

# Seat Back Brace - Frequently Asked Questions

(From I/O Port)

## Why a Seat Back Brace?



What people don't think about when talking about Seat Back Braces is that when the seat travels rearward in an accident, the harnesses will then be loose. You have to question, would you rather take more of the G-forces in an accident by having your seat mounted solid, or would you rather be loose in your harnesses?

Take the following scenario. The racer mounts a brand new composite race seat into the car without a seat back brace. In an accident, the seat flexes, absorbing energy (which is good), but as the seat flexes rearward, the driver moves with it and then gets propelled forward as the seat returns to the original shape. (This is assuming that the seat has not broken.) The head, neck and body are whipped forward at a greater rate and a further distance than if the seat was mounted solid. So the body takes less force on the initial impact but takes more on

the secondary reaction.

Another problem is that the club (be it NASA, SCCA, PCA, BMW CCA, what have you...) has no control over the age of the seat, yet alone the quality of construction. The older the composite seat, the more brittle it becomes due to heat and UV light. Also, the weaker it becomes due to the constant flexing of normal race driving and untold number of crashes by the previous owner! The clubs also have very little control over how the seat is installed. Did the racer install the seat the same way as when it was tested by the FIA?

I can tell you from my experience as a scrutineer for NASA, the answer is probably not! The race car is not the same as the controlled environment of the FIA lab. The seat manufacturer probably has not even provided instructions as to the proper installation. The racer is left on his own to figure it out. I can guarantee to you that the seat manufacturer did not include movable seat rails when the seat was tested but racers routinely mount their seats to movable tracks. These tracks are a weak point in an accident. So, even if a seat can flex and absorb energy in an impact, what if the seat rails break? Then we get what happened at Lime Rock a few years ago that started this whole seat back brace rule in the first place. So do we really want to allow seats to be installed without a seat back brace? I think not!

The best thing that the clubs can do is to follow NASA's lead and regulate out the inexpensive plastic seats (designed for dune buggies) and mandate seat back braces on quality seats. The clubs should further mandate that the seat, seat back brace and head rest be designed to take a certain load in the rearward direction...and then they should test each car to make sure that it complies.

How many drivers out there right now would hesitate to subject their seat to a 300 pound load in the rearward direction? That is only two G's for a 150# driver. Many seats would break or bend at that force, yet these same drivers will go out there and race and risk their lives in these cheap seats. Why? I think it is because the average racer does not understand that there are seats out there that were never designed to take the forces found in a road racing accident. These seats were designed for autocross or dirt track where an impact may be at 40 MPH or maybe 60 MPH, not 120 MPH, which is a common speed we see on the

track. There is a big difference between crashing at 60 MPH and 120 MPH. The G-loads are twice as much! Our seats need to be stronger and the mounting needs to be stronger.

We are not driving Winston Cup cars at those speeds. Our cars are not all built alike and we race in groups where we might have a 1700 pound car along side a 3400 pound car. We might have a 250 pound driver in the 1700 pound car. Now what happens if these two cars collide? The 1700 pound car loses! The physics show that the energy of the 3400 pound car will transmit into the 1700 pound car and therefore into the 250 pound driver.

Do the math.  $F=MA$ . This means that Force equals Mass times Acceleration. This driver will need a seat that will withstand the forces involved. He needs a seat that is stronger than does a 150 pound driver in the same car. A 250 pound driver in a 3400 pound car needs even a stronger seat if the car were to hit an immovable object such as a wall.

This is true no matter what angle the car hits the wall. If the car hits the wall sideways, then the sides of the seat need to be stronger. The seat mounting should take this into account, too. This is a good reason to have a seat back brace bolted to the seat. If the seat is just resting against the brace, then it will not restrict sideways movement.

The BMW Club has a clever rule when it comes to the seat back brace. They require a brace in all classes. They give a minimum of 12 square inches for the plate against the seat back and they allow minimal padding between the plate and the seat. They do not require the brace to be bolted to the seat, but if it isn't, they recommend that the brace be designed to wrap around the sides of the seat to prevent lateral movement.

### **Why does I/O Port require their SBB2 and SBB4 braces to be bolted to the back of the seat?**

The SBB2 brace is designed to clamp to the shoulder harness bar of the roll cage. If the brace was not bolted to the back of the seat, in an accident, the rearward motion of the seat could force the brace to rotate on the shoulder harness bar rendering the brace useless. When the brace is bolted to the back of the seat, this makes a solid connection between the seat and the roll cage and the brace cannot rotate on the shoulder harness bar. This is in addition to helping prevent lateral movement.

The SBB4 brace bolts to the roll cage tabs and locks it in place, and using 2 bolts keeps the brace from

rotating. However, similar to the SBB2 brace, the SBB4 brace has the plate behind the seat bolted to the rearward bars to allow for seat angle adjustment. In an accident the plate could rotate becoming a sharp edge. When the plate is bolted to the back of the seat, not only will the brace plate not be able to rotate, you will also gain lateral support.

If you need a brace that does not bolt to the back of the seat, then consider our SBB3 brace for composite seats.

### **Why do the composite seat manufacturers not want you to drill holes in their seats?**

You hear a lot of talk about FIA-rated seats and how the manufacturers do not want the racer to drill holes in the



The Best In Safety Equipment for Less!



seat to install a seat back brace. This is understandable because the seat manufacturer has no control over how and where you drill the holes. Also, these seats may not be built strong enough to take a rear impact with a piece of metal across the back of the seat. What happens is that there is a sharp edge for the seat to break over. If the brace was not there the seat might bend and not break. You exchange this seat flexibility for loose harnesses. Increase the surface area of the plate behind the seat and the seat will be less likely to break.

I/O Port now offers a brace for these composite seats. Our brace has a larger plate behind the seat, about 34 square inches. We pad it with  $\frac{3}{4}$ " high-density foam. This allows the seat to flex a bit under normal driving and in an accident. We highly recommend getting a new seat when the FIA rating expires, but if you rather extend the life of your seat at the track, this brace is a great choice.

### **Seat back braces and Tube Frame seats.**

How do you brace a tube frame seat? You don't! Get rid of the death trap and get a real racing seat!

### **Seat back braces and fast driving.**



If you want to drive fast on the track, then you need to be able to feel the car's movement on the track. You need to be able to feel the car as it starts to slide sideways, brake into the corner and accelerate out of the corner. You feel this grip through your butt, back and shoulders. If your seat is moving around and flexing as you corner, brake or accelerate, how can you accurately feel what the car is doing? Do you want to go faster? Install a seat back brace. And, one that bolts to the seat!

Right now, go out to your race car and grab the top of the seat back. Move it from side to side and fore and aft. Go on, I will be here when you get back. How far did it move? 1 to 2 inches? They say that 1 inch of movement in the seat is equal to 1 foot of movement on the track! If your seat moves 2 inches while your car is sliding 2 feet at the same time, then how can you possibly know

when your car is about to spin? How can you catch a spin that far into it? A seat back brace is not only an upgrade in safety, it is also a speed secret.