SmartWeight[®] Balancing Technology Hunter Engineering's patented SmartWeight® balancing technology is a revolutionary wheel balancing method that provides a better overall balance while reducing visible correction weights on your wheels.

The GSP9700 Road Force Measurement[®] System uses a "road roller" to perform a computer simulated road test, isolating and measuring the exact cause of wheel-related vibration.



Form 4426-T, 01/10 Supersedes 4426-T, 11/08

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Questions About How To Stop Wheel Vibration

- What's the difference between Wheel Balance and Force Variation?
- An unbalanced wheel causes vibration when spinning because of a heavy spot in the wheel. Force variation causes vibration because of uneven stiffness in the tire sidewall or tread, or because the wheel is out of round when rolling. Imbalance and force variation can affect one another. Imbalance is measured by spinning the tire. Force variation is measured by placing it under load to simulate actual road force. This can only be done using a computer simulated road test. Ask your technician to do this test during tire service.
- How often should I have my wheels checked for excessive vibration?
- A Follow the vehicle manufacturer's recommendation noted in your owner's manual. But whenever you notice excessive vibration you should have a qualified technician inspect for any of the possible causes mentioned in this pamphlet. Gradual worsening of wheel vibration can be difficult to notice, so as a general rule have your tires checked every 10,000 miles or at least once a year.

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Balance Is Only Part of the Solution



What you need to know about Wheel Balance & Vibration Control!



Today's cars and light trucks are designed to ride smoothly and handle safely. Unchecked, excessive wheel vibration can result in:

- Excessive tire wear
- Damage to suspension and steering parts
- Unsafe steering and handling

What Causes Excessive Wheel Vibration?

At 60 miles per hour an average size tire rotates 850 times per minute.* At this speed slight variations in balance, sidewall stiffness or roundness can cause the wheel to literally slam into the pavement *14 times a second*.

• Wheels Out of Balance:

Static balancing uses a single weight plane and only addresses "up-and-down" imbalance. This is simply not adequate for today's vibration sensitive vehicles.

Dynamic balancing uses two weight planes. This eliminates "up-and-down" and "side-to-side" imbalance. Dynamic, two-plane balance should always be requested, even on custom wheels when hidden weights are required.

SmartWeight[®] is an optimized dynamic balance that gives you the best ride possible.



Static balance measures only "up and down."



• Road Force Measurement: A perfectly balanced tire can still vibrate due to force variation...

Force variation is most frequently due to wheel runout, uneven tread, or sidewall stiffness in the tire. Runout is when a tire or rim is *out of round when rolling*; frequent causes are a bent rim or uneven tire wear.

Uneven tread or sidewall stiffness can be found in new or worn tires. Tires by design are never uniformly flexible throughout nor are they perfectly round. And no two tires are exactly alike in these characteristics.



An out of round tire (runout) causes vibration.

A stiff spot hitting the pavement causes vibration.

• How Excessive Road Force Variation Is Corrected:

- Aligning the high point or stiff spot in the tire with the lowest spot in the rim can make the wheel "round when rolling." This procedure is called ForceMatching[®] and solves most vibration problems.
- **2.** Tires or rims with extreme runout or road force variation often cannot be matched and must be replaced to solve vibration problems.



ForceMatching® aligns the high point or stiff spot on a tire... with the low spot on the rim for the maximum roundness and smoothest possible ride.

• Tire Pressure and Wheel Alignment:

Improper tire pressure and/or misalignment causes irregular tire wear, which creates and amplifies imbalance, resulting in wheel vibration. Alignment can be adjusted and wheels serviced to reduce or stop the vibration. Ask your technician.

- Steering and Suspension Components: Steering and suspension components need periodic inspection. They can eventually wear out resulting in wheel vibration. Excessive wheel vibration from other causes can also shorten steering and suspension component life.
- Other Hidden Causes of Wheel Vibration:
 - Wheel to axle mounting error
 - Brake component wear or failure
 - Drive train or engine component wear or failure
 - Vehicle component characteristics

A knowledgeable technician with proper training and equipment can diagnose these problems. <u>But the only</u> way to rule out all wheel-related vibration is a computer simulated road test.

*Rotation for smaller tires is slightly faster; for larger tires it is slightly slower.