

# Construction of a Prosthesis For a Deformed Short Leg

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An 18 year old girl with a deformed left leg recently was fitted by the Lester J. Sabolich Artificial Limb and Orthopedic Appliance Company of Oklahoma City. The patient had a congenitally short leg (See Fig. 7) and had been wearing a brace and extension which was unsightly and awkward. The process of fitting this deformity inside a complete prosthesis may be of interest to other members of the profession.

To prepare a mold for the socket, a cast was taken of the short leg when the foot was in full plantar flexion. The posterior surface of the shank portion and plantar surface of the foot portion were laminated with rigid resin (Laminac #4110) and the anterior portion laminated with 85% flexible resin (85% Laminac #4134 and 15% #4110) to provide for expansion when putting on and removing the socket. The cast was modified so that most of the weight could be taken under the arch and heel. The socket is an entirely separate lace-on unit. (Fig. 1)

The distal end of the socket, along the entire plantar surface of the foot, was fitted into a block of wood which serves as a seat for the socket inside of the plastic shank (Fig. 2). For fitting trials, the socket was bonded to the block with micro-balloons along the border of the wood where it flanged up around the foot, and attached to an adjustable leg and SACH foot. (With long stumps, a SACH foot adapter can be used.) The fitting procedure was carried out as with the Patellar-Tendon-Bearing Prosthesis.

After transferring and shaping of the wood section, the micro-balloons were ground off. (They had not been put between the socket and wood so as not to interfere with seating of the socket and also to permit easy separation of the two.) A long screw was then inserted to hold the socket in place till finished, and two  $\frac{5}{16}$ " diameter dowels were inserted into the ankle block and the wood seat for better bonding. (Fig. 3)

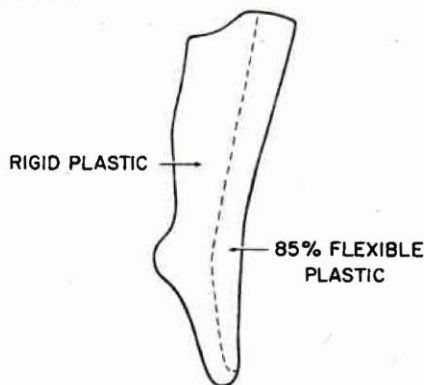


Fig. 1—Socket laminated on cast of deformed leg.

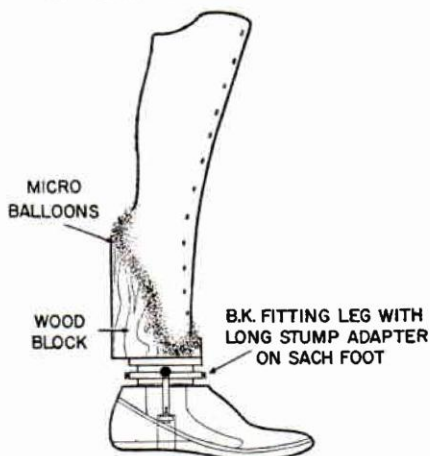


Fig. 2—B/K fitting of leg with stump adapter on SACH foot.

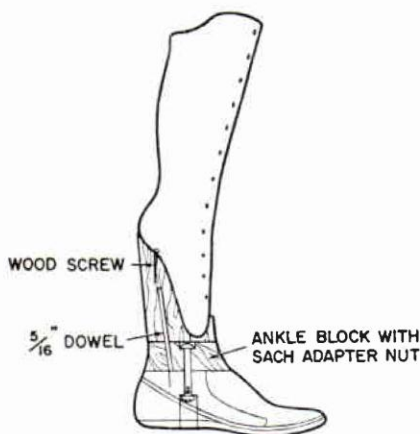


Fig. 3—Fitted prosthesis after transferring and shaping of wood section.

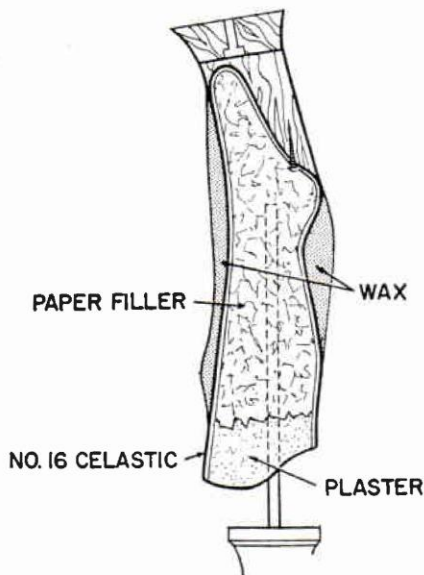


Fig. 4—Wax build-up to match sound limb, ready for lamination.

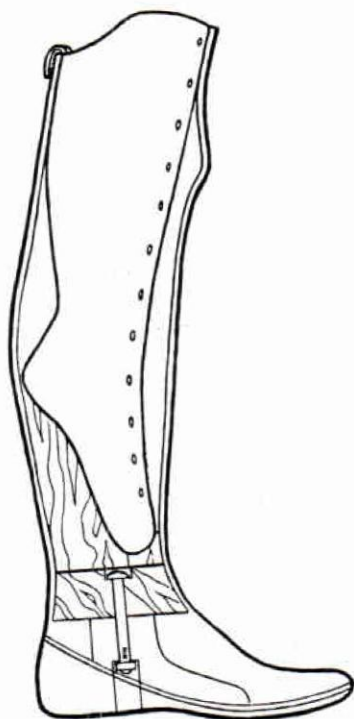


Fig. 5—Innersocket in place within outer plastic shell. Mandle wax and screw removed. Socket is now removable.

The lace opening next was sealed off with #16 Celastic and a half-inch pipe was inserted in the socket, held in place with packing paper to within 6" of the top, and the remaining 6" poured with plaster. (Fig. 4) A wax form was then built up around the socket and contoured to match the sound limb. The wood at the ankle base was protected from the wax with masking tape to insure a good bond when laminated. The proximal area of the socket was coated with silicone and the shank laminated to contact the socket snugly. After lamination with 2 Dacron sleeves and 3 of nylon, the plaster and pipe were removed, Celastic cut along lace opening and the screw removed from the bottom of the socket. The prosthesis then was placed in the oven until the wax began to drip; then the socket was removed and the wax dug out instead of leaving it to melt entirely.

Figs. 5 and 6 show the completed prosthesis. Fig. 7 shows the deformed foot, and Fig. 8 the patient, Miss Cheryl White, wearing the prosthesis.

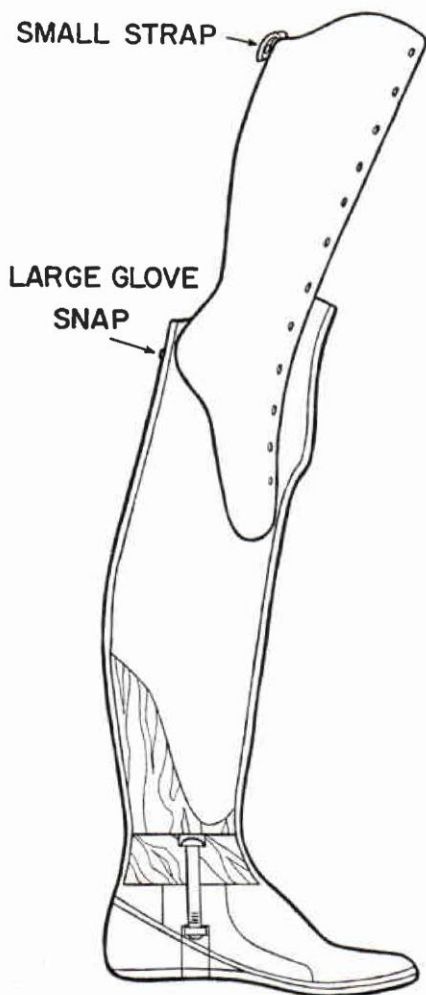


Fig. 6—Socket in relation to shank being inserted or removed.



Fig. 7—The deformed foot.



Fig. 8—Cheryl wearing the finished prosthesis.

She reports that she has learned to dance and do just about anything she wants to do with this new prosthesis, including walking in sand, which she was unable to manage with the brace and extension.

*Editor's Note:* We quote from letters received from Miss White's father, Mr. Leland White of Chicasha, Oklahoma, for information about Cheryl and for the family's appreciation of Mr. Buddin's work.

"Cheryl walked with a brace and extension at the age of 18 months. She mastered the use of this appliance in one day. At 5 years she rode a large tricycle 14 blocks to school. She rode a horse well by the time she was four . . . She has been an excellent driver since she was fourteen. . .

