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29 / 7 / 2011

Supreme Owners Action Registry
PO Box 933
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SUPREME Caravans chassis fault

*I certify,
that I have been provided with the Code of Conduct to preparing an Experts Report
and this Report complies with that Code in Practice note CM 7.*

*This report is based on my experience and training as a tradesman, Workshop Manager,
an Automotive Engineer and an Authorised vehicle Compliance signatory.*

Each SUPREME Caravan I evaluated is presented under separate cover.

The first examination and Report was on the chassis construction of a
Supreme Territory SC-31 Special, Size 16'6" x 7'6" caravan.

In this report I include three selected caravan examples to further illustrate the chassis fault -

Executive SE 1660 Tourer Chassis Number: SE 3972 Build Date: 2008
Selling Dealer: Lifestyle RV's

Executive SE 2060 Tourer Chassis Number: SE 4341 Build Date: 2009
Selling Dealer: Hervey Bay Caravan Sales

Executive Spirit Chassis Number: SE 4493 Build Date: 2009
Selling Dealer: Hervey Bay Caravan Sales

ORIENTATION

It was reported that all the Supreme caravan owner's first noted and reported visually evident faults with their caravans.

The records indicated the caravans were given the standard pre-delivery check by the selling dealers, but each caravan developed problems in a short period of travel. Some faults were minor and rectified, however some became more significant concerns as follows.

CONCERN 1

Specifically one or more of the following-

i) # problems with internal fits.

Doors, cupboards and draws not closing, gaps and some areas splitting.

ii) # water leaks.

iii) # external panel distortions became visibly evident.

The external door was no longer easy to open and close.

CONCERN 2

The floor of the caravan was found not to be flat.

CONCERN 3

Incomplete information or personal treatment by the Supreme staff, dealers or repairers to the caravan owner created anxiety.

CONCERN 4

The rectification to the floor bending had no unanimous agreement by repairers.

CONCERN 5

The caravan mass: discrepancies in original values and then the increased mass from the proposed chassis repair.

Based on my inspection of the Supreme Territory SC-31, I evaluated the Supreme Caravans seeking a common cause to the distortions emphasised in owner's CONCERN 1 and 2.

The caravan has a chassis or base structure with super structure framework mounted on top. The external cladding contains the doors, windows and vents. The internal walls and fixtures are also mounted on the superstructure.

It is a recognised engineering principle that if the base of a structure deforms the superstructure also deforms. The design engineer must ensure the foundation is sound, the vehicle engineer must design for the travel variables.

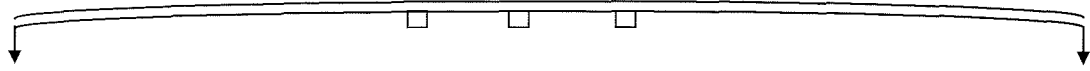
Each Supreme caravan I evaluated had a similar history of CONCERNS for the owners that are included in the individual Reports.

REVIEW

Each owner had been diligent about their substantial investment and advised the manufacturer or dealer about the unsatisfactory situations when they developed, however the company involved did not always address the cause only the effect.

These sample caravan floors were distorted, the chassis structure was visually bent or cracking so an independent measurement for bend as well as 'sway' and 'diamond' distortion was conducted.

The following sketch illustrates how the chassis would need to deform to create the floor bend described.



Every caravan measured had developed that longitudinal chassis bow. The measured drop at the front and rear of the chassis compared to the position above the axles were as follows -

Model:	SE 1660 Executive Tourer	SE 2060 Executive Tourer	Executive Spirit
	SE 3972	SE 4341	SE 4493
measured:	March 2011	March 2011	March 2011
Mm drop: Front	20+	22	24
Mm drop: Rear	20	22	20+

Within the warranty period one or more of CONCERN 1 items were noted by owners, every caravan floor elevation noticeably changed from the axle group at both front and rear.

The unsatisfactory situation for Supreme caravan owners was that -

A Supreme caravans dealer -

accepts the chassis were bent.

accepts the bent chassis should be rectified.

may perform a chassis reinforcement using steel

but declares it was not a 'fix' only a 'possible help'

may present the owner with a caravan that then exceeds the GTM

A Supreme caravan's agent -

declares the bent caravan chassis normal.

A local fabrication workshop proprietor -

quotes to add reinforcement to the bent chassis

Verbally: The chassis reinforcement would not straighten the chassis bows

Written: The method of reinforcement of the chassis.

Disclaimer: Future movement of outer sheeting, inner walls and cupboards would not be that repairer's responsibility.

The messages were disconcerting to each caravan owner involved.

The local fabrication workshop information with the Disclaimer was conveyed by the owners to the Dealer, but with no recognition.

The similarity of those proposed repairs highlighted several features - The repairers

- * were all sceptical about the outcome of their proposed repairs,
- * quoted as was requested,
- * did not consider the superstructure faults,

* added disclaimers that exonerated themselves from the superstructure.

The intended repairs by reinforcement of the chassis were adding further mass without any explanation of the implication to the owner.

The caravan owners, not qualified in the area of such chassis reinforcement, accepted the information that the chassis should be reinforced on face value, but some did not proceed with the quoted chassis repair until there was some verification.

It appeared that the owners were being kept separate and Dealers negotiated with Supreme Caravans and advised -

- * an offer to deal with the caravan in Melbourne.
- * a chassis will have flex in use.

Supreme Caravans declare -

- * that no ADR specifies a bending camber limit of a chassis.
- * longer caravans will have that bending amplified.
- * 20mm of distortion over a 21 foot length on a caravan in excess of 2 tonne "is not a lot".

Supreme Caravans Pty Ltd released their "Testing of strength reports" by K.C. Williams. That as seen in the following Extract is about the drawbar testing with a reference to the chassis.

KC Williams Consulting Pty Ltd
47 Butlers Road
PLENTY VIC 3090
Tel: (03) 9434 7687
Mobile: 0417 383 349
Fax: (03) 9432 0954

Report No: SCM002-35
Date: 8th August 2008
Client: Supreme Caravans
12 Glenbarry Road
CAMPBELLFIELD VIC
Contact: Mr Michael Turkalj
Tel: 0418 597 920
(03)9357 5592

Report of testing to the strength requirements of ADR 62/02 and calculations of chassis strength

Preamble

The manufacturer requested physical testing and assessment of a drawbar design to ensure compliance with the strength requirements of Australian Design Rule 62/02 "Mechanical Connections Between Vehicles". Drawbar is an "A" frame unit of 150x50x3 RHS with 50 mm ball coupling of 3500 kg capacity. Length of A frame is such that the distance from the centre of the ball coupling to the centre of the foremost chassis crossmember = 1740 mm.

The trailer manufacturer provided a rolling chassis complete with tandem axle, brakes, independent, load sharing, centre rocker suspension of the four leaf spring type and 50 mm ball type tow coupling. Identification of tested chassis = SP3866

Chassis was equipped with two safety chains welded to the A frame as close as practicable to the tow coupling as required by ADR 62/02. Each chain was welded such that the weld covered approximately 50% of the circumference of each attaching link.

Aggregate trailer mass of tested chassis = 3500 kg.

A 3,500 Kg ATM caravan was identified and it was the 'Mechanical connections between vehicle test'. It appeared Supreme Caravans released that Report rather than the complete information on the chassis or any other tests or calculations.

The RHS listed in the drawbar test was 150 x 50 x 3mm. It was a heavier capacity caravan and it might be expected that was also the chassis material, but Mr Williams later comments that it was not and makes special reference to the load capacity.

I accept on face value that the test by K.C. Williams in 2008 was conducted and the unit tested passed. I also accepted the following:

Important Note

The Australian Design Rules (ADRs) are a set of minimum safety and environmental standards applied to vehicles and trailers manufactured for the Australian market. As such, compliance with ADR 62/02 or the above strength analysis does not warrant that the chassis will be suitable for all conceivable applications and conditions of use (including misuse such as overloading or improper use of load levelling devices). For example, if it is known that a chassis will be used in off road applications, critical components should be upgraded to ensure that premature failure does not occur. As a general guide, it is recommended that factors of safety for off road applications be increased to at least 5.



Kevin C Williams MIEAust CPEng
Member 1175072

The following is the extract from Australian Design Rule 62/02 that clarifies that the ADR is for the 'couplings' that connect to the towing vehicle.

Australian Design Rule 62/02 Mechanical Connections Between Vehicles

5

3. DEFINITIONS

- 3.1. For vehicle categories, definitions and meanings used in this standard, refer to Vehicle Standard (Australian Design Rule Definitions and Vehicle Categories) 2005.

4. REQUIREMENTS

- 4.1. All '*Couplings*' must comply with the requirements of this standard.
- 4.2. Installation of '*Couplings*' is:
- 4.2.1. Mandatory on all trailers for '*Couplings*' which connect to the towing vehicle; and
- 4.2.2. optional for all other motor vehicles.

5. GENERAL APPLICATION REQUIREMENTS

- 5.1. '*Couplings*' designed for use between tow vehicles and trailers with an '*ATM*' up to 3.5 tonnes must be '*Quick Release Couplings*'.
- 5.2. The '*Tow Coupling Overhang*' must not exceed, in the case of an NC vehicle designed for use in '*Road Trains*', 2.7m."

The reference by Mr Williams to National Code Of Practice: Vehicle Standards Bulletin 6 is perhaps more relevant in this matter. VSB 6 is the general national standard for chassis/ frame strength and performance more directly associated with modification, but not specifically to caravans.

I now refer to the Report by Mr Williams again.

Recommendations

It is strongly recommended that strengthening members commonly referred to as "stringers" not be fitted, as these frequently result in unacceptable stress concentrations, at times followed by fatigue failure.

It is further recommended that the manufacturer review the use of 100x50x3 mm RHS for main chassis rails, as though these are not loaded beyond their yield stress in the load case considered, they have only a safety factor on yield of 1.61. Generally a safety factor on yield of at least 3 is considered appropriate for road vehicles. See note below regarding factors of safety for trailers designed for off-road use.

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The *Recommendation* by Mr Williams was clear, the safety factor for the chassis material at 100 x 50 x 3 mm was not consistent with the National industry standard for road vehicles.

The recorded measurements on these caravans showed that the chassis material was-

100 x 50 x 2.75 mm or 100 x 50 x 2.65 mm.

Other factors being equal the strength of the steel RHS may be reduced if the cross section is reduced and these actual measurements show reduced wall thickness as well. Supreme Caravans did not provide any covering comment on the *Recommendation* by Mr Williams or on the reduced material thickness used.

From industrial experience the safety factor on yield of 3 was proven to be more satisfactory in the general range of on-road vehicles. Touring caravans are usually used for touring, so travel is over the longer distances and the 3 margin is most appropriate as nominated by Mr Williams and apparently ignored.

The comments Supreme Caravan owners attest to made by Supreme Caravans management I find lack engineering credibility are -

a vehicle chassis bending 20mm and greater, was acceptable because no value was specified in an Australian Design Rule.

the bending can be amplified on a longer chassis and these were 'not a lot'.

I accept those comments were made and they are confounding. Flex was not being measured these caravans had a permanent bend in the chassis. Such permanent and continuing deforming of a chassis frame for a vehicle is not an acceptable engineering standard.

The implication is that Supreme Caravans Pty Ltd were not concerned that their caravan chassis bend more than 20mm. Supreme Caravans Pty Ltd demonstrate they accept that these chassis are bending by offering a cash settlement or local chassis reinforcement. They also make offers to have the caravan returned to the Melbourne factory for evaluation. It was interesting that they applied constraints on the owner about rectification at the factory if they were returned.

I could appreciate the reluctance of an owner to send the caravan back to the Supreme Caravans Pty Ltd factory based on the reports on the quality of previous repairs. The demands placed on owners regarding the possible repairs was also likely to be disconcerting.

It is generally accepted that a Warranty is offered to customers purchasing a product so that such faults in the product due to the manufacture or materials used will be rectified or

completed to the satisfaction of the owner. The following is the extract from the Supreme Caravans Pty Ltd standard document.

Warranty

Supreme Caravans agree to warrant without charge, for a period of 12 months from date of first purchase, any shortcomings in the original materials or manufacture of their product. Costs of parts and labour incurred in any rectification will be at the expense of Supreme Caravans and will apply only to the original customer.

Parts replacement under warranty: All parts must be returned to Supreme Caravans or an authorized dealer or service agent before replacement parts are dispatched to customer.

Prior to warranty work commencing by an outside repairer, proof of claim must be presented to Supreme Caravans either by phone, email or written authority by Supreme Caravans.

Warranty does not apply to the following:

DEFECTS CONSIDERED BY SUPREME CARAVANS TO BE BEYOND REASONABLE WEAR AND TEAR.

ANY ITEM AS SUPPLIED BY SUPREME CARAVANS AS ORIGINAL EQUIPMENT AND WHICH IS COVERED BY THAT ORIGINAL SUPPLIER'S WARRANTY ONLY. THIS SHALL INCLUDE:

- Refrigerators, stoves, ovens, hot water systems, solar equipment, air conditioners, transformers, pumps, audio and visual appliances, toilets, awnings and any other accessories or options which may be covered by that original manufacturer's warranty.
- Chassis, tyres, brakes, axles, suspension, bumpers and spare wheels and brackets.
- Removing and refitting costs of same to enable the performance of repairs under those warranties.

THE FOLLOWING ARE ALSO EXCLUDED UNDER THIS WARRANTY

- a ➤ Any defect resulting from negligence, overloading, accident or other causes beyond our control
- Any defect caused by the installation of accessories etc. after dispatch from the Supreme factory.
- Any defect caused by towing equipment not applicable to its design.
- d ➤ Any consequential damage caused by usage after a fault has been recognised.
- Any accommodation or relocation expenses, loss of earning, rents or any other costs incurred before or whilst repairs under this warranty take place.
- f ➤ Any defect or consequential damage incurred from tampering or interference to any equipment by unauthorized persons.

FREIGHT, TRANSPORT AND INSURANCE ARE THE RESPONSIBILITY OF THE PURCHASER, AS ARE THE COSTS OF DESPATCHING SERVICE STAFF TO AN ON SITE LOCATION

If work under this warranty is required, the purchaser must in the first instance contact their original point of purchase or the nearest Supreme dealership or approved service agent.

Please note that this warranty is only valid when repairs are carried out after an approved agent has been authorized by Supreme Caravans to carry out such works.

Under no circumstances will Supreme Caravans reimburse for repairs without prior approval issued.

The above warranty by Supreme Caravans is in addition to any rights provided under the Trade Practices Act 1974 as amended and or any Federal or State legislation.

It was my opinion that the owners -

- (a)
 - * were not negligent,
 - * did not overload,
 - * did not crash,
 - * and did not cause a situation beyond the control of Supreme Caravans Pty Ltd.

The caravans did not show abuse.

(d)and (f).

- * had not tampered with the caravans in such a way to cause consequential damage.

No dealer or agent suggested that any of these Supreme caravans had been abused or tampered with.

It has been and will be certified by the owners that these caravans were not used 'off road' or other than advertised.

Product owners expect that -

^ the items repaired under warranty will be rectified to a trade standard so that each product will perform as expected for a reasonable period, if not permanently.

^ no further damage will result from the rectification.

The Supreme Caravan owners are such product owners.

These Supreme Caravans were ordered by the owners and accepted from the dealers as delivered. The owners did not perform modifications. The caravans are identified and verified by mass as follows -

Model:	SE 1660	SE 2060	
	Executive Tourer	Executive Tourer	Executive Spirit
Build Date:	2008	2009	2009
Chassis Number:	SE 3972	SE 4341	SE 4493
Tyres:	195R 14C	235/75R 15	225/75R 16
Rims:	14 x 6	15 x 7	16 x 7
Axle load: Kg	400	400	400
Licensed Tare: Kg	1690	2128	2210
Licensed ATM: Kg	2090	2528	2610
Licensed GTM: Kg	1968	2392	2416
Design Load Capacity Kg	400	400	400
Tow Ball load: Kg	122	136	194
Actual mass Kg	2020	2520	2580
Load Mass margin	70	8	30
Axle group load: kg	2500	2600	2600
Margin of safety	480	80	20
Vin :	6T9T21V9780BYW355	6T9T21V9790BYW206	6T9T21V9790BYW379

The addition of mass to Supreme caravans for any rectification should be carefully considered.

The materials implications for owners are the Gross Combination Mass of the towing vehicle and the safe load capacity for the caravan. A modification that adds mass in unsatisfactory.

In my opinion the rectification of a 20mm chassis bend by steel reinforcement along the chassis rails is not likely to be satisfactory. The caravan mass increased by the chassis reinforcement along the length creates a revised load with the increased mass.

SUMMARY

The Supreme caravan floors are deformed.

The caravan superstructure is visually deformed externally and internally.

The evidence was overwhelming that the chassis of the Supreme Caravans had bent on the longitudinal axis, fore and aft of the axle group and one sample caravan now had a measured chassis twist.

The chassis of a vehicle should be straight and resist cracking.

The evidence indicated that the Supreme Caravan chassis/frames in the sample were not able to resist bending beyond the elastic limit.

Clearly the bending downwards of the front of the chassis repositions the draw bar 'A' frame horizontal angle to the vehicle tow ball and there are likely alterations to tow ball load and caravan axle loads.

In my opinion chassis reinforcement is a superficial repair. The

- X existing chassis bow remains**
- X stress on the superstructure remains**
- X doors and window fits remain unaddressed**

- X chassis bowing may not cease**
- X GTM may be exceeded**
- X future corrective repairs would be more difficult**
- X caravan is heavier to tow**

- X caravan is not what the owner purchased**

My opinion was agreed to by two engineering fabrication workshops where they recorded Disclaimers about any internal and external damage resulting from the chassis reinforcement.

Supreme Caravans Pty Ltd are alleged by dealers to be contributing to the costs of the chassis reinforcement modifications on two caravans and further offers to other owners. I contend that Supreme Caravans Pty Ltd were aware of these chassis bending and the associated resulting damage.

Two owners in the sample were indirectly forced to consider chassis reinforcement modifications because of the chassis bending. These owners were expected to contribute to the costs for rectification. One owner had a dealer perform an incomplete reinforcement that did not correct the situation and that caravan now exceeds the nominated load capacity.

From the available evidence Supreme Caravans Pty Ltd only offer superficial rectification when owner's complain. These caravan chassis have failed. I agree with the industry standard and with the recommendation by Mr Williams in his Report..

I was surprised that Supreme Caravans Pty Ltd did not adopt the industry standard after that recommendation had been presented. There was no other report provided to indicate that other tests on a later upgraded chassis had been conducted.

Justifiably, the owners are not prepared to submit the caravans for Estimates let alone repairs until they are assured that the evaluation will be thorough and any rectification will be to an appropriate engineering standard overseen by an appropriate independent person.

The reinforcement method of rectification apparently condoned by Supreme Caravans Pty Ltd contravened VSB 6, in my opinion. The reinforcement applied had already proved unsatisfactory on two levels.

Supreme Caravans Pty Ltd were made aware of the likely chassis problem by Mr Williams in his *Recommendation*. Supreme Caravans Pty Ltd apparently ignored the recognised industry standard and produced caravans using other chassis materials.

All these Supreme caravan chassis are still bent and the superstructures are still distorted.

The calculations that may have been performed by Supreme Caravans for the material, design and fabrication are no longer relevant because these chassis failed the practical test in ordinary use.

There was no evidence that Supreme Caravans Pty Ltd adopted the industry standard so an engineer would expect that some, if not most Supreme caravan chassis would bend.

The rectification processes proposed must increase the Tare mass of each caravan.

I agree with the fabrication companies that the reinforcements of the chassis would not correct the fundamental problems, the caravan chassis were bent and would continue to bend although possibly at a reduced rate. It was likely that the superstructure would continue to distort and deteriorate.

The NCOP: VSB 6, Section H 8.6. for Heavy Vehicle Modification is used for all chassis /frame modifications and reflects standard engineering practice where the associated components should be removed for checks of cracks and damage before straightening a chassis.

Appendix 1 of VSB 6 contains the calculations necessary for safe chassis building and reinforcement and corroborates the *Recommendation* by Mr Williams. The pig trailer configuration with longer chassis usually has a design or material quality alteration.

The owner's are not prepared to risk using the caravans for touring as intended.

I contend the bending of the chassis appears to have other consequences with bowing panels and ill fitting doors inside and out, as has been recorded and confirmed.

The unfortunate situation is compounded for the owner because ~

** local repairers place a Disclaimer on the repair that is very limiting.*

** the caravanning fraternity in Australia know about the situation so resale values are reduced*

** superficial chassis reinforcement may require the owner or prospective owner to acquire a vehicle with higher GCM.*

The owners of these Supreme Caravans have no peace of mind that the caravan can be used as intended and if it is repaired there is still no consolation.

CONCLUSION:

Each Supreme caravan I have reviewed had a measurable chassis bend.

The Supreme Caravan owners have not caused or contributed to the bent chassis that developed with their caravans.

In my opinion this is an untenable situation for the Supreme caravan owners, because there will be premature major repairs necessary outside the warranty period due to the bent chassis /frames that occurred during the warranty period.

In my opinion the sample of caravans highlighted in this Report clearly show the Supreme Caravans chassis/frames bend in standard use and therefore ~

⌘ ⌘ are not fit for the intended caravanning application.

⌘⌘ are below the necessary quality.

** cannot be brought to acceptable quality or standard without Supreme Caravans Pty Ltd intervention.

It is my opinion that Supreme Caravans Pty Ltd should address the underlying chassis issues for Supreme caravan owners.



RODNEY STYLE

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