# 13

# TECHNICAL ASPECTS OF SURFING

As I got into the writing of this book, I endeavored to understand and explain how a surfboard works. As I talked to people in surf shops and on the beach and read the various magazines and books on surfing, it slowly dawned on me that no one in the surfing world seemed to be concerned with the mechanics of how a surfboard supports the surfer. I read and heard much about the elements of a surfboard's shape, but I could find little or nothing about buoyancy and planing characteristics. Only two surfing publications show any understanding of the mechanics of planing. John Kelly's book, *Surf and Sea*, has an interesting chapter on the design of Hawaiian guns and semi-guns, in which he covers rail shapes and the use of a step. H. Arthur Klein's book on surfing mentions hydroplaning in relation to paipos. Other books, as well as the magazines, will tell what various experts *think* happens and what is supposed to happen. But none of them tell you *why*. Knowing why didn't matter until the small boards appeared and swept the market. The older, long boards had such a large safety factor that no one needed to know why they worked; they just did. The small boards have little or no safety factor, and because of this, can easily succeed or fail. The number of failures can be judged by the large number of surf shops and manu-

facturers that went out of business in 1970 and 1971 and by the steady decline of novice surfers and girl surfers during those years.

Because I have unusual difficulty in explaining something I don't understand, I had to embark on a research project that took me into all aspects of surfboard design and even into the problems of staying warm in cold water. In doing this, I uncovered some useful information. I believe I have come up with some theories and methods that can be used by others in the surfing world. I make no claim to infallibility and invite any and all to disagree with me, in the interest of advancing the state of this sport of surfing.

The purpose of this chapter is to publish what I have discovered and deduced about the mechanics of the surfer-surfboard-wave-interaction. I hate to see people reinventing the wheel, as they say in the computer world. Perhaps something in this chapter can be the basis of someone's useful work. Or on the other hand, maybe the contents of this chapter can show what *shouldn't* be done.

The bibliography contains a list of publications containing information I have used in writing this chapter, as well as the entire book.

Some of this chapter is my interpretation of material in Lindsay Lord's book, *Naval Architecture of Planing Hulls.* His book, which has been around for a number of years, seems to be the only complete text on the subject of planing.

I have had valuable assistance from Professor Howard C. Curtiss of Princeton University. "Pat" Curtiss has a Ph.D. in aeronautical engineering and teaches in the fields of aerospace and mechanical sciences. His specialties are low-speed aerodynamics (helicopters and V/STOLs) and flight mechanics. His interest in surfboards comes partly from his association with sailing. He owns a class "M" inland scow which he sails on Barnegat Bay and is faculty advisor to the Princeton University sailing team.

Pat has pointed out to me that accurate mathematical relationships for low-speed planing hulls are not available at this time. There are too many variables which are too difficult to measure. As a result, little experimental work has been done in this field. Low-speed planing hulls such as surfboards and sailboats are currently designed on the basis of experience and according to what "looks right."

While I cannot give the reader much accurate information, I