

Speedplay Frog Cleat Mod for Better Latch Exposure

Jonathan Grot
April 26, 2009

Table of Contents

Disclaimer.....	1
Introduction.....	1
Materials.....	2
Procedure.....	3
Step 1: Remove and Disassemble Cleats.....	3
Step 2: Cut Away Obstructive Plastic.....	4
Step 3: Prepare Inner-tube "Shims".....	5
Step 4: Clean All Latch-Plate Parts.....	5
Step 5: Attach Inner-tube Shims.....	5
Step 6: Remove Excess Inner-tube Shim.....	5
Step 7: Reattach White Elastomer.....	5
Step 8: Re-Mount Cleats to Shoes.....	5

Disclaimer

This document is for general information purposes only. It is a procedure I performed that required the use of sharp tools. I claim absolutely no responsibility for personal injury or property damage on behalf of people who attempt to duplicate this procedure.

Introduction

I ride a Barchetta Corsa. It is my first recumbent bike. I purchased it used in January, 2009. It had platform pedals when I bought it. As I got used to riding the bike, I decided that I didn't like my feet slipping off the pedals when I hit bumps at 30 MPH. So I went to my local bike shop (LBS) and bought some extremely comfy shoes (Sidi Dominator 5's) and some Speedplay Frogs stainless steel pedals and cleats on the recommendation of a fellow 'bent rider. I had tried my friend's shoes and pedals, and thought the Frogs would be perfect. I installed the cleats myself based on the instructions that came with the pedals, and also some advice from the LBS. I love how the Frogs work in general. I was told by another fellow 'bent rider that I would definitely fall with both my feet attached to the pedals because I would stop the bike and forget to un-clip. With the frogs, that never happened on the five or so small training rides and two long (15+ miles is long for me at the moment) rides. Rotating my feet to get them unclipped just came naturally.

However, on my two long rides with the Frogs, my feet were coming unclipped at completely unexpected and inconvenient times: particularly when I was pedaling hard uphill and when I was hitting bumps going fast. Purpose defeated. I posted my issue on Bentrider Online (BROL) and also did some tinkering that same day and decided that there was not enough exposure of the latches to hold the cleats on. I determined this because I could put enough torque on the pedal with my hand to pull the shoe off the pedal straight backward, basically escaping the hold of the latch. After I made this determination I checked the BROL message board and found that someone else had a similar problem and that Speedplay told him to slip a patch of inner-tube under the latch. Before I read this I was planning to slip a rigid shim, like a piece of sheet metal under the latch elastomer, but I liked the inner-tube idea better.

The way the Frogs work is that two metal, mushroom-shaped tabs on the cleat hold it against the pedal while a small, metal latch (shown in Figure 1) allows the rider to clip into the pedal by pushing the foot forward over the tab on the pedal. The metal latch is momentarily forced into the housing, and when the latch clears the pedal tab you hear and feel a "click." Now you are locked into the pedal. The metal latch is attached to a plastic plate and the plastic bends behind the latch allowing the latch to retract into the shoe. A white elastomer

provides the springiness needed to force the latch back outward.

Figure 1 shows the initial latch exposure. I don't know what level of exposure is typical, but to the best of my measurements it was 0.67 mm before I started the procedure outlined in this document. The goal was to increase the latch exposure. I was able to increase the exposure to 1.05+ mm and the Frogs now work perfectly.

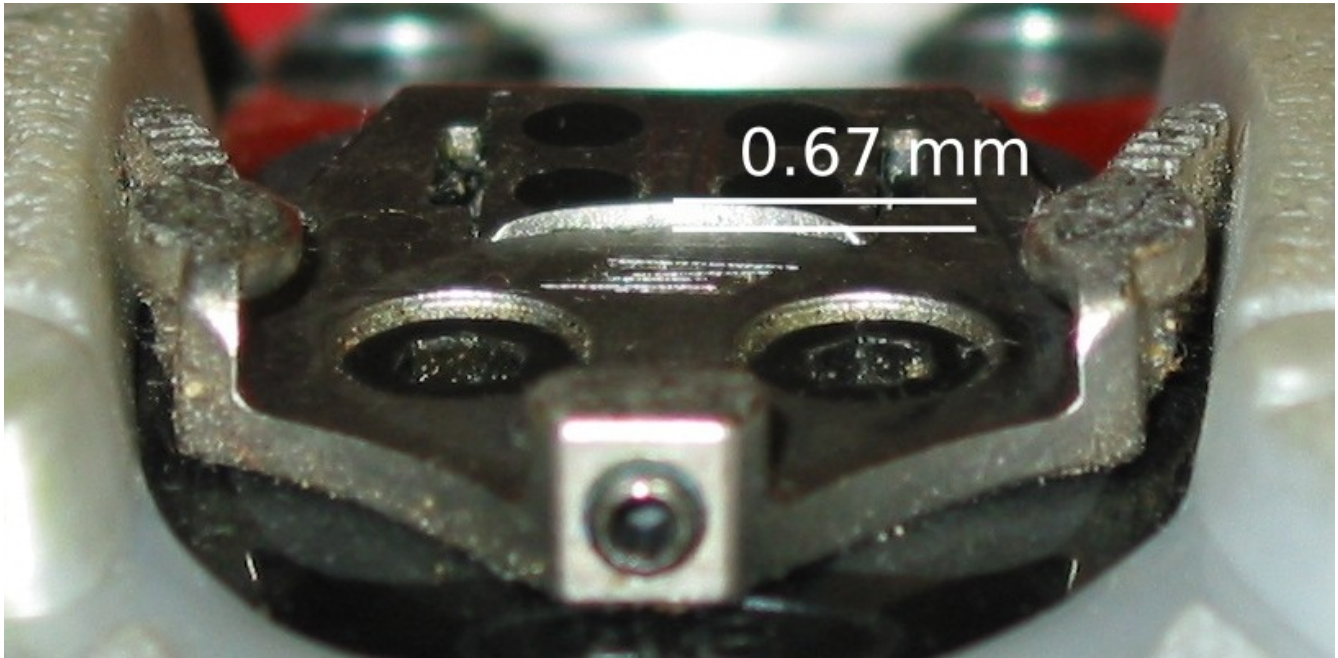


Figure 1: Initial latch exposure was 0.67 mm

Materials

Figure 2 shows the materials used.

1. Elmer's Craft Bond Multi-Purpose Spray Adhesive. I chose a spray adhesive because I thought it would be easy to work with and give uniform coverage. I chose this brand only because I remembered my wife used a spray adhesive for working with fabrics and I was just lucky she had a can of it in the house.
2. A brand-spanking new bicycle tube (sob, sniff). I had just recently replaced one tube on my upright hybrid bike, and bought a spare knowing I would probably puncture at least one tube every time I switch to/from my winter tires. I dug through the garbage for my punctured tube, but I could not find it.
3. Digital caliper for measuring the difference in latch exposure after the operation.
4. X-acto knife for trimming the latch plate and inner-tube shims.
5. Hex wrench to get the cleats on/off the shoes.



Figure 2: Materials. Not shown are a pair of tweezers used for transporting adhesive-coated parts, and a pair of scissors for cutting the tube.

6. A pair of tweezers that I discovered (after snapping Figure 2) to be extremely useful for transporting the elastomers with fresh coats of adhesive.
7. Scissors for cutting the inner-tube (also not shown in Figure 2)

Procedure

Step 1: Remove and Disassemble Cleats.

I used a 4mm Allen wrench to remove the Frogs from the shoes. I separated the latch plates from the cleat bodies (they come right apart). And for the sake of bicycle science I decided to risk sacrificing a set of Frog cleats and gently peeled the white elastomers from the bottoms of the latches. This seemed safe since the elastomers appeared much stronger than the adhesive when I tugged on it a little. They peeled off without any damage.

I spent some time examining the latch plate to see what I could see, and noticed what is probably a significant factor contributing to the problem of not enough latch exposure, and that is that the plastic molding that the metal latch is attached to obstructs the outward bending of the latch because it bumps up against the metal body of the cleat.

Figure 3 shows the plastic molding just underneath the metal latch. Since the photo is a little blurry, I made some annotations in the photos. The white dashes highlight the distortion of the plastic molding due to contact with the metal cleat body. I believe this contributes to the problem of limited latch exposure because the bend in the molding indicates the molding is fighting the force of the elastomer that is supposed to be pushing the latch outward.

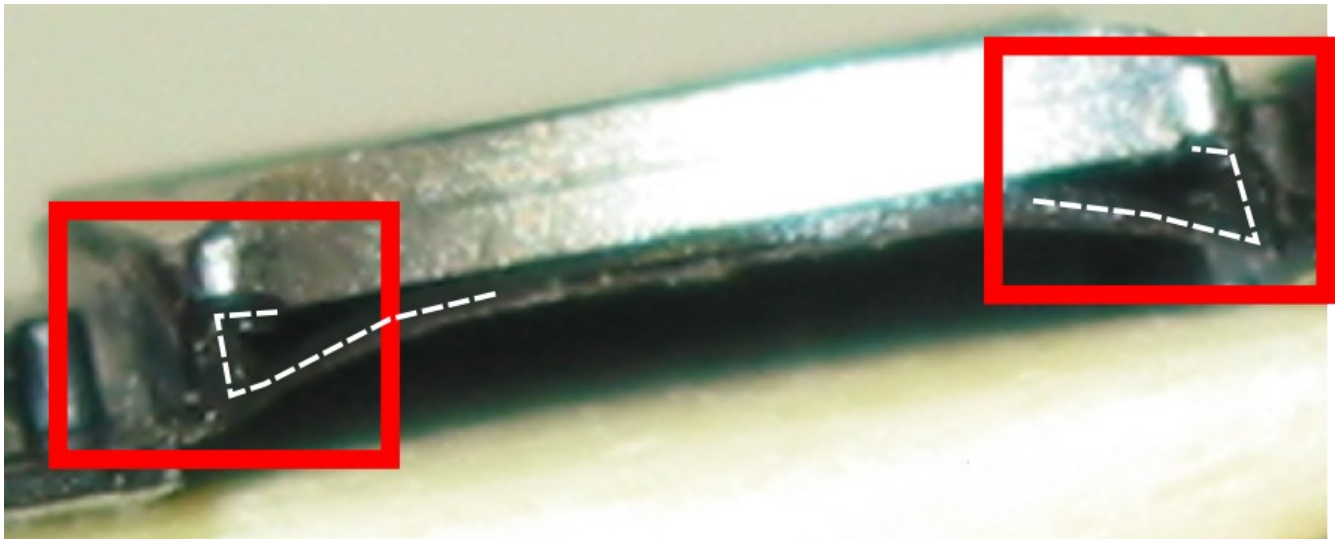


Figure 3: Obstructive plastic molding.

Figure 4 shows the latch plate re-assembled to the cleat body. Again the latch plate deformation is highlighted with white dashes.

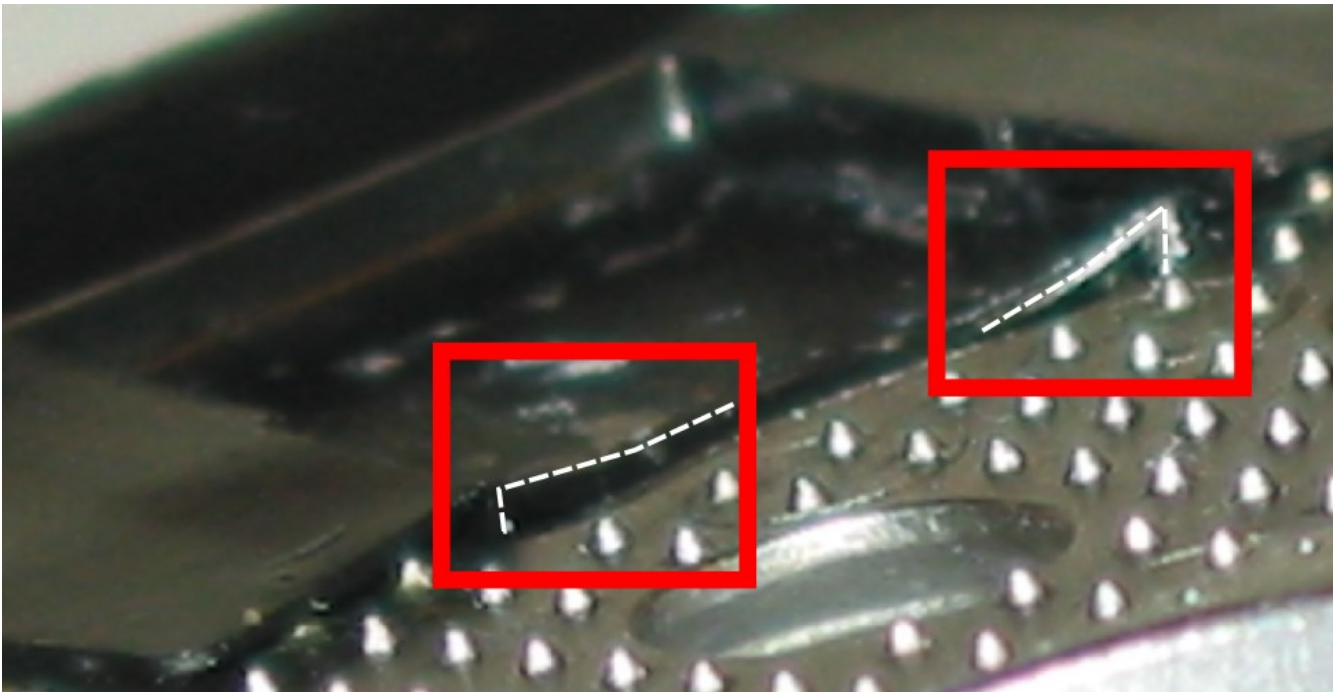


Figure 4: Molding deformed by contact with cleat body

The “wings” shown in figures 3 and 4 aren't the only parts of the molding obstructing outward bending. There is also plastic which is sort of “running over” the sides of the metal latch that also come in contact with the cleat body. Originally, I had planned on slipping a little square of inner-tube beneath the latch, but after this observation, I decided to add some surgery to the procedure...

Step 2: Cut Away Obstructive Plastic

I used the X-acto knife to shave off the plastic that was contacting the cleat body due to the fact that it extended past the the sides of the metal latch. Figure 5 shows the regions of the latch plate that were removed.

If you attempt this, please be careful. The plastic does not cut easily and an X-acto knife may not have been the best choice. In fact, now that I'm thinking about this in slow motion while writing, a metal fingernail file would have been much safer and probably would have done a nicer job.

No, I did not cut myself.

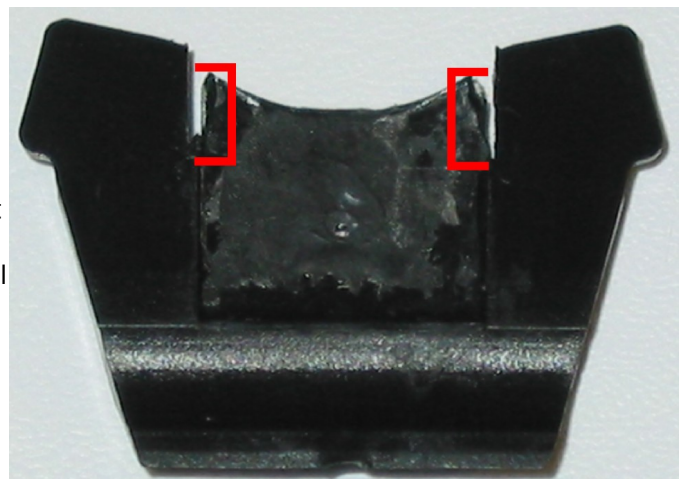


Figure 5: Red brackets show the regions where plastic was cut away.

Step 3: Prepare Inner-tube “Shims”

I reluctantly made a radial cut through my new inner-tube (this is for bike science!) such that the cut is exactly across the “length” of the tube. Then I made one more radial cut about the width of the Frog’s metal latch so that I had a little loop of ribbon about the width of the latch. I noticed there were ribs in the rubber, so I tried to cut out two patches such that the rib would be underneath the lip of the latch (see Figures 7 and 8) after I had installed the patches. I made the patch slightly longer than the length of the latch (front to back). I then trimmed the patch narrower than the latch to avoid contact with the cleat body or the plastic latch plate; because contact with anything other than the latch is what I am trying to avoid. Figure 6 shows a completed, cut-out patch.

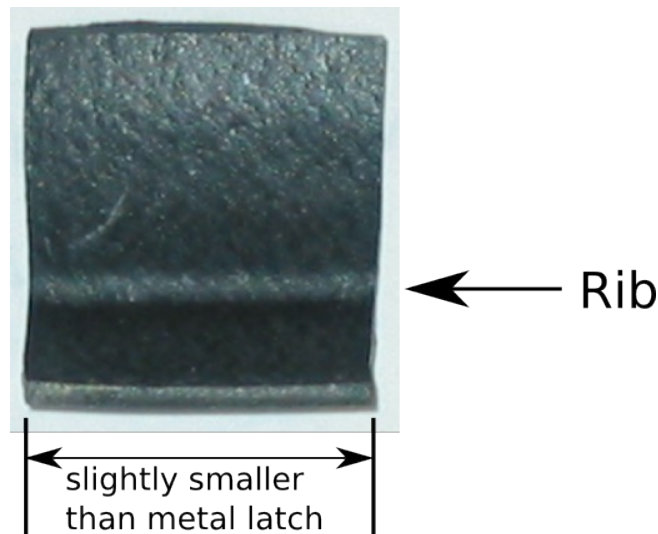


Figure 6: Inner-tube shim.

Step 4: Clean All Latch-Plate Parts (Including New Shims)

To avoid grief for the adhesive from the thin coating of grease I had over everything, I washed all the latch plate parts including the white elastomers and the new, cut-out inner-tube shims. **WARNING:** I recommend two small bowls: one with soapy water, and one with rinse water. Or, make sure you close the drain in the sink! I almost lost one of the white elastomers down the drain of the bathroom sink. Wash, rinse and dry.

Step 5: Attach Inner-tube Shims

To attach the inner-tube shims to the back of the latch, I put the shims on a piece of paper and sprayed the adhesive more toward the “front-pointing” side. By “front-pointing” I mean the edge of the shim that points toward the label on the cleat that says “front.” Anyway, a picture says a thousand words, and I forgot to take a picture. But I did a similar thing with the white elastomers and you can see the adhesive application in Figure 9. I sprayed the adhesive on the smooth side and not the side with the rib bump. The adhesive instructions say that for permanent bonds, the parts should be contacted within 15 seconds of application. So within 15 seconds of spraying, I used tweezers to transport the shim from the paper to the latch plate. The shims were cut such that the ribs would be positioned “under” the region of the latch (facing outward) where the lip is, so don’t forget to orient the patches so that the ribs will be located on the “rear pointing” sides of the latch. The adhesive was still quite wet, so I gently pressed on the shim with the tweezers until the shim stopped pulling away from the latch plate. The adhesive instructions say it takes at least an hour to set, so every 15 minutes, for an hour, I returned and applied a little pressure with my thumb to squeeze the shim against the latch plate to ensure a good bond. Figure 7 shows the shim in place.

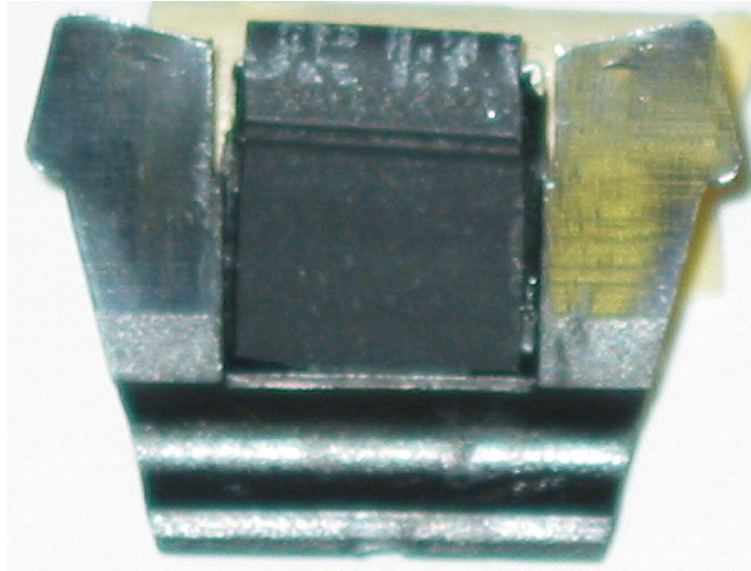


Figure 7: Inner-tube shim attached to back of latch.

Step 6: Remove Excess Inner-tube Shim

After the adhesive was set, I used the X-acto knife to carefully cut away the shims on “back pointing” side to match the contour of the latches. Again, the idea is to minimize contact with anything but the latch.

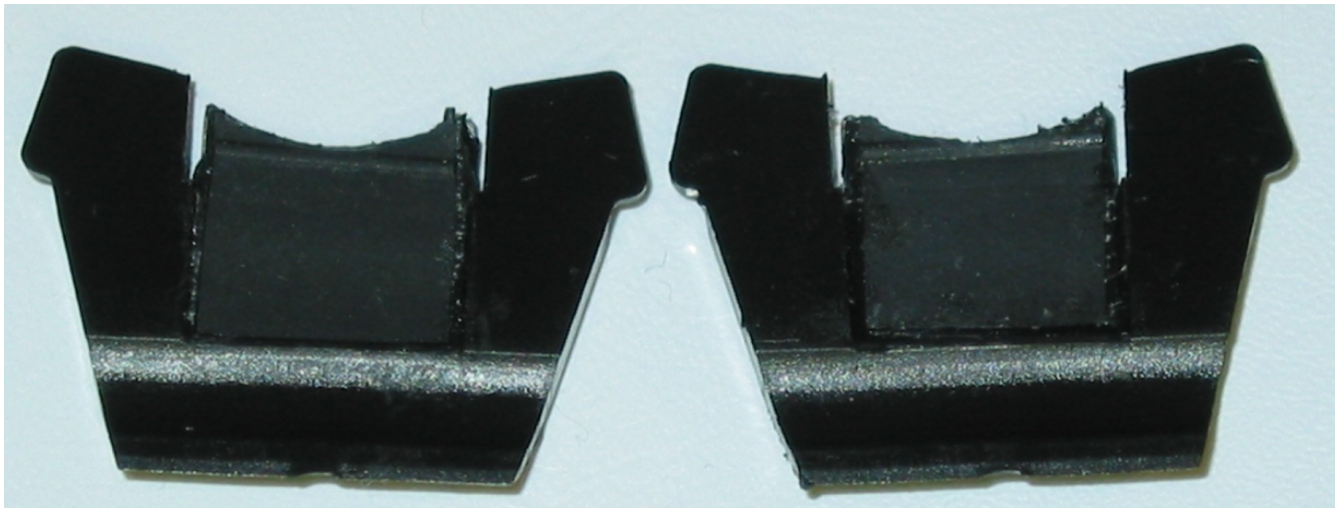


Figure 8: Attached shims contoured to latch shape. Notice the ribs are underneath the lip region of the latches.

Step 7: Reattach White Elastomer

As in step 5, I placed the white elastomers on a piece of paper, back-side-up, and attempted spraying adhesive on the front-pointing halves. The flap (pointing up in Figure 9) does not attach to anything and should not have adhesive on it. Figure 9 shows the result of one of the sprays; not perfect, but it was good enough.



Figure 9: Adhesive sprayed on front pointing half of elastomer. Contrast and brightness were adjusted with Gimp for visibility.

Figure 10 shows the re-attached elastomers. Notice the nice gaps between the latches and the latch plates (toward the photo “tops” of the latch plates). I let the adhesive set for an hour. Again, visiting the latches every 15 minutes or so to squeeze the parts together.

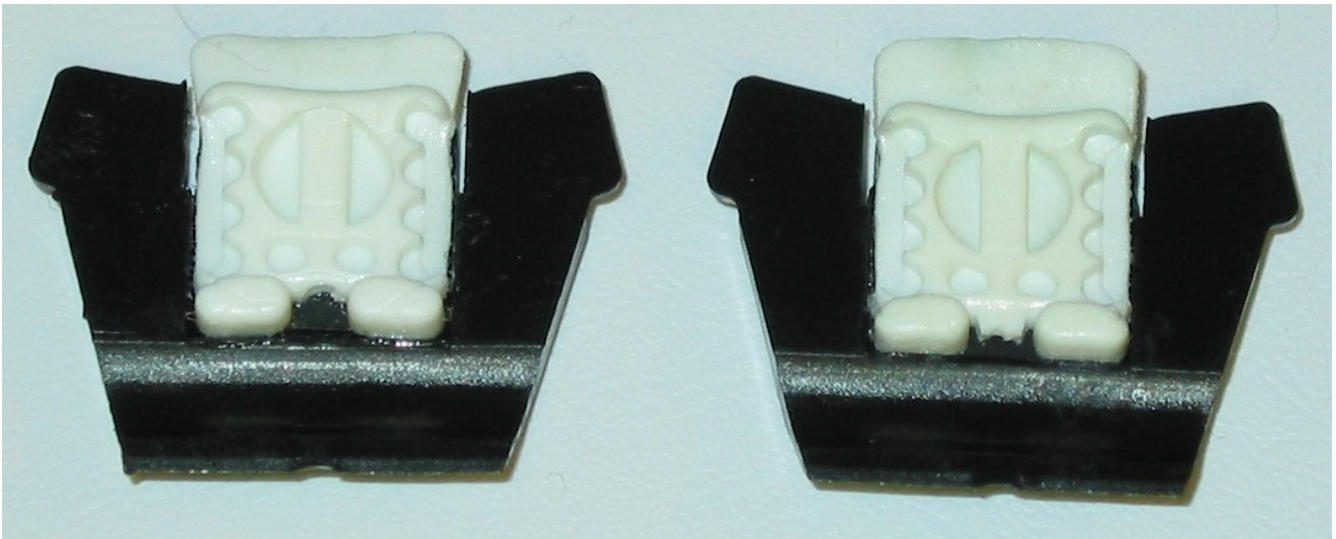


Figure 10: White elastomers reattached in original position over inner-tube shims.

Step 8: Re-Mount Cleats to Shoes and Test

I re-assembled the cleats (latch plates and cleat bodies) and fastened the cleats to the shoes. It was now the moment of truth: Did I gain any latch exposure from this operation? YES! The before measurement (Figure 1) was 0.67 mm. After the operation was complete, the left cleat had a latch exposure of 1.05 mm (56% increase) and the right cleat had an exposure of 1.09 mm (63% increase).

And now the moment of ultimate truth: **the test ride** (dun dun duuuuuuh....). I took my beloved Corsa on a six mile ride, over nasty hills and nasty bumps and potholes. I hit one pothole mid-turn (scary)! I tried hard to make those suckers release. Before the operation I would experience an unexpected release a few times a mile. On the brutal test ride, I experienced **ZERO** unexpected releases.

The operation was a success.