Otto Bock

2.3. 1

TECHNICAL INFORMATION

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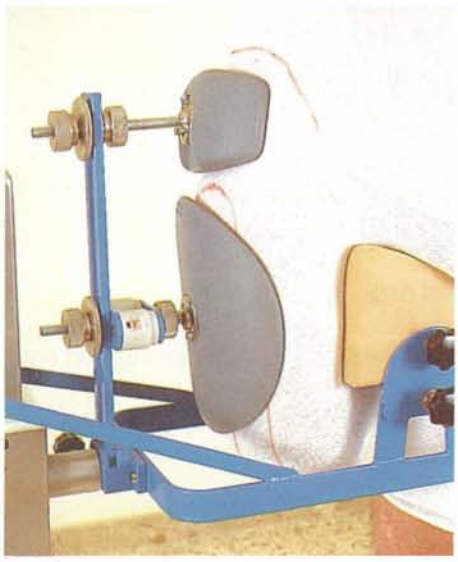
OTTO BOCK Modular Above-Knee Prosthesis

Attention !

The content of this technical information is partially not state of the art .
Materials and techniques may have changed or may be no longer available. The applicability has to be accessed under full responsibility by the technician.

Otto Bock Technical editorial department Duderstadt
2009-02-11



Plaster Technique using the SIT* Cast Casting Apparatus

*Supported Ischium Trochanter

Printed in Germany

646T2=3.1GB

1 Introduction

The wearing comfort and quality of a prosthesis are, to a large degree, determined by the fit of the individual socket. Particularly with an above knee amputation, a reduced capacity for weight bearing makes it necessary to fabricate according to special criteria. The interfacing element between the body of the amputee and the prosthesis must perform the following functions:

- correctly accommodate volume
- reliably attach the prosthesis to the residual limb
- ideally utilize weight bearing capacity and strength
- provide stable control of the prosthesis

Arterial, venous and lymphatic circulation may not be compromised. Likewise, non-physiological pressure points must be avoided.

Each area of the socket must correspond to the anatomy whereas the circumference is reduced, as required, for tissue compression.

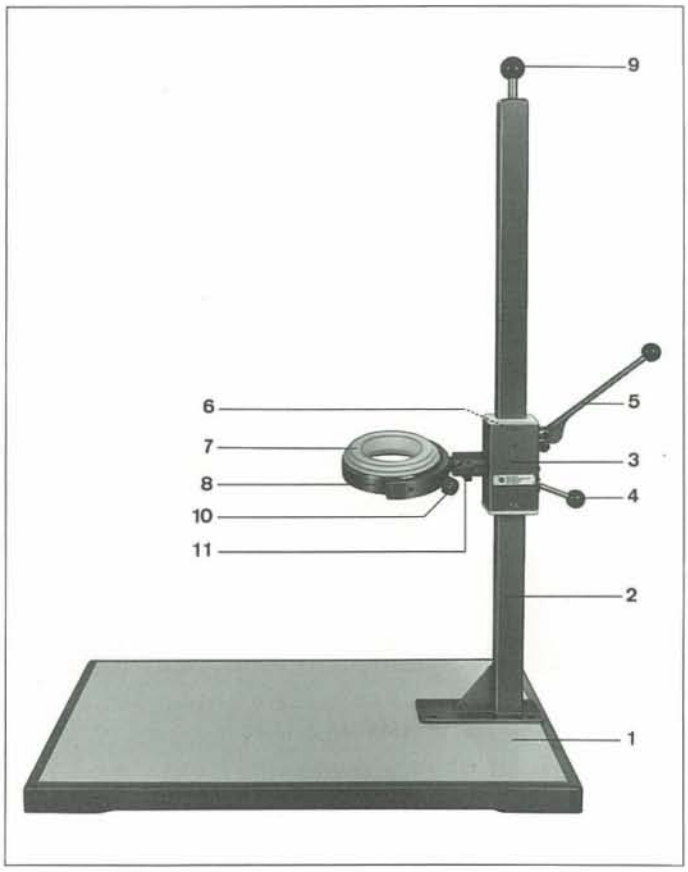
Once the residual limb has been examined, one may select either an **anatomical** or an **ischial containment** socket shape.

The **anatomical** socket supports the ischium whereas the ischial containment socket contains the ischium. The cross section of the ischial containment socket is relatively wide anterior to posterior and is relatively narrow medial to lateral. The total soft tissue is accommodated by the hydrostatic transfer of load; the anterior neurovascular bundle is relieved. The posterior-medial portion of the ischial ramus (Ramus ossis ischii) is surrounded and the ischial tuberosity is cushioned. Other characteristics are the bony lock between the medial area of the ischial ramus and the sub-trochanteric region. The physiological adduction angle of the femur in the socket is significant.

The best known of this socket type is the CAT-CAM (Contoured Adducted Trochanteric Controlled Alignment Method.) The socket is fabricated as a total contact socket. The foundation for this is a technique which allows precise transfer of the residual limb dimensions – something which formerly required a great deal of experience.

Use of the SIT Cast Casting Apparatus allows systematic casting of an above-knee residual limb without neglecting the individual criteria. When utilized together with the 743A11 OTTO BOCK Casting Apparatus, a plaster negative may be produced during weight bearing. Flexible forms and adjustable pessure pads on the open frame construction of the SIT Cast apparatus facilitate the functional shaping of the plaster negative.

A description of the procedure up to trial fitting of the shaped plaster negative follows.

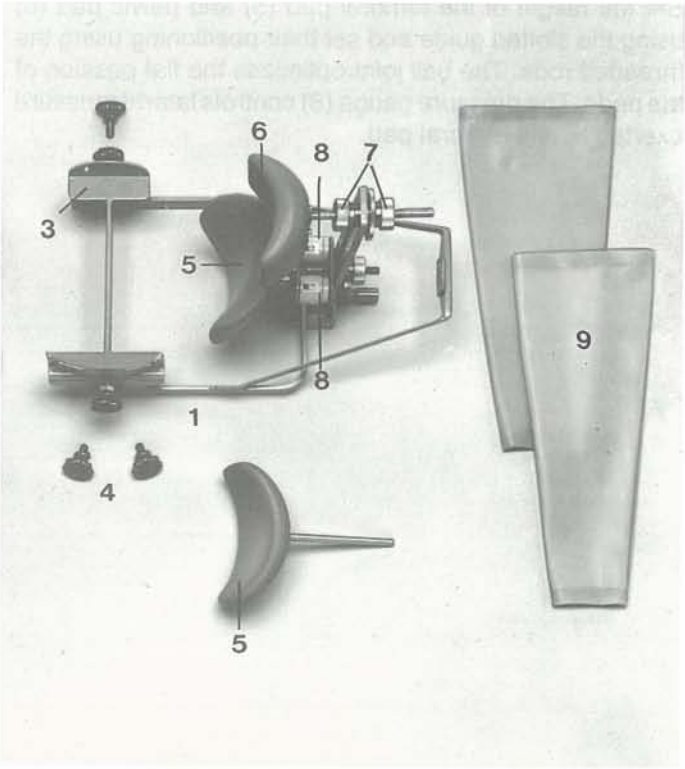


2 Tools, Aids and Materials

2.1 The 743A11 Casting Apparatus consists of the following:

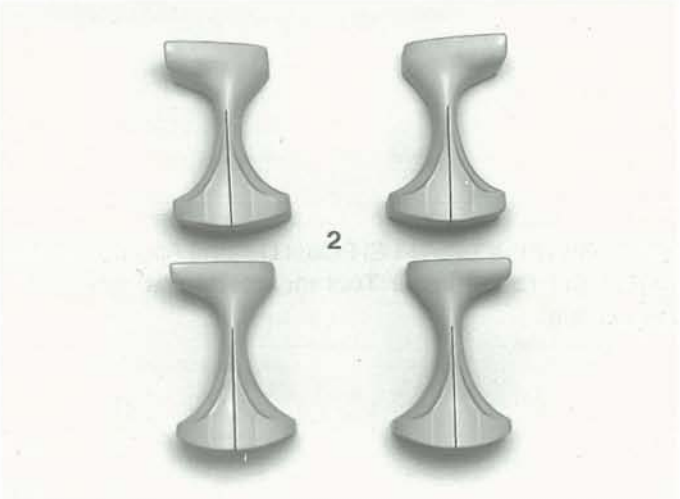
(1) Floor plate
(2) Support column
(3) Height adjustment element
(4) Release lever
(5) Raising lever
(6) Lock lever
(7) Casting Ring
(8) Universal support ring
(9) Support knob
(10) and (11) Holding screws for the universal support ring

Attach the SIT Cast Casting Apparatus by removing the holding screw (11) from the universal support ring (8).



2.2 Parts for the SIT Cast Casting Apparatus

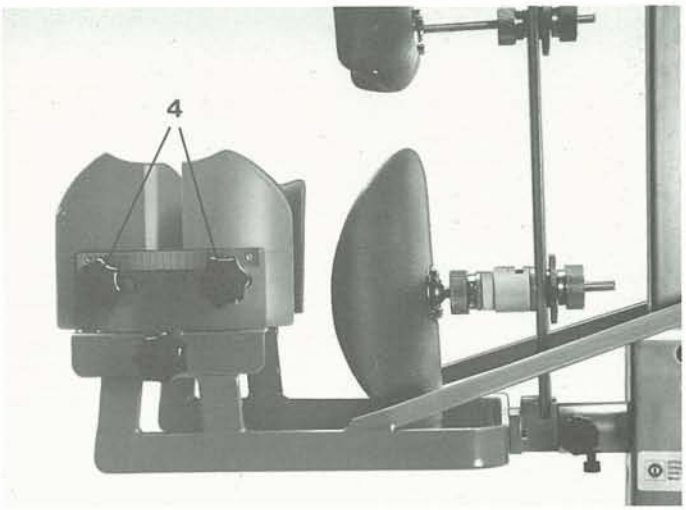
(1) SIT Cast frame
(2) SIT Cast forms
(3) Form receptacle
(4) Holding screws
(5) Femoral pad
(6) Pelvic pad
(7) Quick release nuts
(8) Pressure gauge
(9) Rubber sleeve



The 743Y50 SIT Cast forms are available in two sizes, left and right:

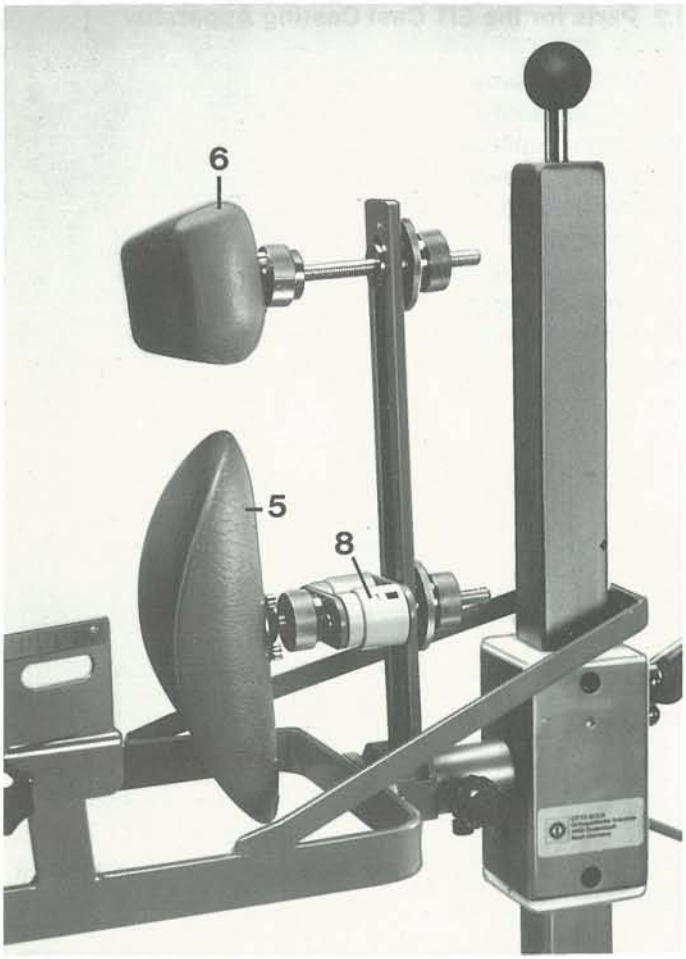
Size	Residual limb circumference*
1	18 1/2–21 1/4 in. (47–54 cm)
2	15 – 18 in. (38–46 cm)

*measured at the seat ring

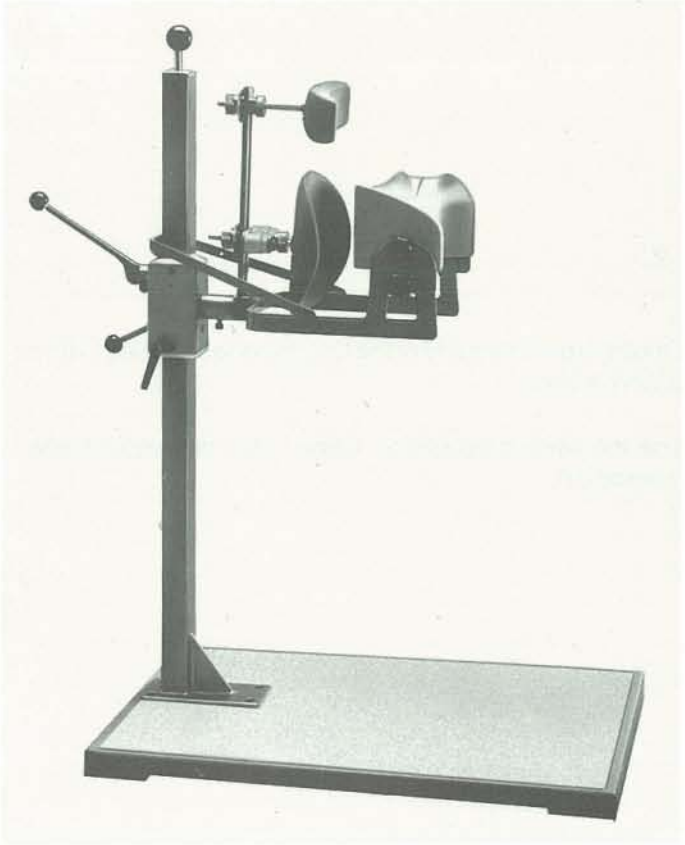


Open the posterior end of the form piece as needed to fit the patient's body.

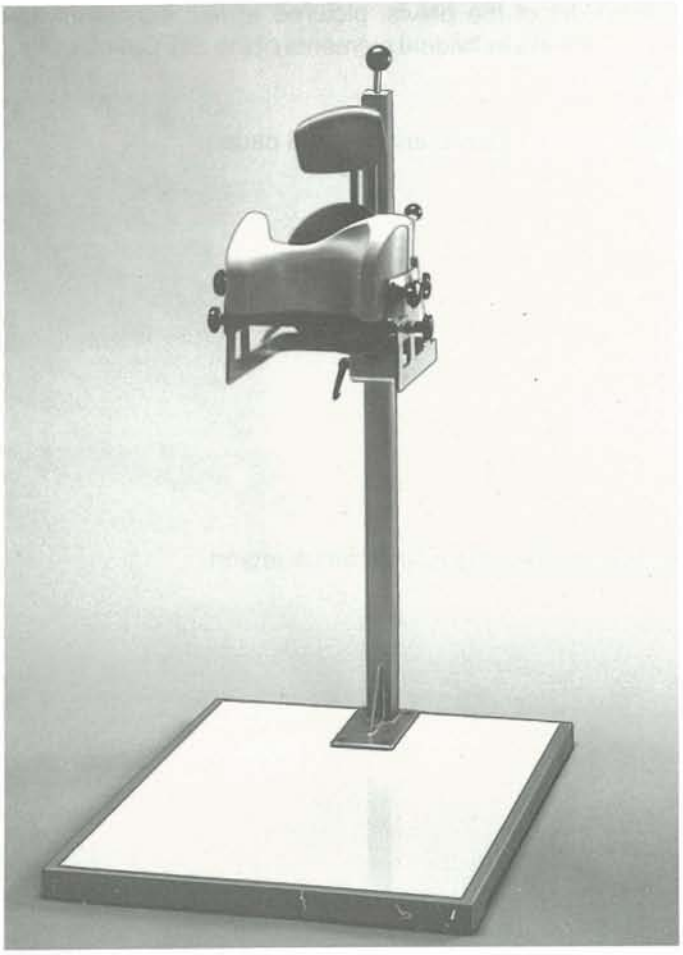
Use the holding screws to maintain the degree of spread desired (4).



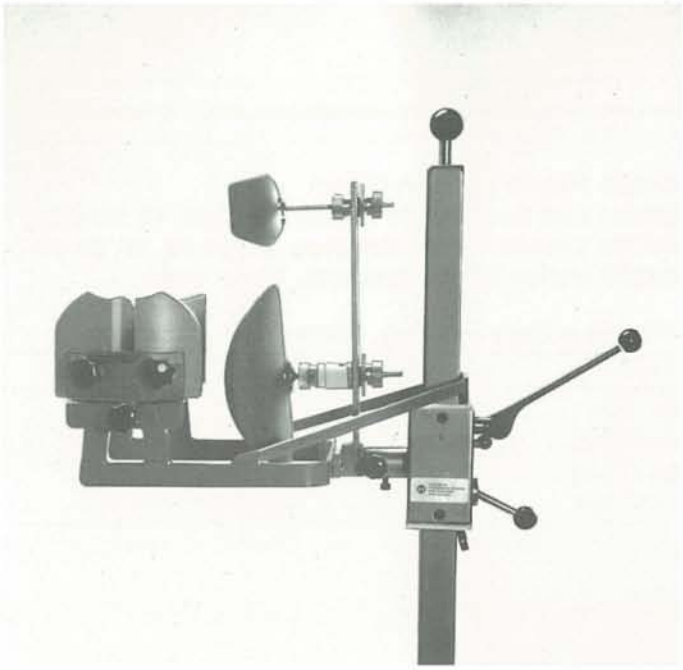
Set the height of the femoral pad (5) and pelvic pad (6) using the slotted guide and set their positioning using the threaded rods. The ball joint optimizes the flat position of the pads. The pressure gauge (8) controls lateral pressure exerted by the femoral pad.



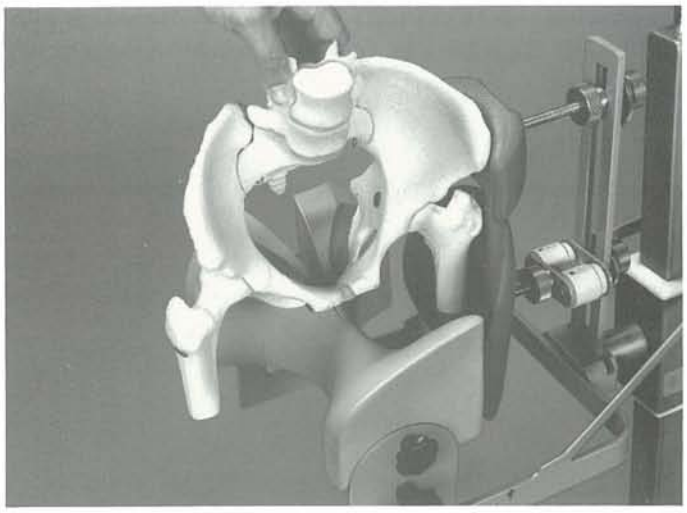
Front view of the 743A11 SIT Cast Casting Apparatus with 743G1 SIT Cast Plaster Tool mounted for a right sided amputation.



Medial view of a 743A11 SIT Cast Casting Apparatus with 743G1 SIT Cast Plaster Tool mounted for a right sided amputation.

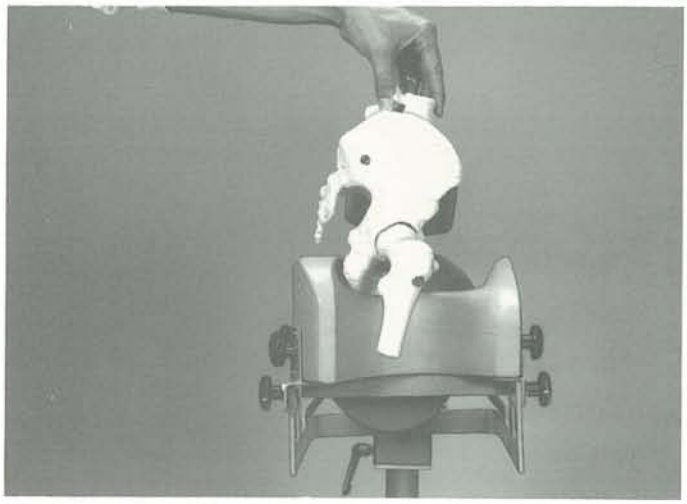


Rear view of a 743A11 SIT Cast Casting Apparatus with 743G1 SIT Cast Plaster Tool mounted for a right sided amputation.

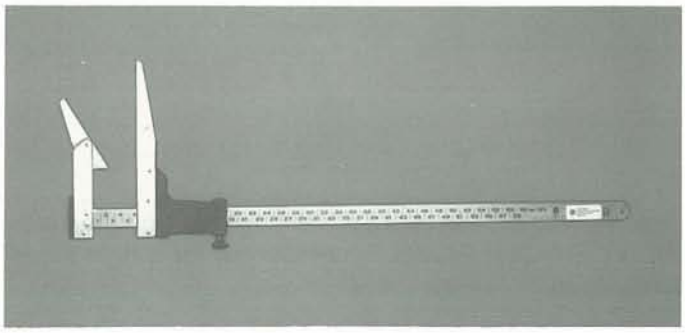


The model of the pelvis, pictured at left, illustrates the function of the individual elements of the SIT Cast Casting Apparatus.

Position of the pelvic and femoral pads.



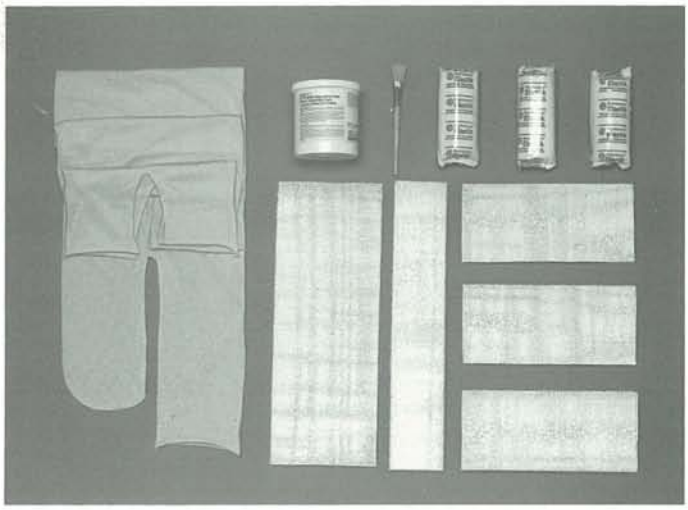
Containment of the ischial ramus region



2.3 Tools and Materials

The following are necessary to produce a functional plaster impression:

743S1=S Body Caliper with Jointed Leg



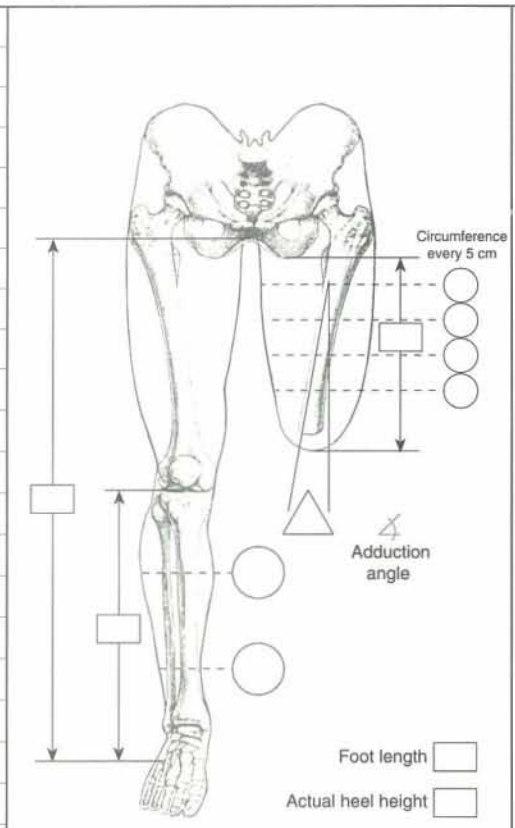
640Z5 Plaster Isolation Cream
699G1 Otto Bock Elastic Plaster Bandage, 15 cm width
699G3 Cellona Plaster Bandage, widths 10, 15, 20 cm
623T3 Perlon Tricot Stockinette, 12 cm width

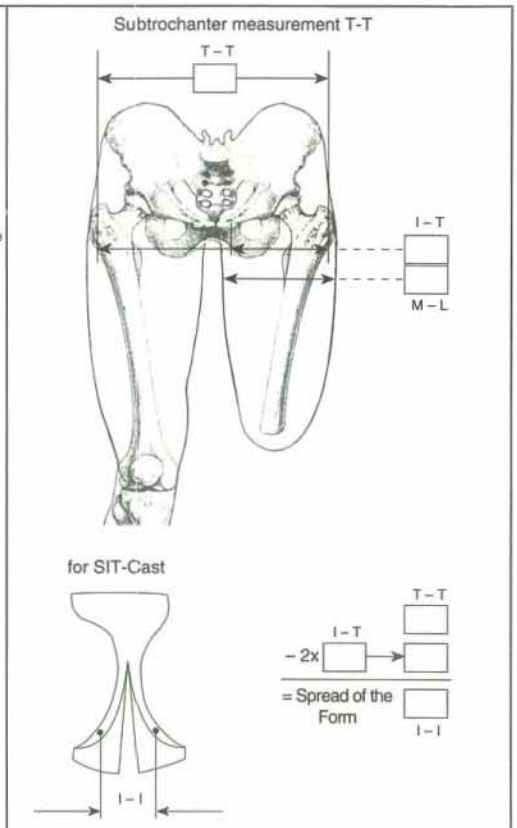
Protective Body Stocking, Cotton, 6 per package

Art.-Nr.	Width	Residual limb length
641T3=1	30 cm	16 cm
641T3=2	30 cm	32 cm
641T3=3	38 cm	16 cm
641T3=4	38 cm	32 cm

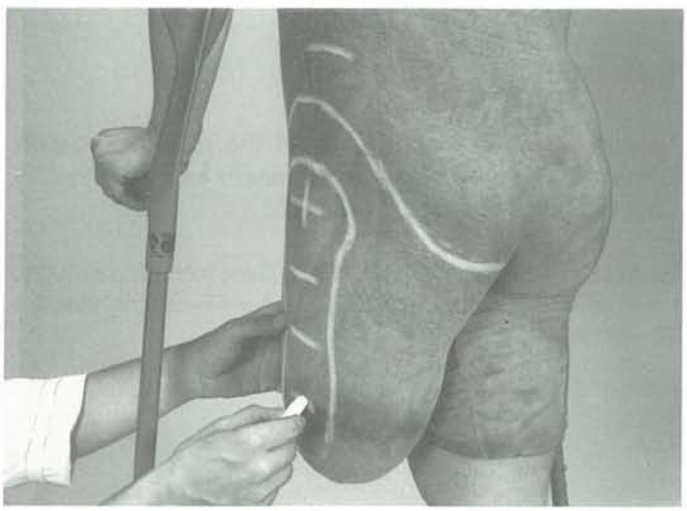
3 Preparation and Measuring

Last name
First name
Sex
Birth date
Weight
Height
Amputation side
Date of amputation
Cause of amputation
Residual limb characteristics
Socket type
Knee joint
Prosthetic foot





Two protective body stockings, one layered over the other, are used both to protect the skin from the plaster as well as to form the soft tissue. The patient should privately don one of the body stockings over bare skin in a changing room. Assist the patient in pulling on the second body stocking over the first taking care to avoid creating any folds or creases. (We have dyed the stockinette, pictured at left, for purposes of clarification.)



Mark the proximal socket brim, angle of the femur and greater trochanter as well as the various levels at which you will be taking circumference measurements (every 5 cm).

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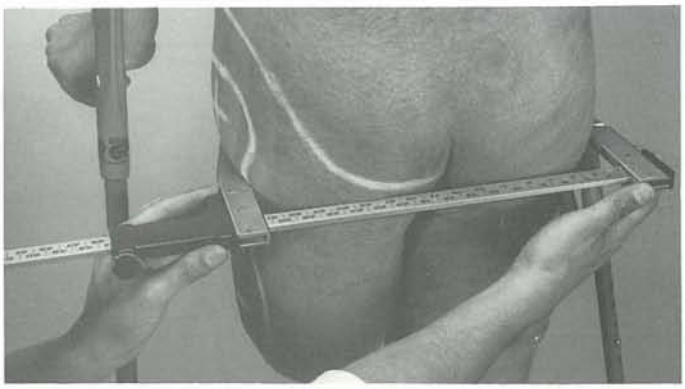
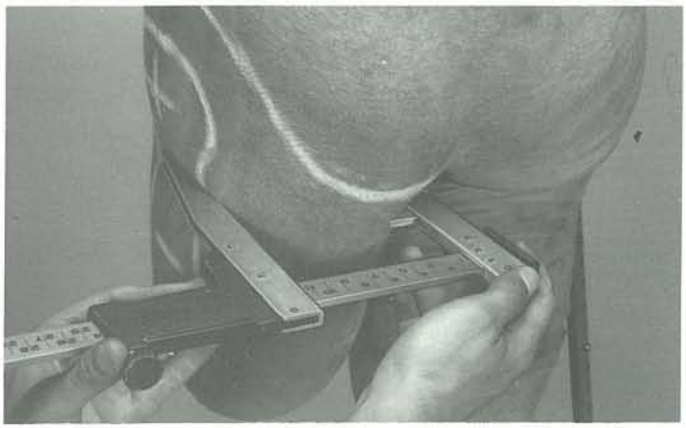
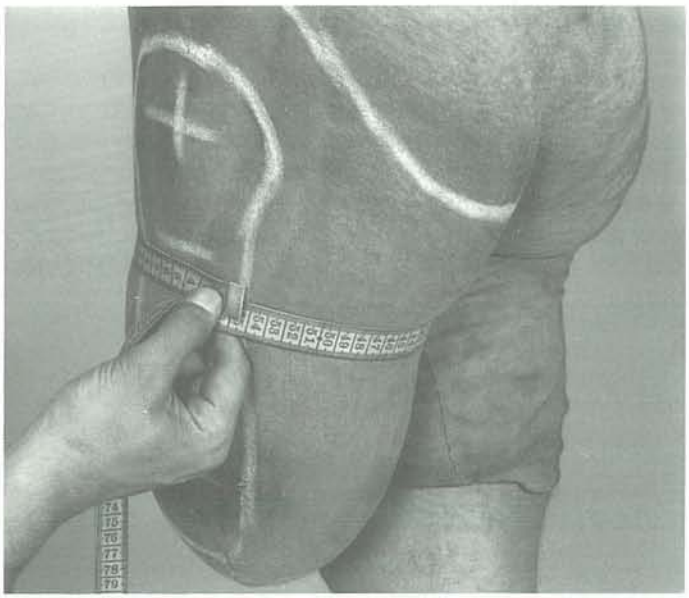


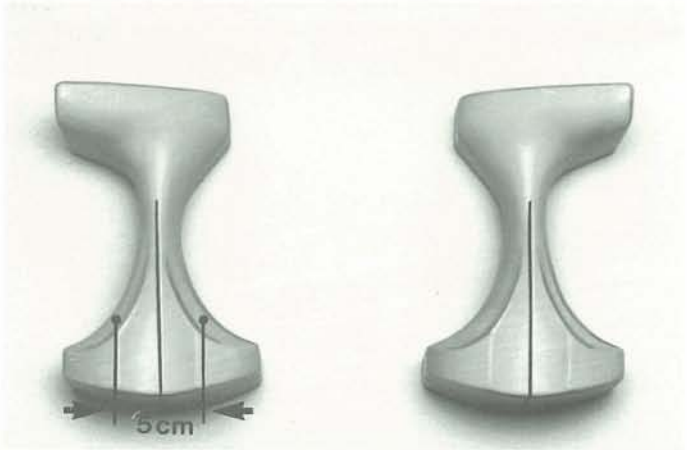
Measure the width of the pelvis at the subtrochanteric level using a 743S1=S Body Caliper.



Measure the distance between the medial ischial ramus and the femur using the body caliper (subtrochanteric level). These measurements are necessary for the initial adjustment of the SIT Cast Casting Apparatus and to achieve the bony lock.



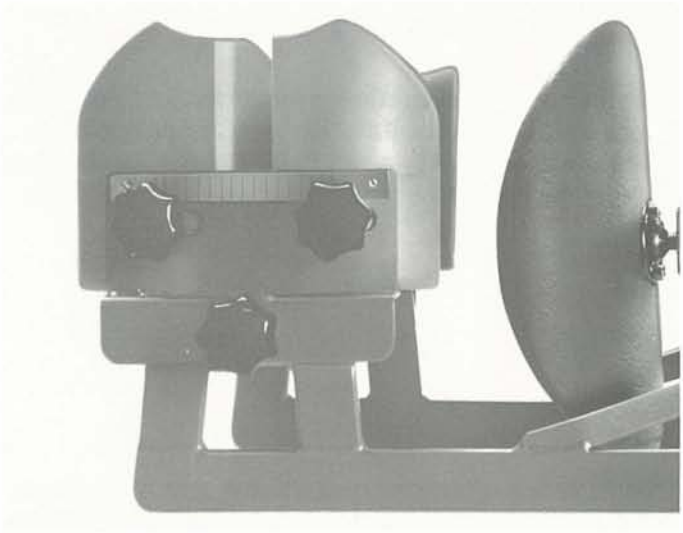
Applying normal tension, measure the circumference of the residual limb at the levels marked (5 cm intervals).



4 Preparation of the Plaster Negative

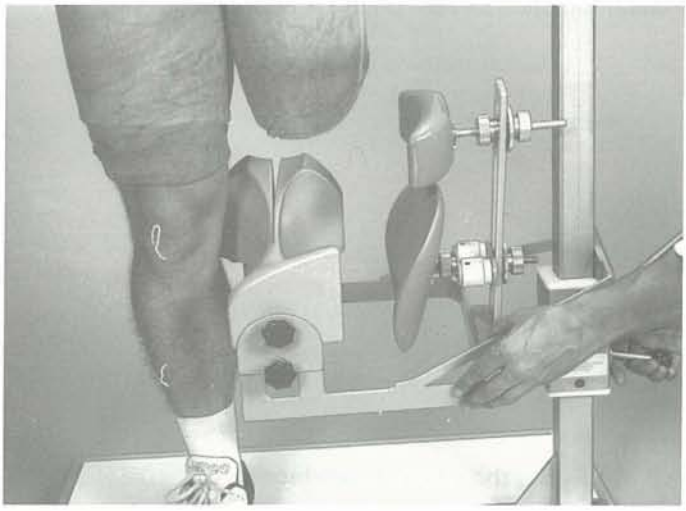
To ensure smooth application of the plaster negative, prepare the necessary plaster bandages as well as the SIT Cast Casting Apparatus in advance.

Select the appropriately sized SIT Cast form according to residual limb circumference. (Size 1 = 47–54 cm, size 2 = 38–46 cm).

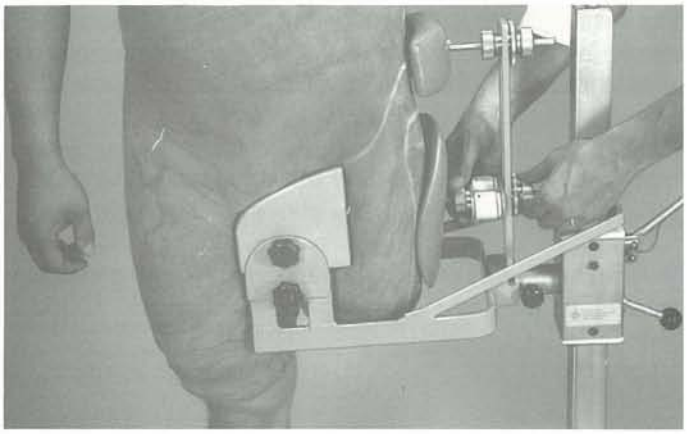


4.1 Adjusting the SIT Cast Casting Apparatus

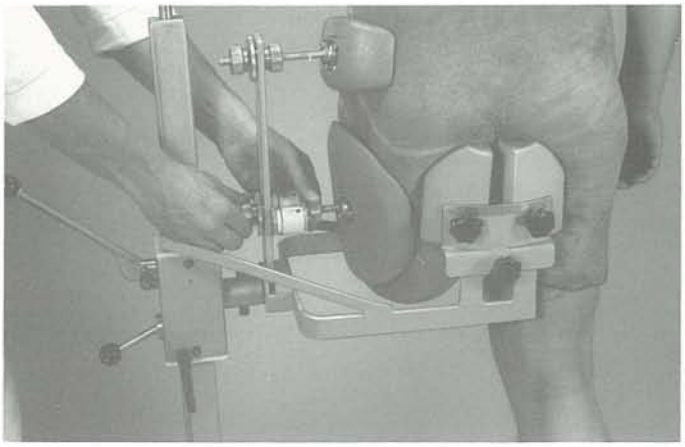
Place the selected form in the frame and secure with the holding screws.
Adjust the spread of the form piece according to the width of the patient's tuberosities (Subtract 2 times the I-T dimension from T-T to obtain the spread of the SIT form. See chart).



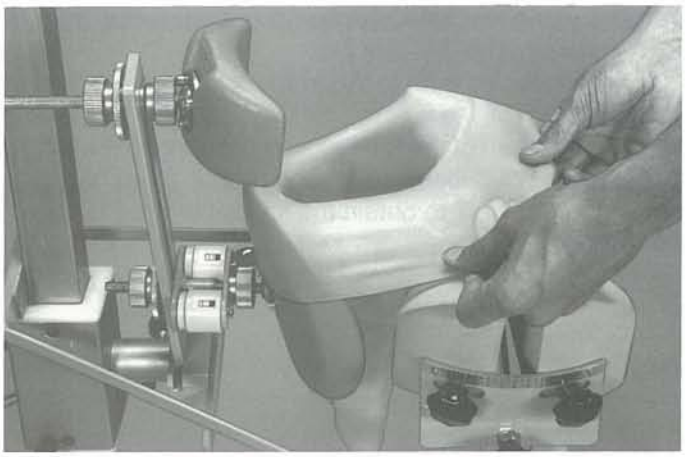
According to the length of the residual limb, select either the large or the small femoral pad. Before adjusting the casting apparatus, instruct the patient to stand as closely as possible to the form piece on his or her sound leg. Adjust the SIT Cast Casting Apparatus upwards.



Be sure that both tuberosities are equally loaded and that the pelvis is level. Place the pelvic pad between the trochanter and the iliac crest for stability.

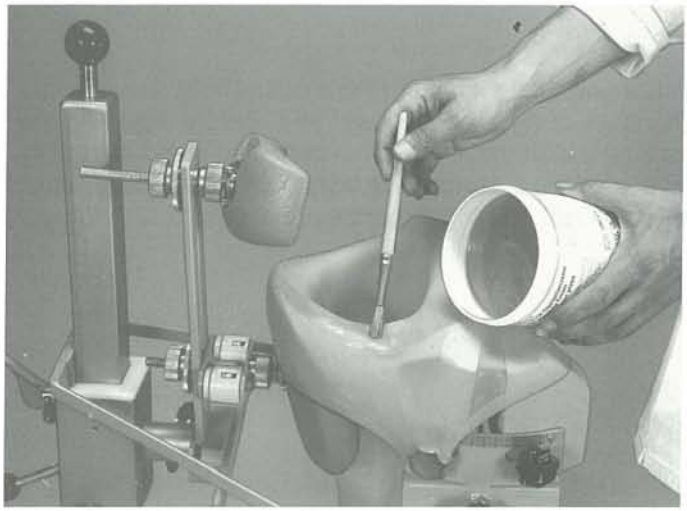


Position the femoral pad with its upper edge even with the crest of the trochanter. The pressure should be between 12 and 20 kilo pounds on the gauge according to soft tissue condition. Match the pad angle to the adduction angle of the femur. Secure the pads in the ball joint using a 4 mm Allen head wrench. Note the position of the pads from the posterior side. Mark the position on the support.

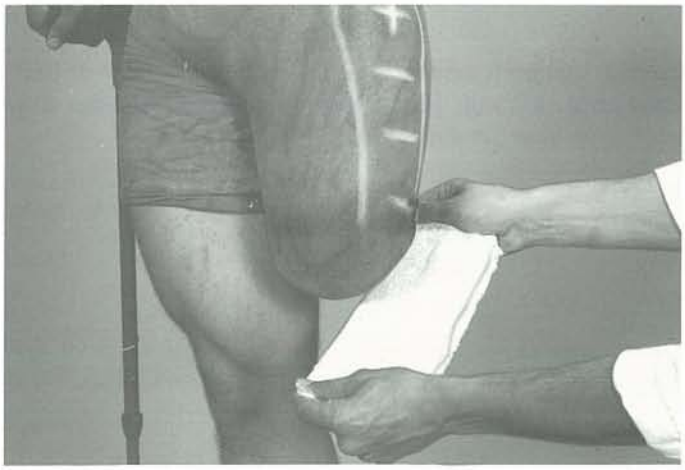


Lower the height adjustment element and allow the patient to be seated.

Open the pads to their maximum width to make it easier for the patient to later remount the SIT Cast Casting Apparatus. Select the appropriately sized 99B4 Rubber Sleeve and pull over the brim of the femoral pad and the form piece.



The rubber sleeve compresses the tissue, and, also protects the apparatus from exposure to the plaster. Smooth 640Z5 Plaster Isolation Cream on the rubber sleeve.



4.2 Applying the plaster bandages

The residual limb is layered with Cellona and Ruhrstern elastic bandages. A final layer of tricot stockinette is applied for use in pulling into the SIT Cast Casting Apparatus.

Note:
Work very quickly, using very moist plaster bandages to avoid premature setting of the plaster prior to shaping.

Moisten two layers of Cellona bandage (15 cm), and place anterior to posterior covering the end of the residual limb . . .

. . . and shape in without wrinkles.

Apply a duplicate layer in the medial to lateral direction.

Place a four layer splint of Cellona (20 cm) from the distal end up to the iliac crest on the lateral side . . .

. . . and shape.

To strengthen the proximal brim, wrap a three layer splint of Cellona (10 cm) over the pubis. Position the bandage to run through the perineum continuing over the iliac crest laterally.

Posterior path: through the gluteal fold and across the posterior-superior iliac spine (P.S.I.S) . . .

. . . and over the iliac crest.

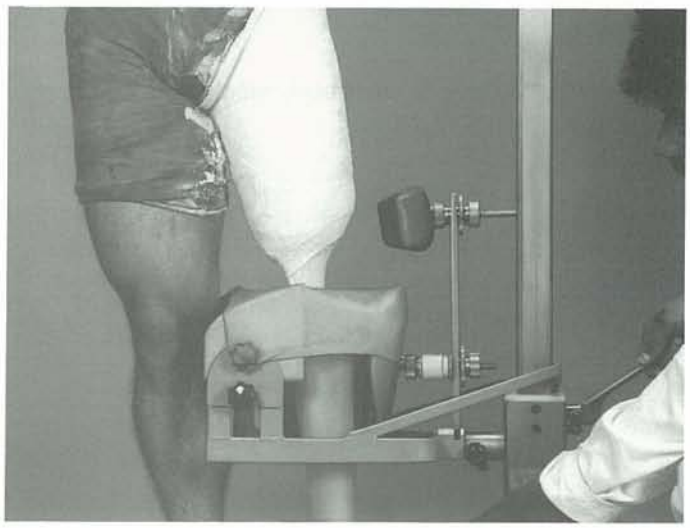
Starting proximally, wrap an elastic plaster bandage around the residual limb. Begin on the posterior side at the level of the crest and work quickly.

Reinforce the wrap using a second elastic bandage. Be sure to apply even tension.

Cut a double length, 12 cm wide strip of perlon stockinette and roll up halfway. This will serve as a pull sock.

Pull on the stockinette . . .

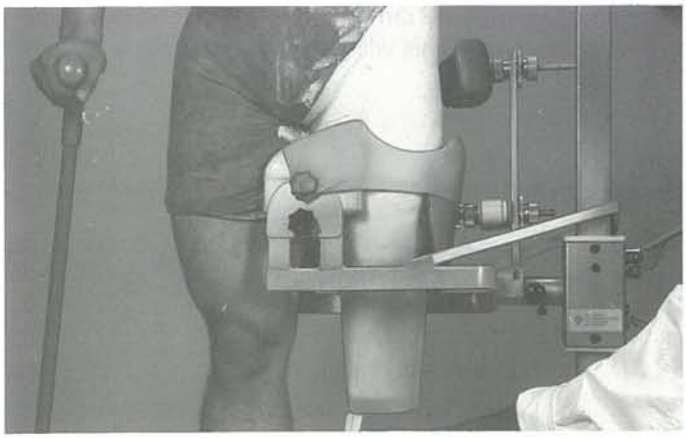
. . . and secure using an elastic plaster bandage.



4.3 Shaping the plaster negative in the SIT Cast Casting Apparatus

Raise the SIT Cast Casting Apparatus and guide the pull sock through the rubber sleeve.

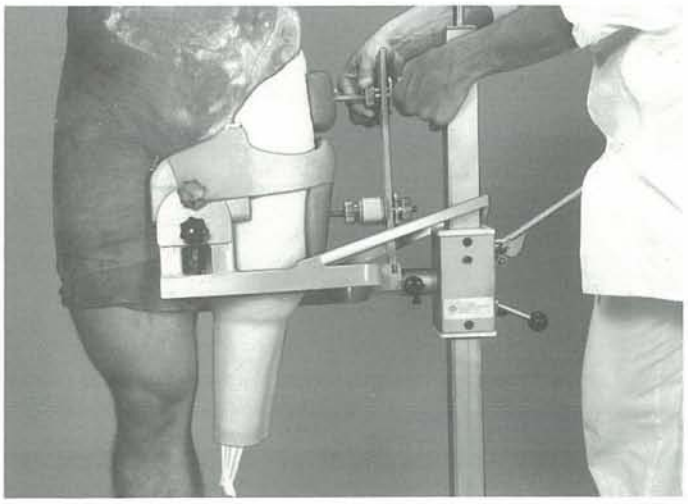
The patient should use the support column along with a crutch for balance.



Pull the patient into the rubber sleeve. The tension on the pull sock should be distal to medial. Instruct the patient to shift his or her body weight to the amputated side.

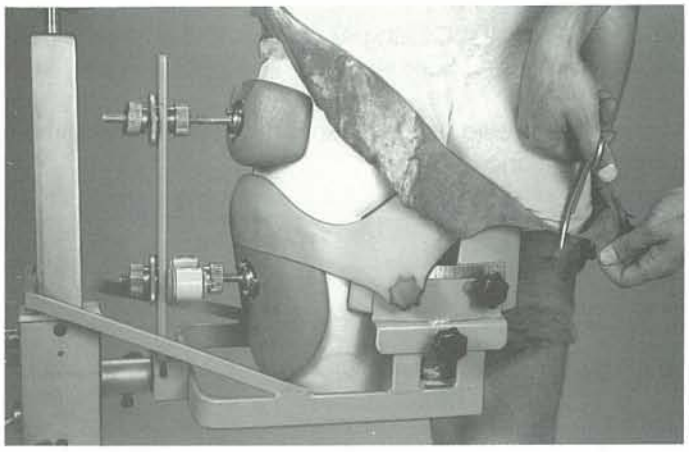
Adjust the plaster apparatus to the exact height. Check to see that the patient's pelvis is level.

To shape the plaster negative, position the femoral pad according to the desired pressure determined earlier. Secure the pads.

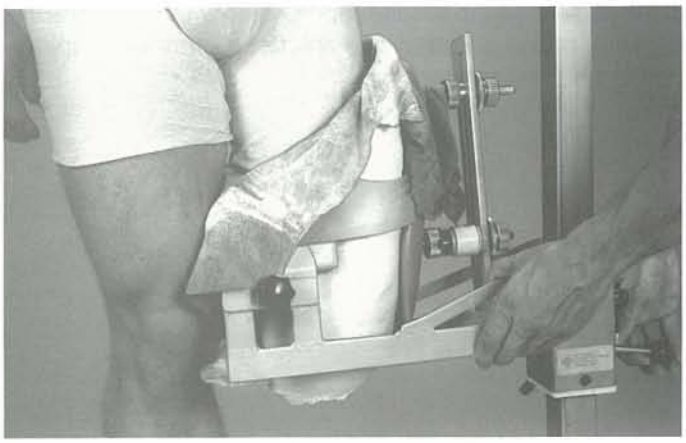


Position the pelvic pad as above.

Allow the plaster negative to harden while bearing weight.

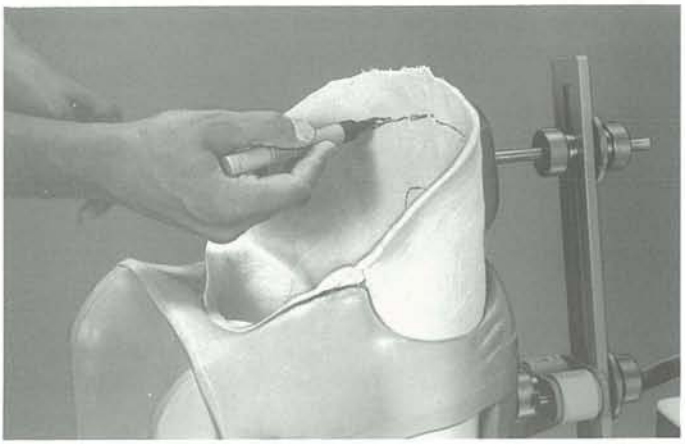


Cut away the outside layer of body stocking.



Lower the SIT Cast Casting Apparatus and allow the patient to be seated.

Loosen the pelvic and femoral pads.

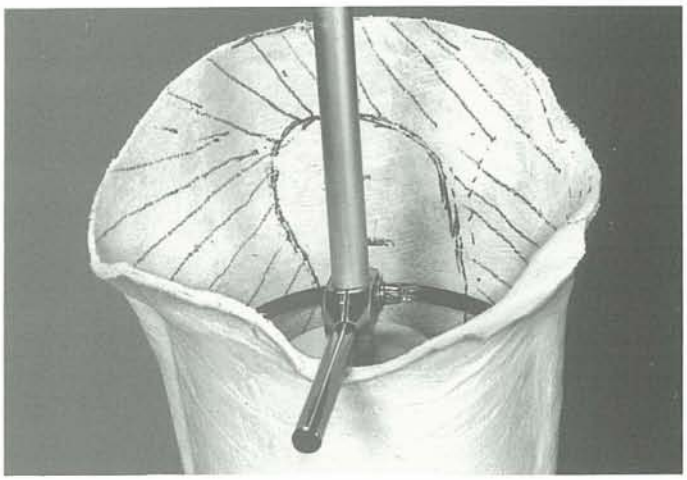


5 Functional Shaping of the Plaster Negative

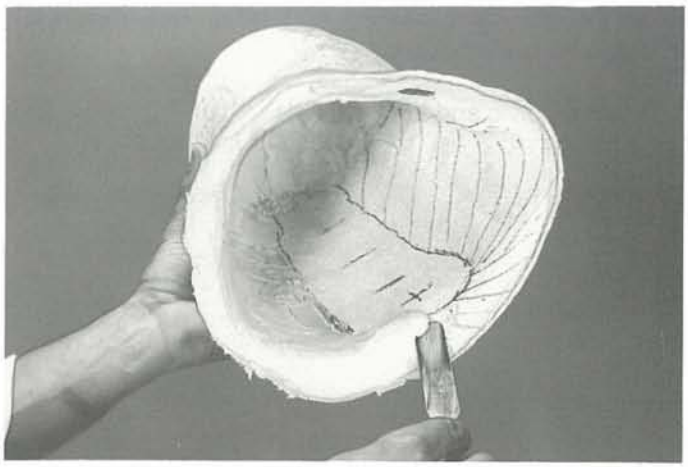
Once the body dimensions and anatomical structure have been determined and marked, the plaster negative may be shaped into a plaster check socket. The brim, as well as changes in circumference and shape, is modified by adding plaster and verified during trial walking.

Retrace the marking made earlier and draw in the brim of the plaster negative according to the most recent socket brim path. Remove the plaster negative from the SIT Cast Casting Apparatus and trim.

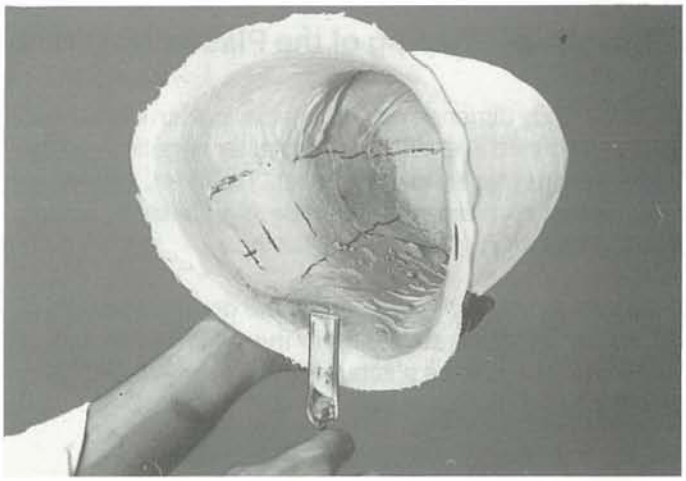
Draw the shaping surfaces.



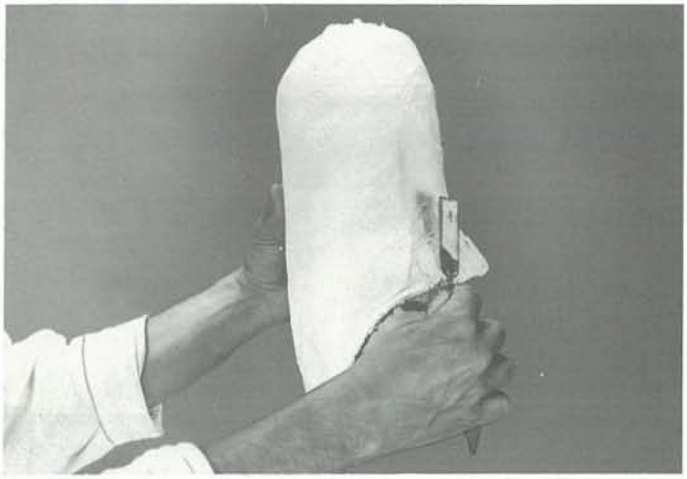
Verify the circumference using the 743E5 Inside Circumference Gauge.



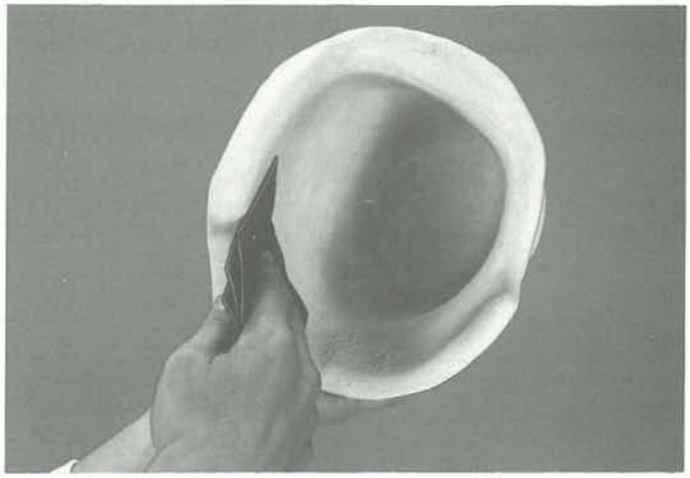
Using plaster, fill the anterior and posterior indentations in the shaft of the negative. Complete any further shaping above the greater trochanter.



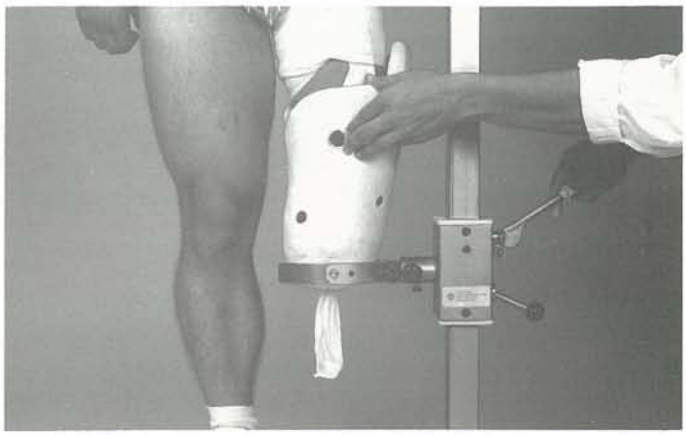
Shape the posterior lateral structure as well as the proximal socket brim. Check the reduced dimensions using the 743E5 Inside Circumference Gauge.



Fill the external proximal area of the negative using plaster and reinforce with a plaster bandage wrap.



Smooth the surface using wet sandscreen.

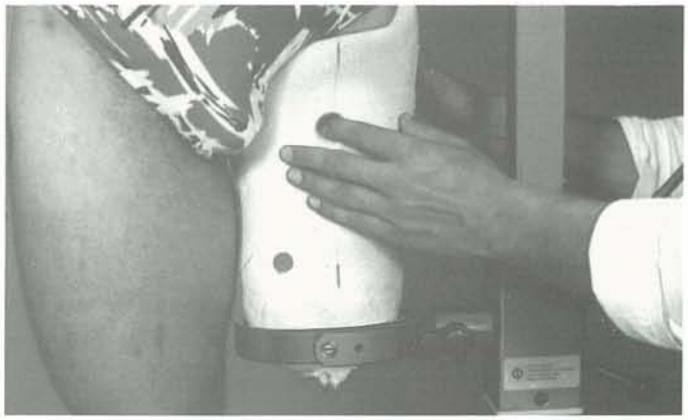


6 Trial Fitting the Plaster Socket

Drall 25 mm holes into the plaster socket to allow you to check the fit. Drill a hole in the center of the distal end of the socket to create a pull hole. Set the plaster cast on the universal support ring and adjust to the correct height.

Pull the person into the socket with a 10 cm wide perlon stockinette using the elastic bandage technique.

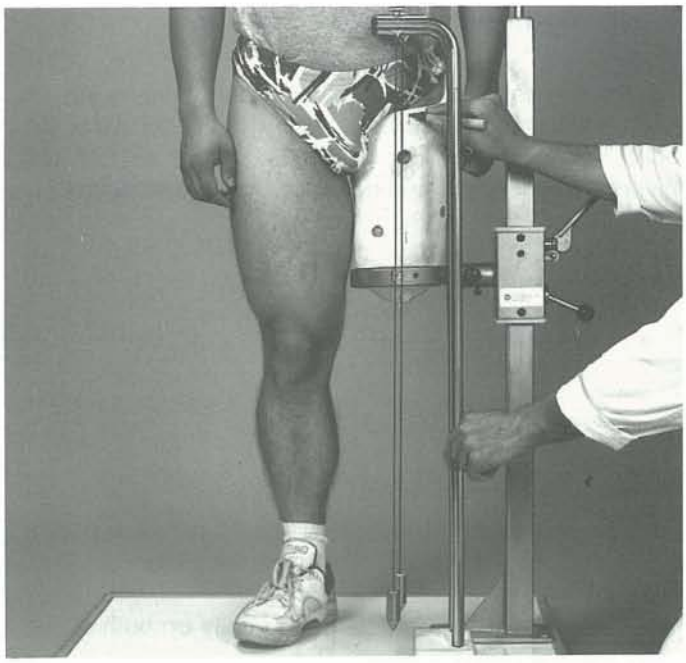
Instruct the patient to bear weight equally on both sides. Verify that the pelvis is level.



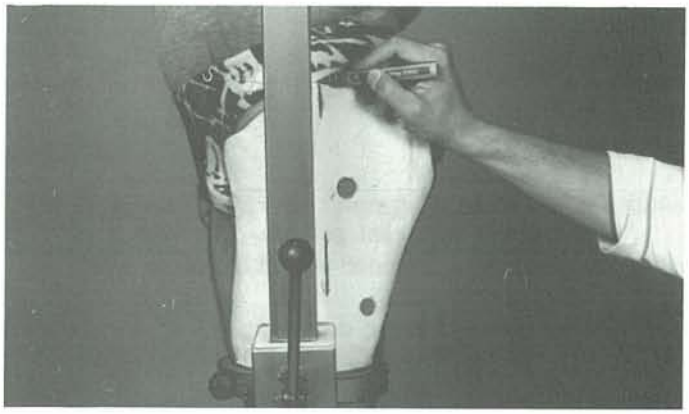
Verify the following:

- Position of the medial ischium
- Bony lock in the medial-lateral direction
- Socket brim shape
- Equal pressure at the drill holes

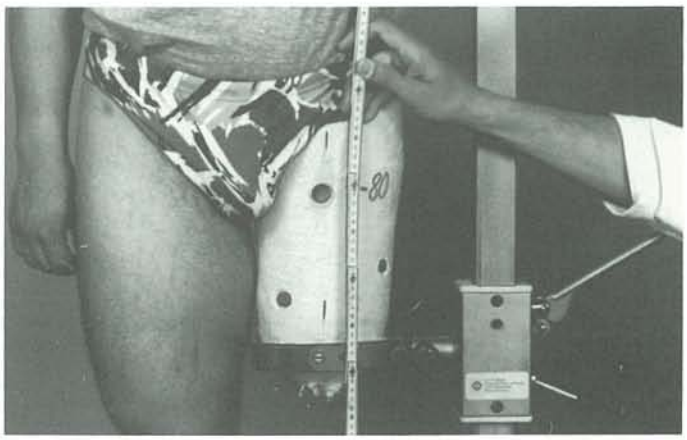
Check the adduction angle. While pressing on the plaster socket, check the bony lock in the medial-lateral direction.



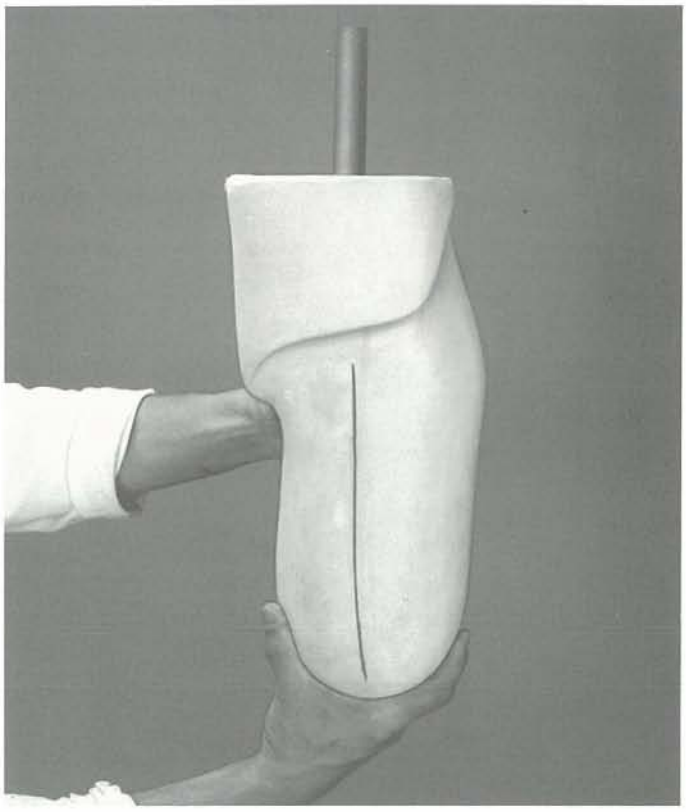
The adduction position of the plaster cast is determined using the universal support ring and may be preserved for alignment. Use a double plumb line in the frontal plane.



Draw a plumb line on the sagittal surface along the support column of the casting apparatus to preserve initial socket flexion.



Mark the height for the fabrication of the prosthesis on the plaster socket.



7 Producing the Plaster Positive for the Test Socket

Isolate the plaster socket and fill the mold with plaster after parting with a plaster parting agent. Transfer the plumb lines. Smooth the plaster positive.

Completed plaster positive with plumb lines.

Verifying fit using a test socket made of 616T52 stiff, transparent thermoplastic.

A Product of the Research and Development Department of OTTO BOCK Orthopädische Industrie GmbH & Co, Duderstadt

Attention !

The content of this technical information is partially not state of the art .