

# Fifth Wheeler Hitches - April 2009

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## Extract from Regulation Impact Statement ADR 62 "Mechanical Connection Between Vehicles" (November 2006 - draft statement)

"When trailers are towed behind motor vehicles, the mechanical connection is the sole means of transmitting acceleration, retardation and lateral stabilising forces from one vehicle to the other.

"The consequences of failure are usually catastrophic; complete separation renders the trailer uncontrollable and free to wander, possibly into the path of another vehicle or off the road and liable to collision with objects and people in the vicinity of the road. Partial separation is no less catastrophic because there is the added consequence that once the trailer is no longer properly attached, the combination becomes unstable, possibly leading to the loss of both the trailer and the towing vehicle."

Serious structural issues may affect fifth-wheel caravans that have single oscillatory hitches (i.e. that limit or prevent lateral rocking).

These hitches are not inherently faulty as such. In fact they are necessary in appropriate applications. But because they limit or effectively prevent lateral rocking, the effects of any resultant forces that result are transmitted *through the hitch* to structural components that may not be intended nor possibly able to withstand the results.

Since I raised this issue (in mid-December 2008), repairers have personally reported incidents of damage (including chassis damage) to tow vehicles and their fifth wheel trailers. There have been over 130 reported incidents.

Compounding this is that a (still) unknown number of imported fifth wheel trailers are alleged to have been illegally registered as being within the 4.5 tonne ATM (Aggregate Trailer Mass) category

using falsified weight documents. Details later in this report.

This matter exacerbates the original issue - in that single oscillatory hitches are possibly being used at weights exceeding their designed/certified limits.

This has major implications in areas including braking, suspension, tyres and possibly even driving licenses that are now invalid for the rig. I include a section dealing with these issues.

### Resisting Overturning

The fifth wheeler vehicle originated in 1914, when US blacksmith August Fruehauf realised that if trucks could only 'bend in the middle' (for turning corners) they could carry long loads more safely than conventional trailers.

His unit proved the concept could work - if only the trailer could be prevented from overturning while cornering or on side slopes when laden way above chassis level. With only its rear wheels to resist

overturning, the high centre of gravity caused the trailer to roll.

Fruehauf realised that a hitch that was virtually rigid in the lateral rocking plane would enable overturning to be resisted by the mass of the tow vehicle. He adopted the 'fifth-wheel' mechanism used on early farm carts. This allowed turning but resisted overturning.

Close to a hundred years later, the Fruehauf company, world leader in this field, still uses the single oscillatory hitch for the same purpose.

### Fine for Trucks

Single oscillatory hitches resist overturning. They work fine for trucks, because their trailers' strong but *flexible* chassis allows them to twist without damaging tow vehicle or themselves.

Road undulations are partially absorbed by spring movement, but mostly by the trailer chassis flexing.

*This rig, owned by CMCA Director, Frans Hamer Q43984, has a fully articulating hitch. Imagine what happens when this occurs with a hitch that precludes lateral movement.*

*Pix: courtesy of Frans Hamer.*



## Fifth Wheelers

Fifth wheel caravans differ from semi-trailers however, and in two vital respects.

\* Firstly: a fifth wheel caravan carries most weight low down. Overturning forces are too low to need the tow vehicle's mass to resist.

Most fifth wheel caravans thus have double oscillatory hitches (that permit other than fore and aft and sideways rocking) – as do ball joint hitch mechanisms. This removes the twisting forces at source.

\* Secondly: unlike semi-trailers, fifth wheel caravans are rarely designed to flex, nor able to flex. Their internal structure stiffens them yet further.

Undulations (e.g., changes in camber, pulling off a highway into service stations at an angle) cause the two parts of the rig to twist relative to each other – and often in opposite directions.

If coupled via a single oscillatory hitch, the effect of the inevitable twisting force is transmitted to the trailer via the hitch and its often sheet metal mountings.

Unless the structure is so rigid that wheels lift from the ground, something has to twist, crack or break.

Despite the above, single oscillatory couplings meet current Australian Design Rules (ADRs).

These Rules however relate only to the hitches' strength. Excepting for heavier trailers, they do not address that to which the hitches are attached: e.g. sheet metal mountings on the tow vehicle and/or a non-flexible trailer.

Possibly the ADR devisors did not envisage that such a manifestly unsuitable device would be used to couple a non-flexible fifth wheeler. (Engineers, including myself, when first discovering this, find it hard to believe without seeing it).

Most local fifth wheeler builders are aware of the issues and use double oscillatory hitches. But not all do.

Some fit single oscillatory hitches, but most offer a double oscillatory hitch as a higher priced option.

## Overseas Use

Many US imports use single oscillatory hitches. I felt at first that they may be suitable for US use, where roads are smoother and less cambered. But American law company, Howard A. Gutman, outlines (alleged) fifth wheel hitch problems on six named American tow vehicles - whose hitch receivers (allegedly) failed through (alleged) bending/ deformation of the pin box area while towing, and through of welds failing around the pin box area.

One of the above (alleged) US incidents details a full weld failure of the pin box that lead to the trailer separating from the tow vehicle.

The safety chain and the emergency brakes were (allegedly) not activated as their parts were attached to the bits that broke off.

## Kinetic Energy

When a hitch precludes movement, the resultant forces are reacted by whatever tries to resist the rig being torn apart torsionally (e.g., the metal to which the hitch is attached, and the outer skin of the fifth wheeler near the nose). There will also be some suspension movement. Where single oscillatory hitches have slight movement, the kinetic energy (i.e. energy inherent in a moving mass) of the rocking components impart hammer-like blows to the hitch components.

Unlike resting a hammer head on a nail – the movement causes the 'hammer' to belt that nail.

Obligatory ADR testing replicates this, but only for the hitch: not whatever that hitch attaches to in actual use.

That problem is thus *non-appropriate use* of single oscillatory hitches: e.g. with fifth

wheel caravans, unless built to cope with such stresses. But next to none are.

## Immediate Concerns

The immediate concern is that the hitch assembly is likely to be stronger than whatever it is attached to.

In most cases of reported failure it was the metalwork to which the hitch was attached that failed in various ways under the ongoing twisting and bending. Strengthening the hitch area does not reduce the forces that cause the problem. It simply transfers their effects elsewhere.

A posting on the Australian Caravaners Forum noted: 'one would suspect an excess of material used to fit a fifth wheel hitch to the tow vehicle may generate more problems for the tow chassis. I have seen a couple of broken chassis rails (C section) caused by a stiff body on a flexible chassis.'

Another concern is that the imposed cyclic stresses may cause or have already caused metal fatigue. If so, this is serious because metal fatigue may only be detectable by specialised equipment.

There is typically only a short period during which it is visible (via hairline cracking) and total failure.

Further, and affecting all fifth wheel hitches, is that some installers bolt them onto pre-existing bitumen coatings that slowly compress, releasing bolt tension. This may result in bolt heads pulling through, or the shanks being sheared.

## The Magnitude of Risk

The incidence of failure is unknown, but as there have been reports of some 130 related incidents (and there's probably less than 3000 fifth wheelers in Australia) there is only too clearly a problem.

I believe this is serious enough to **recall all fifth wheel caravans with single**

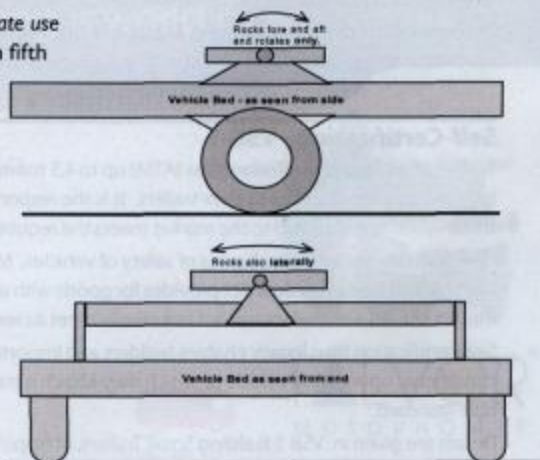


**Right top:** Single oscillating hitch allows the hitch plate only to revolve (movement not shown) and to rock fore aft.

**Right lower:** Double oscillating hitch is as above but adds an additional lateral rocking movement.

**Left:** The D'Angelo hitch (now used by Ms Fogarty) works as shown in the sketch.

Sketch: copyright Collyn Rivers.  
Hitch photo: Michaela Fogarty.



**oscillatory hitches** and require them to be replaced by a double oscillating unit. Also, for the associated tow vehicles to be checked for damage.

## Official Reaction

Australian States have varying requirements but, until recently at least, the emphasis has been on the strength of the hitch itself rather than the appropriateness of its application. This, I suggest, is the heart of this issue.

This is a State and a National issue however and I believe it is now being considered also at State level..

Queensland Transport advises the hitch matter is to be discussed at its next board meeting - and (already) fifth wheeler registration there must be signed off by a qualified independent engineer.

## Overweight Issues

In 2007 an Australian government department publicly warned that some trailer importers have falsified (and/or are falsifying) trailer mass in order to illegally

register products as being within the 4.5 tonne Aggregate Trailer Mass (ATM) limit.

An updated warning was published in November 2008. The full text is retrievable from [http://infrastructure.gov.au/roads/vehicle\\_regulation/bulletin/trailerimporters.aspx](http://infrastructure.gov.au/roads/vehicle_regulation/bulletin/trailerimporters.aspx)

The situation came about by Vehicle Standards Bulletin 1 (VSB-1) allowing makers and importers to self-certify that their products/imports comply with the applicable Australian Design Rules (ADRs). The most relevant section is reproduced at the bottom of this page.

We may thus not only have hitches used for an unsuitable application, but subject to excess stress; maybe not of the legal rating required, and possibly loaded beyond their designed and legal capacity.

The rigs may have:

- \* braking systems that may not meet the requirements of the 'over 4.5 tonne class'.
- \* axle/s, suspension and tyres that may not meet the requirements (as above).

\* a mass imposed on the tow vehicle that may be in excess of that vehicle's GVM (Gross Vehicle Mass), as also may be the CGVM (Combined Gross Vehicle Mass).  
\* a license for the rig's driver that may not be valid for the CGVM.

Once a vehicle is supplied to the market regulation of the vehicle rests with the State or Territory jurisdictions.

These jurisdictions regulate in-service requirements such as registration, road worthiness and vehicle modifications.

They require that a vehicle must continue to comply with all applicable Australian Design Rules (ADRs) at its date of manufacture.

The individual jurisdictions have their own schemes for certifying modifications to in-service vehicles

## Probable Action

This VSB-1 standard is being updated and will very soon be re-issued. The VSSB advises that it is to initiate a schedule of audits on suppliers of trailers up to 4.5

**The text below is the summary of one official response to an actual hitch failure, raised by CMCA Member, and lawyer Michaela Fogarty N58627 (page 76/77 of the March issue of *The Wanderer*). The response relates to the alleged failure of a specific hitch.**

1. There are no grounds for the Vehicle Safety Standards Branch (VSSB) of the Department of Infrastructure, Transport, Regional Development and Local Government to require all single oscillating hitches to be recalled.
2. There is insufficient evidence to show that the hitch tested used correctly has a fault that requires a recall action.
3. The design of the fifth wheel caravan needs to consider if a torsional load (i.e. single pivot hitch or when a double pivot hitch has hit its stops) is to be carried by the frame.
4. Single oscillating hitches may not be the best choice for many fifth wheel caravans with a low centre of gravity.
5. Caravan frames will naturally vary in serviceability and purchasers should appropriately make their own enquiries for their intended service (e.g., used over rough terrain or extended stays in caravan parks).
6. Hard sprung tow vehicles can impose significant shock loads into a fifth wheel caravan frame particularly considering Australian roads.

## My comments:

Item 1 is not in dispute - I did not seek such action.

Regarding Item 2, Ms Fogarty states that the hitch in question was not examined by the VSSB. The only sense in which it was 'used incorrectly', she states, is that set out in 3, 4 and 6., (all of which reinforce the generality of that which I contend regarding the use of single oscillating hitches in non-applicable applications (i.e. used incorrectly).

I agree with the intent of Item 5, but it is not reasonable to expect buyers to question, let alone establish, the structural integrity of caravan frames. My research experience suggests that failures will increase as metal fatigue sets in.

## Self-Certification - VSB-1

Trailers of an Aggregate Trailer Mass (ATM) up to 4.5 tonne are not subject to certification. Therefore manufacturers of these trailers are not required to affix compliance plates to their trailers. It is the responsibility of the person or company manufacturing or importing a trailer to ensure that the trailer when first supplied to the market meets the requirements of the ADRs.

The ADRs do not address all areas of safety of vehicles. Manufacturers should note they have a responsibility for the overall safety of their trailers, and that the Trade Practices Act provides for goods with any safety related defects to be recalled and the problem rectified. There is provision within the Act should a manufacturer not voluntarily meet its recall obligations.

Self-certification thus legally enables builders and importers to by-pass otherwise obligatory requirements of the Motor Vehicle Standards Act 1989 conditional upon every vehicle to which they attach a trailer plate complying with VSB-1. It is an offence to supply a vehicle to the market which is non-standard.

Details are given in: VSB 1 Building Small Trailers, at [http://www.infrastructure.gov.au/roads/vehicle\\_regulation/bulletin/index.aspx](http://www.infrastructure.gov.au/roads/vehicle_regulation/bulletin/index.aspx)

tonnes ATM to confirm that their vehicles comply with VSB-1.

Also included are:

- \* Requiring vehicles that cannot comply with VSB 1 to be certified through the RVCS (Road Vehicle Certification System). This allows vehicle manufacturers to electronically certify that the vehicles that they supply to the Australian market do meet the prescribed requirements specified in the ADRs.

- \* Requiring the suppliers of non complying vehicles to rectify the non compliance and to conduct a recall where required.

The above matters are also being investigated as part of a Victorian Parliamentary Enquiry into a range of issues affecting all RV usage in Australia.

The official response/action is expected in November 2009.

Further, several reliable industry sources advise that an 'official' submission has been made to the Australian Federal Government calling for a compulsory recall of imported fifth wheelers; and a ban on all further RV imports from the USA. I cannot positively confirm this is so.

What I can confirm is that some trailer importers are publicly alleged by an Australian government authority to have falsified weight documentation to illegally register fifth wheel trailers as being under 4.5 tonne for registration requirements.

How to tell if your's is one of them?

Easy! Have a lawyer seek written agreement or denial (from the vendor) to a few carefully worded questions – in the form of a statutory declaration.

The penalties associated with a false

statutory declaration far exceed (but do not preclude) the \$13,200 - \$132,000 penalty for falsifying registration data.

(Under section 11 of the *Statutory Declarations Act 1959*, the penalty for making a false statement in a statutory declaration is four years imprisonment).

### 'Lightweight' Imports

In Australia and New Zealand, caravans are used for permanent living. There, such lifestyles have no social connotations.

But in the USA, 'trailer' living is seen as truly inferior (e.g. the horrid term 'trailer trash'). Americans using RVs for holidaying however lack such stigma!

Australian and New Zealand RV

products vary in price/quality, but there is little reason to suspect they may not meet relevant Australian on-road requirements.

This does not apply to the US. There, some product made for extensive travelling may have higher specifications than those intended for trailer park use.

The latter, for example, have no use for a chassis and suspension suitable for ongoing (or possibly any) road use. All that is needed is a means of delivering and minor wheeling around.

It is thus possible there are two types of product – it makes sense for this to be Rumour alleges the lighter version may



Michaela Fogarty (N58627) and Molly the pooch's well set-up Isuzu (Stumpy) and her fifth wheeler - now fitted with the well-engineered D'Angelo hitch (shown elsewhere in this article).

## Industry Comment

### Fifth Wheels Australia:

*A single oscillating hitch has slight side to side movement, but nowhere near enough to allow independent side to side movement between the tow vehicle and the fifth wheeler on Australia's highly cambered roads. My first experience while travelling with this type of hitch was of a great deal of trailer input into the tow vehicle - what I'd describe as 'shunting'.*

*The forces which cause this are a result of the independent movements of both trailer and tow vehicle and the fixed hitch which does not support such independent movement. Some of these forces are dispersed into the chassis and suspension components of the tow vehicle; whilst others are transferred into the pin box, the pin box mounting structure, the trailer chassis and its suspension components.*

*Invariably this twists the trailer chassis around the pin box and is then transferred to the trailer's walls and roof. I have repaired several fifth wheelers with frontal damage - usually cracking of the trailer's outer skin - be it aluminium or fibre glass, and also severe cases of cracked chassis components.*

*The air bag hitches and various suspension type pin boxes now being introduced into Australia reduce the transitional forces between trailer and tow vehicle (which are exacerbated by fixed hitches). But the problems described can be greatly diminished by using one of the many well designed oscillatory hitches readily available here.*

*I would not recommend the use of a single oscillatory hitch.*

**Glenn Porch, Director, Fifth Wheels Australia**

(Fifth Wheels Australia has no association with 5<sup>th</sup> Wheelers Aust)

be amongst the product imported.

I cannot comment on this except that it seems more likely to me that they are road-going products, but that not all may be necessarily designed for the more strenuous Australian type of usage.

There may be two versions, but if there were, the trailer park version is likely to have no suspension at all!

Come November 2009 and we will all know. But right now it is publishing insanity even to suggest the rumours are even the right rumours.

## Insurance Issues

Specific insurance related matters should be discussed with the insurer involved. Most have common clauses like:

*"Your caravan is being towed by any person who is not the holder of a current*

*driver's license that allows the person to drive a vehicle for the purpose for which it is being used."*

It has been suggested (by a lawyer) that if falsified weight documentation has resulted in a fifth wheeler being illegally registered as under 4.5 tonne, there is a possibility that the rig may not be legally drivable by holders of a car license. This could invalidate the insurance cover.

Also typically excluded is:

*'Loss or damage to your caravan caused by structural failure.'*

Depending on the circumstances of the incident however *'Repairs to or replacement of the hitch itself would not be covered.'*

One insurer advises that *'subsequent damage to the fifth wheeler caravan could be covered.'*

## Final Comment

This sad affair must be addressed by regulators and legal bodies.

Not to do so is unfair to the local industry which has tried to hard to make good products at realistic prices - but will not sacrifice quality to do so. It is also unfair to those who bought affected imports in good faith.

**It is particularly unfair to the known decent, law abiding trailer importers now faced with major problems.**

I urge the State regulatory bodies to take urgent action.

**Collyn Rivers, Director, Caravan & Motorhome Books, Broome 6725.**

## Industry Comment

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### D'Angelo Engineering:

Typically, fifth wheels are only able to tilt around the foot pin on the front to back (Y-axis). The D'Angelo Double Oscillator hitch allows the fifth wheel to also tilt on the left to right axis (or X-axis). The benefits of having this assembly type on a vehicle are four fold:

With a double oscillator hitch, the vehicle has a greater independence of movement from the trailer. This keeps the drive wheels in contact with the road, improving traction and control.

The double oscillator assembly reduces the stresses on the vehicle and trailer chassis caused by a fifth wheel being locked in position on the X-axis. This reduces twisting, or torsional, forces on the chassis rails which may cause cracking through fatigue.

The greater freedom of movement granted by the double oscillator also reduces local forces around the coupling that might induce cracking and twisting of van bodies, including their internal fixtures and fittings.

To give a greater order of control to the user, the D'Angelo double oscillator hitch has three positions either side of the fifth wheel in order to respond to differing road conditions. These can be set up to be symmetric for normal use or asymmetric, for instance if there is a strong camber or crown in the road.

### D'Angelo Engineering

## Industry Comment

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### Travelhome Pty Ltd:

As a Director of Travelhome (fifth wheel RV manufacturers) I am concerned that owners may be confused by this matter. I comment therefore from my own local industry perspective.

I fully appreciate the concerns raised by the RVMAA, Michaela Fogarty, Collyn Rivers and others (including many confused potential buyers). I am also aware that Mr Rivers has presented a Technical Report to the various regulatory and other bodies involved, seeking urgent action.

I am concerned however that many owners may relate this matter to fifth wheeler hitches in general and that the entire RV market can be provided with a clear understanding that at least some local manufacturers of fifth wheelers use hitch assemblies and/or chassis structures that are not of the single oscillatory type that Mr Rivers and others are questioning.

Our own position is this. Travelhome decided that the commonly used imported US made fifth wheeler turntable style hitch is unsuited for use on the Travelhome due not only to its bulk but because of restricted lateral movement (on some versions) and that we believe is unsuitable for Australian road conditions. Travelhome accordingly designs and manufactures its own ball and socket coupling which it has tested for compliance with ADR 62/01 - [Mechanical Connections Between Vehicles]. . . the tests of the Travelhome coupling show that the coupling would now exceed the new ADR62.02 minimum coupling strength requirements by at least 70%.

I trust that the above provides a clear understanding that Travelhome Pty. Ltd. takes its reputation in the industry, and the safety of the road-using public, very seriously.

### Geoff Dutch

#### Director

#### Travelhome Pty. Ltd.

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