



Testing Times

Issue 18

May 2005

Welcome

Welcome to Edition 18 of Testing Times.

We have another interesting collection of items for you again in this issue including some followup information as a result of an article in Testing Times 17.

If you have comments on any of the articles here please e-mail to:

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LPG Training

As foreshadowed in the last issue of Testing Times, restrictions on who can issue a RWC for an LPG fuelled vehicle are about to be introduced. From the 1st November 2005, only mechanics who have AAFRB accreditation or who have successfully completed the approved LPG for LVTs training course offered through distance learning by Box Hill Institute can inspect vehicles fitted with LPG. If you haven't already done either course and want to continue to be able to inspect LPG vehicles for roadworthiness you will need to do something about it soon.

LPG Testing Requirements

What is an LPG fuelled vehicle? This is very obvious with a dedicated LPG vehicle but there has been some confusion with dual fuelled vehicles particularly when the owner does not use the LPG system. If a vehicle is fitted with either an LPG tank or LPG filler then for safety, the rest of the system MUST be connected, fully operational and pass all the inspection requirements set out in Australian Standard AS1425 other than those which require the LPG system to be opened to check.

If the LPG system is not required, then:

- the LPG tank must be removed
- the LPG filler must be removed
- the connections from the converter to the engine must be removed

- the air intake must be reverted to the standard pollution equipment setup.

These clarifications have arisen from an analysis of recent incidents and from the Coroner's recommendations. If you follow these guidelines then there will be no room for a mishap to occur.

Great Hilux Feedback

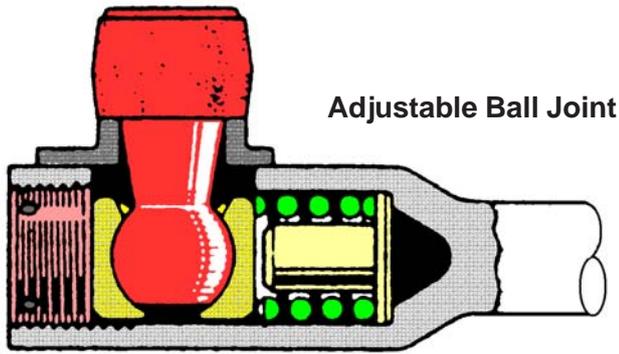
The article about Toyota Hilux drag links in the last issue created a wealth of feedback. While some said it was the result of a well known problem and provided the reasons and cures, many others were clearly not aware of the issue.

The Hilux has a range of different steering linkage setups depending on the model and version and whether it has a beam axle or an independent front suspension. On at least some versions both non-adjustable and adjustable ball joints are used. The problem appears to be the consequences of poor maintenance of the adjustable ball joints - mainly insufficient lubrication and incorrect adjustment frequency.

With adjustable ball joints the ball is held between two half cups [shown yellow in the diagram overpage] and these can be adjusted to compensate for wear. If they are properly adjusted and lubricated the wear occurs over most of the contact surfaces and they remain reasonably spherical. Between services this normal wear is compensated for by the pre-load spring [shown green overpage].

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However, if the ball joints are not regularly lubricated and adjusted correctly, they soon develop more free play than the preload spring can effectively handle. The ball then starts to hammer in the half cups and this further accelerates wear much of which now occurs in the straight ahead position where most travel occurs. As a result, the once circular ball and half cups quickly become oval.

Now the real problem starts when someone finally adjusts the ball joints to take out all this excess free play. In the straight ahead position the steering will not have any excess free play but there may now be insufficient clearance for the oval ball to turn between the newly adjusted half cups when the steering goes to the extremes of lock. Severe binding is likely to occur and in this situation something has got to give – unfortunately it is usually the shaft of the ball. It gets sheared off at its weakest point and suddenly the steering wheel has disconnected from the road wheels.



What's in this for you? If you are responsible for the routine maintenance of the vehicle then make sure it is properly carried out in accordance with the manufacturer's instructions. If you are simply doing a roadworthiness inspection be VERY, VERY wary of a steering system that has any noticeable increase in stiffness when turned to extremes of lock. It is very likely that the ball joints have just recently been adjusted up to get rid of the free play so that you will pass the vehicle.

Note that adjustable ball joints are also commonly used in heavy vehicles so that what applies to the Toyota Hilux also applies to the steering systems of many heavy vehicles.

The Big Truck Seatbelt Issue

What trucks are required to have seatbelts? The answer is set out in detail in Vehicle Standards Information sheet N° 21 but just to recap,

- * goods vehicles over 4.5 tonne built from 1 July 1977 - seat belt for the driver and the outer front seat passenger.
- * goods vehicles over 4.5 tonne built from 1 July 1992 - seatbelts for all seating positions.

It is pretty straight forward when we consider what type of seatbelt, too. Up to 1 July 1992 the minimum requirement is a non-retractor type lap belt. From 1 July 1992 onwards all seat belts must be the retractor type and for vehicles up to 12 tonne GVM a lap/sash seat belt is required for the driver and the outer front seat passenger.

A normal seat belt retractor locks under two different sets of circumstances:

- * if the vehicle experiences very high decelerations; or
- * if the seat belt webbing strap is pulled out quickly.

The first type of locking is not so much the problem but as the suspension seat bounces up and down the webbing can be pulled out fast enough to lock the mechanism of a normal retractor. Drivers complain that not only does this result in constant snatching of the seat belt but it can end up in progressively tightening the seat belt until the seat is held down in its lowest position and the driver very tightly strapped in. That is one reason why drivers don't like wearing the seat belt.

To try and overcome this problem the N4 type retractor was introduced. This retractor required higher decelerations before it would lock but more importantly, a much higher strap pullout speed was required before it locked. This meant that the belt could reel in and out quite quickly without locking. Initially, this type of retractor was not mandatory and only became mandatory from 1 July 1996 for suspension seats where all the anchorages were not fixed to the seat.

Of course, with two or more straps to every seat belt this still does not solve the sawing problem unless the lap anchorages are fixed to the seat.



So why don't manufacturers fix the lap parts to the seat? The strength of the seat and/or the floor is the main reason. It is not much good being well restrained in a seat if the seat comes adrift. Enter the tether strap. This strap is used to anchor the seat to the back wall

of the cabin and the tether strap retractor allows the suspension seat to move up and down freely. In a crash the retractor locks and transfers much of the seat belt loads to the back wall of the cabin relieving the seat mounts and cabin floor.

While many new top of the line trucks are now fitted with suspension seats that have all the anchorages mounted on the seat, there are still many trucks that are fitted with standard seats and seat belts as original equipment. If these are later fitted with suspension seats either by the dealer or someone else and the seat belts not changed to suit, the old problem is perpetuated. This can happen if the fitter is not aware of the ADR requirements but in some cases may happen to simply save money. After all, the seat belts are in perfect condition so why remove them? Well now you know why they should be replaced and why you should check the type of retractor fitted.

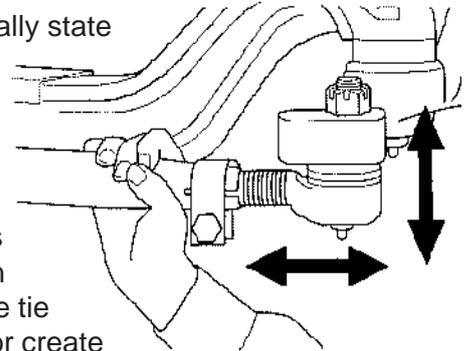
Seat belts save lives especially in trucks – but only if you are wearing them. In one study of crashes involving prime movers with trailers more than 200 drivers were not wearing seat belts while 20 were. 45% of the unbelted drivers were killed or seriously injured, compared to none of those who wore belts.

Dana Spicer Ball Joints

Just about every manufacturer has different wear tolerances and methods of checking ball joint free play so you need to know exactly what you are dealing with and how it is supposed to be checked against the tolerances quoted.

For example, Dana Spicer state that for the D, E, EFA & I family of front axles, free play should be checked by hand by pulling the tie rod cross tube back and forth and up and down.

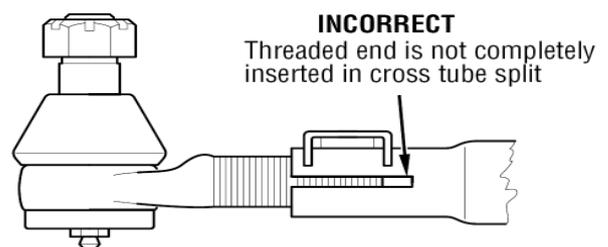
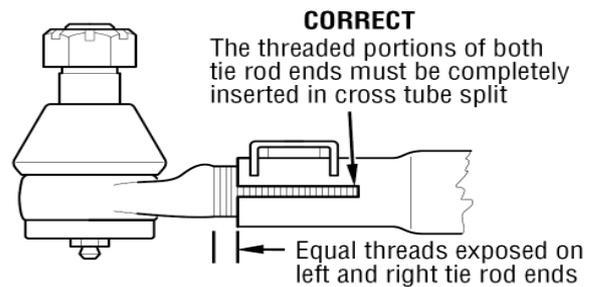
They specifically state that pry bars or other mechanical methods should not be used as "This could result in damage to the tie rod end and/or create a false indication of wear."



If the tie rod cross tube can be moved by hand [i.e. there is detectable free play] then the horizontal and vertical free play of the ball joint housing should be measured with a dial gauge.

For the above axles, if the free play is more than 0.060" in either direction the ball joint must be replaced. Where the reading is above 0.030" the ball joint should be replaced at the next service interval but this does NOT mean the vehicle should fail a RWC test.

While we are talking about tie rod ends, the engagement of the threaded part of the ball joint into the tie rod cross tube is important. Dana Spicer requires that the engagement be for the full length of the cross tube split to ensure adequate clamping as shown in the diagram.



And of course, there must be a cotter pin correctly installed in the ball joint nut and any split in the ball joint boot requires the entire rod end to be replaced.

Turbo Timers

Turbo timers are devices that keep an engine running [perhaps for 5 minutes or more] after the “ignition” is switched off and the key removed.



Turbo timers are essential on some vehicles to allow time for the turbo to spin down and cool down while there is still a supply of oil to the bearings. The vanes in a turbo can get red hot and spin at perhaps 10,000 to 15,000 RPM so to simply let everything come to rest and cool down with no lubrication to the bearings is courting disaster.



There used to be a rumour going around that turbo timers were illegal. The rumour probably stems from the old Road Safety [Traffic] Regulations 1988 or earlier equivalents. They made it illegal to leave a vehicle unattended without first ‘**stopping its engine**, locking the ignition, and removing the ignition key, applying the brake’ and so on.

The new Road Rules [see Government Gazette of 28 October 1999] have changed this situation. They now say you must **switch off the engine**, remove the ignition key, apply the brake etc. It is marvellous what a simple little change to the words can do, isn't it?

Oldies but Goodies?

The “oldies but goodies” comment applies to many jokes but it is rare that it applies to the average motor vehicle. Other than those that have been meticulously and lovingly restored at huge cost, it is fair to say that older cars will inevitably have a number of roadworthiness defects. In addition to the usual “consumables” such as tyres and brakes, many other components on a car have a finite life. Metal steering and suspension components do wear out with use and other items such as “rubber”

bushes and flexible brake hoses will deteriorate even if the vehicle is not used. Yet it is surprising to see just how many older cars get a pass on the first inspection and even further how many get rejected for just a few minor items. And we haven't even mentioned body rust and fatigue cracking yet!!!!

Is this because much of the wear and tear, deterioration and defects as well as the rattles and the general looseness that occurs in older cars is simply being passed off as normal? “**Well, she's getting on in years so you can't expect too much.**” Or is it because it is too hard to find replacement parts? “**The stuff the wrecker has for this model is no better that what's already there.**”

If this is so then it is time to lift the standard.

In most cases the roadworthiness certificate you issue will be used to enable a change in ownership. But there comes a time when it is simply not economical to maintain an older car in a fit state for use on our roads. Maybe many more of these older cars should be simply scrapped rather than having their problems passed on [via a low standard RWC inspection] to someone else who is probably even less financially capable of keeping the car in a safe condition.



Armoured Vehicles

What has a 25mm thick windscreen? Armoured vehicles used to transport money, etc. Some of these vehicles have been presented for inspection and they clearly do not comply with the standards. So before you inspect one of these vehicles, contact Vehicle Safety for guidance on what to accept. They will need to be treated on an individual basis that varies according to what they were like when originally approved.

Note:

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