

My fuel economy has dropped by at least 5 MPG... what happened?

Shortly after Henry bought his new car, he began figuring his gas mileage on a regular basis.

Since it consistently registered between 24-26 MPG, he eventually lost interest and quit doing the calculations.

This lasted for a few years—until he noticed that he was having to fill up more often on long trips. (Time to get out the calculator again!)

Imagine his surprise when the num-

bers were now consistently showing up at around 20-21 MPG!

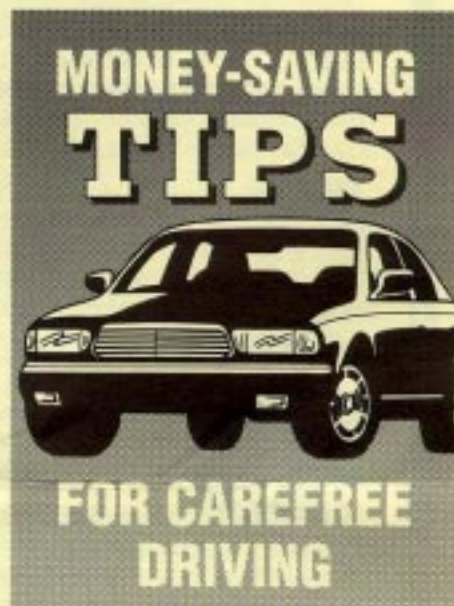
Henry was baffled. The car seemed to be running fine. He hadn't noticed any problems recently. And he was using the correct grade of fuel, according to his owner's manual. *So, where did that missing 5 MPG go?*

Actually, Henry's problem is not so unusual for drivers who don't track their mileage. What many fail to realize is that there are numerous factors that can gradually "nibble away" at their vehicle's fuel economy, often without them even noticing.

And what are the primary sources of these mileage-robbing factors?

At **highway speeds**, energy is expended primarily to overcome *aerodynamic drag* and *rolling resistance*. In **city driving** it's expended primarily to overcome *inertia* as opposed to maintaining a certain cruising speed.

Thus anything that increases wind drag or rolling resistance, hinders



smooth acceleration or wastes kinetic energy (such as a dragging brake) will reduce Henry's fuel economy.

And of course in **all types of driving**, any factors that compromise his engine's *efficiency* or *performance* will also contribute to an increase in fuel consumption. So all in all, Henry might *(see Mileage robbers, page 2)*

INSIDE:

- Tips for better mileage
- How to read tire sidewalls
- Vehicle maintenance tips
- Trouble shooting tips
- Voltage inside radiator?
- Ask the Answer Guy
- Need a digital compass?

SECRETS OF THE SIDEWALLS

The average motorist is often surprised to find out how much information is contained in all that printing on the sidewall of every tire. Granted, some of it is stuff you may not care to know, like the type of construction, number of plies, serial number, date of manufacture, place of manufacture, etc. But there's also a wealth of useful information that can come in handy when you want to compare one tire to another. Here's a rundown on what you'll find:

TIRE SIZE: "P225/65R15 88T" is the alphanumeric code which breaks down as follows: P is for passenger tire; 225 is the (inside) width in millimeters; 65 is the percentage ratio of the sidewall height to the tread width; R stands for radial tire; 15 is the diameter of the wheel in inches; 88 is the load index; and T is the maximum speed rating.

SPEED RATING: This letter designation indicates the maximum speed at which the tire can be safely operated. A "T" represents 118 mph; "S" is a common one (112 mph) and the highest is "Z" (150 mph or higher.) All four tires on your vehicle should have the same rating.

LOAD INDEX: This two-digit number represents the maximum weight each tire is designed to carry. An "88" corresponds to 1,235 pounds. Multiply times four to get the combined safe load for a set of four identical tires.

INFLATION PRESSURE: "240 KPA (35 PSI) MAX PRESS" is the maximum recommended pressure in kilopascals and/or pounds per square inch. The recommended pressure for your vehicle may often be lower, as specified in your owner's manual.

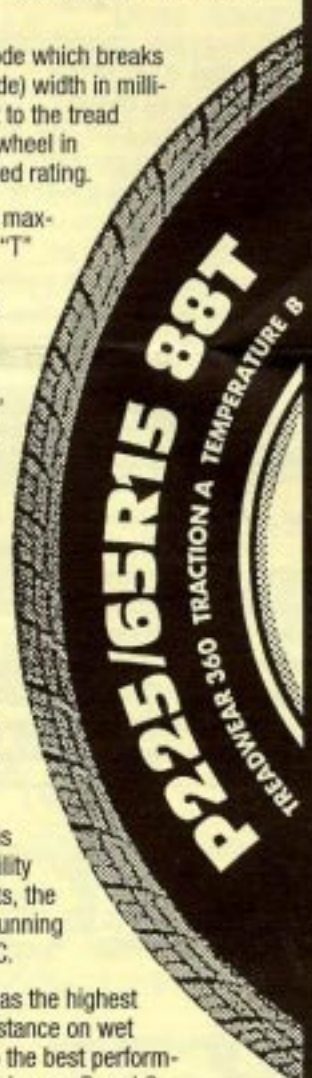
TREADWEAR RATING: "TREADWEAR 360" means the tire should last twice as long as one with a rating of 180. Multiplying the rating times 200 should give you a rough approximation of the number of miles the tire will last under *ideal conditions*.

TEMPERATURE RATING: "TEMPERATURE A" means the tire has the highest possible rating in terms of its ability to resist heating up on the highway. The hotter a tire gets, the shorter its life and the greater its risk of failure. Cooler running tires offer better fuel economy. Other grades are B and C.

TRACTION RATING: "TRACTION A" means the tire has the highest possible rating in terms of its ability to stop in a short distance on wet pavement. However, this does not necessarily equate to the best performance on dry pavement, snow, etc. The other traction grades are B and C.

MUD/SNOW DESIGNATION: "M" or "S" or "M+S" immediately after the size designation indicates that the tire is rated for use in mud or snow or both.

DIRECTIONAL ARROW: Some tires are meant to rotate in only one direction to expel water for improved wet traction. The arrow points in the direction of rotation.



Mileage robbers *(from page 1)*

be looking at a typical set of circumstances something like these:

If he's driving on underinflated tires, this could be costing him 1-2 MPG. A faulty thermostat could cost another 1-2 MPG. Wheels out of alignment, another 2-3 MPG. Leaking fuel injectors, 1 MPG. Worn spark plugs, 1-2 MPG. A dirty air filter, 2-3 MPG.

Obviously these numbers can add up pretty fast! So how does one avoid these "mileage robbers" that can reduce fuel economy without even being noticed? Here are some suggestions:

On the highway:

1) Whenever possible, keep your windows closed to reduce wind drag. If necessary, turn on the A/C to keep cool. 2) You can further reduce drag by putting cargo inside the vehicle instead of on the roof rack.

3) Make sure your transmission is in overdrive or high gear at cruising speed. 4) Use your cruise control to maintain a steady speed. 5) Keep in mind that most engines are designed to operate more efficiently at around 45-50 mph as opposed to 65-70 mph.

In city traffic:

6) When possible, keep the A/C off and open the windows if necessary. Wind drag is relatively slight at speeds below 35 mph.

7) Avoid idling for more than 30 to 60 seconds. If you're going to be waiting longer, shut the engine off.

8) Avoid long warm-ups. Your engine will warm up faster if you begin driving a minute or so after start-up.

9) Avoid hard braking and hard acceleration by watching the road ahead and anticipating required changes in speed so they can be made gradually.

10) Avoid short trips by combining them into one long trip. This will allow the engine to warm up properly for less internal wear and greater efficiency.

Wheels and tires:

11) Check tire pressures at least once or twice a month and keep them inflated to the levels recommended in your owner's manual.

12) Have your wheel alignment and

TROUBLE shooter

balancing checked annually, or any time you notice symptoms indicating that they might need attention.

13) When buying new tires, consider getting a "highway" tread design with low rolling resistance.

Preventive maintenance:

14) Remember to have your vehicle's fluids, filters, PCV valve, belts and hoses inspected and replaced at the recommended intervals.

15) Follow the recommended maintenance schedule to insure periodic inspections of your cooling system, brake system, exhaust system, ignition system, computerized engine controls, wheel bearings, tire wear, etc.

16) Tighten your gas cap until it clicks. A loose one can cost you a couple gallons per month in fuel that simply evaporates. On newer cars, it may also trigger the MIL light on the dash—often requiring the services of a technician to turn off the light.

17) Check your vehicle once a month for excess cargo in the trunk or back seat. A 200-lb. reduction in weight can save you up to 1 MPG.

18) Consider switching to synthetic oil if you haven't already done so. This can also save you up to 1 MPG.

Diagnosis tells the tale:

In Henry's case, his drop in mileage could be the result of several conditions that are relatively simple to fix—underinflated tires, a clogged fuel filter, a worn-out thermostat, etc.

But it could also be the result of something more complicated such as: wheels out of alignment; worn suspension parts; a sticking brake shoe or caliper; an exhaust leak that causes the oxygen sensor to supply false data to the onboard computer; carbon build-up in the fuel injection system or combustion chambers; a leaking fuel pump or fuel injector; timing that's out of adjustment; or a transmission that's not shifting at the right points.

The sooner Henry gets his problems diagnosed and corrected, the sooner he can restore his car's performance and fuel economy. And by paying more attention to the "mileage robbers," he just might be able to avoid surprises like these in the future.



"What would a master mechanic do now?"

Car pulls to right after right turn, but not left turn

This is known as "memory steer." It's usually caused by a binding suspension part on one side of the car—in this case, the right side. The most likely culprit would be a binding strut, ball joint or tie-rod end. Possibly a problem in the steering gear.

Odor of burning rubber is noticed immediately after engine is shut off

This type of smell is frequently caused by: a) a slipping drive belt or serpentine belt that needs to be adjusted or replaced; b) a rubber hose that's slightly out of position and contacting a hot engine part; or c) a brake shoe or pad that's "hanging up" and not releasing when you take your foot off the pedal.



Loud crackling and popping noises after engine is shut off

This is considered a normal condition caused by the contraction of certain very hot metal parts as they cool off. (In particular, the heat shields and exhaust system.) It may not sound very loud when you park outdoors, but inside a garage it can make quite a racket.

Flickering overdrive light on instrument panel

The flickering suggests that the problem may be electrical—such as a bad wire, loose connection or faulty solenoid. But if the overdrive is not functioning when the light flickers, you may have a transmission problem such as internal wear or a sticking shift valve. Your owner's manual may offer a better explanation of how this particular light works.

Temperature needle fluctuates up and down while driving on highway

You could have a faulty temperature sensor or sending unit, a bad ground connection or a problem with the gauge itself. But if the coolant temperature really is fluctuating as the needle indicates, then the most likely causes would be: air pockets in the cooling system; a failing water pump; a low coolant level; a clogged radiator; or a bad thermostat.

Voltmeter shows electrical charge inside car radiator

Coolant that hasn't been changed in a long time tends to develop a high acid content. This may produce a chemical reaction that can create a low voltage inside the radiator, not unlike the electrolyte inside a car battery. This voltage may interfere with the coolant temperature sensor, cooling fan sensor, etc. If they're sending false readings to the central computer, your car's performance and/or fuel efficiency will be degraded until the coolant is replaced.



ASK THE



Dear Answer Guy:

My car is supposed to run on premium but I've been trying regular as an experiment. Since I have not noticed any knocking, is it okay to stick with the cheaper 87 octane? ANSWER GUY: No, you've probably been outsmarted by your car's onboard computer (PCM). As your octane level dropped, the knock sensor was busy telling the PCM to adjust the ignition timing to prevent the engine from knocking. Unfortunately, retarding the timing in this fashion can cause increased engine wear, reduced fuel economy, overheating of the catalytic converter and increased pollution of the atmosphere.

Dear Answer Guy:

I quit smoking two years ago but I still get a hazy film on the inside of my windshield. Where is it coming from? ANSWER GUY: Possibly from a leaking heater core or A/C evaporator, but the most common source is vapors or gases given off by the various plastic and vinyl parts of your car's interior. These emissions occur mainly when the car gets "baked" in the hot sun. To reduce the effects, try opening the windows a bit when the vehicle is parked—and using a sunshade to cover the inside of the windshield.

Dear Answer Guy:

I tried to take the floating-ball compass from the dashboard of my old car and mount it in my new car, but the readings are all haywire. Is there some way to correct this? ANSWER

GUY: The electronics prevalent in today's newer cars often produce stray magnetic interference that will confuse an ordinary analog compass. You may need to get yourself a digital electronic compass designed for automotive use. These run on batteries or 12-volt DC power and are not subject to the same interference problems.

Dear Answer Guy:

My teenage nephew was "grounded" for going over 90 mph in the family car. He never got a ticket but the speed was recorded in the car's computer and came out when a mechanic was scanning the memory for codes. How is this possible? ANSWER GUY: If the throttle is held wide open for a time and the onboard computer (PCM) can't figure out why the air/fuel mixture is running so rich, it might conclude that something is wrong and set a fault code. Along with the code, some PCM's record other pertinent data such as vehicle speed, engine temperature, etc., to help the technician diagnose the exact nature of the problem.