

## *TeamFAST's AIRWAVE Suspension*



At last, someone got the trike ....right and face it, the voluminous transfusion of snowmobile plasma was critical in bringing this new and exciting platform to life. A quick check into US patent docs make it very clear just how much the snowmobile has conceptually influenced its design. The Spyder has quickly proven its metal in both high and low speed cornering. Its inherent stability is welcomed by most who've ridden it with the exceptions generally being limited to two wheeled purists. However most cycle rider's soon figure out that though different, directional changes are both exhilarating and efficient.

A great feature the new platform enables is the unit's substantial 525 lb Maximum Vehicle Load. In covering the varied load situations that this large MVL presents, an ample challenge was placed upon suspension engineering.

Example: With the 525lb MVL, the variation of loads the rear suspension has to control are many. A single rider only load of say 175lb requires a specific amount of spring rate and preload. When a passenger and gear are added that number can go up another 350 lbs. That's 200% of additional mass, most people can understand, that amount would require quite a different spring rate and preload in achieving optimum bump isolation and ride quality.

As a production Spyder owner, the only tuning option available is spring preload, the spring

rate cannot easily be changed thus it's ultimate selection for production must be a too firm compromise for most situations. Out of the necessity to be able to take the big hits while fully loaded, the selected spring rate needs to match loads nearer the high end of the 525lb MVL number. This leaves the most common solo rider condition with a spring rate that is much too firm for optimum ride control / quality. To cover this a rider must use a preload setting that is too low, resulting in lost travel due to sag.

In Can-am models through 2010, spring preload has been a tough adjustment that's accomplished by crawling under the rear suspension and cranking preload in and out. Can-am's latest unit have been upgraded to pneumatic preload adjustment, a step in the right direction.

Ultimately in vehicles like this where the MVL is over 50% of dry weight (929lb) what is needed is the ability to vary the suspensions spring rate to properly match the great force variation between light and heavy load conditions.

Considering the Spyder's DNA, what better place for Spyder owners to look for a ride / load solution than the experienced group at TeamFAST.com. The long seasoned suspension company manufactures the Assault Air-Shock line and Airwave Suspensions and the company is long known for their innovations in suspension technology.

To get a better understanding of how the Assault Air-Shock could be the answer to the ride quality challenges that the diverse loadings of the Spyder presents, we asked Gerard Karpik of TeamFAST to give us an explanation and the following is his response.

Gerard Karpik stated, First one must dissect the premise that preload adjustment is the "answer" to all suspension changes for load and conditions. While preload adjustment can work well for small changes in payload it can't handle large changes without hurting the most common and annoying small to medium road irregularities.

For example let's say a second rider of the same weight jumps on board. One would naturally assume that doubling the amount of preload on the rear spring would take care of the doubling of payload. This all makes some sense for the Initial Spring Force and loads and will work alright in small bumps, see the simplified examples below:

<b><u>Initial Spring Force</u></b>	<b>=</b>	<b><u>Spring rate</u></b>	<b>x</b>	<b><u>Preload in inches</u></b>	
60lb	=	100	x	.6"	One rider
120lb	=	100	x	1.2"	Two riders <b>Preload Force up 100%</b>

Where the problem shows up is in controlling bigger and higher speed bump events. While pre-load does double the initial force, the Ending Force will only go up incrementally:

<b><u>Initial Spring Force</u></b>		<b><u>Spring rate</u></b>	<b>x</b>	<b><u>Spring Displacement</u></b>	<b>=</b>	<b><u>End Spring Force</u></b>	
60	+	(100lb	x	3.0")	=	360lb	One rider
120	+	(100lb	x	3.0")	=	420lb	Two rider <b>End Force up 17%</b>

The 17% increase in End Force will not help enough to resist bottoming of the rear shock /

spring in bigger bump events when heavily loaded, so the answer for the owner is to increase preload even more until an acceptable amount of End Force is generated. And though a large enough adjustment may stop the bottoming, the loss in the far more frequent small to medium bumps will be significant because the Initial Force numbers go way out of proportion in this approach. What is needed here is actually a change to a higher spring rate which of course is totally impractical because no one is going to want to be switching springs between one and two riders.

So....what is the answer?



In actuality there isn't an absolute answer to the equation but there is a solution that goes a long way to improving the situation. The naturally progressive nature of an air spring and its static pressure setting (in psi) is extremely advantageous in responding to this challenge, see simplified example below:

<u>Initial Spring Force</u>	<u>Spring rate</u>	x	<u>Spring Displacement</u>	=	<u>End Spring Force</u>	
60 (20psi) +	( 74:302	x	3.0")	=	418lb	One rider
120 (40psi) +	(114:364	x	3.0")	=	591lb	Two rider <b>End Force up 41%</b>

As seen the air-spring's rate is progressive and rises as displaced delivering greater End Spring Force for improved bump isolation both with single and double riders. This eliminates any need to run with excessive preload and loss of ride quality as with the stock system. What could help.....to make this easy and practical?



For a rider to easily go between one and two riders, with and without gear a simple, efficient and compact on-board air compressor was employed. And to control the air-compressor there needed to be a simple and effective switching method.



If an owner bolts one in, what does he really get?



According to Gerard Karpik, “whether you are into hard charging sport rides or two up – full bag touring, the air system delivers command and control over nearly all road surfaces and challenges. The system’s push button air switch easily adjusts to the both surface conditions and load, delivering the rider much more comfort and improved isolation from all small through larger jarring bump events. TeamFAST is very proud of the benefits this system delivers and flat guarantees that there is a measurable improvement in ride quality over all existing Can-ams including the 2011 models. We back up this guaranty with our:

**45 Day - RIDE IT AND LOVE IT - or return it**

**GUARANTY**

TeamFAST Website: [www.teamfast.com](http://www.teamfast.com)

More SPYDER AIRWAVE Info on Product Page: [www.teamfast.com/products](http://www.teamfast.com/products)

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