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# Foretravel Torsilastic Suspension

This is a discussion of maintenance, adjustments and changes to the Torsilastic Suspension found on the 1991-1995 Foretravel U225/U240. With these enhancements, the ride and handling of the Torsilastic-suspension Foretravel rivals that of air coaches, while maintaining the mechanical simplicity of the original suspension. Noted improvements were made to overcome body sway, bounce, vague steering and harsh ride over small bumps. These changes were made with the assistance of engineers at Goodrich, Bilstein, Koni, and especially Wayne Wells at IPD.

The original 15,000-lb rear springs were replaced with 19,000-lb springs from Goodrich (Goodrich PN: 06-81-6015). The late model U240's rear wet weight is over 14,200 lbs. With the original spring, we were out of adjustment shims and could not achieve ride height specs of 32-33". This is generally NOT an issue on the U225 with its much lighter engine and transmission. With the new springs there are 5 shims on the right and 6 shims on the left @ 32 1/2" ride height. Ride quality has not suffered, and there is slightly less body lean on bumps and corners. Particularly if you are out of adjustment shims, get 19k springs when replacing the rear springs.

If ride height is too low, the suspension can bottom out over bumps causing very poor ride and potential damage. Removing one shim from both in front of and behind a wheel raises the body at that position 1/4". Before attempting ride height adjustments, verify that the 32 nuts on the shackle arm to frame bolts are 2X normal length to width ("tall boy nuts"). Normal style nuts will not torque to spec (110-120 ft lbs.).

In 2002 Goodrich sold the Torsilastic division to Lord Corp: 800 458-0456. Lord Corp has made no parts and offers no support for this suspension.

Our front springs are original. At a ride height of 32 1/2"- spring to stop clearance of 3 1/2", there are 6 shims on both sides and actual weight is well within the 9,000 lb capacity. I agree with Rob Lovegrove @ Goodrich about not replacing springs without a reason- I have seen Dina buses in Mexico with over a million miles of rough use on their torsilastic suspensions.

Shock absorbers are a real problem, as those spced by Foretravel are too short and the valving is not optimized for the Torsilastic Suspension. In the rear, at a ride height of 32.5", there is only 2.48" of travel on extension with the Foretravel spced Bilstein AK1241. On extension greater than 2.48", the rear axle "hangs by the shocks" risking broken shocks and broken shock mounts. If the lower shock stud breaks, it is obvious. The upper mount can break at the upper or lower weld holding it to the "C" channel frame member. Normally the lower weld breaks. This break is less obvious, but prying with a screwdriver will reveal the break. This can be rewelded and a reinforcing angle can be added. As with any electric welding, follow all the proper electric disconnect procedures to prevent problems with computers, PC boards, alternator, etc.

If the upper shock mount (bushing welded to plate welded to frame "C" channel) is wallowed out, the 3/4" bushing hole can be tapped and shock bushing drilled/reamed to 20mm (.0374" oversize) or to 7/8" (.125" oversize).

The Torsilastic suspension tends to ride stiffly, particularly if the front axle is not loaded close to its GAWR. ADDITIONALLY, the Torsilastic spring is TOO efficient, causing excessive bouncing and sway. These two opposite factors really challenge the shock manufacturer—Koni's philosophy of soft on compression and stiff on extension really suits this suspension best.

After trying many alternatives from Bilstein and Koni, the best shocks for the Torsilastic suspension are: Front Koni 88-1547-SP1 (adjusted full firm less 1/2 turn). Rear Koni 90-2256-SP1 (adjusted 1 turn firm).

In front, the Koni 88-1547-SP1 gives .16" more travel on extension than the OE Bilstein B46-1868 (@32.5" ride height 3.27" on extension Vs 3.11"). Valving on compression is 52% softer than the Bilsteins for a much softer feel over bumps. It is 330% as stiff on extension, so the overall control is much better.

In the rear, the Koni 90-2256-SP1 gives a critical .75" more travel on extension than the OE Bilstein B46-1868 (@ 32.5" ride height, 3.23" on extension Vs 2.48"). Travel on compression with the Koni's is still a more than adequate 4.45". Valving on compression is 58% softer than the Bilsteins for a softer feel over bumps. It is approximately 40% stiffer on extension when adjusted full firm, so the overall control is better.

Loading the front axle to near GAWR (full fresh water and fuel and carrying heavier gear forward) helps soften the ride and lessens the effect of side winds.

Ride quality is sensitive to front tire pressure. Following the tire manufacturer's tire guide recommendation for our actual weight, we carry 90 PSI front (factory specs at max GAWR: 95) and 85 PSI rear (factory specs at max GAWR: 85) on good roads. OE tires are Michelin 9R22.5's. Replace tires after 6 years, irrespective of tread. The last three digits (on tires built before 2000) of the DOT... number molded into one side of the sidewall indicate the week and year of production (DOT ....347 was built the 34th week of 1997 and is due for replacement.). If buying new tires, consider a wider tire such as the Michelin XZE 255/80R22.5 as we did. They have almost exactly the same rolling diameter, but are wider and will carry the same weight with slightly less air pressure. As with any coach, have front tire runout checked, and if over .030" have it trued. Spin balance front tires ON THE VEHICLE after minimizing runout.

Tie rod, drag link and front track rod boots were replaced. The ends were mechanically good, but the boots were age cracked, allowing dirt in.

Front end was aligned to factory specs— caster angle of 4.7 degrees left and 4.9 degrees right, and toe in of 1/16".

A Safe-T-Plus steering cylinder was installed. It is a steering dampner AND exerts over 200 ft lbs. of centering force on the wheel. This was installed early in the process. In hindsight, I would probably wait until other changes were made to verify the need for it before spending the money. Front wheel turning angles were checked and set to Rockwell (axle) and Sheppard (steering box) specs. For a quick check to see if you may be able to increase your turning angles, look at the two small stop adjusting screws (top and bottom) of the Sheppard steering box (A good picture of this is in the Sheppard manual that came with the coach.). If the screws are not screwed out almost flush with the surface, you might be able to gain some turning angle. Our coach was misadjusted at the factory, and by adjusting we gained 14 degrees of turning angle!

Draw key nuts (2 on each side in the middle of steering knuckle) are torqued to 30-45 ft-lbs with front wheels off the ground. They hold the king pins in place! Check these about every 4th lube job with wheels off the ground.

To check for kingpin bushing wear, with the front wheels off the ground, have someone push-pull HARD on the wheel at 6 and 12 o'clock. Look for side to side play at the upper and lower king pin bushings. Max play is .010"

The rear part of the protector bar under the engine drags the ground on steep departures, particularly if the ride height is not toward its highest setting. The oil pan on the Cat 3208 is low enough to require the bar as it is. The oil pan on late model U240's with the Cat 3116 is several inches shallower in back. We got the same heavy gauge, unseamed pipe from Foretravel and had a local shop reweld it. The lowest point on the rear bar is now  $\frac{1}{4}$ " ABOVE the bottom of the side plates resulting in an increased ground clearance of 2.0".

Per Rob Lovegrove with Goodrich, when storing the coach, use the jacks to take half the weight off the wheels. This helps the tires and torsilastic spring (and is actually a good idea on any coach irrespective of suspension).

Engineering assistance from Goodrich and particularly from Wayne Wells at IPD lead to some MAJOR suspension enhancements. IPD was commissioned by Safari in 2000 to do a major redesign of the Safari torsilastic suspension (the redesign was called Velvet Ride 2—the 2 denoting the changes from IPD), so Wayne was already familiar with the Torsilastic Suspension. At IPD's suggestion, an IPD front custom 1  $\frac{3}{4}$ " sway bar with Urethane bushings replaced the OE 1  $\frac{1}{2}$ " bar. A rear 2" sway bar with oversized Urethane bushings replaced the original 1 $\frac{1}{2}$ " bar. Together, they materially reduce side to side body sway and allow for an increase of 8-10 mph in a curve with less lean and much less under-steer. Little increase in ride harshness or noise level (the two possible negatives) was noticed.

An IPD custom rear track rod (panhard rod) was also installed. It goes from one side of the rear axle to the frame on the opposite side to control sideways movement of the body as it pivots around the torsilastic shackles. It has made a big difference on curvy roads, again with no negative side effects. Prior to installation, when entering a corner, you turned the wheel, the rear end "took a set" (inducing oversteer), requiring you to dial out some of the wheel turn, then add wheel turn to continue around the corner. Now you do not have the rear end "taking a set" to contend with. I did all the installations with the exception of the welding of the track bar bracket on the rear axle.

We like the Foretravel U-240's: high mechanical quality; solid walnut interior; 96" width (particularly on the narrow roads we enjoy traveling); overall coach strength and lower height with good basement storage afforded by the unihome construction; size (36'); maneuverability with the 228" wheelbase and 50 degree front turning angles; and interior layout (Side Bath Island (queen bed) Dinette). The torsilastic suspension is simple and rides and handles very well when set up properly. I also like the Cat inline 6 (3116), Allison 6-speed transmission and full sized side mounted radiator on the 1993 models. We just completed an interior remodel as well as the mechanical upgrades.

by Brett Wolfe

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