

CADIAX[®] *compact 2*

A practical method for TMJ registration

Operating instructions

GAMMA
Medizinisch-wissenschaftliche
Fortbildungs-GmbH

CE 0408



CADIAX[®] *compact 2*

Operating instructions

from CADIAX[®] *compact 2*
Model A
Firmware Version 1.14
and
CADIAX[®] *compact 2* Recorder
Version 2.0.0.0

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2 Introduction

Thank you for showing your confidence in us by purchasing the CADIAX[®] *compact 2*. You have purchased a top-quality medical-technical product, the result of more than 20 years of experience in the electronic registration of joint tracks (TMJ). In the following pages, we would like to help you get acquainted with the CADIAX[®] *compact 2* and its software.

2.1 Important safety considerations



For your own safety, as well as for operational safety, please read these instructions thoroughly, before beginning to operate the device. Always comply with any and all warnings included in these instructions, and/or on the device itself.

2.1.1 General safety instructions:



The device must be operated in a roomy area, in order to allow for proper dissipation of heat.

Never operate the device in areas, where there is a danger of water seeping into the machine.

The device is powered from a computer connection, through a Universal Serial Bus (USB). Only connect the device directly to a computer's USB terminal. Only connect the device directly to a computer's USB jack. Never operate the device through a USB hub. Never use alternative power sources of any kind.

Never set up the system in the proximity of potential fields of electromagnetic interference (loudspeakers, mobile phones, sterilizers, etc.).

Never attempt to repair the device yourself. All repair work must be done by authorized, trained technicians.

In case of the following, disconnect the device from the computer, and contact a qualified, service technician:

- If water or other liquid seeps into the device.
- If the device does not operate properly, although the operating instructions have been followed correctly.
- If the device is dropped, or falls, or the housing is damaged.
- If the device shows noticeable deviation from its normal operation.

Please make sure that the device is set up on a smooth, even surface, which is longer and wider than the device itself.

The surface on which the device stands must be sufficiently stable, as the machine could be badly damaged by shaking or falling.

In choosing the working area and/or storage area, make sure that the device is not subject to extreme deviations in temperature or humidity, as well as to direct sunlight and excessive heat.

Make sure that the device is not subjected to vibrations and jolts.

Also make sure that the cable does not pose a hindrance (e.g., to be stumbled over).

2.1.2 Special information about medical electrical devices

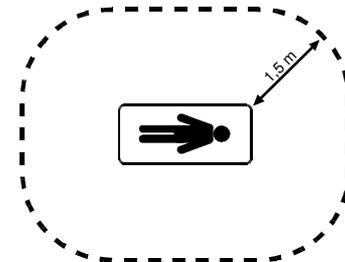
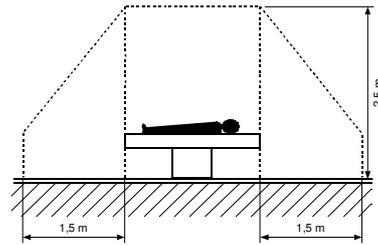
2.1.2.1 Setting up the CADIAX[®] compact 2



If the computer being used to power the CADIAX[®] compact 2 is in the proximity of the patient, it must be tested, in compliance with standard EN 60601-1.

If the computer powering the CADIAX[®] compact 2 has not been built according to standard EN 60601-1, it must be set up at a distance from the patient, or the computer, including any devices connected to it (e.g., monitor) must be connected to the power source through an isolation transformer.

The patient's proximity is the area within which the patient could, intentionally or unintentionally, come into contact with any parts of the medical electrical device or system, or in contact with someone using or touching part of the device or system.
(Definition according to Standard EN 60601-1)



Definition of patient proximity, according to Standard EN 60601-1-1

The CADIAX[®] compact 2 may not be operated in the direct proximity of other devices, or stacked with other devices. If it does become necessary to operate the CADIAX[®] compact 2 in the proximity of other devices, or stacked with other devices, please make sure to observe the device carefully, to ensure its correct operation in this system configuration.

2.1.2.2 Operating the CADIAX[®] compact 2



Only switch on the recording mode, after the measuring sensors (flags and styli) are completely mounted.

During the registration, do not touch the flags or styli. This also applies to the patient.

Always switch off the recording mode, before detaching the flags and styli from the facebow.

2.1.2.3 Electromagnetic compatibility



Medical electrical devices require special safety precautions, with regard to electromagnetic tolerance. Therefore, the CADIAX[®] *compact 2* may only be installed and put into operation according to the instructions contained in chapter 9.6 of this handbook.

Only use accessories which are explicitly approved for the CADIAX[®] *compact 2*. Using other accessories, especially cables which are longer than the cable lengths prescribed in this user's manual, can lead to the emission of interferences, or to reduced interference immunity in the CADIAX[®] *compact 2*.

Portable and mobile HF-communication appliances, e.g., mobile telephones, cordless telephones, computers, and laptops with activated WLAN, etc., can have detrimental effects on medical electrical devices. Do not operate CADIAX[®] *compact 2* in the proximity of these potential sources of interference, and make sure to adhere to the safe distances described in 9.4 of this handbook.

2.1.2.4 Connecting other devices



Devices connected to analog or digital interfaces must be certified to satisfy the applicable standard EN specifications (e.g., EN 60950 for data-processing devices, or EN 60601 for medical electrical devices). In addition, all configurations must satisfy system standard EN 60601-1-1. Whoever connects supplementary devices to the signal input or outlet units is the system configurer, and responsible for ensuring that system standard EN 60601-1-1 is adhered to.

2.1.3 Contraindications-limitations to application



When operating the CADIAX *compact 2*, the following conditions can hinder or limit its application:



- Cognitive abilities:
Patients who are not able to follow or carry out the attending dentist's instructions correctly (e.g., where to move the lower jaw, etc.), for physical or psychological reasons
- General clinical pictures:
Patients with illnesses, which do not allow for the attachment of a facebow for registration purposes. Illnesses may be physical or psychological in nature (e.g., spastic, epilepsy, claustrophobia, injury or disease of the skull or soft-tissue structures of the skull, or ears, etc.).
- Dental clinical picture:
Patients with odontopathy or periodontal disease, which excludes the mounting of a clutch (parodontosis, loose teeth, damage to the tooth substance, changes in the mucous membranes in the mouth or pharynx, etc.).
- Certain diseases in the ear region.
Patients with diseases in the ear region (e.g., painful inflammations, tinnitus, ear pain, etc.).
- Patients with extreme muscle pain in the head and neck region are not able to wear the facebow for the duration of the examination.
- Patients between 0 and 9 years of age. Children are first able to follow the dentist's

instructions well enough to lead to a successful examination from about 10 years of age onwards. In addition, existent deciduous teeth can make it difficult to fix the clutch.

- Patients with active implants (e.g., heart pacemakers) should be handled cautiously, as the stylus tip, to which a magnet is attached, could come into proximity of such implants.

2.1.4 CADIAX[®] Magnet-Sensor system



The CADIAX[®] Magnet-Sensor system ("M"-Sensor) contains a magnet in the tip of the stylus. For this reason, special care is necessary, when using the CADIAX[®] "M" Sensor system with patients with pacemakers or implanted defibrillators! Make absolutely sure to adhere to the necessary safe distances. If necessary, consult the handling cardiologist. If in doubt, refrain from using the CADIAX[®] "M" Sensor system.

2.2 Explanation of symbols used on the packaging and the device:



ATTENTION: see accompanying instructions



ATTENTION: magnetic field



Type B applied part



Follow user's instructions



Manufacturer

SN

Serial number



Dispose of separately from other waste material



Connection for flag and stylus, right



Connection for flag and stylus, left



Connection for Universal Serial Bus (USB)



Connection for foot switch

2.3 Appropriate application

The CADIAX[®] *compact 2* System is designed for registration and display of hinge axis movements of the human mandible, conversion of these movements into an intercondylar distance, determined through the articulator, and calculating the settings for an articulator, appropriate to the patient.

The system is used by dentists and dental technicians.

2.4 About these operating instructions

The authors of this handbook assume that the reader has a basic knowledge of condylography, working with a facebow, and the transfer of head-related data into an articulator.

In addition, a sound basis in the Microsoft Windows operational system is required. The user should be able to work with the user-interfaces, and other operational elements of the Windows programs.

This handbook is not a substitute for a basic education in using the Windows operating system. If you have only little or no education in Windows, we recommend that you first become acquainted with the system. This will make it much easier to work with the CADIAX[®] *compact 2* software.

2.4.1 Symbols and notations

The following symbols and notations will be used in this handbook to describe certain commands and instructions:

- Designations of keys will be written in italics. For combinations of keys, plus signs (+) will be included.

e.g.: *CTRL+D* means: hold down the Control key, then press the D key

- Menu items in CADIAX[®] *compact 2* software are displayed in italics. If several menu items need to be selected in succession, they will be linked with arrows (→).

e.g.: *File* → *Close* means: first, click on the *File* menu item, then click on the menu item *Close*, in the open menu.

Special attention will be called to important aspects with the following symbols::



Attention

This symbol points to a possible source of error, or the danger of possible operational error.



Info

Here, you will find especially important additional information, regarding the theme being described.



Tip

Useful Tips und Tricks, for working with CADIAX[®] *compact 2*.

2.5 Scope of delivery

When you receive your CADIAX[®] compact 2 system, check the package contents, for quality of delivery.

The following items are included in the CADIAX[®] compact 2 basic system (Article No. 01-10D200-2 + 03-SOFTD000CC2 + 06-230430 + 06-230451) scope of delivery:

	CADIAX [®] compact 2 device		2 measuring flags ⁽¹⁾
	Foot switch ⁽¹⁾		2 measuring styli ⁽¹⁾
	USB Cable, Length 3 m		
	Upper facebow ^{(1) (2)}		Lower facebow ^{(1) (2)}
	Retaining strap for the upper facebow ^{(1) (2)}		Occlusal clutch (small) ^{(1) (2)}
	Axis locator pins (2 pieces) ⁽¹⁾		AB bow-adapter for two fixing screws ^{(1) (3)}
			Screwdriver for fixing the AB bow-adapter ^{(1) (3)}
	CD-ROM with CADIAX [®] compact 2 software		This operation manual

⁽¹⁾ These units are not included in the scope of delivery of the CADIAX[®] compact 2 Upgrade (Article No. 01-SP0060 or 01-SP0061)

⁽²⁾ These units are not included in the scope of delivery of the CADIAX[®] compact 2 system (Article No. 01-10D200-2)

⁽³⁾ In the CADIAX[®] compact 2 basic system (Article No. 01-10D200-2 + 03-SOFTD000CC2 + 06-230430 + 06-230451) the AB bow adapters are already mounted. In this case the screwdriver is not necessary and not in scope of delivery.



Before using the system, the AB-Bow adapters must be screwed onto the Reference AB Bow. The measuring flags will then be fixed to these parts, whereby the bore for the fixing screw (the hole with the depression) must face forward!



Computers or laptops, necessary for operating the CADIAX[®] *compact 2* System, are not included in the scope of delivery.

2.5.1 Required accessories, not included in the scope of delivery

The following accessories are required for working with CADIAX[®] *compact 2*, but are not included in the delivery package of the CADIAX[®] *compact 2* System.

Bite registration material for fixing the occlusal clutch	Dispenser for applying the bite registration material in the occlusal clutch
---	--



Use exclusively a silicone adhesive, with a Shore-hardness of maximum A 60. Follow the manufacturer's directions!

2.5.2 Optional accessories

The following accessories are optional. They serve to expand the possible applications of the CADIAX[®] *compact 2* System:

	Para-occlusal Track ¹⁾ (Article No. 06-230345)	ESPE Protemp for fixing the para-occlusal clutch
	Occlusal clutch (small) (Article No. 06-230335)	GAMMA Dental Software

Please contact your local distributor for further information.

2.6 Computer system requirements

A computer is required, in order to use the CADIAX[®] *compact 2* System. The CADIAX[®] *compact 2* Software runs on the following operation systems:

- Windows[®] 2000
- Windows[®] XP Home
- Windows[®] XP Professional

The minimum computer system requirements are:

- Sufficient main memory on hand, according to the configuration and the software installed.
- At least 100 MB of free hard disk space is recommended.
- CD-ROM drive.
- One free USB interface on the Computer.



Do not operate the CADIAX[®] *compact 2* over a USB hub. Sufficient power for trouble-free operation of the device is only guaranteed through a direct connection to a computer interface.

A screen appropriate for use at the dental chair is required. Please note here, that the distance between the user and the screen can be greater than when using normal computer applications.

3 Preparing to operate CADIAX® compact 2

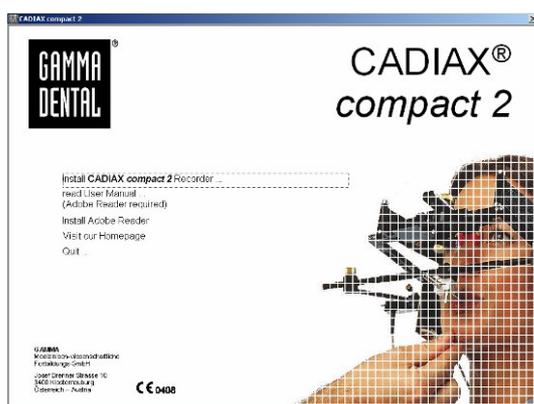
Before beginning to work with the CADIAX® compact 2 System, several preparatory steps must be carried out.

3.1 Installing the CADIAX® compact 2 Software

To install the CADIAX® compact 2 Software, insert the CD-ROM into the computer's CD-ROM drive. The installation program will start automatically, after a few seconds.



Before connecting the CADIAX® compact 2 with the computer the first time, first install the CADIAX® compact 2 Software. The installation program for the CADIAX® compact 2 Software also installs the appropriate drives for the CADIAX® compact 2 device. Only then, can the computer's operational system recognize the CADIAX® compact 2 when it is connected. This also applies, even if GAMMA Dental Software is already installed on your computer.



After placing the CD ROM into the computer, this menu appears. Here you have several possibilities:

- Install CADIAX® compact 2 Recorder Software.
- Read the operating instructions directly onto the PC and/or print them out

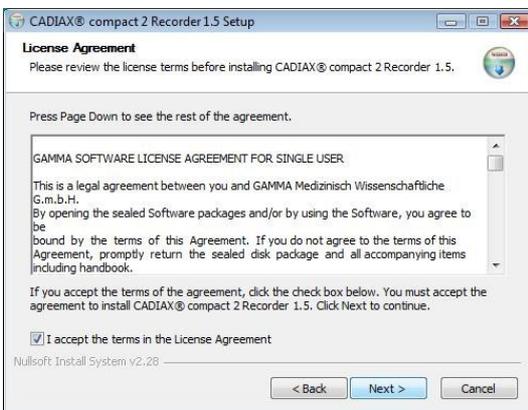
Install the Adobe Acrobat software, which you need, in order to read the operating instructions on the computer.



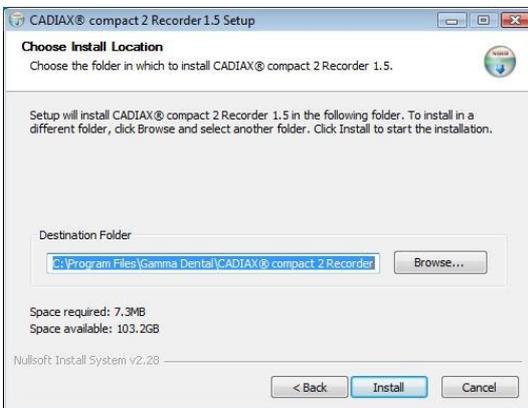
When you install CADIAX® compact 2 Recorder Software, you will first be directed to select the language in which you want to work on the software. The language for the software can be changed at any time, after installation.



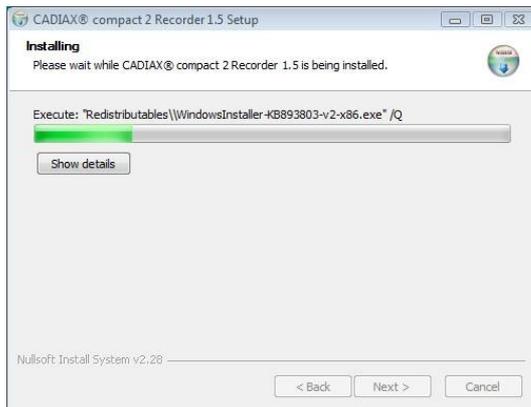
Click on *Next*> to start the installation procedure.



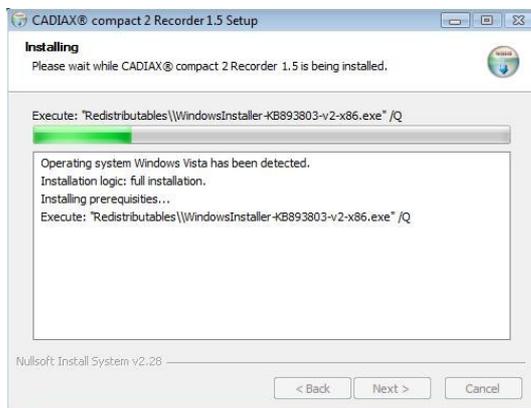
Please read through the conditions in the license contract carefully. If you accept the license contract, mark this in the corresponding place, and continue the installation, by clicking on the *Next*> button. If you do not accept the license contract, please discontinue the installation of the CADIAX® compact 2 Software.



In the next step, you will be asked which directory the program data should be copied in. The standard installation directory is: *C:\Programme\Gamma Dental\CADIAX® 2 Recorder*. Only change this as much as necessity demands. Start the installation of the CADIAX® compact 2 Software, by clicking on the *Install* button.



The Installation program copies only the necessary data onto your computer.



Installation of the software is now completed.



The CADIAX® *compact 2* Software is now operational. Before you finally complete the installation and start the CADIAX® *compact 2* Recorder Software, connect the CADIAX® *compact 2* to a free USB jack on your computer. The operating system now undertakes the configuration of the drives. As soon as this procedure is completed, the CADIAX® *compact 2* System is ready for operation.



Do not operate the CADIAX® *compact 2* over a USB hub. Sufficient power for trouble-free operation of the device is only guaranteed through a direct connection to a computer interface.



Use exclusively the USB cable, which is provided in the delivery package. Do not use either longer or unshielded USB cables. In these cases, the safe operation of the CADIAX® *compact 2* device would not be guaranteed.

3.2 Basic settings in CADIAX[®] compact 2 Software

After installation of the CADIAX[®] compact 2 Recorder Software, you must work on several settings. First, start up the CADIAX[®] compact 2 Recorder Software:

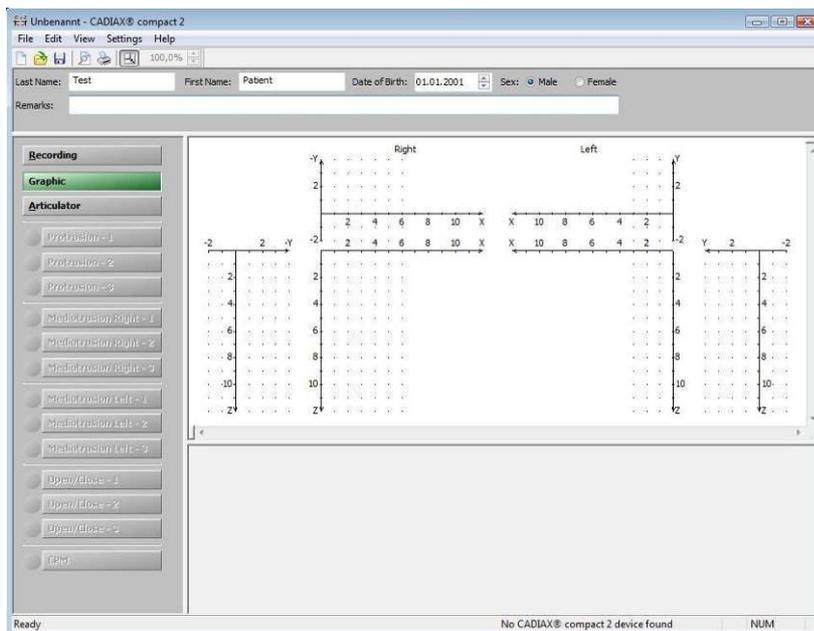


It is not necessary that the CADIAX[®] compact 2 device is connected to the computer.

3.2.1 Starting the Software

CADIAX[®] compact 2 Recorder Software is started through the Windows[®] Start menu (*All Programs* → *Gamma Dental* → *CADIAX[®] compact 2*) or through the  button on the computer desktop.

After starting the program, the following screen appears:



If you are already using GAMMA Dental Software, you should start the CADIAX[®] compact 2 Software directly from the CADIAX[®] Analysis program. This has the advantage that the data will then be saved to the GAMMA databank automatically, and can then be used in all of the other parts of the program.

If the CADIAX[®] compact 2 Recorder software is started from GAMMA Dental Software, the *Graphics* and *Articulator* buttons are not available, as these functions are integrated in the CADIAX Analysis software.

3.2.2 Setting the facebow

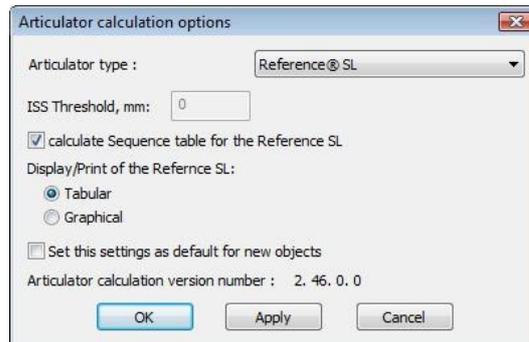
Set the facebow type, which you use in your practice. You will find the selection of facebows in the menu: *Settings* → *Facebows...*



The various facebows have different scales for entering facebow width. If a wrong facebow is entered, the given facebow width will also not be correctly converted in the flag distance. This leads to a distorted picture of the recorded condylar tracks and, in some circumstances, to a falsification of the value settings for the articulator.

3.2.3 Setting the articulator programming

Now, please set the type of articulator, which you use in your practice. The selection of articulators is found in the menu: *Settings* → *Articulator...*



CADIAX® compact 2 supports the following types of articulators (in alphabetical order):

Artex® AP / CP
 Artex® TR / CT
 Denar® D5A
 Hanau® Modular
 Ivoclar® Stratos 300
 Reference A
 SAM®
 WhipMix® 3040

Artex® AR / CR
 Artex® SL
 Denar® Mark II
 Hanau® Wide Vue
 KaVo® Protar
 Reference I
 WhipMix® 2240
 WhipMix® 3140

Artex® TK / CN
 Denar® Anamark
 Hanau® 96H2
 Ivoclar® Stratos 200
 Panadent®
 Reference SL
 WhipMix® 2340
 WhipMix® 8500

In addition, you should determine whether you want the data output in tabular or in graphic form.

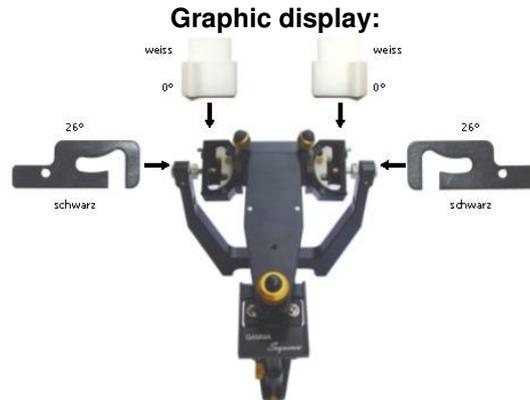
Tabular display:

Sagittal Condylar Guidance Reference® SL

Inlay	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
Straight	●4°	●6°	●8°	●32°	●33°	●34°
Convex	0°	3°	10°	25°	29°	36°
Retrusive	Blue	Blue	Blue	Blue	Blue	Blue

Transverse Condylar Guidance Reference® SL

	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
WHITE	●0°	●0°	●0°	●0°	●0°	●0°
YELLOW	0°	0°	0°	0°	0°	0°
RED	0°	0°	0°	0°	0°	0°
BLUE	0°	0°	0°	0°	0°	0°



The data output in graphic form is not available for all articulator types.



If you want to save these settings as default values for further work, click on the control field "Save settings as default values".

3.3 Preparing the facebow



This is only necessary if you are using the Reference AB Facebow.



The AB-Bow-adaptors must be screwed onto the Reference AB Bow, before using the system. The measuring flags will then be fixed onto these parts, whereby the bore for the fixing screw (the hole with the depression) must face forward!

4 Recording TMJ movement

Basically, the registration of mandibular movement is always carried out in the following method:

1. Preparations (see paragraph 4.1)
2. Fixing the clutch to the lower jaw teeth (see paragraph 4.2, page 24)
3. Mounting the anatomical upper facebow (see paragraph 4.3, page 26)
4. Mounting the writing bow and adjusting the writing tips to the anatomical axis (see paragraph 4.4, page 28)
5. Measuring flags and measuring styli (see paragraph 4.5, page 30)
6. Registration of joint track curves (see paragraph 4.6, page 32)
7. Registration of CPM (see paragraph 4.7, page 37)
8. Complete registration/ save data (see paragraph 4.8, page 39)

4.1 Preparations

Before you begin registration, get all of the necessary devices and materials ready and available. Start up the CADIAX[®] compact 2 Software on your computer and connect the CADIAX[®] compact 2 to your computer.

The functions display on the front of the CADIAX[®] compact 2 will light up green, if the device is ready for operation. The status line on the CADIAX[®] compact 2 Software shows you whether a CADIAX[®] compact 2 device is connected to the computer. If either of these is not the case, you will find information for error correction in chapter 8, page 61, under “Troubleshooting”.



Do not operate the CADIAX[®] compact 2 over a USB hub. Sufficient power for trouble-free operation of the device is only guaranteed through a direct connection to a computer interface.



Use exclusively only the USB cables, provided in the delivery package. Do not use longer or unshielded USB cables. In these cases, the safe operation of CADIAX[®] compact 2 would not be guaranteed.

Next, enter the patient data. There are input fields available, above the coordinates system, for given name, family name, date of birth, and gender.



If the registration software is started from GAMMA Dental Software (CADIAX[®] Analysis program), the historical data will be displayed automatically. It is not possible to change data here.

4.2 Fixing the clutch onto the lower jaw teeth

There are two different kinds of clutches available for attaching the lower face bow to the lower jaw. These are the occlusal-covering tray clutch (see paragraph 4.2.1), and the para-occlusal clutch (see paragraph 4.2.2).

4.2.1 Fixing the occlusal tray clutch onto the lower jaw teeth:

 If you are using a para-occlusal clutch, you can skip this step, and begin reading paragraph 4.2.2, "Fixing the para-occlusal clutch to the lower jaw teeth" (page 25).

When mounting the occlusal tray clutch, proceed as follows:

Before use, the clutch should be properly disinfected and/or sterilized, respectively, according to hygienic instructions.

 Check whether the clamp on the lower face bow can be pushed up easily. If not, do not continue to use this clutch.

Select an appropriate clutch for the patient. There are two sizes available (small / large).

 Examine the periodontal status of the lower jaw dentition. In case of a poor periodontal situation, either refrain from using the clutch, or (the attending dentist's responsibility), take suitable precautionary measures (e.g., blocking out). Areas of the dentition, undercut to the occlusal plane, should always be blocked out with appropriate material (e.g., soft wax), even with patients having a healthy periodontal status.
If you fix the clutch to a provisionally cemented denture, the possibility arises, among others, that the denture can become loose, due to mechanical influences. In such cases, you must determine whether provisional cementing is appropriate or not.

 Use exclusively a silicone adhesive (bite registration material), with a Shore-hardness of maximum A 60. Follow the manufacturer's instructions!

 Before introducing the silicone material, the clutch is inlaid with 3 thin rolls of soft wax (diameter 3-4 mm). The rolls are attached at diagonals to the arch, one in the front, and two in the back. These provide natural breaking points, which will make removing the clutch much easier.

Fill the clutch to maximum 2/3 full, with the silicone material.

Place the filled clutch onto the lower jaw teeth. Set the shaft in a median-sagittal position. The patient draws back the lower jaw, and closes, thus automatically positioning the shaft, so that the smallest possible locked bite is achieved.



- !** Before mounting the lower jaw writing bow, the silicone must be completely set, with the patient's mouth slightly open. Follow the manufacturer's instructions! As a control, we recommend that you check the material separately (extra-orally). Make sure that no interferences occur in the back areas, caused by material being squeezed out. If there are any such interferences, these should be removed.

4.2.2 Fixing the para-occlusal clutch onto the lower jaw teeth

- i** If you are using the occlusal-covering tray clutch, you can skip this paragraph, and begin reading paragraph 4.3, "Mounting the anatomical upper facebow" (page 27).

Using a para-occlusal clutch allows you to analyze the effects of occlusion on the TMJ position, and hinge axis movement. Condylar Position Measurements (CPM) can be carried out directly in the patient's mouth, so you no longer need to measure CPM on mounted casts. The para-occlusal clutch is located outside of the occlusion, so it doesn't touch the upper jaw teeth, neither in intercuspation, nor in function.

- !** Check whether the clutch shaft fits in the lower facebow clamp, and if it can be moved freely.

Place the clutch in the patient's mouth, and bend the wings until they lie on the lower tooth arch. Allow 1 mm of space between the teeth and the clutch, for the plastic.

Place a wax plate between the upper and lower teeth, and have the patient bite down. The wax plate prevents the plastic from flowing onto the upper teeth, and eliminates the tiresome job of having to polish the clutch's plastic surface.

Use the 3-phase system, ESPE Protemp, as plastic material, with excess material on the catalyzer, to shorten the setting phase.

Coat the surface of the clutch, which should be facing the labial and buccal teeth, with a 2

mm thick layer of plastic. Wait until the material begins to set.



Place the clutch in the patient's mouth and instruct the patient to close, without allowing the upper teeth to touch the clutch (check this).

Wait until the material has set, then remove the clutch from the patient's mouth.



Remove any excess interferences of the plastic material, with a sharp knife or a cutter. Use as little plastic as possible. Too much plastic can often cause pain in the gums.

Check to see whether the clutch fits properly in the mouth.



Occlusion paper marks the contacts between the clutch and upper jaw teeth, which must be removed.



If the plastic has not completely set, you can lay the clutch aside, and begin mounting the upper facebow.



Examine the periodontal status of the lower jaw dentition. In case of a poor periodontal situation, either refrain from using the clutch, or (the attending dentist's responsibility), take suitable precautionary measures (e.g.: blocking out). Areas of the dentition undercut to the occlusal plane, should always be blocked out with appropriate material (e.g., soft wax), even with patients having a healthy periodontal status.

If you fix the clutch to a provisionally cemented denture, the possibility arises, in some circumstances, that the denture can become loose, due to mechanical influences. In such cases, you must determine whether provisional cementing is appropriate or not.

Moisten each tooth impression in the clutch plastic with a thin layer of medical glue, appropriate for this purpose. A gel consistency is preferable to a liquid consistency..



Do not fix the para-occlusal clutch onto painful or loose teeth.

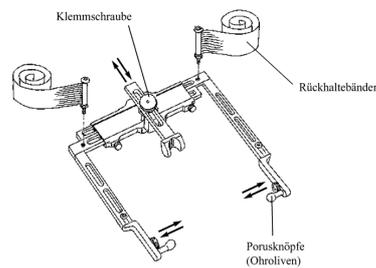
Place the clutch on the lower teeth, from gingival towards occlusal. The teeth should not be dried immediately before applying the glue.

Instruct the patient to take the maximum intercuspation position. As soon as the glue begins to absorb moisture, it hardens quickly. Press the clutch firmly onto the teeth for 30 seconds.

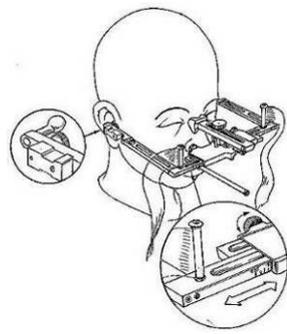
After the registration, the clutch can be removed easily. The teeth need only a light cleaning (scaling). The same plastic-coated clutch can be re-used for the same patient (glue residue need not necessarily be removed).

4.3 Mounting the anatomical upper facebow

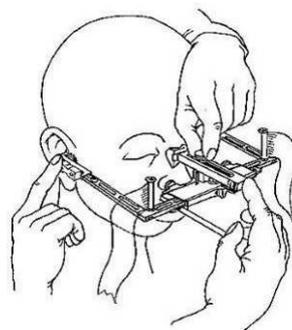
Pull back the glabella support. The retaining straps are fixed to the facebow. The bite fork base is not on the bow.



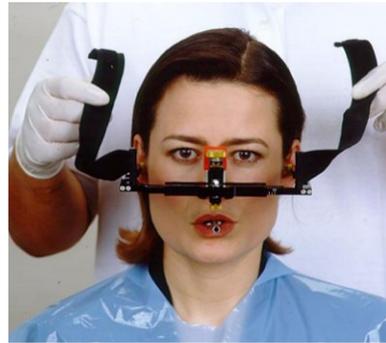
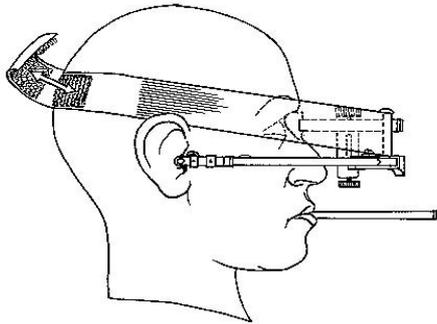
The porus knobs of the anatomical facebow are placed into both ear canals. The patient can actively help here. The bow width is fixed on the front crossbar, with the aid of the clamp screws.



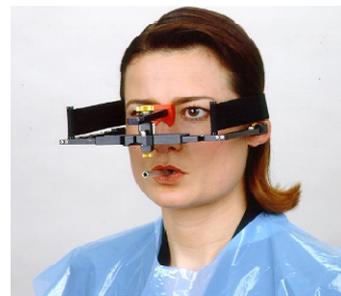
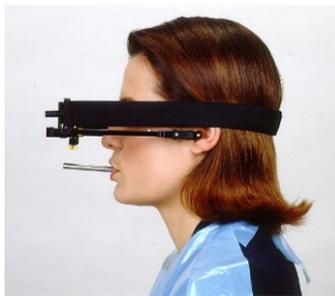
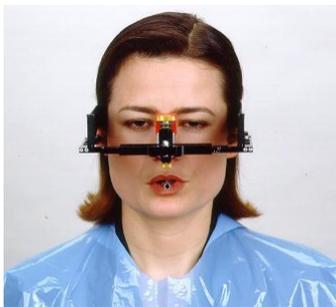
As the facebow is carefully closed, the porus knobs are guided into the ear canals. The comfortable, painless position is then fixed with the clamp screws. With moderate pressure, the glabella support is carefully pushed against the bridge of the nose, then lightly clamped.



The retaining straps are stretched on both sides, then closed behind the head and fastened with the Velcro fastener. The porus knobs should now tend to face dorsal to the ear canal, so that during excursive movements, the lateral condyle is not hindered. The facebow is checked, to see that it is attached comfortably and problem-free. If necessary, adjust the retaining straps and/or the glabella support. Eliminate rolls of skin under the glabella support, by pulling the forehead skin tight, then screwing in the support.



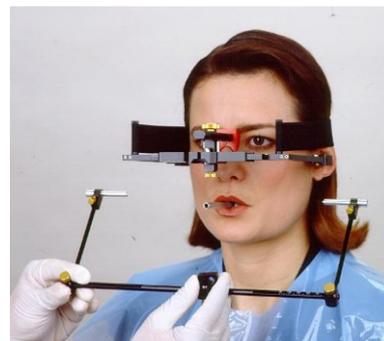
A completely mounted upper facebow



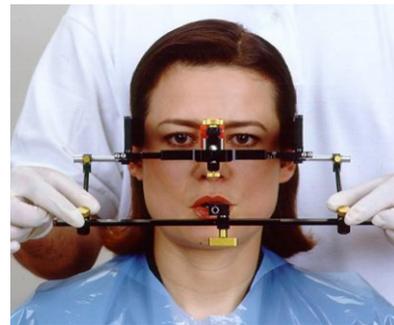
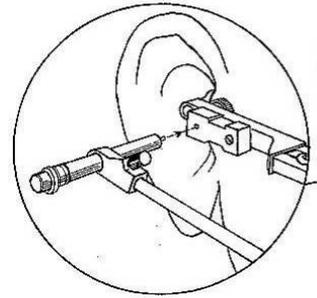
4.4 Mounting the writing bow and adjusting the writing tips to the anatomical axis

The upper facebow is mounted without electronic flags.
The two axis locators are slipped into the bores of the left and right styli and clamped firmly.

The side arms of the lower face bow are pushed completely outwards, then attached lightly.
The patient holds the lower jaw closed, in centric (retral) position.
The double clamp is pushed onto the clutch.



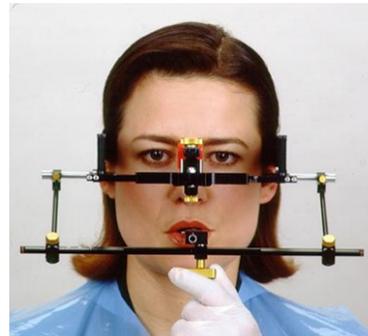
The side arms are moved, so that the tips of the guide units slide into the bores on the upper facebow, which mark the anatomical axis point. This fixes the positions of the styli on the anatomical axis, and also guarantees a correct distance to the flag. The patient (or an aide) lightly presses the guides inwards, on both sides..



The writing bow is now adjusted so that it is parallel to the bow. Both fixing clamps of the side arms (right and left) are now carefully clamped firmly.



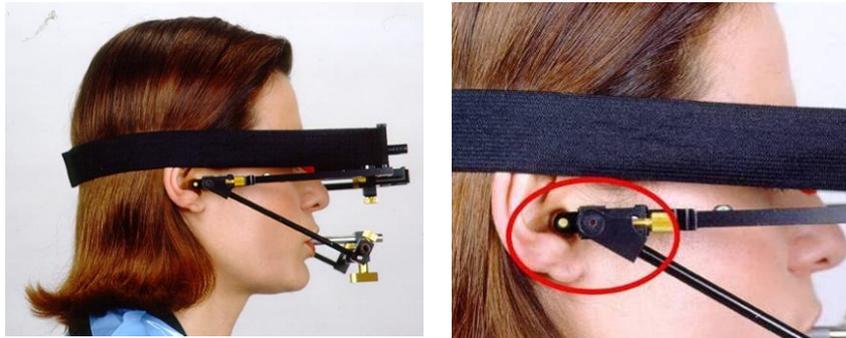
The double clamp is pulled on carefully. **It is important, that the double clamp is pulled on at the end, and not before clamping the two side arms!**



The axis locator pins for setting the anatomical axis are now removed. Make sure here, that the positions of the side arms don't change.



The mounted lower facebow, set at the anatomical hinge axis point.



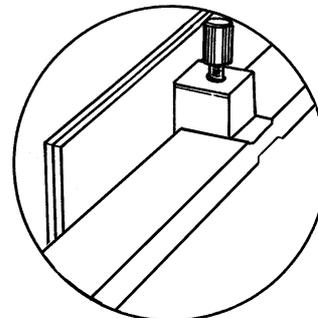
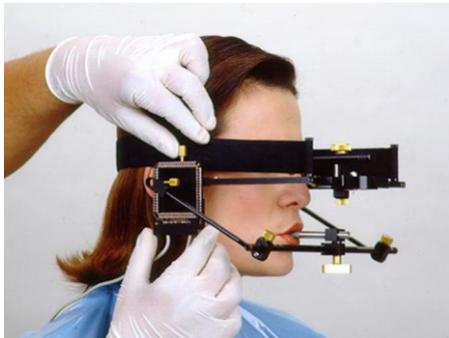
If there is a change in position, this means that the system is not mounted tension-free, or that one of the clamps is not fixed properly. The mounting procedure for the lower facebow must then be repeated. An improperly mounted lower facebow can lead to false registrations!

4.5 Attaching the measuring flags and styli

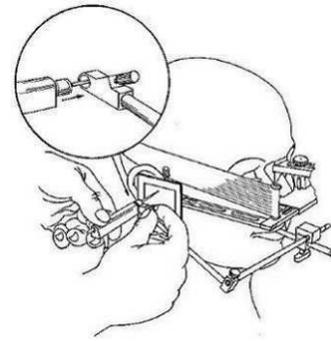
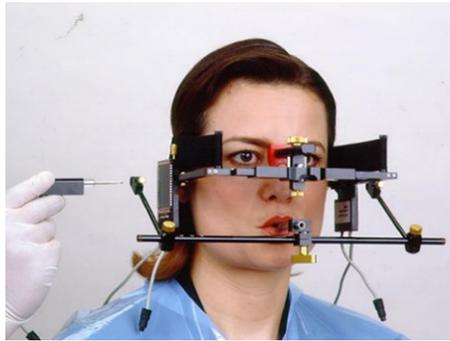
The measuring flags are placed behind the side arms of the lower face bow and screwed firmly onto the facebow.



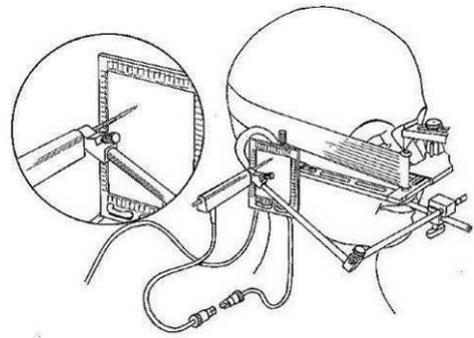
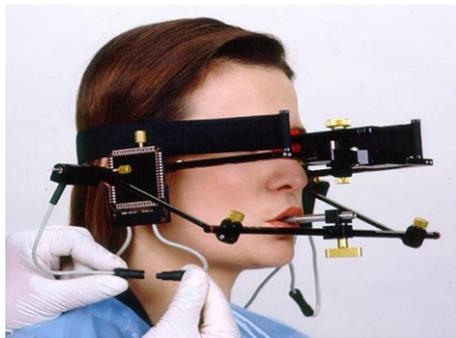
Make sure not to soil or scratch the black surfaces of the flags. Also make sure that the recording mode is not switched on, while the flags and styli are being attached.



The measuring styli are fixed into the bores of the lower face bow. They are pushed in to their hilts. The cable of the stylus should hang down after it is fixed in the bore.



If the system is mounted properly, with the lower jaw in centric position, the stylus tip should be located in the area of the upper back quarter of the flag, approximately 7 mm distant from the upper and back edges of the black measuring surface on the flag. The short connecting cable is plugged into the free plug from the flag.



The circuit between stylus and flag should remain closed, even when the system is dismantled after use, and the individual parts are stored in their packages. Improperly breaking the circuit could lead to faults or disturbances in the system, e.g., broken cables.

The flag cable is plugged into the CADIAX[®] compact 2. The flag mounted on the patient's right side, is plugged into the plug designated *right*, the left flag into the plug labelled *left*.

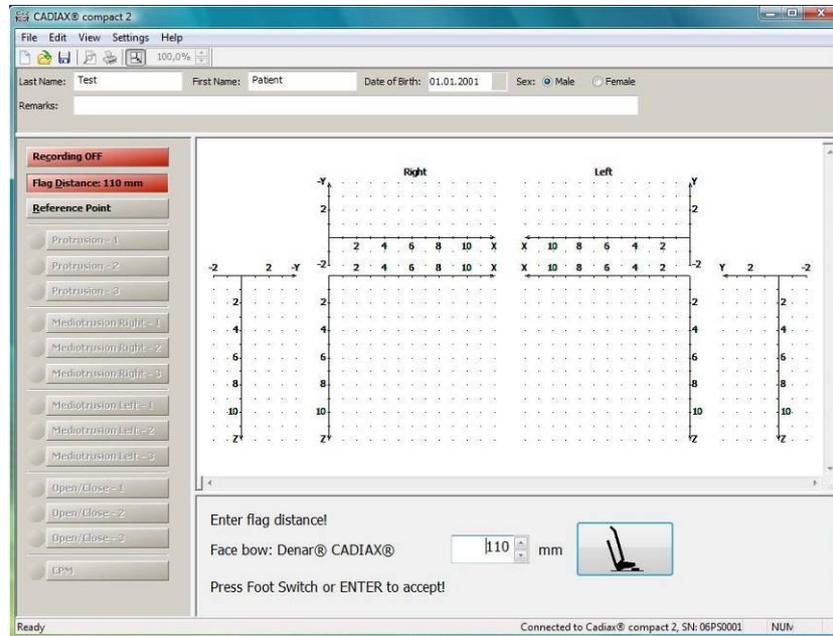


4.6 Recording joint track curves

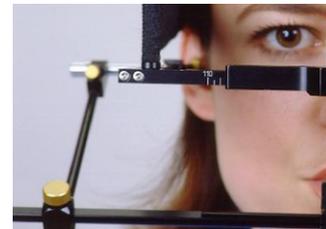
Click on the *Recording* button. It changes color to red. The fields underneath also turn red.



Only switch on the CADIAX® compact 2 recording mode, after the measuring flags and measuring styli are completely mounted. Do not touch the flags or styli during the entire registration procedure. This also applies to the patients.

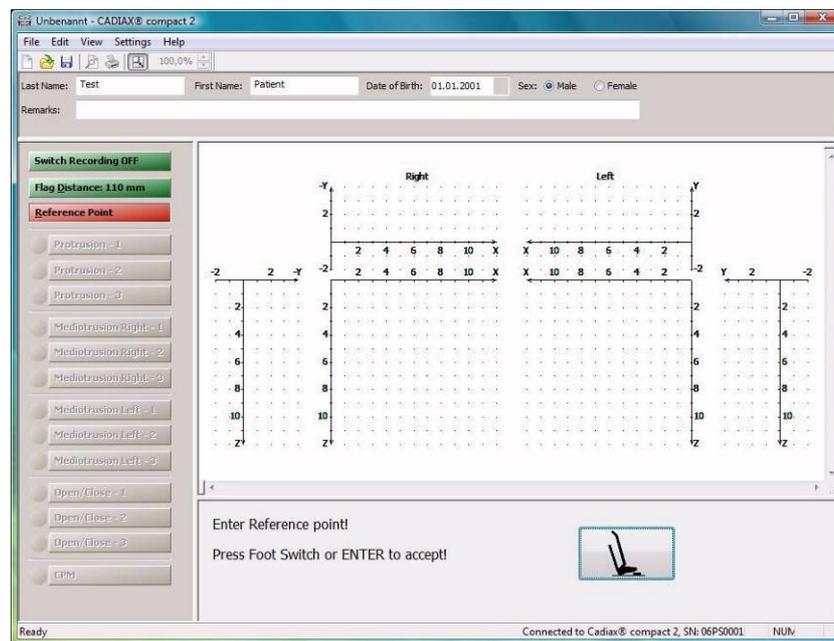


An input screen appears automatically, for definition of the flag distance (geometric input). Read the appropriate values from the front facebow scale in millimeters, and make any necessary changes in the value on the screen.



This value should be input as exactly as possible, so that after the registration, when the conversion to the condylar distance of the articulator is carried out, it will also be as exact as possible. Also make sure to input the data for right facebow type.

By pressing the *Enter* key, or activating the foot switch, the set value is accepted and the program skips automatically to the function, "Reference Point".

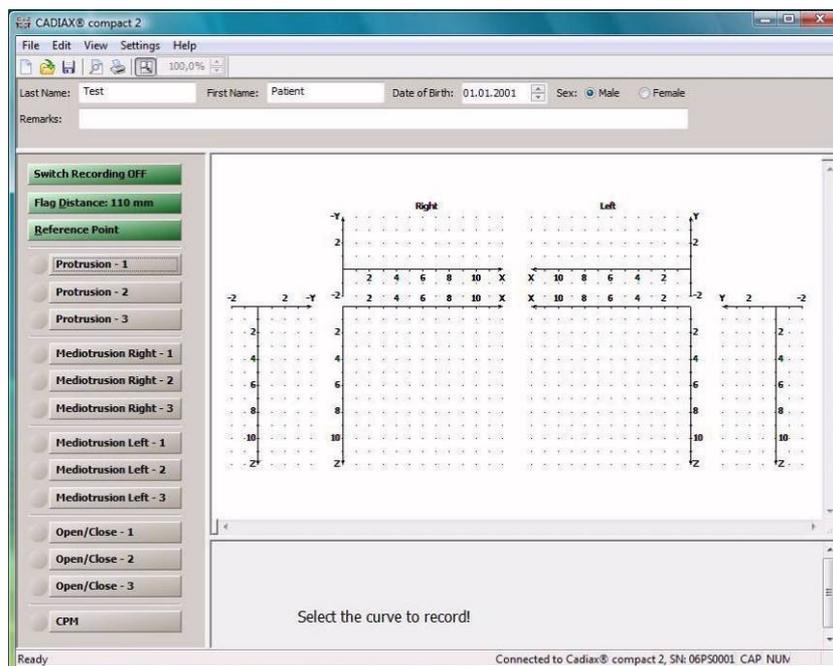


Guide the patient's lower jaw into the reference position (joint centric) and acknowledge this position by pressing the *Enter* key, or by pressing the foot switch. A signal tone acknowledges the input and the field turns green on the screen.

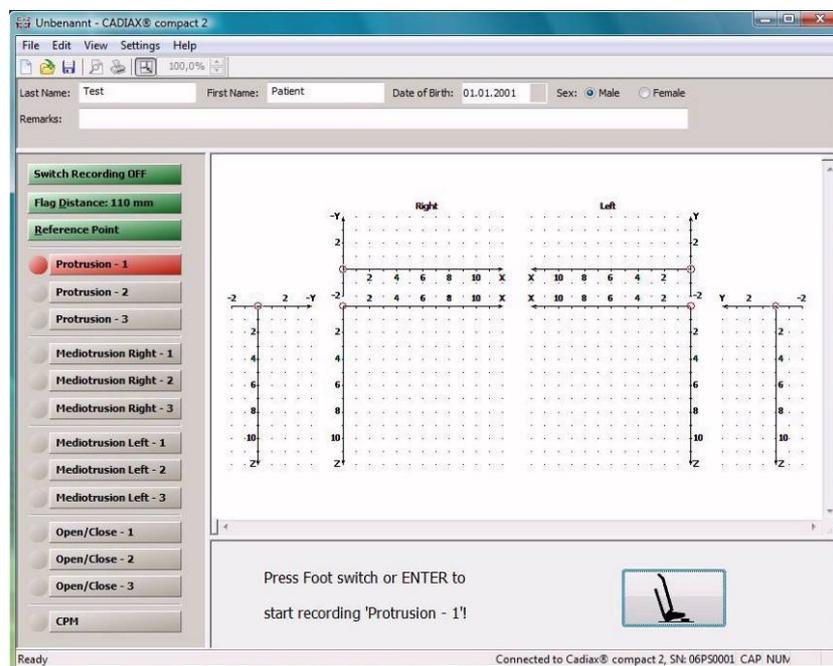


The chin-guiding technique shown here can be replaced by any other user-specific technique for achieving the centric position.

After successfully determining the reference position, you will be directed to select the curves, which you want to record next. Click on one of the twelve curve buttons, or the CPM button (if you want to carry out a condylar position measurement).



The curve selected for registration appears on the screen in red background. Press the *Enter*-key or the foot switch to start recording the lower jaw movement.

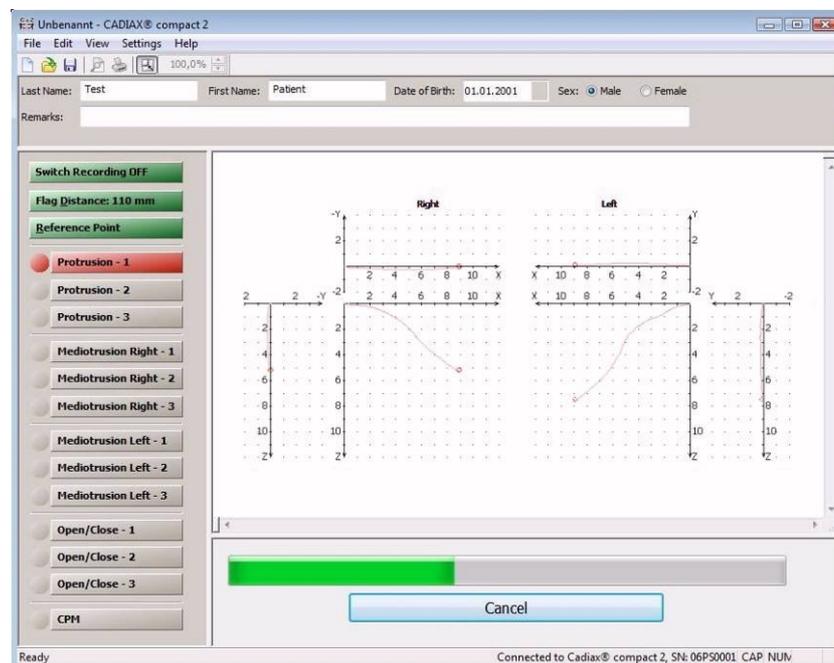
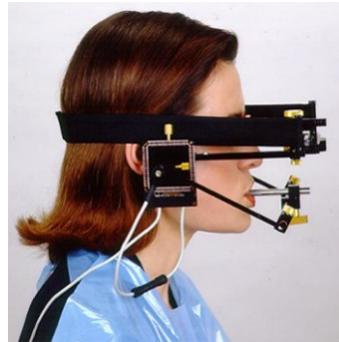
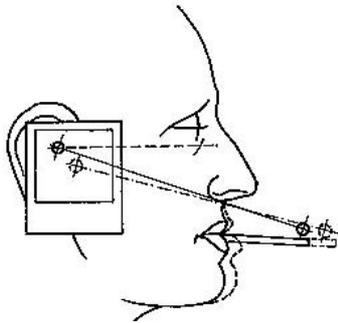


The patient carries out the desired movement, e.g., *Protrusion*. The CADIAX® compact 2 registers the movements for 4.5 seconds. A signal tone marks the beginning of the registration.



If there is no signal tone, the acoustic signals in the CADIAX® compact 2 Recorder Software must be set, or the sound system of your computer must be reconfigured (see also para-

graph 6.4.4, page 51).

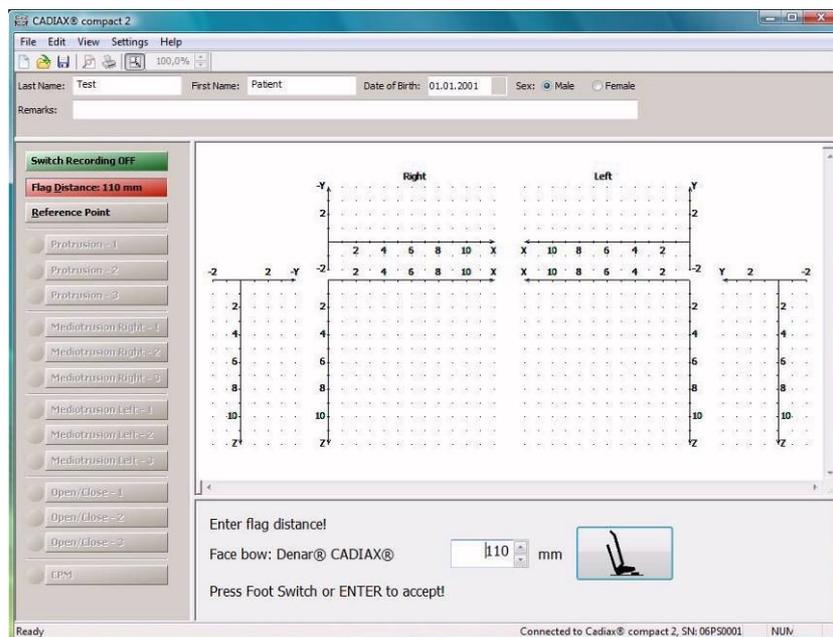


The remaining time is displayed with a progress bar. The end of the recording is marked by a second signal tone. As soon as the registration is completed, the curve is displayed on the screen.



The recorded curve must first be checked for its quality. Here, the start position of the curve should be examined, relative to the reference point (0 in the coordinate system), and the quality of the curve, in the sense of cleanness of the curve line. Registrations with apparent distortions should not be accepted; the flags and/or styli should be cleaned. Don't let faulty recordings deter you (even after having cleaned the sensors); discontinue the registration and contact an authorized Gamma Service department.

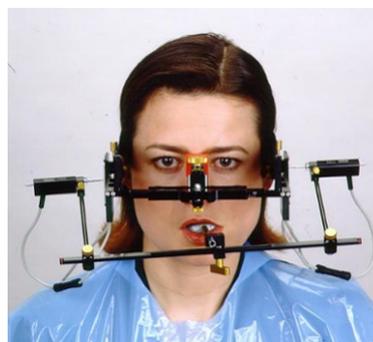
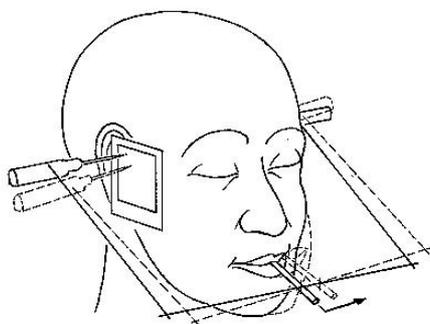
A curve registration contrary to the expected form needs to be analyzed and verified by further registration. If necessary, the curve must be recorded again.



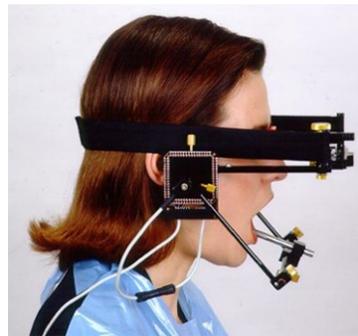
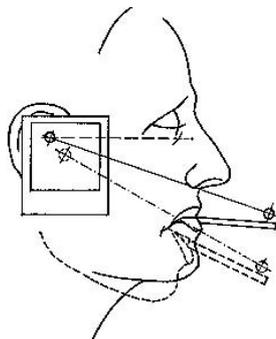
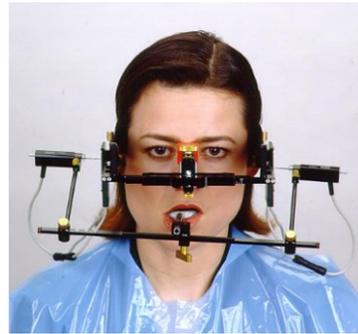
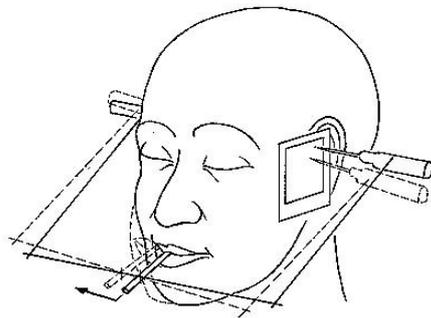
If you press the *Enter* key or activate the foot switch, the next curve will be selected for registration.



You can configure the examination process individually, i.e., you can determine the number and order of the movements to be recorded, individually (see paragraph 6.4.3).



Please note that the designation mediotrusion right and mediotrusion left, always refer to the condyle which is making the mediotrusive movement at that particular time. This means that mediotrusion right is a mandibular movement (chin) to the left side and a mediotrusion left is a mandibular movement (chin) to the right side.



4.7 Registration of CPM

The difference in the joint between the reference position (RP or RCP) and another, arbitrary joint position (e.g., max. intercuspation) is measured 3-dimensionally.

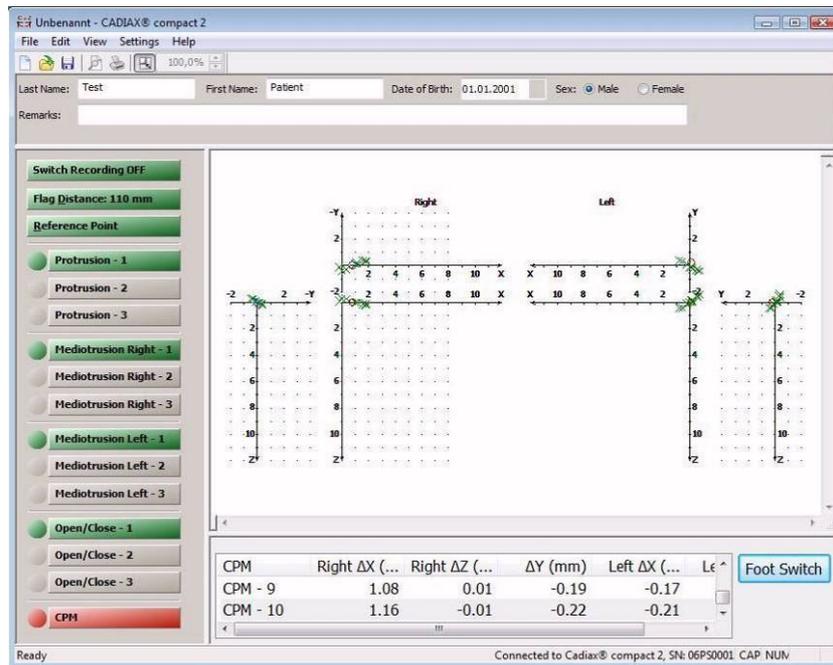
As reference position (RP), the last position determined as reference position by the "Reference Position" function is retrieved.

10 registrations of CPMs are available to the user. These consist of 10 possible repetitions, from which an average (avg.) is taken as the measurement. We recommend also, that you re-determine the reference point before beginning a CPM.



These measurements of a position, in relation to the occlusion (e.g., ICP), only make sense, if the registration clutch is fixed to the lower jaw teeth in the **para-occlusal** method.

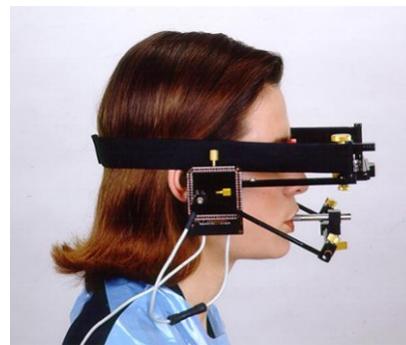
After registration of the last joint track curve, the software can be switched to record mode of the electronic CPM (**C**ondylar **P**osition **M**easurement), with CADIAX® *compact 2*. Initiate this by clicking on the CPM button.



For the CPM measurement, the patient is guided to the position to be measured (in ICP, the patient bites the teeth together). Then shortly press the foot switch.



→



RP

→

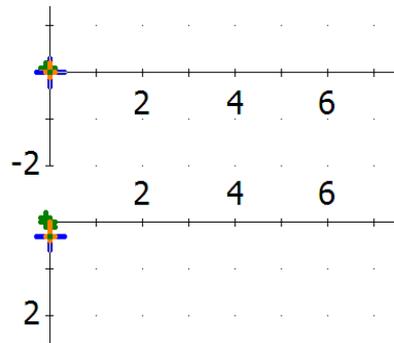
ICP

The device acknowledges the position with a signal tone. The recorded coordinate values will be entered into the appropriate free space in the list and the average will be calculated and entered in the Avg. section.

This point registration can be repeated up to 10 times.

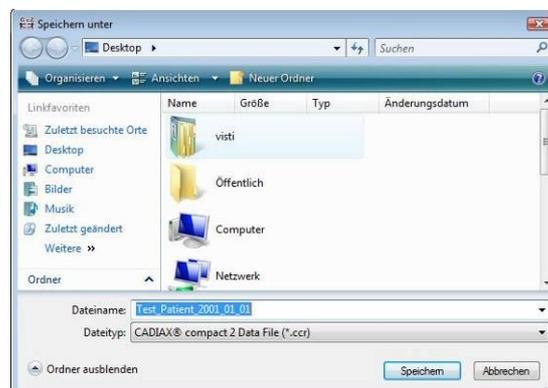
CPM	Right Δx (mm)	Right Δz (mm)	Δy (mm)	Left Δx (mm)	Left Δz (mm)
Average	1.57	-0.27	-0.62	1.58	0.28
CPM - 1	1.57	-0.26	-0.62	1.59	0.28
CPM - 2	1.57	-0.27	-0.61	1.58	0.28
CPM - 3	1.57	-0.27	-0.62	1.58	0.29
CPM - 4	1.57	-0.27	-0.61	1.58	0.28
CPM - 5	1.57	-0.27	-0.62	1.58	0.27
CPM - 6	1.56	-0.26	-0.62	1.59	0.28
CPM - 7	1.56	-0.28	-0.62	1.59	0.28
CPM - 8	1.57	-0.27	-0.62	1.58	0.28
CPM - 9	1.56	-0.26	-0.62	1.59	0.28

The entered values are distance values, in mm, of the individual position, measured from the reference point. The values are relative to given spatial coordinates. Simultaneously, the CPM point will be marked in the graphics with blue crosshairs.



4.8 Ending registration/saving data

To end the registration, press the *Record* button again. The field returns to green and the screen shows the coordinate system without data display. Next, save the recorded data. CADIAX[®] compact 2 saves the data of every patient. The file name can be chosen arbitrarily. The program suggests a file name automatically, consisting of family name, given name, and the patient's date of birth.



Now, the measuring flags and the styli are removed from the facebow. Then, the facebow is removed from the clutch, and the clutch is then removed.



Always switch off the recording mode, before you remove the flags and styli.



Carefully move the shaft of the clutch up and down, to loosen it. When removing the clutch, make sure that it does not strike the upper jaw teeth. If necessary, the upper jaw teeth may need to be shielded (e.g., with a wax plate).

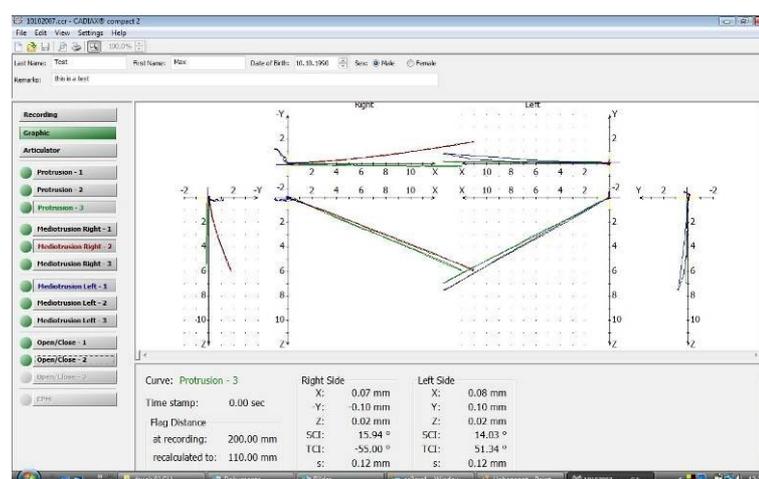
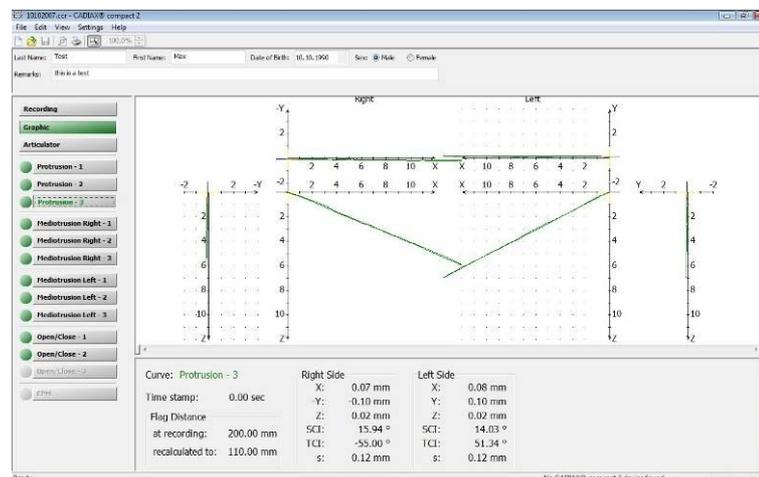
5 Data evaluation

After the registration, the compiled data must be evaluated. For this purpose, the recorded curves are, on the one hand, displayed in different views on the screen. The curves can be measured in detail. An overlay display is possible, for comparison of different curves. On the other hand, value settings for various articulators can also be calculated from these recorded joint tracks.

5.1 Retrieval and analysis of recordings

When the registration process is ended, the data can be analyzed immediately. Data that has already been saved can be loaded again in the CADIAX® *compact 2* Software.

To display the curves in a graphic, the *Graphics* function must be switched on (displayed with green background on the screen). The curves are displayed in the axis-orbital reference coordinate system.



Click on the buttons for the various curves (Protrusion, Mediotrusion right, Mediotrusion left, Open/Close), and they are displayed. Click on the button again, and the curve is blended out. To be able to distinguish the individual curves, they are displayed in different colors. The color of the curve

corresponds to the color of the labeling in its corresponding field. The green point on the left, next to the curve buttons, shows whether data is saved there or not. If a field contains no curve data, the button is disabled.

With the computer's mouse, you can click on any arbitrary curve. The values of this curve position will be shown in the lower half of the values window,:

- x, y, z: Spatial coordinates of the selected position
- SCI: Sagittal condylar track inclination
- TCI: Transversal condylar track inclination
- s: Length of the condylar track, from the point of origin to the selected position

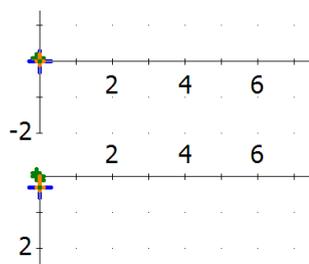
The output is given separately for the right and left sides.

5.2 Retrieval and analysis of the CPM

To load the Condylar Position Measurement (CPM), click on the corresponding button. A table appears in the lower part of the screen, with the CPM measurement values.

CPM	Right Δx (mm)	Right Δz (mm)	Δy (mm)	Left Δx (mm)	Left Δz (mm)
Average	1.57	-0.27	-0.62	1.58	0.28
CPM - 1	1.57	-0.26	-0.62	1.59	0.28
CPM - 2	1.57	-0.27	-0.61	1.58	0.28
CPM - 3	1.57	-0.27	-0.62	1.58	0.29
CPM - 4	1.57	-0.27	-0.61	1.58	0.28
CPM - 5	1.57	-0.27	-0.62	1.58	0.27
CPM - 6	1.56	-0.26	-0.62	1.59	0.28
CPM - 7	1.56	-0.28	-0.62	1.59	0.28
CPM - 8	1.57	-0.27	-0.62	1.58	0.28
CPM - 9	1.56	-0.26	-0.62	1.59	0.28

The given values are distance values, in mm, each according to its position, measured from the reference point. The values are relative to the given spatial coordinates.



Simultaneously, the CPM point is marked with blue crosshairs.

5.3 Value settings for the articulator

Semi- or fully- adjustable articulators allow the user to fit the device, with its simulation of eccentric movement, to the actual movements of the lower jaw. For this purpose, we are able to set given guidance tracks on the articulator in the two spatial planes (sagittal, transversal), which determine the movements, in their angularity to the reference plane, and/or select from various forms. We are refer-

ring here to sagittal condylar inclination and characteristics (SCI, formerly HCI), and transversal condylar inclination and characteristics (TCI, or Bennett).

The curvatures of these inserts are modelled after the naturally occurring tracks, in order to achieve as exact a match as possible with the actual track. In order to be able to select a ruler with a corresponding angle setting, the curve must be converted to the actual intercondylar distance of the articulator.

Press the *Articulator* button, and CADIAX® *compact 2* switches to the articulator programming function mode. The *Articulator* field is now displayed in green.

In the basic setup, all recorded protrusion- and mediotrusion curves are loaded for calculating the articulator settings. Therefore, as in the picture shown above, all of the entries in this field have a green background. If several curves are registered, the articulator calculations will be made, based on an average value of the selected curves. Just click on the curve button to select or deselect a curve.

CADIAX® Curves						
	Protrusion		Mediotrusion right		Mediotrusion left	
	SCI right	SCI left	S C I	T C I	S C I	T C I
1st	20,3°	16,1°	20,2°	4,2°	16,1°	17,0°
2nd	20,0°	16,8°	19,3°	2,2°	18,1°	11,9°
3rd	19,7°	17,8°	19,3°	1,7°	17,4°	9,3°
4th	19,8°	18,1°	19,1°	1,5°	17,2°	8,1°
5th	19,6°	17,5°	18,9°	1,2°	17,3°	7,4°
6th	19,4°	18,0°	18,8°	1,2°	17,6°	6,8°
8th	19,6°	17,9°	19,0°	1,6°	17,9°	6,3°
10th	19,5°	18,2°	19,0°	1,6°	17,9°	6,2°
14th						
	Retrusion					
-1.	17,4°r	19,9°r				
-2.	18,8°r	18,5°r				

The first table shows the raw data for protrusion, retrusion, and mediotrusion right/left. The information here is for documentation purposes, the values may **NOT** be used in programming the articulator.

Articulator settings tables:

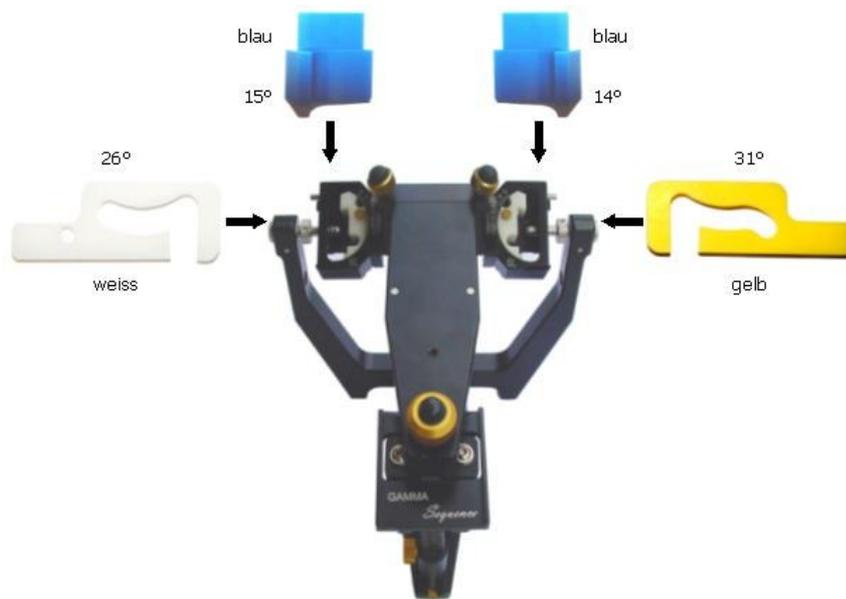
Sagittal Condylar Guidance Reference® SL						
Inlay	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
Straight	●20°	●20°	●20°	●17°	●18°	●18°
Convex	14°	16°	22°	11°	14°	20°
Retrusiv	Blue	Blue	Blue	Blue	Blue	Blue

Transverse Condylar Guidance Reference® SL						
	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
WHITE	●2°	●1°	●1°	●11°	●9°	●6°
YELLOW	0°	0°	0°	0°	0°	0°
RED	0°	0°	0°	0°	0°	0°
BLUE	0°	0°	0°	0°	0°	0°

The CADIAX® *compact 2* program searches for the best-fitting curve form, with corresponding angularity. Various distances are taken into consideration. If the articulator selected has various guidance inserts available, with distinguishable characteristics, then an optimal insert will be calculated for each curve. The insert which corresponds most closely to the actual registration will be displayed in bold print and marked with a point.

- **SCI:** Indicates the table for the sagittal condylar track guidance
- **TCI:** Indicates the table for the transversal condylar track guidance
- **Insert:** Describes the curve characteristics which are most similar to the individual patient's registration.
- **Angle:** Indicates the rotation of this insert to the reference plane (setting according to the scale on the articulator)
- **3 mm, 5 mm, 10 mm:** Indicates up to which number of millimeters the selected condylography curve for the calculation has been used.

As an alternative to the tabular display of the articulator value settings, a graphic display is also possible.



The graph display of articulator value settings is not available for all articulators.

5.4 Data printout

The CADIAX® compact 2 Software allows the user to printout a standard sheet, containing all of the patient-relevant data from the condylography. Printing is done with your Windows® printer.

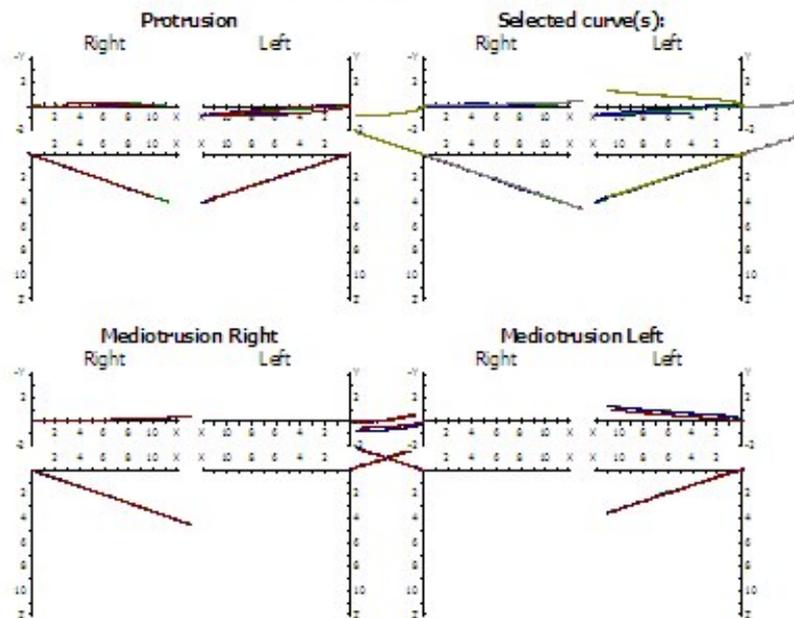
The printout shows the registered curves in graphic form, and the setting values for a selected articulator.

CADTAX® compact 2 Recorder

Gamma
CF

Patient: DEMO, Dr. Test
 Date of birth: Monday, 19. February 2007
 Sex: male
 Remarks: This is an example for OC2 recording, done with an articulator ...
 Articulator: Reference® SL

Protrusion	Protrusion - 1	19.02.2007	111,0	110,0
	Protrusion - 2	19.02.2007	111,0	110,0
	Protrusion - 3	19.02.2007	111,0	110,0
Mediotrusion Left	Mediotrusion Left - 1	19.02.2007	111,0	110,0
	Mediotrusion Left - 2	19.02.2007	111,0	110,0
	Mediotrusion Left - 3	19.02.2007	111,0	110,0
Mediotrusion Right	Mediotrusion Right - 1	19.02.2007	111,0	110,0
	Mediotrusion Right - 2	19.02.2007	111,0	110,0
	Mediotrusion Right - 3	19.02.2007	111,0	110,0
Selected curve(s):	Protrusion - 1	19.02.2007	111,0	110,0
	Protrusion - 2	19.02.2007	111,0	110,0
	Mediotrusion Right - 1	19.02.2007	111,0	110,0
	Mediotrusion Right - 2	19.02.2007	111,0	110,0
	Mediotrusion Left - 1	19.02.2007	111,0	110,0



Sagittal Condylar Guidance Reference® SL

Inlay	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
Straight	•20°	•20°	•20°	•17°	•18°	•18°
Convex	14°	16°	22°	11°	14°	20°
Retrusiv	Blue	Blue	Blue	Blue	Blue	Blue

Transverse Condylar Guidance Reference® SL

	Right			Left		
	3rd mm	5th mm	10th mm	3rd mm	5th mm	10th mm
WHITE	•2°	•1°	•1°	•11°	•9°	•6°
YELLOW	0°	0°	0°	0°	0°	0°
RED	0°	0°	0°	0°	0°	0°
BLUE	0°	0°	0°	0°	0°	0°

CADTAX® compact Sheet

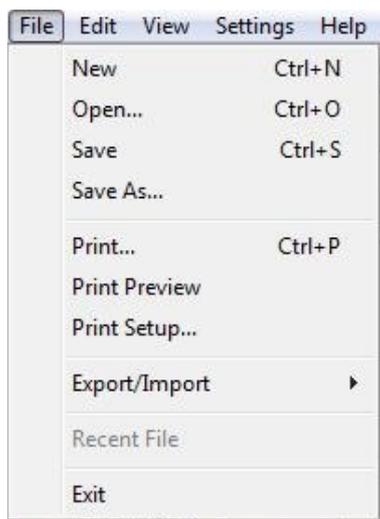
Gamma Dental Software® for Windows 6.0.0.0 - License IDS_Only_AMF
 © 2007 GAMMA med. wiss. Fortbildungs-GmbH Date of printing Thursday, 29. March 2007

Page 1

6 Individual settings

6.1 The *File* menu

In the *File* menu, you will find all of the functions necessary for processing the data recorded with the CADIAX[®] *compact 2* System.



New prepares for the next registration. If a previous recording has not been saved, the program will inform you, so that no patient data will be lost.

Open loads an existing file with CADIAX[®] *compact 2* data, enabling you to modify and/or evaluate the registrations.

Save secures the CADIAX[®] *compact 2* registrations to the computer's hard disk. If the data to be saved does not have a name, you will be directed to supply one.

Save as secures the data under a new file name.

Print prints out the selected data.

View presents a preview of the printout, i.e., how the data will appear in the printout.

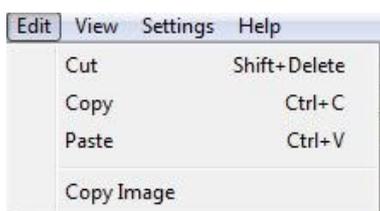
Printer allows you to select and configure the printer to be used for the printout.

Export/Import enables the import and/or export of data in the SCII and XML formats.

In the next section of the *File* menu, you will see a list of the most recently processed files. Click on any one of these, to load it into the program.

Exit ends the program

6.2 The *Edit* menu



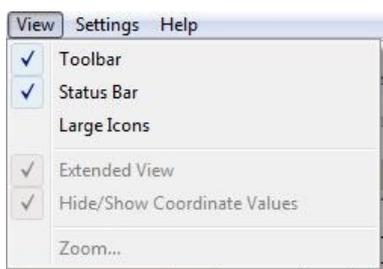
Cut removes the marked entries and stores the information in the Windows Clipboard for possible use in other programs. This function is only available for the patient data in the header.

Copy places the marked entries on the Windows Clipboard, for possible use with other programs. This function is only available for the patient data in the header.

Insert takes the information from the Windows Clipboard and insert it into the marked location. This function is only available for the patient data in the header.

View Copy makes the current view of the condylography curves on the Windows Clipboard available to the other programs as a graphic.

6.3 The *View* menu



Icon bar fades in and fades out the icons.

Status bar fades in and fades out the status bar.

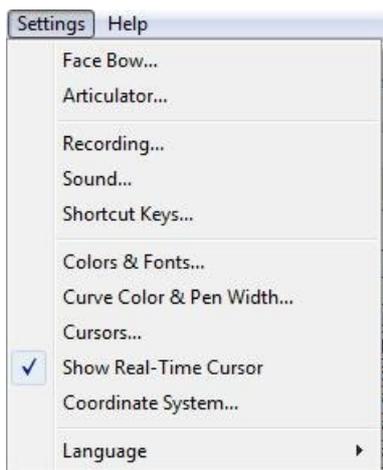
Large Symbols displays large or small icons.

Expanded Display also displays the vertical plane (y/z), in addition to the sagittal plane (x/z) and the transversal plane (x/y).

Coordinate values fades in or fades out the inscriptions on the coordinate system.

Zoom settings determines the display size of the coordinate system.

6.4 The *Settings* menu



Facebow allows you to set the facebow to be used (see paragraph 6.4.1, page 49)

Articulator allows for the setting of the articulator to be used (see paragraph 6.4.1, page 49)

Record enables the individual adaptation of the examination procedure (see paragraph 6.4.3, page 50)

Sound allows you to set individual acoustic signals. (see paragraph 6.4.4, page 50)

Assign Function Key enables the individual assignment of program functions to particular keys (see paragraph 6.4.5, page 51)

Colors & Fonts allows for the individual setting of fonts, font size, and color, for an optimal adaptation of the CADIAX[®] compact 2 Program (see paragraph 6.4.6, page 51)

Color & Line Depth of the curves enables individual setting of

the line depth and color of the condylography curves, for optimal adaptation of the CADIAX[®] *compact 2* Program (see paragraph 6.4.7, page 51)

Cursor allows for the individual setting of form, color, and size of the various cursors used in the program, for optimal adaptation of the CADIAX[®] *compact 2* Program (see paragraph 6.4.8, page 52)

Show Cursor for Real-time Display shows the current stylus position (cursor) during the registration, or fades it out.

Coordinate system allows you to change the inscriptions on the coordinate axes (see paragraph 6.4.9, page 52)

Language activates a different language for the program. The program will then have to be re-started.

6.4.1 Facebow

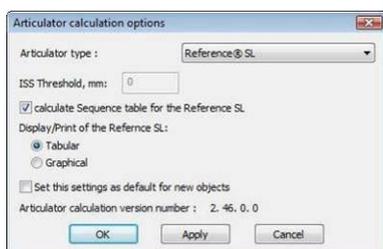


Here you can choose the facebow to use for the registration.



Different facebows have varying scales for input of facebow width. If a false facebow is entered, the given facebow width will not be converted correctly in the flag distance. This leads to a distorted display of the recorded condylar tracks and, in certain circumstances, to falsification of the value settings for the articulator.

6.4.2 Articulator



Here you can select the articulator, which you use in your practice. The recorded condylography curves will be converted to value settings for the chosen articulator, so that the articulator can reproduce the recorded movement as closely as mechanically possible.

Now you need to input the ISS Threshold, if the chosen articulator also allows for setting the immediate sideshift (ISS). For more information regarding the ISS Threshold, see paragraph 7.3, page 60.

The articulator value settings can be presented in either tabular or graphic form (see paragraph 5.3, page 42).

The options selected here will be saved with the data from the condylography curves. If you also want to use these settings for further registrations, mark the option: *Save these settings as default for new objects*, before closing the window.

6.4.3 Recording

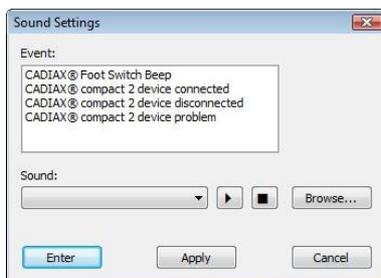


Here, you have the possibility to individually determine the examination procedure. If the option, *Select next recording automatically*, is marked, all of the movements marked in the accompanying list will be loaded. Otherwise, you would need to select each movement to be recorded manually.

Mark the items in the list, which should be recorded in the automatic examination procedure. You can change the order of the movements to be recorded by using the two arrow keys.

If a reference point needs to be newly determined, before a registration, press the *New reference point before recording* button. The corresponding item will be marked with a »« symbol..

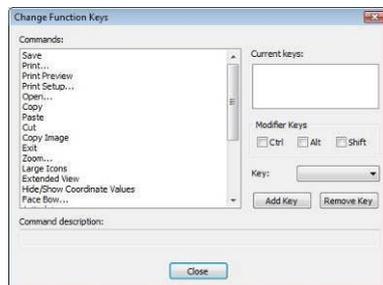
6.4.4 Sound



CADIAX[®] compact 2 uses your computer's sound system for acoustic signals. Here, you have the possibility of determining the individual tone signals for the various events in the CADIAX[®] compact 2 Recorder Software. Mark the appropriate event, then select any sound file you like, which should be played when the event takes place. The sound file must be available in WAV format.

Please also check the settings on your computer's sound system.

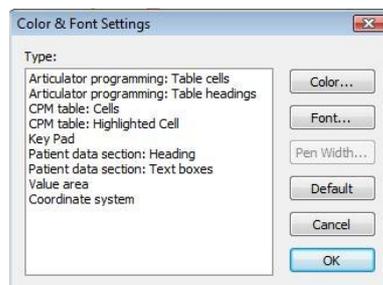
6.4.5 Function keys



Here, you have the possibility of individually assigning the program functions to keys.

Mark the program function, and select the desired key or key combination, which should carry out the particular function. Multiple key assignment is also possible.

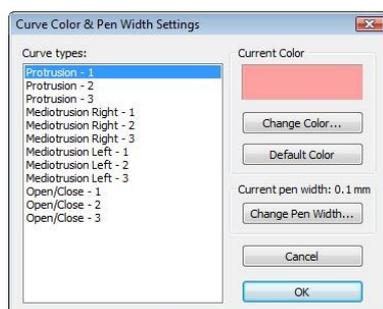
6.4.6 Colors & Fonts



Here, you can individually modify the graphics user interface of your CADIAX[®] compact 2 Recorder Software

From the list, select the section of the program interface which you want to modify. Now, you can individually modify the color-coding, font size and color of this section.

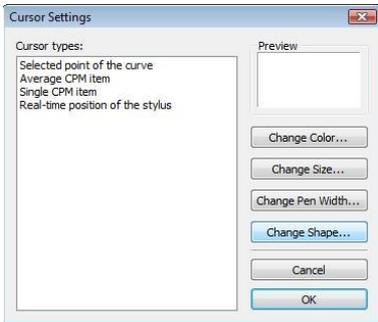
6.4.7 Color & line depth of the curves



Here, you can adapt the displays of the condylography curves, individually.

Select a curve, and assign the color and depth of line.

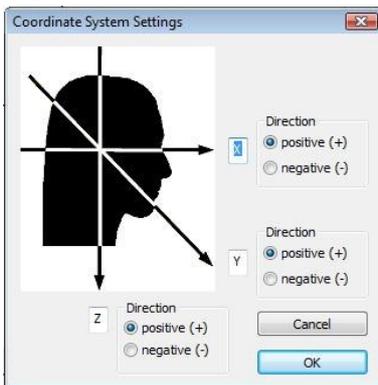
6.4.8 Cursor



Here, you can individually adapt the size, color, and the appearance of the cursor.

Select a cursor type, and assign its color, size, form and depth of line.

6.4.9 Coordinate system



Since the names of the coordinate axes are not administered uniformly, you have the possibility here, of adapting the names of the axes, as well as the positive number direction to correspond to your own nomenclature.

6.5 The *Help* menu



Info supplies you with information regarding the installed version of CADIAX[®] compact 2 Recorder Software

7 Additional information

The CADIAX[®] *compact 2* System is an arbitrary registration system, i.e., it is based on an anatomic facebow. By using an anatomic facebow, it is predetermined, that the system measures exclusively movements from an averaged hinge axis, dependent upon the patient's ear canal. A measuring method near the joint is carried out.

The advantage of an arbitrary measurement lies in the ease of setting the measuring styli onto a predetermined anatomic hinge axis point. The mechanical system defines the hinge axis point exactly, relative to the ear canal, and is easily adjustable.

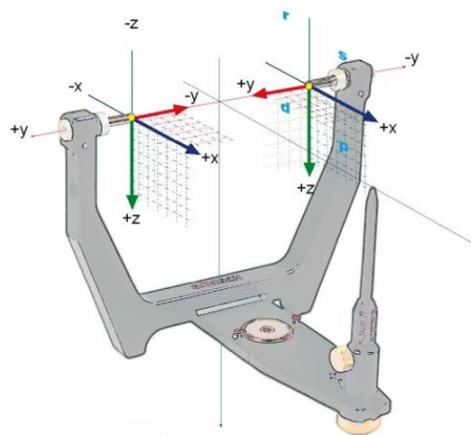
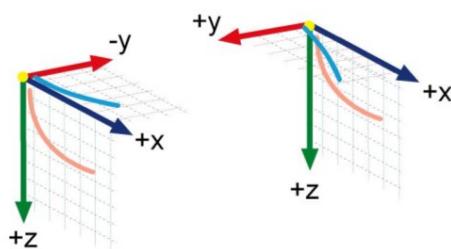
The compromise of arbitrary measurement is also valid; in the TMJ movements relevant for articulator programming (protrusion and mediotrusion), normally a very slight rotational movement occurs, which distorts the curve characteristic.

In the same vein, for further definition of the hinge axis orbital plane, an average anterior reference point ("orbital point") is selected, relative to the glabella support.

7.1 The Reference Coordinate system

For the registration of reproducible TMJ movements, a reference coordinate system was introduced, which makes it possible to carry out a standardized conversion in the articulator. This coordinate system is designated the "hinge axis-orbital coordinate system".

The origin of the coordinate system lies in the middle, between the condyles, at a point where the hinge axis, at the zero position (centric), intersects with the median-sagittal plane. From this coordinate origin, the positive x-axis goes forwards, the positive z-axis goes downwards, and the positive y-axis goes to the right (from the patient's viewpoint).

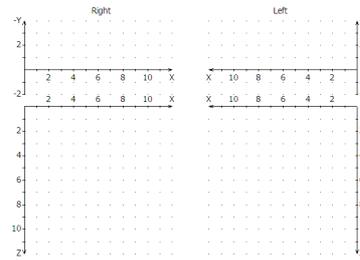


The graphic display above left, depicts the Bennett movement, or transversal movement of the right condyle (in the graphic, the x-axis is oriented horizontally, the y-axis, vertically)- The graphic display underneath, shows the sagittal plane, subdivided into points, one millimeter apart, whereby the x-axis is oriented horizontally, and the z-axis, vertically.

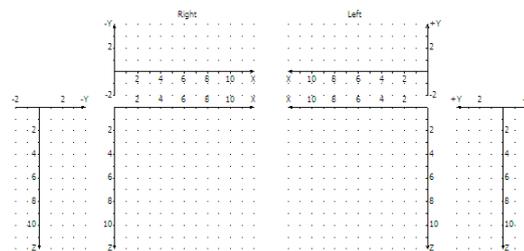
The graphic display in the upper right section depicts the Bennett movement, or transversal movement of the left condyle (on the screen, the x-axis is oriented horizontally, the y-axis vertically). The graphic underneath shows the sagittal plane, whereby, in the graphic, the x-axis is oriented horizontally, the z-axis vertically.

The origin of all graphic displays is the Reference position, which is determined through the corresponding *Reference point* function. The curves are not always congruent with the origin of the coordinate system.

The above sections of both Bennett coordinate systems are oriented to medial (positive Bennett movement, according to the former standard), and describe the transversal shift of the hinge axis. The sagittal coordinate systems are oriented to the front, and point to the middle of the of the graphic.



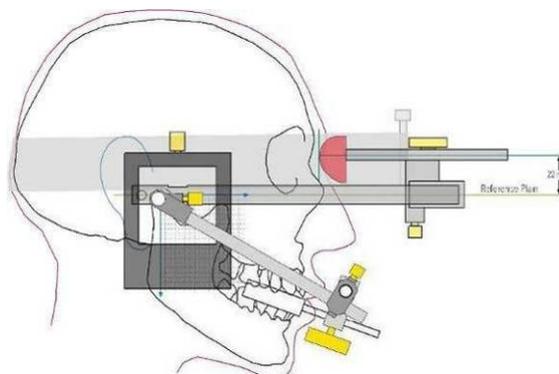
Coordinate system with sagittal and transversal view



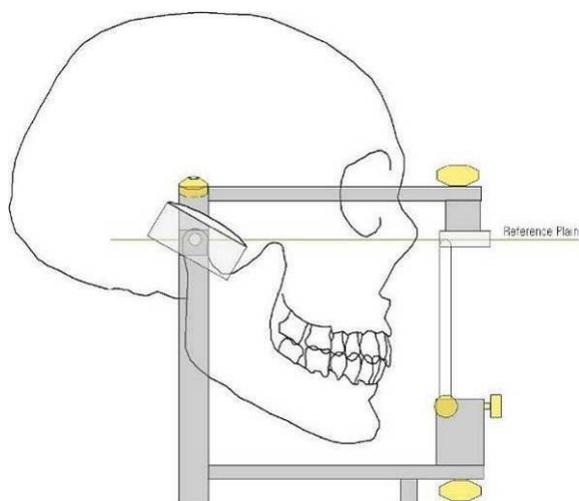
Extended coordinate system with sagittal, transversal and frontal view

7.2 Mounting the articulator

All of the calculations of the CADIAX® compact 2 System are given in a reference coordinate system. This coordinate system is defined by the (statistical) right and left hinge axis points, and a third, anterior reference point. These 3 points describe a reference plane, the hinge axis-orbital plane.

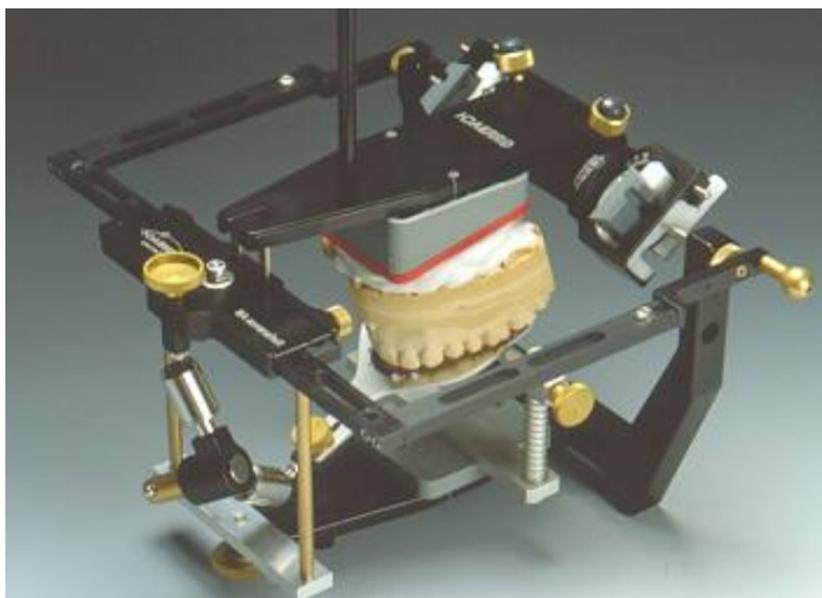


The anterior reference point of the hinge axis-orbital plane is established by a fixed, predetermined distance of 22 mm of the nasion-support, to an imaginary middle line of the side arms of the facebow. If this reference plane is transferred in the articulator, the diagram would look like this:



Now, if the upper jaw model is transferred to the articulator, with the same facebow, the calculated values will match the actual settings of the condylar housing of the articulator.

Facebow transfer of the upper jaw is optional.



If you are using a different facebow for transfer, make sure that the facebow is set to the same reference points. Only then can you be sure that the calculated values from CADIAX® compact 2 will match with the transferred model situation in the articulator.

Model transfer with an exact transfer bow

Basically, the transfer can be made in the following way:

The reference points of the GAMMA bow (right and left hinge axis points, plus the anterior reference point) are marked on the patient. Then, using the facebow from the articulator system, the transfer of the upper jaw is carried out, relative to these marks on the patient's skin.

Marking the anterior reference point is only done on one side (patient's left side), at the side of the bridge of the nose, or under the eye. Measure a distance of 22 mm from the deepest depression of the nasion and mark it. Transferral of the hinge axis point is best carried out after the registration, using the writing bow, which is still set up, whereby, the the anatomic bow is dismantled and the skin marked with a pen (axis pin), through the bore (stylus holders).

Model transfer with the anatomic transfer bow:

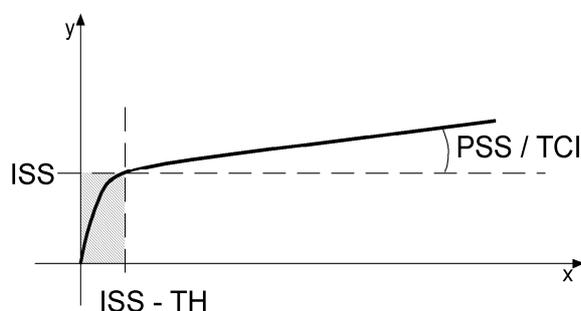
The anatomic transfer bows from various manufacturers differ somewhat, both in their measurements, as well as in their methods of use in mounting models. The limitations and characteristics of their construction necessitate using different methods of transferring the reference plane, but also different locations of the reference plane, relative to the nasion point. If we assume, that the statistically accepted hinge axis points hold the same position, or that the difference lies within a tolerably small range, then we arrive at the following tables of mounting and/or conversion recommendations, respectively, for using the various anatomic facebows:

Articulator	Anatomic Bow	TCI	SCI
Artex®	Direct mounting in the Artex® Articulator, Reference facebow upgrade with axis pins	Calculations are set directly	Calculations are set directly It
Denar®	Mounting with Denar® Slidematic facebow, adjustment of the bow on the anterior mark on the skin with the orbital pointer	Calculations are set directly	Calculations are set directly
Hanau®	Mounting with Hanau® Slidematic facebow, adjustment of the bow on the anterior mark on the skin and orbital pointer	Calculations are set directly	Calculations are set directly
Ivoclar®	Mounting using Ivoclar® UTS (Universal Transfer bow System), Reference plane determined by means of anterior mark on skin and orbital pointer	Calculations are set directly	Calculations are set directly
KaVo®	Direct mounting in KaVo® Articulator, Reference facebow upgrade with axis pins (Girrbach Art. Number 230491). required accessory: KaVo Extraneous bow reference	Calculations are set directly	Calculations are set directly Scale: Frankfurter Horizontal

Articulator	Anatomic Bow	TCI	SCI
Panadent®	Mounting using Panadent® facebow	Calculations are set directly	Calculations are set directly
Reference®	Direct mounting in the Artex® Articulator, Reference facebow upgrade with axis pins (Girrbach Art. Number 230491)	Calculations are set directly	Calculations are set directly
SAM®	Mounting with SAM® ATB facebow	Calculations are set directly	Subtract 2 degrees from the given SCI table values, the calculation of the fossa characteristic remains unchanged
WhipMix®	Mounting with WhipMix anatomic facebow	Calculations are set directly	Calculations are set directly

7.3 ISS Threshold

The **ISS Threshold** (ISS = Immediate Sideshift) divides the measured curve into two parts (see graphic). The initial part is necessary for calculating the ISS, the second section, for calculating the PSS (Progressive Sideshift) or TCI (Transversal Condylar track Inclination)



8 Troubleshooting

There are always two steps involved in correcting errors in the CADIAX® compact 2 System: first, determine what the problem is, then carry out the recommended solution to eliminate the error.

If errors occur, which are not covered in this chapter, you must contact an authorized GAMMA service outlet, to solve the problem.

The device functions, but the green LED on the front is unlit.

Possible cause	Solution
The device is not connected to the computer.	Connect the device with a USB terminal on your computer.
The USB interface of the computer is defective.	Have the computer checked; if necessary, use another computer.
The CADIAX® compact 2 is connected to the computer through a USB hub.	Connect the device directly with a USB terminal on your computer.

The CADIAX® Recorder Software can't respond to the device.

The message keeps appearing, that the registration cannot be continued, even though the device is connected.

Possible cause	Solution
The device is not connected to the computer.	Connect the device with a USB terminal on your computer.
CADIAX® compact 2 drive is not installed, or not installed properly.	Re-install the CADIAX® compact 2 drive.
	<p>Disconnect the CADIAX® compact 2 from the computer and plug it in again. Wait until the device is completely recognized, then press the <i>Record</i> button.</p> <p>If the device is still unresponsive, shut down the software, and disconnect it from the CADIAX® compact 2; then, plug it in again, re-start the software, and press the <i>Record</i> button.</p> <p>Finally, you can restart the CADIAX® compact 2; wait until the operating system is completely running up, then start the software, and press the <i>Record</i> button.</p>

When I mount the styli, their positions are outside the black measuring surface areas of the flags.

Possible cause	Solution
The patient's lower jaw was not in the reference position, when the writing bow was set at the statistical hinge axis point.	Repeat the procedure of setting up the writing bow, according to the directions. The patient should keep the lower jaw closed, in centric position (= reference position).

When I mount the styli, their positions are outside the black measuring surface areas of the flags.	
Possible cause	Solution
The fixing clamps of the writing bow are not firmly in place.	Make sure, that the bow's holding clamps are firmly in place, both on the shaft of the clutch, and on the side arms. Additional stress from the styli can cause a certain amount of shifting.
The writing bow was not adjusted properly, to be free of tension.	When mounting and setting the writing bow, make sure that there is no tension in the system. The bow must not be allowed to shift, especially when pulling out the adjustment bolts.

The system is mounted, but one of the function displays (right/left) indicates an error .	
Possible cause	Solution
The stylus is not connected.	Make sure that the short stylus cable is plugged into the appropriate flag connector.
The flag is not connected.	Check that the flag is plugged into the CADIAX® compact 2 device.
The stylus is not in the proper measuring field of the flags.	An error may have occurred during the mounting procedure, so that the stylus tip is not in the appropriate measuring field of the flag, i.e., the entire black measuring surface. Here, you must also pay attention to the working side (movement towards the back), during the mediotrusion movement.
The flag is soiled.	Due to the flag being soiled, no electrical contact is possible between the tip of the measuring stylus and the flag. Clean the flag, according to the directions for maintenance.
The stylus is defective.	Contact your local dealer, or contact GAMMA directly.
The flag is defective.	Contact your local dealer, or contact GAMMA directly.
The CADIAX® compact 2 device is defective.	Contact your local dealer, or contact GAMMA directly.

The recorded curves go "backwards", instead of to protrusive.	
Possible cause	Solution
The right and left measuring systems are reversed.	An error has been made, by connecting the right measuring system, to the left flag plug on the CADIAX® compact 2 device, and vice-versa. Correctly replace the plugs, and repeat the registration.

The recorded curves display strong artifacts.	
Possible cause	Solution
The flags are soiled.	Because the flags are soiled, there is no electrical contact between the stylus tip and the flag. Clean the flag, following the directions for maintenance.

The recorded curves display strong artifacts.	
Possible cause	Solution
The stylus is not in the measuring of the flags.	An error has occurred in mounting , so that the stylus tip is not in the permissible measuring range of the flag, i.e., the entire black surface. Here, it is important to observe the working side (movement towards the back), during mediotrusive movements.
"Sliding chair effect"	A so-called "sliding chair effect" can sometimes come about, by the stylus moving across the flat surface of the flag: the stylus hops up shortly from the flag surface, as the stylus "skips" across the flag. If a measurement happens to be read, during one of these "hops", this could result in artifacts showing up on the registration. The sliding chair effect is accompanied by a distinctive squeaking sound. To minimize the effect, you can apply a tiny amount of medical vaseline to the flag surface. After the registration, the flag must be cleaned again.
The stylus is defective.	Contact an authorized GAMMA service outlet, or GAMMA directly.
The flag is defective.	Contact an authorized GAMMA service outlet, or GAMMA directly.
The CADIAX [®] <i>compact 2</i> device is defective.	Contact an authorized GAMMA service outlet, or GAMMA directly.

The recorded curves do not begin in the coordinate origin.	
Possible cause	Solution
The reference point is displaced.	The reference point must be re-determined. Do this with the <i>Reference Point</i> button.

9 Specifications

9.1 Technical Data

Measuring resolution ADC:	14 Bit
Measurement data display:	0,01 mm
Deviation of linearity:	± 5%
Supply voltage:	5 V = (only through USB Bus from the PC)
Current input:	max. 0,5 A (in compliance with USB specifications)
Protection class:	B



9.2 Cleaning

9.2.1 CADIAX[®] compact 2 Device

Make sure that the device is turned off, and disconnect from the computer. The CADIAX[®] compact 2 electronics may not be connected.

Remove dust and dirt with a soft cloth.



Do not use liquid, and make sure that no liquid gets inside the device during cleaning. The device must never be cleaned under running water, or any other liquid. Do not use stiff brushes or steel wool.



Never clean the device with alcohol, organic solvents, or disinfectants, as these may cause damage to the components and the housing.

9.2.2 Measuring flags:

The flag surface must not be damaged (e.g., scratched) or soiled (oil, dust, fingerprints, etc.). Check the condition of the flag surface before every application.

The flag surface must be cleaned, from time to time, whereby the measuring surface should be wiped off with rubbing alcohol. The flag should then be patted dry, with a soft, lint-free cloth, and left out to dry completely. During cleaning, make sure that the sensitive surface of the flag is not damaged.



Never treat or clean the flags with stiff brushes or other "scratchy" material.

9.2.3 Measuring stylus:

The stylus may only be wiped off with a dry, lint-free cloth. The tips can be cleaned, when necessary, with rubbing alcohol.



Never handle or treat the sockets and the axes with oil, or any other lubricants.

9.3 Recurrent tests

Like all other electronic devices, CADIAX® compact 2 and its electronic components also go through the aging process. Therefore, the device must be tested at regular intervals, in regard to its measuring technology and its security technology. We recommend an interval of one year.

The security testing should be carried out in compliance with standards DIN VDE 0751-1 ("Recurrent tests and tests before placing in operation of medical electrical equipment or systems, Part 1: General Specifications"), standard ÖNORM/ÖVE E 8751-1 ("Recurrent tests and test after maintenance of medical electrical equipment, Part 1: General requirements"), or IEC 62353 ("Medical electrical equipment - Recurrent tests and test after repair of medical electrical equipment").

The recurrent tests measure any differences in potential between the touchable, conductive elements of the connector assembly. Any difference in potential which appears, indicates faulty security technology, which must be corrected. These measurements are carried out as supplementary to the required standard tests above.

Measurement technology testing will be carried out by GAMMA, or an authorized GAMMA service outlet.

The measuring flags are subjected to relatively high mechanical stresses, and undergo the results of normal wear and tear. They should be replaced after approximately 500 examinations.

9.4 Operating conditions

The device is designed for operation exclusively in dry areas.

- Temperature range: +15 bis + 35 degrees Celsius
- Relative humidity: maximum 85 %, non-condensing

In case of a drastic change in temperature, wait until the device has reached room temperature, before beginning operation.

9.5 Storage and Transport

If the device is to be transported over long distances, return the device, completely packed, to its original carton.riginalkarton.

For storage and transport, please comply with the following conditions:

- Temperature: -10°C - +60°C
- LHumidity:max. 85% - store in a dry place
- Pressure:0 hPa - 1060 hPa

9.6 Guidance and manufacturer's declaration Electromagnetic compatibility

9.6.1 Electromagnetic emission

The CADIAX® compact 2 is intended for use in the electromagnetic environment specified below. The customer or the user of the CADIAX® compact 2 should assure that it is used in such an environment.

Emission test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The CADIAX® compact 2 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The CADIAX® compact 2 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Not applicable	The CADIAX® compact 2 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

9.6.2 Electromagnetic immunity

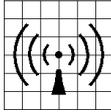
The CADIAX® compact 2 is intended for use in the electromagnetic environment specified below. The customer or the user of the CADIAX® compact 2 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % U_T (> 95 % dip in U_T) for ½ cycle 40 % U_T (60 % dip in U_T) for 5 cycles	Not applicable	Mains power quality should be that of a typical commercial or hospital environment. If the use of the CADIAX® compact 2 requires continued operation during power mains interrupts, it is recommended that the CADIAX® compact 2 be

	70 % U _T (30 % dip in U _T) for 25 cycles < 5 % U _T (> 95 % dip in U _T) for 5 s		powered from an uninterruptible power supply or a battery.
Power frequency (50 Hz/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE

U_T is the a.c. mains voltage prior to application of the test level.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the CADIAX [®] compact 2, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter: Recommended separation distance
Conducted RF IEC 61000-4-6	3 V _{eff} 150 kHz to 80 MHz	3 → V1 in V	$d = \left(\frac{3,5}{V1} \right) * \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 → E1 in V/m	$d = \left(\frac{3,5}{E1} \right) * \sqrt{P}$ 80 MHz to 800 MHz
			$d = \left(\frac{7}{E1} \right) * \sqrt{P}$ 800 MHz to 2,5 GHz
			Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). ^b Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- ^a Field strengths from fixed transmitters, such as base stations for radio (cellular /cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the CADIAX[®] compact 2 is used exceeds the applicable RF compliance level above, the CADIAX[®] compact 2 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocation the CADIAX[®] compact 2.
- ^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V1] V/m.

9.6.3 Recommended separation distances between portable and mobile RF communications equipment and the CADIAX[®] compact 2

The CADIAX[®] compact 2 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the CADIAX[®] compact 2 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the CADIAX[®] compact 2 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = \left(\frac{3,5}{V1}\right) * \sqrt{P}$	80 MHz to 800 MHz $d = \left(\frac{3,5}{E1}\right) * \sqrt{P}$	800 MHz to 2,5 GHz $d = \left(\frac{7}{E1}\right) * \sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,37	0,37	0,74
1	1,17	1,17	2,33
10	3,69	3,69	7,38
100	11,67	11,67	23,33

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

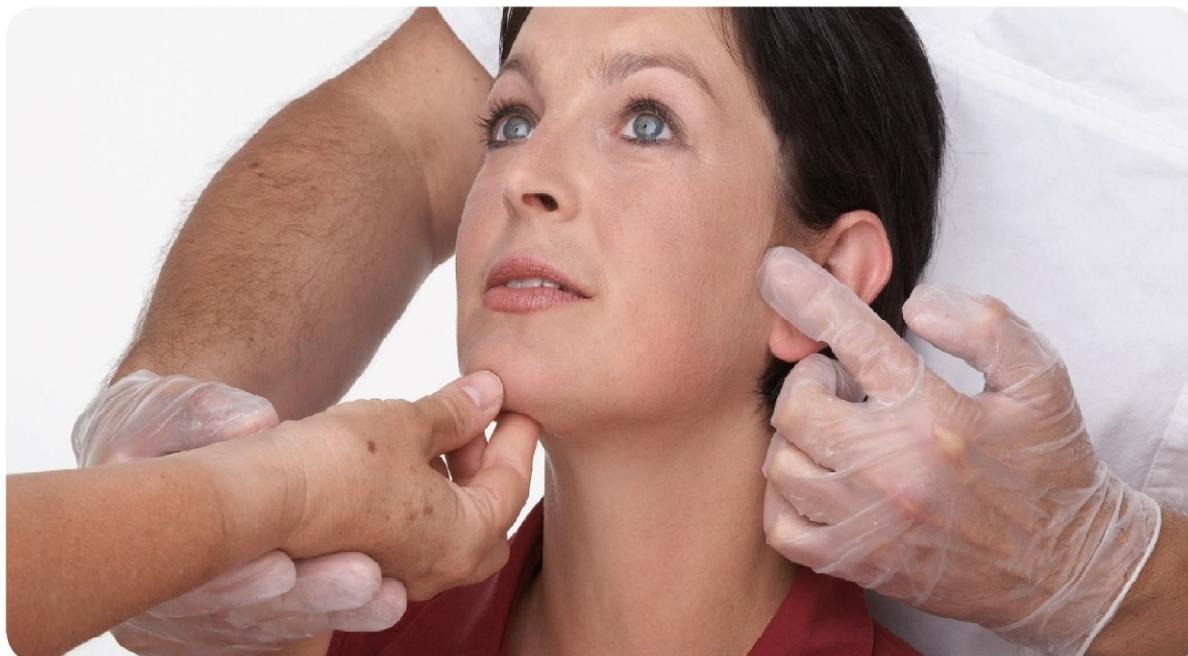
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

9.7 Disposal

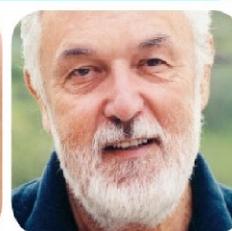
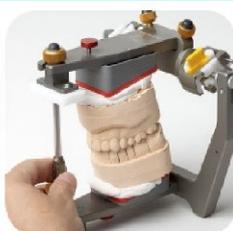


After their product life, the CADIAX[®] compact 2 appliance and its components should be disposed of correctly. You should comply with the regulations that are in effect in your country or city, regarding the disposal of electronic equipment.



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