



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

# ODI RESUME

Investigation: RQ 08-004  
Date Opened: 06/24/2008 Date Closed: 11/03/2008  
Principal Investigator: Tom Bowman  
Subject: Front Axle / Tire Overload

Manufacturer: Blue Bird Body Company  
Products: 2005-2007 MY Blue Bird Body Model 450 LXI (Wanderlodge)  
Population: 57

Problem Description: Manufacturer's campaign recommendation for owners to maintain 130 P.S.I. Inflation pressure in motor home tires.

## FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	1	1	1
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	0	0

\*Description of Other:

Action: Close this recall query.

Engineer: Thomas Bowman Date: 11/03/2008  
Div. Chief: Richard Boyd Date: 11/03/2008  
Office Dir.: Kathleen C. DeMeter Date: 11/03/2008

Summary: Blue Bird is implementing various weight reduction, weight redistribution, and capacity upgrade initiatives to improve the front axle / tire over-load condition of the affected vehicles.

ODI is primarily concerned about Blue Bird's initiative to uprate the front tire by requiring owners to maintain 130 PSI inflation pressure. In response to ODI's concerns, Blue Bird will supplement their original remedy plan of providing new front tires and new tire certification labels specifying the 130 PSI inflation requirement with initiatives to: (1) install an on-board tire inflation system capable of providing 130 PSI; (2) install a placard on the dash panel as a ongoing reminder to owners of the need to maintain proper inflation pressure; and (3) investigate the possibility of periodically reminding owners of the importance of maintaining specified tire pressure.

ODI remains generally concerned about front tires installed in motor homes because ODI's experience has shown that motor home owners are frequently unable or unwilling to maintain high inflation pressures in their tires. See ODI's closing report for additional observations / details regarding this.

## Closing Report – RQ08-004

### Front Tire – Axle Overload Affecting Model Year 2005-2007 Blue Bird Wanderlodge 450 LXi Motor Homes Addressed by Bluebird Safety Campaign 07V-586

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Approach or Equal a Tire's Maximum Allowable  
Inflation Pressure

**(1) Subject Vehicles -**

This report addresses 57 model year 2005-2007 Blue Bird Wanderlodge 450 LXi motor home vehicles that were the subject of Blue Bird Campaign 07V-586.

Campaign 07V-586 was originally filed on December 11, 2007, and amended on March 11, 2008. Blue Bird amended the campaign to add certain initiatives, such as increasing the front tire inflation pressures, to improve / address the remedy pertaining to certain vehicles that were potentially at risk of overloading the front tires.

**(2) Chronology -**

**Table 1 – Chronology Summary**

Date	Event	Reference Notes (below Table)
October 16, 2007	Vehicle crash, fatality (I-24, Tennessee) alleged that right front tire failed abruptly.	(A)
December 11, 2007	Blue Bird filed Defect Report 07V-586	(B)
March 1, 2008	Vehicle crash (Florida Turnpike) alleged that right front tire failed abruptly.	(A)
March 11, 2008	Blue Bird amended Defect Report 07V-586	(C)
April 23-25, 2008	Blue Bird requests Michelin to approve the use of 315/80R22.5 XZA2 tires @ 130 psi “for 18k application.”	(D)
May 3, 2008	Owner files VOQ 10226544 that outlines concerns about the remedies proposed in 07V-586.	none
May 21, 2008	ODI contacts Blue Bird about VOQ 10226544 and provides a copy of EA05-011.	none
June 24, 2008	ODI opens RQ08-004.	none
June 25, 2008	Blue Bird representatives meet with ODI in Washington.	
July 15, 2008	ODI meets with Federal Highway Administration (FHWA) regarding maximum axle loads permitted by FHWA regulations.	(E)
July 17, 2008	ODI issues Information Request to Blue Bird	none
August 25, 2008	Blue Bird provided initial response to requested information (Request Nos. 2, 3, & 6).	none
September 4, 2008	Blue Bird provided partial response (Request Nos. 4, 7, & partial information for Request Nos. 1 & 5).	none
October 15, 2008	Blue Bird provided partial response (Request No. 5) [ODI note: The majority of the information was submitted with a request for ODI to grant confidential treatment] - Blue Bird will provide further information responsive to Request No. 1 when the data is available (as remaining vehicles are remedied during the course of the campaign).	none

Reference Notes to Table 1 above.

(A) ODI did not include the two incidents in the closing resume because ODI has not established the cause of the crashes and has not inspected the tires that had been installed in the crash vehicles.

(B) Blue Bird's Defect Report 07V-586 describes a front axle overload issue as, "The front axle curb weight ... exceeded the specified 16,000 pounds front axle weight rating." This report referred to the possibility that a change in the tie rod end material may have been a contributing factor. [ODI note: ODI is not aware of any tie rod end failures being reported on any of the subject vehicles.]

Blue Bird described their proposed remedy as "the original ... tie rod ends will be replaced with the redesigned tie rod end. New certification labels showing a 17,000 pound front GAWR, new labels stating weight limits for each of the three front storage bays, and instructions for the application of these labels will be issued."

(C) Blue Bird amended Defect Report 07V-586 which identified the following additional defects / remedies:

".... insufficient front tire inflation pressure reduces the weight rating of the front tires; improper alignment of the front suspension can cause premature tire wear and subsequent degradation of the structural integrity of one or both front tires...The defect will be corrected in the following manner:

The original TRW left and right hand front tie rod ends will be replaced with redesigned TRW tie rod ends. New certification labels showing a 17,000 pounds front GAWR, new labels stating weight limits for each of the three front storage bays, and instructions for the application of these labels will be issued."

Appropriate replacement tires will be provided and the front steering alignment will be checked and corrected if necessary. New tire data decals will be supplied requiring 130 PSI tire inflation pressure."

(D) Michelin responded that "no vehicle corner weight may exceed 9,090 lbs. @ 130 psi (single = 2 tires/ axle) with this tire."

(E) ODI met with FHWA to review concerns that certain Blue Bird campaign actions directed at re-distributing (reducing) front axle loads may load the rear drive axle in excess of 18,000 lbs. in certain vehicles. FHWA verified that in accordance with 23 U.S.C. § 127(a)(2) the maximum allowable axle load limits on the Interstate System are 20,000 lbs on a single axle and 34,000 lbs on a tandem axle. This statutory provision conditions the receipt of Federal-aid for the National Highway System on the adoption of these limits by the States due to concerns about the potential adverse effect of higher weights on the highway infrastructure. Enforcement is a state responsibility. Though all vehicles, including personal use vehicles such as motor homes, are expected to comply, enforcement efforts generally prioritize on commercial vehicles.

### **(3) Tires Installed in Motorhomes -**

Over the past several years, ODI has observed and expressed concern that front tires selected and installed by motor home manufacturers frequently lack a sufficient capacity margin ("safety factor") to support a loaded and moving vehicle when inflated to the tire pressures that operators of these vehicles commonly maintain. ODI summarized a number of pertinent observations in a separate closing report pertaining to Country Coach Front Tire Failures, ODI Investigation EA05-011, and has provided some additional comments on this subject in the Appendix to this report.

### **(4) Blue Bird Actions to Deploy the Front Tire Remedy -**

ODI requested that Blue Bird summarize the actions that they intended to implement. Blue Bird provided the following response:

"In its safety recall owner letter Blue Bird began the process of notifying the owners of the subject vehicles that the proper inflation and condition of the front tires was critical to the safe operation of their motor homes. Concurrent with the mailing of the owner letters, this same message was communicated via telephone contacts with all of the owners. The owner letter and telephone contact both stated that owners should proceed immediately to the nearest commercial vehicle/tire repair facility that could replace the front tires with new Michelin XZA2 315/80R22.5 LRL tires and inflate them to 130 psi."

"As part of the recall remedy the subject vehicle will have a new tire inflation label installed showing the new front tire pressure of 130 psi, new drive axle tire pressure of 100 psi, and the original tag axle pressure of 95 psi. A placard is being installed on the right-hand side of the dash panel (immediately above the radio/music controls) stating

the proper pressure for the front tires. The amended certification label installed above the driver's seat on the forward bulkhead also contains the recommended tire inflation pressures. Finally, as part of the recall remedy process, representatives from Blue Bird and/or Complete Coach Works conduct a walk-around review of the motor home and all recall related modifications with the owners – including a final review of the importance of maintaining proper tire pressure in the front, drive, and tag axle tires. If the owners are not on-site to take delivery of their motor home, then a teleconference is arranged to verbally review the recall remedies. Subsequently, a letter summarizing the main points of the conversation is sent to the owners.”

“Blue Bird is continuing discussions with Complete Coach Works on providing periodic tire care and maintenance information to the current and future owner of the subject vehicles.”

“Blue Bird will install on all of the subject vehicles an auxiliary tire inflation system that has the capacity to inflate the front tire to 130 psi in a timely and safe manner. This on-board tire inflation system will provide the capability to properly inflate all of the tires regardless of the vehicle's location.”

“The owner’s manual will be updated with an addendum containing additional material from Michelin on the proper care of RV tires, as well as proper inflation pressures for all of the tires. Blue Bird will urge owners to follow the instructions and recommendations of Michelin as stated in their brochures and literature and does not make any other recommendations. Copies of the Michelin brochures that will be included in the owner’s manual are provided in Appendix II.”

### **(5) Blue Bird’s Risk-to-Safety Assessment –**

In its July 17, 2008, letter to Blue Bird, ODI requested the following information:

*Furnish Blue Bird’s assessment of the potential risk(s) associated with an abrupt front tire failure:*

- (a) The failure mechanism(s) / typical sequence of events that has, or may, lead to the an abrupt front tire failure;*
- (b) The risk to motor vehicle safety posed by the alleged defect in the subject vehicles;*
- (c) What warnings, if any, would be provided to the operator that would indicate the alleged defect had occurred or was about to occur.*

Blue Bird provided the following response:

“As the Agency is aware, front tire failures (abrupt, as well as slow, loss of pressure) can occur as a result of multiple root causes. Some of these potential root causes involve circumstances and conditions beyond the control of the final stage vehicle manufacturer, such as:

- Materials used in the construction of the tire that do not meet design specification;
- Manufacturing processes used in the production of a tire that do not meet operating specifications;
- Damage to the tire during shipping;
- Damage from road debris;
- Exposure to chemicals that may degrade the performance characteristics of the tire;
- Damage to the tire from striking a curb or a road anomaly (e.g., pothole);
- Damage to the tire due to the front suspension steering components changing to an out-of-alignment condition after the vehicle enters service;

- Operating with improperly inflated tires; and
- Continued use after age and weathering has degraded the materials compromising the tire.

In Blue Bird's notice letter to the Agency, dated December 11, 2007, we [Blue Bird] stated our determination that the front tires on certain of the subject vehicles may be subject to weight loads exceeding the specified front axle rating and possible tire failure. Accordingly, Blue Bird notified owners in its Part 577 letters that an overweight condition on front tires could result in tire damage or tire failure; further, continued operation of their motor home with improper tire inflation pressure or alignment of the front suspension could degrade the structural integrity of these tires and their performance."

ODI views this response as marginally responsive in that it only superficially recognizes / identifies / discusses the most pertinent issue in this investigation: the potential for front tire over-load. Nor did Blue Bird discuss the risk to motor vehicle safety in their response (i.e., the likely effect on vehicle handling and control) --- all of which are highly pertinent to the central issue of this investigation.

#### **(6) ODI Risk-to-Safety Assessment –**

To supplement the partial response from Blue Bird as summarized in the prior section, ODI makes the following assessment of the safety risk associated with an abrupt front tire failure.

An abrupt front tire failure can affect the control of any vehicle. Motorhomes are frequently operated at high speeds by owners who may lack professional driving experience and who may lack the physical strength to safely control a vehicle directional "pull" following a tire failure.

There is also a risk that vehicles may be disabled and stranded along the roadside. The subject vehicles are equipped with tires that require heavy duty tools which may be too heavy for ordinary owners to use. Further, both the tire needing to be replaced and the replacement spare tire and wheel assembly are heavy, awkward to handle, and frequently dirty making it extremely challenging for the ordinary motor home driver to remove and replace the wheel-tire assembly without professional assistance. For these reasons, motor homes frequently do not carry spare tires.



If a vehicle experiences a front tire failure, owners must frequently request roadside service to replace the damaged tire before the motor home can be moved any significant distance from the roadway. Vehicles that are stranded roadside, possibly for extended periods of time, after dark and/or in remote locations, expose the vehicle's owner and/or servicing personnel to being struck by passing vehicles, potentially resulting in injury or death.

## **(7) Conclusions –**

Based on the information that Blue Bird provided to ODI, it appears that Blue Bird manufactured the Wanderlodge close to, or exceeding, the maximum allowable vehicle loading for a number of years (model years 2005- 2007) without realizing the actual or potential overload condition existed.

Due to the custom nature of the vehicles and the variation in discretionary loading practices of owners, certain of the affected motor home vehicles are likely to be "more overloaded" than others and the various weight reduction, weight redistribution, and capacity upgrade initiatives that Blue Bird intends to deploy may have substantially varying consequences depending on each respective vehicle's loaded condition.

Each remedial weight reduction / weight redistribution initiative may detract from the originally-intended full function of the vehicle.

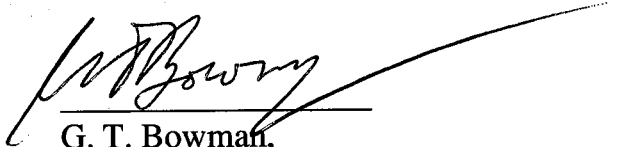
Similarly, owners whose vehicle's rear axle load exceeds the FHWA-specified 20,000 lbs maximum axle load when operated on the interstate highway system, whether as originally built or after campaign modification, bear the risk of penalties as deemed appropriate by the state authorities responsible for enforcement for this regulation. NHTSA is not directly or indirectly authorizing an exceedence of this loading limit.

Blue Bird's initiative to increase the front tire capacity by specifying increased tire pressure is likely to decrease vehicle ride quality, impose increased maintenance responsibilities on the owner, and, because of the challenges for owners to routinely check and inflate tires, poses the risk that certain of these front tires will be operated in an under-inflated condition and thereby risk potential tire failure. However, owner's maintenance of 130 psi in their Michelin 315/80R22.5 XZA2 tires should reduce or re-distribute weight on the front axle.

In recognition of these issues, at the initiation of RQ04-008, ODI referred Blue Bird to prior investigation EA05-011. Blue Bird subsequently adopted several initiatives, including installing an on-board tire inflation systems and mounting a reminder tire

inflation reminder plate to the dash board – both intended to improve the effectiveness of this campaign.

As outlined in the Appendix to this report, ODI remains concerned that motor home owners are unwilling or unable to maintain high inflation pressures in their tires. Failure to maintain the proper pressure at all times risks operating the affected vehicle with overloaded tires and correspondingly increases the risk of tire failures. This risk increases with time due to: (1) the likelihood that the original owner's awareness / interest in extensive tire maintenance is likely to wane over time; (2) the vehicle is likely to be sold to second owners who are unlikely to be aware of Blue Bird's notification letters and potentially unfamiliar with the importance of maintaining the tire inflation maintenance responsibility; and (3) the tire properties will diminish over time due to exposure / aging. To address these issues, ODI encourages Blue Bird to conduct ongoing and thorough education and communication to the affected owners to focus their attention on the continuous and challenging responsibility of maintaining the specified tire pressure.

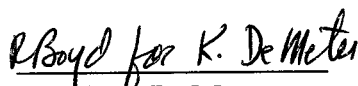
  
G. T. Bowman,  
Safety Defects Engineer

Date 11/10/08

I Concur:

  
Richard Boyd,  
Chief, Medium & Heavy Duty Truck Division

Date 11/10/08

  
Kathleen DeMeter  
Director, Office of Defect Investigation

Date 11/10/08

## **ODI Concerns about Tire Inflation Pressures that Approach or Equal a Tire's Maximum Allowable Inflation Pressure**

### **Introduction –**

Through recent investigation activity (e.g., EA05-011, RQ08-004), field surveys and interviews with motor home owners, ODI has observed that certain vehicle manufacturers have recommended/specified tire inflation pressures that approach or equal the maximum allowable tire inflation pressure for that tire.

Recommending that tires be inflated to their maximum allowable pressure may be acceptable for certain vehicles, such as those engaged in commercial service, whose operators –

- (1) are able to easily and accurately determine the load on the tires of their vehicles;
- (2) are aware of the importance and consequences of failing to maintain the recommended/specified inflation pressure;
- (3) frequently check the tire inflation pressures; and
- (4) have adequate access to appropriate (pressure and volume) sources of inflation air.

In contrast to commercial vehicle operators, ODI observes that operators of motor home vehicles frequently --

- (1) lack the ability or interest to accurately determine the frequently non-uniform and varying load on the tires of their vehicle;
- (2) are unaware (or vaguely aware) of the importance of maintaining the recommended/specified inflation pressure;
- (3) find it a challenging exercise to check the tire's air pressure; and
- (4) often lack convenient access to appropriate sources of inflation air.

ODI is concerned that certain motor home manufacturers have frequently based their selection of tire size/capacity on the premise that these tires will be consistently inflated and operated at the specified inflation pressure. Recommending/specifying an inflation pressure requirement that is the same as the maximum allowable inflation pressure enables a manufacturer to select a tire based on its maximum potential load carrying capacity without incurring the expense associated with specifying a larger size/larger capacity tire though the larger size/larger capacity tire may be more appropriate to the reasonably anticipated "real world" operating conditions of the tire.

ODI believes that motor home manufacturers should select components (*e.g.*, tires, axles, steering, and suspension) and establish maintenance requirements appropriate to “real world” practices of owners / operators. These issues are particularly important for motor homes whose operating environment adds additional complications / challenges for the vehicle’s tires.

ODI notes the similarities in front axle overloading in motor homes and the case *United States v. General Motors Corp.*, 518 F.2d 420 (D.C. Cir, 1975)(Hereafter referred to as “*Wheels*”).<sup>1</sup> Specific to the issue at hand, the *Wheels* Court stated that “a manufacturer would have an obligation to anticipate some degree of misuse perhaps or failure to maintain and build in some additional [safety] margin for his product.” *Id.* at 435.

<sup>1</sup> The *Wheels* Court held that a “motor vehicle or component contains a ‘defect’ if it is subject to a significant number of failures in normal operation, including failures either occurring during specified use or resulting from owner abuse, including inadequate maintenance, that is reasonably foreseeable.” *Id.* at 427. In *Wheels*, the manufacturer argued that “an item of equipment cannot be called ‘defective’ in any sense if it fails to operate properly when the applicable instructions and warnings are ignored.” *Id.* at 434. The Court noted that GM conceded at argument that a “manufacturer would have an obligation to anticipate some degree of misuse perhaps or failure to maintain and build in some additional margin for his product.” *Id.* at 435. The Court went on to say that a common sense approach would say that a technical overuse (overload) could be deemed a realistic expectation. *Id.* at 436. It added that there is an affirmative defense of “gross and unforeseeable owner abuse or unforeseeable neglect of vehicle maintenance.” *Id.* at 438.

ODI recommends that motor home vehicle manufacturers review and, if necessary, amend their practices for selecting tires and the associated tire inflation pressure recommendations. ODI urges manufacturers to consider that it is frequently likely that tires will not be inflated to the placard-specified pressures and that the vehicles will be loaded extensively regardless of the manufacturer’s recommendations. If the tires selected by the manufacturer must be inflated to impractically high inflation pressures to support the vehicle at their fully loaded service condition (and with consideration for the possibility/likelihood for a modest overload), the maintenance burden on the owner/operator may be considered impractical and unrealistic.

### **Relationship of Tire Inflation Pressure to Load Rating –**

Generally, vehicle manufacturers make their tire size/ tire capacity selection based on various design and functional issues such as tire capacity, tire size, ride quality, noise, durability, cost, and a host of other tire-related attributes.

Various tire rating publications issued by tire manufacturers and the "The Tire and Rim Association Yearbook," illustrate that tire load ratings increase as the tire inflation pressure increases. Thus a vehicle manufacturer is able to increase the rating applied to a given size of tire simply by specifying a higher inflation pressure for that tire (up to the maximum pressure allowable).

ODI has observed that in "real world" usage, many motor home operators are unaware, unwilling, or unable to maintain inflation pressure in cases where vehicle manufacturers have specified/recommended inflation pressures that approach or equal the maximum allowable inflation pressures.

### **Motor Home Owner Awareness / Diligence about the Importance of Maintaining Tire Pressure-**

Due to the recreational nature of motor homes, motor home operators often are not as fastidious as commercial vehicle drivers about inspecting and checking tire inflation pressures.

As indicated by past ODI surveys, many motor home owners simply can not and/or do not maintain the specified tire pressure. Where the specified inflation pressure is high, the maintenance requirement on the operator is challenging. The greater the challenge to the operator, the more likely it is that the tire will not be inflated to the specified pressure.

### **Difficulties for Motor Home Owners to Determine Tire Loading -**

Due to their characteristic features such as kitchens and slide-outs, motor homes often are not loaded uniformly side-to-side (laterally) across their axles. Hence, a tire installed on one side of an axle may be loaded significantly higher than an equivalent tire installed on the opposite side of the same axle.

The GAWR (Gross Axle Weight Rating) provides an overall axle rating but assumes that the axle is --- within reasonable limits --- loaded more-or-less uniformly from side-to-side as is typical of most vehicles.

Individual wheel end loading can only be determined by using scales that weigh each wheel end separately. Typically, motor home operators have only occasional access to truck scales which are able to weigh only the load on the complete axle without regard to the lateral (side-to-side) distribution of the axle load.

It is much more difficult for owners of motor homes to obtain access to wheel end scales to accurately determine the individual tire loads. Hence, non-uniform lateral axle loading common, for example in recreation vehicles, equipped with slide-out extensions and similar accessories, coupled with the challenge of effectively measuring side-to-side vehicle loads, pose a situation that owners cannot easily detect, evaluate, and/or correct.

Some owners may also find it further difficult to determine the true load on each of the front, rear, and trailing axle tires due to the variations in loading associated with the amount and placement of discretionary cargo such as food, personal goods, luggage, optional equipment, cargo, fresh water and other necessities/amenities. Also, motor home operators may occasionally elect to retain some volume of gray / black waste water on board during certain trips.

While some motor home manufacturers provide recommendations on the various liquid capacities that may be carried (fuel, fresh water, waster water, propane, etc.), not all owners can estimate / adhere to such recommendations.

In addition, loading each of the motor home's storage bays / reservoirs to its maximum posted or labeled capacity may risk overloading certain tires of the motor home. The carrying capacity specifications for these individual cargo bays and reservoirs may be mutually exclusive: i.e., the owner may load individual fuel / fresh / waste water reservoirs to their individual maximum capacity rating and certain cargo bays to their maximum capacity rating, but may find that he/she cannot load ALL or, in some cases, even SEVERAL of these storage areas to their maximum capacity without risking overloading one or more of the vehicle's tires or other structural components.

### **Difficulties for Motor Home Owners to Find Sources of Tire Inflation –**

It can be difficult for owners of motor homes to find sources of high pressure inflation air. Sources of high pressure inflation air are usually available at heavy truck and commercial vehicles service centers, but are less likely to be available at service facilities more commonly frequented by motor home operators. Many motor home owners have expressed a reluctance to have their motor homes serviced at commercial vehicle service centers.

Specifying the maximum allowable tire pressure provides a near-impossible challenge to the owner to achieve the specified "single point" target value than inflate the tire within an inflation pressure "range." Owners attempting to inflate the tire to the maximum allowable pressure are put in a position of (1) assuring the tire is inflated to the specified pressure to avoid the risk of operating an under-inflated tire with the

associated risk of tire damage and, potentially, a later tire failure and (2) trying to avoid inflating the tire above the specified (maximum allowable) pressure so as to avoid causing damage to the tire structure.

The challenge of maintaining a "single point" inflation target can be further exacerbated by other factors, including possible variations in gage accuracy and the natural changes in tire pressure associated with changes in ambient temperatures, whether the tire is exposed to direct sunlight (warm) or shaded (cool), and by changes in the local ambient temperature as the motor home is driven through various climate zones.

### **Summary -**

Tires operated in an under-inflated condition at highway speeds are prone to catastrophic tire failure. Vehicle manufacturers who recommend / specify the maximum allowable tire inflation pressure create a condition in which virtually any inflation pressure below the maximum inflation pressure risks placing the tire in an overload condition thereby damaging the tire which can cause, or contribute to, a subsequent tire failure.

In cases when there is little margin between the tire load carrying capacity and the tire's actual load, it is highly important / critical that the affected motor home owner maintains the tires at the specified tire pressure. If the owner fails to maintain the specified tire pressure, there is a corresponding decrease in the tire's load capacity and an increased risk of tire overload. Tires that have been selected with marginal reserve capacity risk being operated in an overloaded condition and possibly a subsequent tire failure.

ODI has found that tire failures that occur in the front position have led to the most severe loss-of-control crashes in motor homes. However, a tire failure mounted in any vehicle position can cause damage, strand vehicles, and possibly affect vehicle control.

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