



Harsco Track Technologies

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SERVICE BULLETIN MAINTENANCE OF WAY EQUIPMENT

DATE: 12-7-2005 **BULLETIN NO:** 05-019

TITLE: 19.5 INCH WHEEL AND TIRE VIBRATION INFORMATION

RATING:

<input type="checkbox"/>	DIRECTIVE (Action Is Required)	<input type="checkbox"/>	ALERT (Potential Problem)
<input checked="" type="checkbox"/>	INFORMATION (Action Is Optional)	<input type="checkbox"/>	PRODUCT IMPROVEMENT (Enhance Product)

PRODUCT SERIES / MODEL: All Ford F-250 / F-350 Vehicles Equipped with HY-RAIL® Guide Equipment and 19.5 inch Accuride Wheels, Wheel Spacers, and Tires

SERIAL NO: N/A

SUMMARY: There are many rotating items in a vehicle that can cause vibration. Vibrations in the vehicle drive-train components occur at high frequency. Tire and wheel related vibrations occur at lower frequency, typically 10 to 15 times per second. This vibration results in vehicle shake. This Service Bulletin contains information on 19.5 inch wheel and tire vibration and possible remedies.

OPERATIONAL IMPACT: Incorrect alignment of the vehicle and improper balancing of the wheel / tire assembly can lead to a wheel and tire vibration.

ACTION: Follow the instructions in this Service Bulletin if problems arise while balancing 19.5 inch wheels and tires on Ford F-250 / F-350 vehicles equipped with HY-RAIL® Guide Wheel Equipment.

CONTACT: If you have any technical questions or if we can be of any service, please contact Roger Kusick at the Fairmont, MN. facility: (507) 235-7212. If you want to purchase a wheel balancing jig (HTT part # 3408658), please contact the HY-RAIL® Parts Department at the Fairmont, MN. facility: (507) 235-7143 or (507) 235-7191.

SAFETY INFORMATION

- n FOLLOW APPLICABLE RAILROAD LOCKOUT - TAGOUT PROCEDURE TO REMOVE ALL ENERGY SOURCES FROM VEHICLE AND RAIL GUIDE WHEEL EQUIPMENT. FAILURE TO COMPLY COULD RESULT IN SEVERE BODILY INJURY.**

WHEEL AND TIRE VIBRATION INFORMATION

Wheel and tire induced shake is most often caused by:

- a. A poorly seated tire on the rim.
 - b. A heavy spot in the tire.
 - c. A stiff spot in the tire.
 - d. An out of round tire.
 - e. Loose lug nuts on the vehicle wheel.
1. Wheel and tire balance is important for vehicle ride and stability. Even a small amount of wheel / tire imbalance can cause vehicle shake.
 2. Tires are manufactured to close tolerances for roundness and shape. As the tire wears, the tire's mass becomes unevenly distributed and the vehicle wheel / tire balance may be effected.
 3. Worn shocks or suspension will allow a minor vibration to magnify until it is felt as a major vibration.

Static Balance

1. The most critical speed for the tire induced shake is 55 to 65 MPH (88 to 105 km/h). At this speed, the 19.5 inch tires are rotating approximately 10 revolutions per second. Frequency range between 10 to 15 times per second corresponds to the natural frequency of a vehicle suspension, making shake a potential problem for all drivers.
2. A heavy spot in the tire or tire rim combination causes a radial force which bounces the tire up and down once per tire revolution. This force increases as the vehicle speed increases. Generally, it is only at speeds above 40 MPH (64 km/h) that this weight-induced bounce becomes noticeable.
3. An out of round tire or wheel causes a once per tire revolution up and down force that is independent of speed. If a bounce is felt at very low speeds, it is most likely the result of an out of round tire or wheel. If the bounce is only felt at higher speeds, imbalance is the likely cause.

Dynamic Balance

1. The side-to-side shake (dynamic imbalance) can result from poor bead seating or a heavy spot in the sidewall. Proper balancing can correct vibrations resulting from the heavy spots in the tire.

WHEEL AND TIRE VIBRATION INFORMATION

Dynamic Balance (continued)

2. An out-of round wheel / tire or a stiff spot in the tire can vibrate a perfectly balanced tire. In this situation, force creates vibrations that are present regardless of vehicle speed. Wheels do not have force variations, but they all have some run-out. Every tire has some force variation. Each of these variations, by itself, would not cause a problem, but there will be a vibration problem if the stiff spot or high point of a tire happens to be placed at the high spot of the rim during mounting. If a vehicle indicates run-out vibration, the tire should be rotated one half turn (180 degrees) on the wheel. This generally reduces the vibration.

Wheel Weight Position

1. Inspect wheel weight position after the tire has been balanced. Wheel weights on the inside and outside must not be applied 180 degrees opposite of each other. Weights applied opposite each other (180 degrees) will indicate excessive weights applied to the wheel causing a counter-balancing effect.
2. If this situation is found, the tire must be rotated on the rim 180 degrees and re-balanced. To ensure a proper balance, all weights must be applied on one location of the wheel, inside and outside.

Wheel Run-Out

1. Wheel run-out can be measured using a dial indicator, although it may not be easy. Measure and mark the lowest spot of the inside bead seat and the outside bead seat. Midway between these two marks is the average low spot of the rim. Mark this spot on the valve stem side of the rim.

Tire Run-Out

1. Tire run-out is not simple to measure. Tire run-out includes both measurable run-out as well as a possible stiff spot in the side wall. Interaction between the visible run-out and a stiff spot makes it nearly impossible to find a tire's true high spot without specialized equipment.
2. This specialized equipment loads a tire against a road wheel that simulates a highway surface. The tire is rotated against the revolving road wheel and the radial force variation of the tire acting against the road is measured.

Tire Inflation

1. The tire also acts as a spring between the wheel and the road. When HY-RAIL® equipment is applied to a vehicle, the tires are inflated the manufacturer's recommended maximum pressure printed on the sidewall of the tires, or the wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower. This is done to prevent cupping around the rail.

WHEEL AND TIRE VIBRATION INFORMATION

Tire Inflation (continued)

2. This high inflation causes the tire to transmit shock loads to the suspension and reduces the tire's ability to absorb vibration. Because of this, vibration and road impacts will be felt more in a vehicle equipped with HY-RAIL® equipment than in a regular passenger vehicle.

Balancing

Note: The wheel balancer must be calibrated to the manufacturer's specifications.

1. The wheel / tire assembly should be balanced dynamically with a wheel balancer that is capable of handling a 100-pound assembly with a 5-inch offset. Most passenger car tire balancers can not balance this wheel / tire assembly. Therefore, a commercial truck balancer or equivalent may be required.
2. A balancer that is capable of balancing this assembly will give duplicate results when the balanced wheel is taken off the balancer and remounted on the balancer.
3. The wheel / tire assembly and the wheel modification spacer can be balanced as an assembly. If the wheel modification spacer will not fit on the wheel balancer, a wheel balancing jig (modified wheel spacer) is available for purchase from HTT (part # 3408658).

Note: The wheel balancing jig (modified wheel spacer) is to be used only on a wheel balancer, not on a vehicle.

4. After balancing the wheel / tire assembly, remove the wheel / tire assembly from the balancer and roll it on the floor. Remount the wheel / tire assembly and check the balance with the applied weights in place. If the balancer indicates the just-installed weights are in the wrong place, the balancer is not capable of balancing the wheel assembly.

Alignment

1. After the guide wheel equipment has been mounted, an alignment must be done to the vehicle. Perform a four-point alignment. The tolerance for this four-point alignment is "0" or as close to perfect as possible. Then, check the caster, camber, and toe-in to the vehicle manufacturer's service manual specification. It recommended that the caster and camber be set to the minimum but within the specification of that particular vehicle.

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