

# Service Test Report

## PATELLA-TENDON PROSTHESIS FOR BELOW KNEE AMPUTATIONS

By S. L. BAIRD\*

1. I have worn a left BK prosthesis since February 1949. All during this period I became increasingly convinced that there must be a better prosthesis from the standpoint of comfort, gait and wearability than the standard BK prosthesis with laced thigh corset, knee joints, belt and fork-strap. I was also convinced that improvement in appearance, maintainability and reduced weight, plus ease and simplicity in putting the leg on and taking it off could be achieved.

2. I discussed these convictions with Mr. Stanley Hedges, President of the Indianapolis Artificial Limb Company and he described the new patella-tendon concept of fitting a BK prosthesis. Upon learning that his company had not acquired experience with this new concept I volunteered to service test such a leg. Mr. Hedges agreed and insisted on a conservative approach. My standard leg was modified to provide for end bearing to determine toleration. Beginning with light pressure in approximately two months I was able to comfortably tolerate approximately 40 percent end bearing. I also noticed an immediate improvement in the condition of the skin of the bearing surfaces, with only a slight thickening of the skin at the terminus of the stump.

3. A cast was taken over two stump socks and a closed end socket was fabricated of plastic material. The socket is approximately  $2\frac{1}{2}$  inches longer than the stump to provide for end-bearing cushioning. The socket encloses the lower half of the patella and extends on the sides well up on the condyles of the femur. The socket was temporarily fastened to an aluminum pylon to check for fit and alignment. It was then fitted into the shell or shank which was contoured as closely as possible to the good leg. A Sach foot with a medium heel was attached and a light leather knee harness riveted through the shell proved to be completely adequate to retain the leg in place without the use of a belt and fork-strap.

4. Only a slight amount of relieving was required around the top edge of the socket, mainly along the sides of the knee cap. Thin foam rubber pads covered with chrome horsehide were glued in place in the knee cap area and on the lateral and posterior aspects of the socket to provide for a firm fit. Sufficient foam rubber pads were used in the closed bottom of the socket to provide cushioning for end bearing.

5. I have worn the leg continually for five months and I believe the following conclusions can be safely reached:

a. The prosthesis weighs  $3\frac{1}{4}$  pounds without a shoe as compared to my standard willow limb which weighs 7 pounds.

b. I am comfortably tolerating approximately 60 percent end bearing without complications. A calloused area the size of a fifty cent piece at the terminus of the stump is apparently normal and not bothersome.

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*Editor's Note:* We are indebted to Stanley Hedges for this article, written by a prosthetic wearer in his neighborhood, who compiled the report entirely on his own initiative.

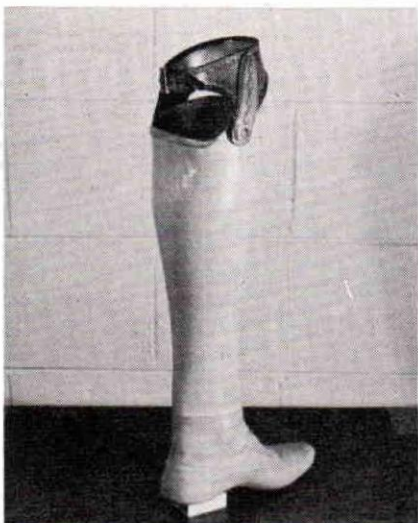


Fig. 1—The light leather harness employs only one buckle. The sides of the harness have light aluminum stiffeners, covered with leather to prevent sagging. The Sach foot is covered with a latex cover.

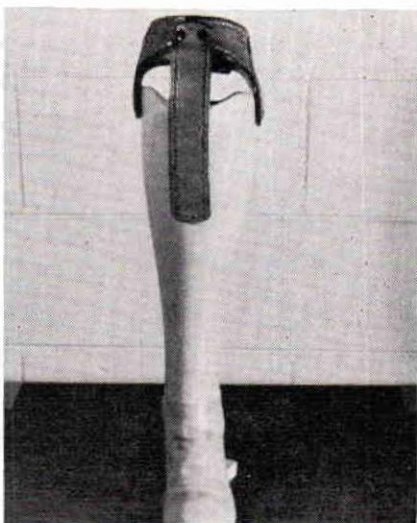


Fig. 2—A light leather strap can be snapped in place to prevent trousers or skirt from catching in the slight gap between the knee cap and the socket when walking or on windy days.

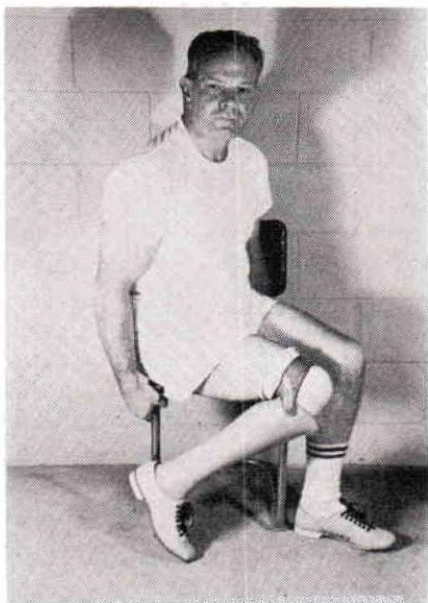


Fig. 3—Note the great amount of knee flexion possible.



c. There is no edema of the stump and no skin irritation whatsoever. I estimate that circulation has improved considerably because the thigh corset has been eliminated.

d. The prosthesis is more comfortable than the standard prosthesis, particularly when sitting. (Note the great amount of knee flexion possible).

e. The prosthesis was worn throughout the hot summer months and in spite of the closed socket I have had no heat rash or chafing. Apparently the slight piston action within the closed socket provides a greater amount of air circulation than a standard prosthesis. I have played 18 holes of golf in 90 degree temperatures without discomfort.

f. The prosthesis can be put on or removed in five seconds. Only one buckle is used.

g. Appearance is vastly improved (note the extremely neat fit around the knee). This consideration would be important to female amputees.

h. The prosthesis is virtually maintenance free due to the absence of any working parts. The Sach foot eliminates the necessity for an articulated ankle. It is also virtually water proof.

i. I have no discernable limp and I am an habitually fast walker.

j. Muscle tone of the thigh muscles has vastly improved with an increase in circumference of  $1\frac{1}{2}$  inches at mid-thigh.

6. These conclusions are strictly the result of this personal service test. I do believe, however, that on a selected basis any BK amputee with a normal, well healed stump even as short as 4 inches, would be equally well pleased with the patella-tendon leg. I also wish to express my appreciation to Mr. Stanley Hedges and his associates of the Indianapolis Artificial Limb Company for their expert prosthetic knowledge and technique and for the opportunity to participate in this service test.

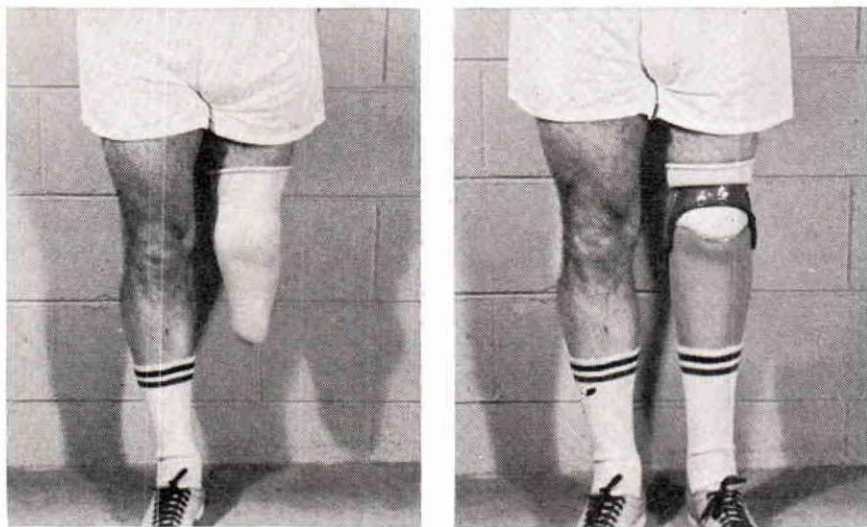


Fig. 4—The leg is remarkably neat. The close fit at the knee would be especially desirable for female amputees. In such cases a full length latex cover can be pulled up over the knee and fastened to a strap and light belt, thereby eliminating the leather knee harness.