within the green arc. If it drops below the green arc either you aren't carrying runup power on the engines or there's a leak in the system or holes in the boots. If all is well, visually observe the boots inflating and deflating in the proper sequence.

Some systems operate wing, horizontal stabilizer, and vertical stabilizer boots simultaneously, while other systems sequence them. Check your POH and assure that the system is sequencing correctly. Inflation cycles generally take about six seconds, so let them cycle at least three times. This is also a good time to check for softballing—a ballooning effect that has three possible causes.

The most common cause of softballing is debonding, where the de-icer comes unglued from the airfoil over time, generally the result of poor installation technique. With a sewn de-icer, a broken stitch can cause ballooning and is often the result of a lightning strike or FOD damage but can also be the result of aging and normal wear. The third possibility is delamination, which is the separation of the outer neoprene layer from the undersurface, as seen in Figure 13-4. Delamination is more likely in older boots, as new materials and process improvements established since the early 1990s have effectively eliminated that problem.

Troubleshooting

Boots also may have one of those Gordian knot problems. During preflight, everything checks out, but at altitude some of the boots don't inflate. Indignantly, you land, taxi up to the shop, and curse silently as the mechanic tells you there's nothing wrong. The problem is subtle but not really difficult to understand and locate. You almost certainly have pinholes in the boot, and they're probably caused by erosion, FOD, or simply ozone deterioration. These tiny holes are too small to prevent proper inflation on the ground, but in flight, when flying through rain or clouds, the vacuum that holds the boot flat will draw moisture through them. Because few pneumatic systems have water separators, the moisture collects in the valves, lines, and boots. At altitude, the moisture freezes and prevents pressure from reaching the boot, then unfreezes when you descend. Those same

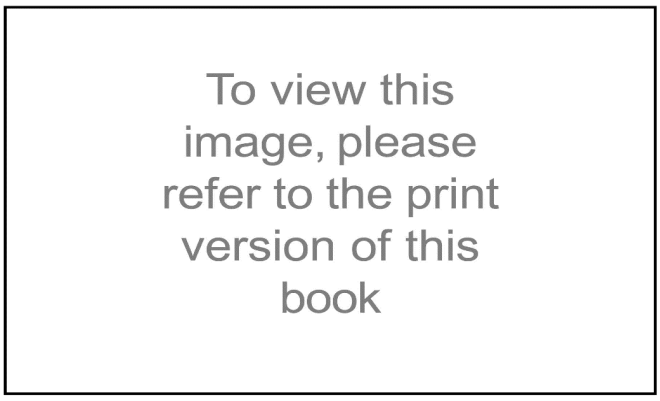

Fig. 13-4. *Ballooning effect of de-icing boots.*