Type 26 Register Update No. 6

I have had many enquiries relating to the methodology involved in accurately adjusting the height of the steering rack to minimize the effects of bump-steer on all road going Elans. So this article also covers types 36, 45 and 50!

Elans, as you are all aware, use shims of specified sizes under each steering rack clamp. If these get lost, damaged, mixed up etc. the correct shim pack to avoid bump-steer needs to be re-established.

Reasons to check

If your car tends to self-steer after it has hit a bump in the road even though you have not changed input on the steering wheel, you could (there are other reasons!) be suffering from excessive bump steer.

You have bought a new or second-hand chassis that has lost the information of how much shimming to use under each rack clamp.

You choose to use a different rack clamp system to the original, potentially causing the rack to be a different height from the platform.

Even if you are fortunate enough to avoid all bumps, one thing you can't avoid is applying the brakes. Think what happens to the front suspension when you brake and you will realise that it is moving in exactly the same way as if you had hit a bump.

Methodology

I do stress that what follows is only my system and is not intended to give the impression that the practice of others is inferior. I have been asked to recite how I have tackled the job and I hope that the explanation that follows is clear. I strongly urge that any one who is not sure how to do this job or who has any doubts about his or her completed work should have the suspension of the car professionally checked by a respected expert.

Set-up

As I have mentioned in previous updates, the reason I needed to adjust rack height was that the new ungalvanised chassis I had bought had no information on the shimming thickness required.

The methodology I describe is based on a rolling chassis without body. Nevertheless these principles can be easily adapted for a chassis and body. Please refer to illustrations.

Support chassis unit securely using trestles as shown. At the front, arrange a rigid support across the trestles for the chassis to rest upon, so any sideways play is minimized.

Attach a datum plate ("A") vertically to each trestle using a pair of G clamps or similar. Ensure that these are parallel to each other and to the centre line of the chassis. These plates MUST be absolutely true, not a warped piece of ply!

Remove both spring/ damper units complete.

Loosen each wishbone to chassis spindle nut and nip back up, so that each front hub assembly can move up and down freely with no play.

With reference to the workshop manual, establish full droop, normal ride height and full bump positions for each hub assembly. I made a length of wood ("B") for each hub. This supported each hub to droop height by placing it under the trunnion. Simply adding two further wooden blocks then increased the height to "normal ride height" and "bump".

I used a U section aluminum extrusion approx 1.2M long ("C") clamped at its mid-point to each disc with bulldog clips, to accurately establish and set correct toe-in at normal ride height. The extrusion also extends to the rear of the hub, so that accurate measurements (to 0.5mm typically) can be made to the datum plates at all the three hub heights (Droop, Normal and Bump). Whatever material you use for this needs to be rigid and absolutely straight.

Clearly mark two positions on each extrusion (A, B and C, D) approx 300mm apart and at the same distance along, such that they align to each datum plate for the full travel from droop to bump. See illustration.

Ensure the hubs are in the straight-ahead position (easy when you have set the datum plates parallel to the chassis centre line) and ensure that they remain in this position for all measurements.

Measurement

Clamp the rack to the chassis in the normal way. In my circumstances, not knowing any likely shimming sizes, I used no shims as a starting point.

Set the hubs to full droop, and carefully take measurements from positions A, B on the right-hand aluminum extrusion to the right-hand datum plate. Repeat for the left-hand side and positions C, D.

Repeat this procedure with the hubs at normal ride height and full bump.

The total toe-in measurement is (B-A) + (D-C)

You will now have three sets of total toe-in readings. In all probability the readings at the extremities of suspension travel will differ wildly from the correct toe-in measurement set previously at normal ride height.

In all probability you will notice that (B-A) readings will vary from the (D-C) readings. This is the advantage of using an external measuring system rather than a trammel between the front wheels – it lets you know the alteration on each side rather than the total alteration in toe-in.

The difference between the min/ max readings of total toe-in represents the amount of bump-steer, and the objective is to eliminate this. i.e. to maintain the same toe-in throughout all suspension travel.

Due to the geometry on the Elan:

At full bump: Adding shims decreases toe-in; removing shims increases toe-in

At full droop: adding shims increases toe-in; removing shims decreases toe-in

So now you can start to add or remove shims to completely eradicate toe-in variation over the range of suspension travel. It is interesting to note that removing or adding shims from one side of the steering rack will affect measurements on the other side! But, with practice, you will soon be able to adjust the rack height such that there can be less than 0.5mm variation of toe-in throughout travel from full droop to full bump.

The Type 26 register continue to offer parts that are all excellent quality, and are made as closely to the original design as possible unless stated otherwise. Please let us know if there is a particular part which you need. A full list was published in Club Lotus News issue 3 2008 and we will be displaying some of them at Donington (and hopefully will have windscreen tie rods available to suit type 26 cars.

If you are interested in any of them, or would like to make contact for any other reason, then please contact Tim Mees or Charles Giles by email tim.mees@hotmail.co.uk or 01189 891705.

Tim and Charles