the average value patient.

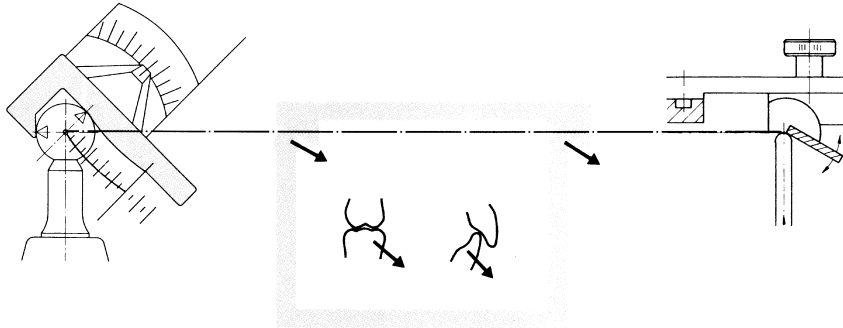


Two incisal tables are available

- a) Standard table
- b) Adjustable table



Authentic Mandibular Movement Simulation



The SAM® Universal Incisal Table is attached to the upper member of the SAM® 3 articulator with the incisal table surface positioned on the axis orbital plane. This arrangement results in the correct simulation of anterior guidance.

Programmable curved condylar pathways and curved Bennett guidance inserts, developed from research with the SAM® AXIOGRAPH, coupled with the universal incisal table makes the SAM® articulator system fully adjustable.



Lower member of SAM 3 articulator.

a) Centric locks to lock articulator in absolute machined centric.



Incisal guide pin assembly.

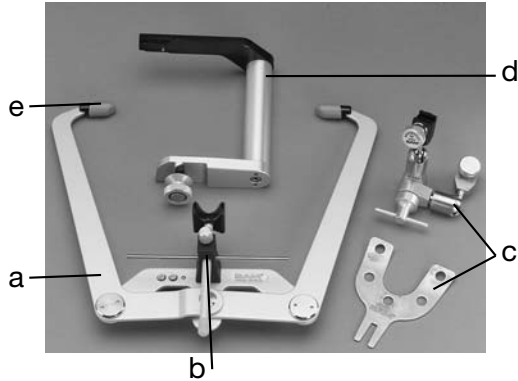
a) Incisal pin locking screw

b) Incisal pin assembly locking screw



Lower member of SAM 3 articulator with incisal pin.

Preparing and Placing the Axioquick Facebow Using the Axiomatic® Transfer Fork Assembly



Axioquick Facebow Assembly

- a) Axioquick Facebow
- b) Nasion Relator AX with horizontal interpupillary line leveling rod
- c) Single Toggle Axiomatic Transfer Fork Assembly
- d) Laboratory Transfer Stand AX
- e) Hygienic disposable ear caps



- 1) Attach blue disposable earpiece caps to black earpieces with flat surface positioned anterior.



- 2) **Attaching the transfer fork assembly to facebow:** At the top of the transfer fork assembly, there is a black portion with a dovetail slot. On the underside of the facebow, there is a black dovetail slide. The transfer fork assembly is attached to the facebow by guiding the dovetail slot onto the dovetail slide. The assembly will be secured once it contacts the small silver pin at the end of the slide. Tighten screw.



3) Attach the nasion relator (with interpupillary line leveling rod) to the facebow, making sure it is fully retracted. Use the guide pins to ensure that the nasion relator is centered.



4) Prepare the bitefork with compound bite tabs:
a) Place tabs on bitefork (as shown in photo).
b) Immerse the bitefork with tabs in water heated to 58°C (135°F) for 2 minutes.



5) Place the bitefork on the maxillary arch to obtain imprints.

* Note: Make sure the bitefork is centered.

6) Remove bitefork and chill tabs in cool water. Confirm that teeth fit imprints and fork is stable.

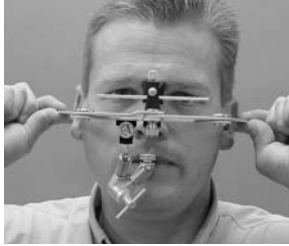
Seating the Facebow



The SAM Axioquick Facebow can be positioned automatically parallel to the interpupillary line when you follow these instructions:

- 1) Hold the facebow with the thumb and index finger opposite the covered earpiece. Position the earpiece into both ear canals equally blocking hearing. Move the earpieces superiorly and firmly inward into the small bony depression. The patient's hearing should now be unobstructed.
- 2) With the patient holding the facebow opposite the earpieces, gently position the Nasion Relator AX into light contact with nasion to establish a horizontal plane. Use the interpupillary line leveling rod to verify that the facebow is parallel to the interpupillary line. Tighten nasion screw.
- 3) Holding the clamp assembly in one hand, use the other hand to tighten the single toggle lock to secure the bitefork assembly in place.





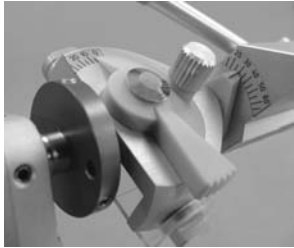
- 4) Confirm that the facebow is parallel to the interpupillary line and that the nasion relator is properly positioned. Loosen toggle and adjust as necessary.

Removing the Facebow



- 1) Check the single toggle lock for tightness.
- 2) Remove earpieces from the patient's ears and remove facebow assembly.
- 3) Loosen silver screw at the top of the transfer jig and slide the transfer fork assembly off the facebow. Set aside until ready for upper cast mounting.

Mounting the Maxillary Model



- 1) Confirm the articulator settings before the mounting procedure begins.
 - a) The horizontal condylar inclination should be set at 30° to assure consistent and proper transfer from the anatomical facebow to the articulator.
 - b) The Bennett angle should be set at 5°.



- 2) Remove incisal pin from lower member of articulator.



Casts may be attached to the articulator using screw-threaded mounting plates, Axiosplit plates, or the magnetic plate system.

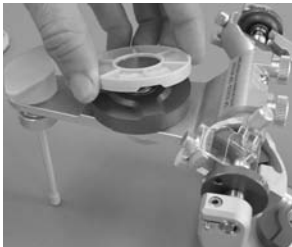
- 3) To use the Axiosplit method of mounting, you will need:
 - 2-Axiosplit Super Matrix Holders (050-046)
 - 2-Axiosplit Matrix Mounting Plates, round, with metal inserts (050-048, 20/pkg)



a) Attach one matrix mounting plate holder to the upper member of the articulator and one to the lower.



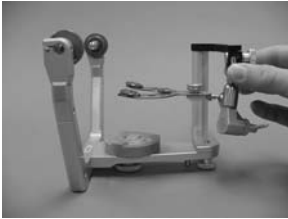
b) Insert a metal adhesion plate into a matrix mounting plate.



c) Place mounting plate on upper matrix holder.



- 4) Attach the Laboratory Transfer Stand AX to the lower member of the articulator as shown.



- 5) Slide the transfer fork assembly onto the dovetail slide of the transfer stand upper arm.

Secure the transfer fork assembly to the lab transfer stand by tightening the large silver screw.



- 6) Replace upper member of the articulator, move the centric locking rings inward until they click into place, securing the upper member to the lower.

Note: The incisal table must be in place on the upper member of the articulator to parallel upper and lower members for mounting.



- 7) The facebow transfer fork assembly is stabilized with the telescopic transfer fork support. Place the telescopic transfer fork support on lower member.

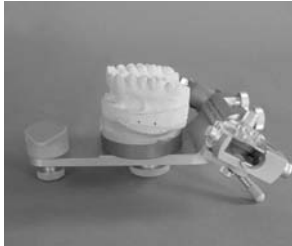


- 8) Seat model into the bitefork registration.



- 9) Estimate the amount of mounting stone needed between the maxillary cast and the upper member of the articulator. Use a quality mounting stone, like Whipmix mounting stone, to secure the upper model. Mix stone and mount the upper model.

Mounting the Lower Model



- 1) Remove the upper member of the articulator complete with upper model mounted. Place the upper member of the articulator in the inverted position allowing it to stand on the fixed tri-point rest.
- 2) Remove the transfer set and adaptor table from the lower member.



- 3) Insert the other metal adhesion plate into the matrix mounting plate and place the mounting plate on lower matrix holder.
- 4) Replace the incisal pin raising it approximately from 1.0mm to 2.5mm to compensate for the thickness of the wax bite registration.





- 5) Place interocclusal record onto upper model and place lower model onto record. Stabilize the maxillary and mandibular models by securing them together prior to mounting.



- 6) Replace lower member of articulator. Move the centric locking rings inward until they click into place to secure the upper and lower members of the articulator.



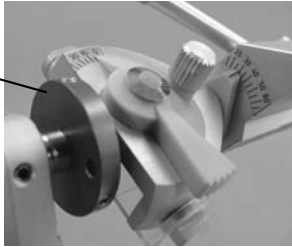
- 7) Mix quick set mounting stone and mount lower model. The incisal guide pin must contact the incisal guide table while the stone is setting.



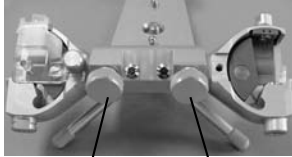
- 8) Remove the bite registration and leave the incisal pin setting at a slight open vertical to prevent accidental damage to cast teeth surfaces.

Setting Horizontal Condylar Inclination & Bennett Angles (H.C.I.)

Locking
Rings



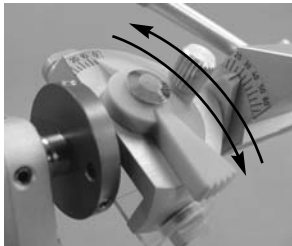
1) Unlock both Condylar Centric Locking Rings.



Thumb Screws

2) Loosen both Condylar Housing Thumb screws.

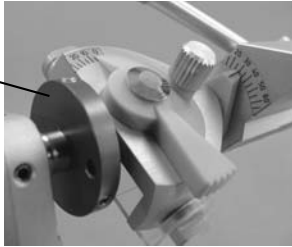
3) Place a protrusive record (edge to edge) between the mounted models.



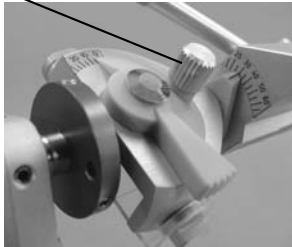
4) Slowly rotate the Condylar housings at the point when the posterior teeth have fully seated into the registration, tighten the Condylar Housing Thumb Screws.

Setting Horizontal Condylar Inclination & Bennett Angles (Bennett)

Locking
Rings



Thumb
Screw



- 1) Unlock both Condylar Centric Locking Rings.
- 2) Loosen the Bennett Thumb Screw.
- 3) Place an excursive bite registration between posterior teeth of mounted models.
- 4) Tighten the Bennett Thumb Screw at the point where the Condylar ball comes in contact with the Bennett Insert.

Mandibular Position Indicator (MPI)

The Mandibular Position Indicator (MPI), a modified upper member of the articulator, can be used to verify CR bite registration and identify 3D CR/CO discrepancies.



Components include:

- MPI
- Incisal Pin
- Calibration Rod
- Allen Wrench
- 120 MPI Labels



Using the MPI to Verify CR Bite Registration



Materials needed:

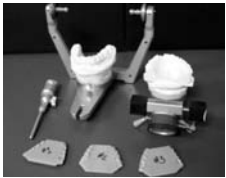
- SAM mounted casts
- Multiple CR bites
- MPI Labels
- Articulating paper - two colors



MPI labels are designed to represent the right and left sides of the articulator. Each square of the graph represents 1mm.



1) Place label on corresponding cube.



2) Transfer maxillary mounted cast to MPI.

a) Label bites (note bite # used to mount case)

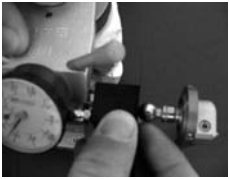
b) Remove incisal pin from lower portion of the articulator.



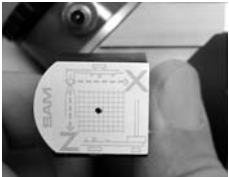
3) The swing arm should be disengaged.



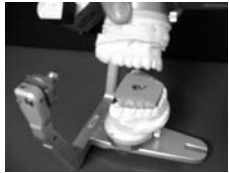
4) Seat maxillary model (MPI) onto bite #1.



5) Place articulating paper between cube and condylar ball and slide cube back and forth to obtain marking.



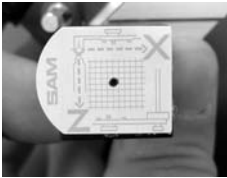
6) Note marking. Repeat on alternate side.



7) Repeat procedure with bite #2.



8) To obtain the second set of markings, use a different color articulating paper.



CR Bite verified

Note: If marks do not overlay, additional CR bite needed or the bite with condyles in most superior position may be used.

Using the MPI to Identify CR/CO Discrepancies



Materials needed:

- SAM Mounted Casts
- MPI Labels
- Calibration Rod
- Allen Wrench
- Articulating Paper – 2 colors



1) Place labels on corresponding cubes.



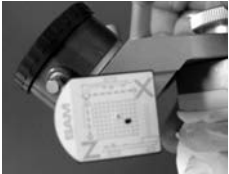
2) The swing arm should be disengaged.



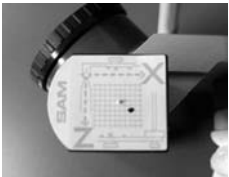
3) Place MPI with maxillary model onto lower model and hold in CO/Maximum Intercuspal position.



4) Place articulating paper between cube and condylar ball and slide cube back and forth to obtain marking.



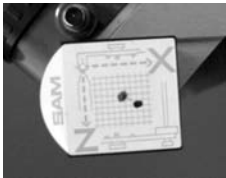
5) Note marking and repeat on opposite side.



6) Move cube toward MPI body and perforate label. This perforation represents CR.



7) Mark perforation with pen.



Note movement: 1mm down and 2mm forward.



8) To determine lateral side shifts, engage swing arm. Place calibration rod between cube and MPI body.

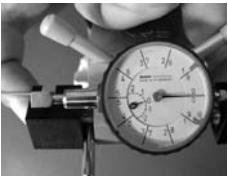


9) Place Allen wrench into cube screw on left side.



10) Use Allen wrench to “zero out” dial.

- Large dial indicates .1mm
- Small dial indicates mm



Utilize inner dial as reference: Movement towards the red indicates a shift to the right, movement towards the black indicates a shift to the left.



Place MPI mounted model into CO/Maximum Intercusation. Hold in place. Register reading.

Note .1mm movement to left (black indicator).

Conclusion: The condyle moves down 1mm and forward 2mm with a .1mm shift to the patient's left.

Commonly Asked SAM 3 Questions

Q) When I have the centric locks disengaged (checking lateral and protrusive excursions), how can I keep the upper member and lower member together?

A) *Place the clear plastic covers back on condylar housings. The covers need to be in place to hold the upper and lower members together.*

Q) What settings should be on my condylar housings?

A1) *Horizontal inclination should be set at 30°. Bennett side shift should be set at 5° when verifying.*

A2) *When performing functions many clinicians recommend 25° HCI and 10° Bennett.*

Q) At what setting should the incisal pin be?

A) *The incisal pin should be set less than the zero mark when checking the articulator for accuracy. When placing the bite registration on model, raise to accommodate the thickness of wax bite.*

Q) How do I check to make sure my articulator is accurate?

A) *Attach the plaster split-cast check to the articulator. There should not be a discrepancy. See page 2 in this manual for more detailed instructions.*

Q) What can I use to support the bitefork?

A) An acrylic block or the Telescopic Bitefork Support – see page 9 in this manual.

Q) Are SAM 2 and SAM 3 interchangeable?

A) With the adaptation of the mounting plate extender, (050-038) you can transfer your SAM 2 mounted case to your SAM 3. However, you cannot transfer a case mounted on your SAM 3 to your SAM 2 articulator.

SAM 3 Articulator Accessories



Incisal Pin Extension (050-041)

The incisal pin extension holds the upper member in position, parallel to the table top, when the upper member is open 180°. To place the incisal pin extension on the articulator, push the extension down on the large screw which fixes the incisal table to the articulator.

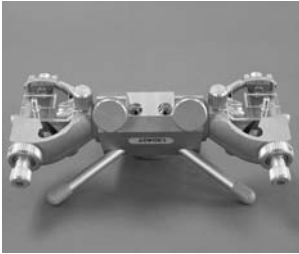
* Note: The articulator must always be locked in centric or condylar housing covers should be used.



Tilt Support Rods (050-042)

The tilt support rods maintain the articulator in a convenient position while working at a lab bench. Insert the tilt support rods in upper holes in the back of the articulator. Lean articulator back to rest on rods.

* Note: The articulator must always be locked in centric or condylar housing covers should be used.



Protrusion Screws (055-028)

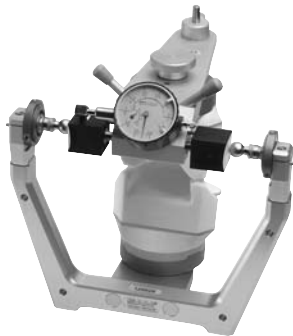
The protrusion screws provide a simple method to position the lower member forward. Each full turn of the protrusion screw equals .8mm. Always release the centric locking rings before activating the protrusion screws.

* Note: Straight, metal Bennett guidance inserts should be used.



Reference Centric Instrument (RCI) (050-006)

The RCI is used to mount upper and lower casts precisely without using an articulator. This keeps your articulator clean and gypsum-free.



Mandibular Position Indicator (MPI) (050-104)

With the SAM MPI, you can validate the accuracy of your mounting, confirm the “reproduce-ability” of centric bite registration and show relative changes in condylar position from centric relation to centric occlusion in a horizontal, vertical and transverse plane.

Great Lakes Loaner Program

At Great Lakes, we know how disruptive it can be when your equipment needs to be repaired, that's why we offer a FREE loaner program. If you should have a problem with your SAM[®] 3 System purchased from Great Lakes, tell us what's wrong - and we will ship you a free loaner* by UPS Ground. Once your equipment is repaired and returned, we'll issue a call tag to pick up the loaner - it's that easy.

* Subject to availability. Shipping charges apply unless item is under warranty.

How to Contact Us



200 Cooper Avenue
P.O. Box 5111
Tonawanda, New York 14151-5111

Toll-free: 800-828-7626
Local: 716-871-1161
Fax: 716-871-0550
E-Mail: info@greatlakesortho.com
Website: www.greatlakesortho.com

Notes:

Notes:



Great Lakes
PROSTHODONTICS

A Division Of Great Lakes Orthodontics, Ltd.

200 Cooper Avenue
P.O. Box 5111
Tonawanda, NY 14151-5111

1-800-828-7626
Local: 716-871-1161
Fax: 716-871-0550

E-Mail: info@greatlakesortho.com
Web Site: www.greatlakesortho.com