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The Bell Performance Guide To Maintaining Your Older Vehicle

Introduction

More people are keeping their cars longer than ever before. The days of trading in a vehicle after two years seem to be over for a growing part of the US populace who have decided to keep their cars and drive them until they drop. In today's economy many owners hang onto their older cars because they can't afford a new one.



Older cars do offer advantages over newer models. Financially, all of the initial depreciation has already happened, so you don't lose the value initially that you would when you drive the new car off the lot. You can buy a five year old Porsche for the same price as a brand new Honda Accord. Figures from CNW Marketing Research also show that a car purchased new in 2008 would cost around \$25,500, with the same car now being worth \$13,000. If you were to purchase it now, you'd have saved about \$12,000 over a five year period.

In addition to being cheaper, older cars generally have lower insurance costs and cost less to register. The difference in registration can be as much as \$1,000 depending on the state and whether the car is less than three years old. Older cars cost less to insure because they're cheaper to replace if stolen or wrecked.



Some times we may refer to older vehicles and some times we use the term 'high mileage'. High mileage can be understood to mean high miles per year, such as over 15,000 miles per year. For our purposes here, we're thinking of older vehicles that have accumulated high total miles. How many miles? If you are driving a car or truck with 75,000 or more miles on the odometer, investing the time and money to properly maintain your older vehicle may turn out to be the right move.

With that in mind, we bring you *The Bell Performance Guide to Maintaining Your Older Vehicle*. In this resource we will cover the important priorities you should consider in maintaining your older vehicle, important maintenance points for when you acquire a new-to-you older car, and when you should consider finally replacing your older vehicle for a newer one.

The Important Priorities

Keeping an older car running well can be a daunting task when you're unfamiliar with what to do. What should you do first? Last? What things can you ignore and what things do you ignore at your (and your car's) peril? There's a lot of think about.

To simplify things, break it down into manageable bits. When owning and maintaining an older car, there are three types of priority areas that need to be addressed.

Priority #1: Items that may cause unsafe operating conditions when driving your vehicle. This includes your car's braking system, tires, steering system, and what we call "the driver vision system" which is ensuring the clarity of all glass and keeping the windows and windshields' free of cracks or anything else that would obstruct vision.



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Priority #2: Proper maintenance on potential things that could leave you stranded or cause other components such as the engine to fail. This includes radiator hoses, fuel lines, constant velocity (CV) joints, clutch fan and timing belts.

Priority #3: Normal maintenance like changing the engine oil, transmission fluid and engine coolant. This type of maintenance doesn't prevent catastrophic breakdown but is essential to keeping your older vehicle running its best for the longest possible time.

Recommended Maintenance Procedures

Being proactive in the maintenance of your older vehicle will extend its life and save you money. Consider the following areas to target.

Oil Changes – The Life Blood of the Vehicle

If you read the Bell Performance blog, you should remember the Healthy Oil series published in January 2012. Those who followed the series came away with the important thesis that oil changes conducted at the recommended intervals are the single most important step you can take to keep your vehicle healthy. An oil change is cheap insurance because it removes grit and combustion by-products that end up in the crank case and can cause premature wear.

What to do?

Change the oil every 5,000 to 7,000 miles, which is fine for most vehicles. If you drive under severe service conditions (dusty environments, lots of short trips in cold weather), you should change it a little more often. Exactly how often is best dictated by whatever the vehicle owner's manual says.



Some oil change places push high mileage oils for older cars. These high mileage oils are supposed to be formulated with higher doses of additives to prevent oil burn-off and deposits. It certainly doesn't hurt to use a high mileage oil like this or even to use synthetic oil. But the frequency and regularity with which you change the oil is the most important factor.

Brakes – Driving's Not Fun If You Can't Stop

Brakes are one of your vehicle's most important safety features and you should replace brake pads and shoes when they wear out. How often you need to do this depends on your driving habits and where you drive. Lots of city driving with stops and starts will wear the brake pads faster. So will towing trailers and carrying loads. On average, pads may last 30,000 to 40,000 miles. Some more expensive pads can last twice as long.

You can tell that your pads are worn thin if you hear a squealing noise when the brakes are engaged. When the pads are getting thin, the brakes will start to squeal. This is due to built-in wear indicators that are in contact with the rotors, producing that sound. Squealing is kind of a warning sound to you that you need to check your brakes. If you continue on without servicing the brakes, the squealing will turn into grinding. Grinding is the sound that the brakes have



Worn brake pads



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ground past the wear indicators and into the rotors themselves, which means the rotors are being damaged when the brakes are engaged. What was a cheap job of replacing pads just became more expensive when you have to re-surface or replace the rotors as well.

Rotors and Drums

It is wise also to pay attention to the other parts of your brake system – rotors, drums and calipers. All of these parts have to work together for the system to function properly and effectively. Over time, brake rotors or drums can be worn down. Excessively worn pads, as noted above, can lead to scoring of the rotor's surface. If you feel pulsating when stopping, you know it's time to have the rotors looked at.

Proper care of the rotors involving "turning" or resurfacing at the mechanic's shop, giving you a fresh surface for the brake pads to grip onto. Resurfacing them saves money you by keeping you from having to replacing them completely. Of course, rotors and drums can only be turned so many times, so it is possible with an older vehicle that you will have to replace these parts.



Machinist turning rotors

Brake System Troubleshooting

There's more to assessing brakes than simply listening for strange sounds. You can get some solid clues on the health of the vehicle braking system (and what you're going to have to do to get it healthy again) by noting any of these unusual symptoms.

- **Pulling or Grabbing to One Side:** This can happen for many reasons, none of them good. The brakes can be misadjusted, there can be leakage of grease, oil or brake fluid, or the brake cables may be frozen.
- **Loss of Brake Pedal:** This happens when you've lost brake fluid to a leak. Leaks can be a result of brake line leaks or faults or even a bad master cylinder. Any good mechanic can diagnose the problem pretty easily.
- **Vibration of the Brake Pedal:** This results from warping of the brake system surfaces. Excessive heat coupled with excessive wear warps the surface of the rotor or drum and results in the signature vibration. Unfortunately when the wear is up to this point, you're probably going to have to replace the brake parts instead of being able to resurface them.
- **Clicking Noises During Braking:** Clicking is simply a result of worn or broken devices on the brake pad that are supposed to stop movement of the brake pad. If they break, the pad will be loose and rattle during braking.
- **Excessive Drag During Acceleration:** If you don't use your emergency break very often, the cable can become rusty and may freeze.

What About Lost Brake Performance?

Catastrophic brake failure is something you want to avoid. But it doesn't just happen overnight; some of the following factors can contribute:



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1. Crystallized brake pads and/or shoes: Brakes function when the pad material is able to grab and hold the surface of the rotor or drum. Heat is generated as the brake functions in this way. When brakes become overused from stopping too fast too many times or from riding the brakes, the surface of the pad material crystallizes and becomes hard. This makes the brake pad surface unable to grab the rotor surface and unable to stop the car effectively.



Hot brakes under stress

2. Oil or grease soaked brakes. An important reason you should fix broken boots (the rubber sleeve that fits onto the end of the axle) and transaxles. If they're broken in some fashion, oil and grease can leak onto the brakes and reduce the stopping effectiveness.

3. "Hot Spots" on the brake drums or rotors can develop from excessive overheating in the same fashion as brake pad crystallization. These hot spots are really hardened areas that have been "cooked" by excessive heat. The brake pads can't grip the surface of these areas effectively and this reduces stopping ability.

What To Do?

Don't let the brakes in your older vehicle get to this point. If you can't check the brake pads or rotors yourself for wear and tear, have them looked at by a mechanic every six months or so, as part of a vehicle checkup such as when you have the oil changed. It will save you money and headaches in the long run.

Belts and Hoses

The battery, air conditioning and cooling systems of the car all use belts and hoses to perform their essential functions. You have the timing belt, which keeps the crankshaft and camshaft synchronized to maintain engine timing, and transmits power from the front of the engine to power-hungry systems like AC and the fan. Cooling hoses distribute coolant to needed parts of the engine to prevent overheating. These belts and hoses, made out of rubber, will wear out over time. If one breaks, it can leave you stranded.

The remedy? Replacing them before they have a chance to fail. But how often to do this?

There are serpentine belts and there are v-belts. V-belts last about 3 years or 36,000 miles. The three year cutoff is important to note because research shows that the failure rate for these belts skyrockets when you get into year four.



Serpentine belt



V-Belt System

Serpentine belts last longer at about five years or 50,000 miles. But they cost more to replace so there is a tradeoff there. It's true for both types that you don't want to be around when they break, so pay attention to their life span and plan accordingly.



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For rubber hoses like in the cooling system, these develop tiny cracks that turn into big cracks, splits and leaks. This process is accelerated by oil contamination, atmospheric ozone exposure (urban driving), and extra engine vibration which may causes the hose to rub against something it wasn't intended to.

What to do?

You can do visual inspections of the hoses, pinching them and inspecting them for signs of cracks and brittleness. But this only goes so far because coolant hoses especially wear from the inside due to the conductivity of the coolant flowing inside of it.



So the only real way to be sure is to bite the bullet and replace the hoses within the recommended lifetime guidelines.

Automotive Fluids: Coolant

Coolant is the primary fluid most people think of in a vehicle. Coolant has a defined lifespan and requires changes every so often. How often depends on what the owner's manual says. Some vehicles have long-life coolant that's supposed to last 100,000 miles. If you have an older vehicle, this may not be the case.

You need to change the coolant because it breaks down over time. Like oil, coolant has certain kinds of additives contained, including corrosion/rust inhibitors. When the coolant gets old, these get used up and the cooling system rusts from the inside out. The engine block itself will contribute a lot of rust to the situation. The coolant also turns acidic over time due to chemical reactions with the metal in the coolant system. This accelerates the corrosive process. If you let this go too long, the rust clogs passages in the radiator, which causes it to fail over time and your engine to overheat. Now you're talking a big money expense.



Coolant corrosion

For some reason, drivers in Bell's home state of Florida ignore their cooling systems more than you would expect. Talk to mechanics in Florida and many will tell you that overheating is the #1 repair they have to deal with. Overheating the car even one time can destroy an engine by warping engine parts like head gaskets and rings. This happens especially if the engine has aluminum parts, which are more sensitive to high heat fluctuations than the old cast iron models. Since we are talking about older cars in this resource guide, it's not certain if your engine would have aluminum in it or not.

What to do for coolant?

Obviously you should keep your coolant levels topped up at the recommended levels. But you will need to flush your coolant system periodically. There are coolant flushes available formulated to neutralize acid buildup in the system, so it may be a good idea to use one of those.



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Automotive Fluids: Transmission Fluid

Cars with automatic transmissions use ATF fluids to lubricate the transmission parts, act as a coolant, and help transmit power from the engine to the transmission. Manual transmissions aren't as complex as automatic one but still require some type of oil to accomplish these features. Both of these fluids need to be changed within recommended guidelines (owner's manual). ATF fluid breaks down over time due to the heat exposure. Manual transmission oil gradually gets a buildup of metal particles in it (ATF fluid does as well). Without being cleaned out and changed, these will shorten your transmission life. You don't want to lubricate your transmission with metal shavings. If you've kept your older vehicle as long as you have, it would be shame for it to die due to a transmission issue.



Bad ATF Fluid vs. Good ATF Fluid

What to do for transmission fluids?

Check the owner's manual for specifics, as usual. Recommendations for changing the fluid can vary, so it is most important to follow the manual recommendations.

Generally speaking, manual transmission fluid gets changed every 30,000 to 60,000 miles. Automatic transmission fluids require changing from every 30,000 to 100,000 miles (60-100k is more common). In between changing, you should always check your fluid levels. Automatic transmissions have dipsticks (like the oil crankcase dipstick) to allow you to check the level. Manual transmissions rarely have dipsticks anymore, but since you have an older car, it's possible. If it does not, you can ask your mechanic to check the oil level when they're looking at other things.

Whether or not to change automatic transmission fluid can be a tricky question, however. If you put new ATF into an old transmission that contains "gunk" and particulate, the detergent action of the new fluid can dislodge things that you don't want dislodged, and it can cause more harm to your transmission than good. If you're unsure whether or not to do it, you could default to smelling the fluid. Automatic transmission fluid that has "going bad" will have a burnt smell to it. Check your fluid dipstick and smell the fluid. If you notice that kind of burnt smell, it's a good indication that you need to not just have the fluid serviced but the actual transmission looked at. Burnt transmission fluid is a sign that the parts inside are breaking down, so to speak.

*One more thing.....*you should always check transmission fluid levels if you notice a leak. Transmission fluid is different from motor oil in that it doesn't burn. So if you check the fluid level and it's low, you've got a leak, no doubt about it. Which you need to get fixed.

Steering and Power Steering Fluid

If you can't steer, you can't get where you're going (unless it's in a straight line). Steering components like ball joints and tie rod ends wear out over time and can cause failure. If you start hearing noises when going over bumps and when turning the steering wheel, this is an indication some of these parts might be



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wearing and you should look into it. Unless you have a lot of tools, you'll want to take this to a professional.

Power steering fluid is the hydraulic fluid that transmits the power in "power steering". It functions in the steering system through being pushed by a pump to pistons on either side of the steering rack, which enabled you to turn the wheels. Like all fluids, it does not last forever. As the vehicles ages, the steering components like o-rings will wear out and break apart, contaminating the fluid. This causes the power steering pump to work harder and wears it out faster. Replacing power steering fluid is cheaper than replacing a power steering pump. Both of these are cheaper than replacing a damaged power steering rack, which is the words of NPR's Car Talk guys, will require you to take out a small home-equity loan to replace. If you have an older car (and since you're reading this, you probably do), this will likely total your vehicle.



Blown power steering pump

What to do for steering?

Have the steering looked at by a professional when you start hearing funny noises. If you hear whining or moaning when turning the steering wheel, this is a sign your pump could be ready to go. Have your steering fluid changed according to manufacturer guidelines. And check your fluid level, since running out of fluid will destroy your pump pretty quick.

All Aboard The Power Train

The power train encompasses the parts of the car that translate the action and energy of the engine and transmission into vehicle movement.

The part of the power train that older car owners need to concern themselves with the most are the CV joints or drive axle boots. If you look under vehicle near the wheels, you'll see a rubber cover by the axle; this is the CV "boot", and it protects the CV joint which has a compaction of grease lubricating bearings and moving parts that encompass the connection between the drive shaft and the wheel axles. CV stands for "constant velocity", an important component for transferring power from the engine to the wheels.



New CV Boot



Damaged CV Boot. If this is not repaired, the grease will leak and destroy the CV axle

CV boots often wear out on older front-wheel and all-wheel drive cars. It is crucial that you replace them before they fail because they connect the drive shaft to the wheel axles. There are warning signs you can pick up on if you pay attention. Most common is a popping sound you can hear when you turn the



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steering wheel. If you look up under your car every so often, you can visually see the condition of the rubber boot and spot if there are cracks in the boot. If so, it's an easy and cheap repair. But if you let it go, the grease can leak out through the cracks and the CV joint can fail. Now you're looking at hundreds of dollars instead of a few.

What to do for CV Joints?

Just check the CV boots every so often, such as when you have your oil changed. Once cracks are noticed, have the boot replaced.

Vehicle Suspension



The suspension interacts with the steering system to provide you with vehicle control. The suspension absorbs energy from bumps in the road to keep the vehicle stable and under control. Shocks, struts, and springs compress and release hundreds of thousands of times over the years of the vehicle's life. This causes them to weaken. These parts are essential for road handling, cornering and cushioning you from bumps, jolts, and vibration. So the suspension isn't as essential as the brakes, but it does play a major part in having a good driving experience. But don't mistake this for a conclusion that the suspension doesn't play an important part in safety. Worn or broken suspension system components can cause accidents or even vehicle roll over in the right driving conditions.

Symptoms of a worn out suspension are obvious but can include things like uneven tire wear and vibration or noise while cornering in the vehicle. Driving habits and operating conditions play a part on how often suspension components wear out and require replacement. So too is the frequency of regular maintenance like chassis lubrication and even wheel alignment.

What to do for suspensions?

Priority should be given to replacing any needed parts to keep the vehicle operating properly. Maintenance steps should include making sure the chassis is lubricated properly.

Wheel Alignment

Tire alignment is essential to the life of your tires. If the alignment is not perfect, excessive tire wear and premature tire failure can result. A new set of tires can run \$600 or more, so you want to everything you can to make them last longer.



Examples of uneven tire wear caused by mis-alignment



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Periodic alignment checks and adjustment when necessary can save you hundreds of dollars over the life of your vehicle. It's easy to know when your vehicle is out of alignment as it will pull to one side or the other while driving.

Tires: The 2nd Most Important Safety Item

Tires are the contact points between your vehicle and the road. As noted, they can be expensive and thus the incentive is created to keep them in good condition. It's worthwhile to make sure your tire pressure is within the recommended range. Tires are second only to brakes as a safety device on the vehicle. Having tire pressure too high or low affects handling and even braking.

Keep your tires inflated to the correct pressure for safety, even tire wear, and maximum tire life. Proper tire inflation can also improve your gas mileage by as much as 3 percent according to the U.S. Department of Energy.

What to do?



Check the tire pressure monthly with one of those cheap gauges you can pick up anywhere. Do the check when the tires are near room temperature, not after driving for an hour. And check all four tires. Compare it to the pressure guidelines in the owner's manual or on the door post or even under the center console cover. Over-inflated tires will compromise your handling and your stopping ability. Underinflated tires create a drag on the road, wear the tires out quickly and cause them to overheat with the potential for a blowout.

Rotating your tires every 5,000 miles or whatever your owner's manual says will increase their life because they will wear more evenly. But don't pay more than \$20 or so to have it done. And don't always have the tire rebalanced after rotation; only if you feel vibration while driving.

Fuel Systems and Ethanol Fuel

Older vehicles made before 2004 do not have fuel system components that can stand up to the highly corrosive effects of ethanol-blended gasoline. As ethanol has infiltrated the nation's fuel supply, more and more people are witnessing firsthand how ethanol dissolves rubber and plastic parts over time and draws water into the fuel. Beyond this, ethanol reduces gas mileage (it has less energy than gasoline does). Depending on what state you're in, it may actually be illegal to buy ethanol-free gas at the filling station.

What to do?



The common answer is to additize the fuel so the gas mileage improves and the engine/fuel system parts are protected. There are lots of ethanol additives on the market, including ones made by Bell Performance (Mix-I-Go). You want to choose a fuel treatment that does not contain alcohol and you want to make sure the claims of the treatment are reasonable. A bottle that guarantees it will raise your mileage by 40% is probably overstating its claims by just a little.





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What To Do When You Buy An Older Car?

Buying an older car is the best value since you're not taking the depreciation that new cars have. The tradeoff is that you're not the only person to have driven the car and you have no idea how previous owners treated it. If you're lucky enough to get some kind of vehicle history report, that can give you a good clue. But let's say you have no information at all about what's been done? What should you worry most about?

The **most important** items you should consider are those that most directly affect vehicle safety. Remember Priority #1 earlier. Beyond those, you should consider the following:

- Oil change
- Air filter
- Check condition of hoses and belts



The other areas of the car are ones (like the health of the suspension) you can assess as you are driving and operating the vehicle. If the tires are out of balance or the suspension is worn, you can figure that out pretty quickly and plan accordingly.

The DIY Guide for Vehicle Repairs

If your car is getting older, maybe you're at the point where you decide you want to take more action in keeping the car in good working order. Fixing a car can range from the simple shade tree job to the extremely complex. You need to distinguish between what's worthwhile to attempt and what you should leave to the professionals at the risk of causing more damage to the vehicle than good.

For the novice mechanic, here are the simple things you should be able to try, in order of increasing difficulty:

- Change wiper blades
- Replace the air filter
- Replace a headlight
- Replace the battery
- Replace spark plugs
- Change the oil
- Replace belts

Car repairs you attempt in house should be judged on scales of safety, car damage and complexity. Safety means "how easy would it be for me to hurt myself doing this?". Car damage means "how likely is it for me to damage my car attempting to fix it and how badly could I damage it?". Complexity means "how hard is it and do I have to have special tools?"

The Car Talk guys on NPR, Tom and Ray Tappet, published an excellent matrix that grades various repairs on these scales. The left column is **SAFETY**, middle column is **CAR DAMAGE**, and the right column is **COMPLEXITY**.



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Replace windshield wipers	●	●	●
Replace spark plug(s)	●	●	●
Change oil	●	●	●
Change air filter	●	●	●
Change a belt	●	●	●
Change a battery	●	●	●
Change a headlight	●	●	●
Rotate tires	●	●	●
Replace an alternator	●	●	●
Replace a starter Motor	●	●	●
Replace a radiator	●	●	●
Replace water pump	●	●	●
(IF TIMING BELT RUNS PUMP)	●	●	●
Changing a timing belt	●	●	●
Changing fuel pump	●	●	●
Replacing brake fluid	●	●	●
Replacing fuel filter	●	●	●
Replacing fuel hoses	●	●	●
Replace radiator coolant	●	●	●
Replace automatic transmission fluid	●	●	●
Replace brake linings (drum brakes)	●	●	●
Replace disc brakes, pads	●	●	●
Replace brake rotors	●	●	●
Replace brake master cylinder	●	●	●
Replace brake line	●	●	●
Replace CV boot	●	●	●
Replace CV joint	●	●	●
Replace wheel bearings	●	●	●
Replace muffler	●	●	●
Replace exhaust pipe	●	●	●
Replace struts or shock absorbers	●	●	●
Replace ignition module	●	●	●
Replace front end components (tie rods, ball joint, etc.)	●	●	●
Replace steering rack	●	●	●
Replace head gasket	●	●	●



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When Should You Replace Your Older Car

The decision to replace an old faithful car is a personal one dictated by the unique circumstances of your life. There is no easy answer to the question of when to get rid of your older car. Factors like reliability, vehicle use and personal finances all enter into these decisions.

A big influence on replacing an existing car is whether it would cost more to repair the vehicle than the vehicle is worth. If you blow the power steering rack on a 1995 Ford Escort, it's highly likely that rack is going to cost more than it would cost to buy another 1995 Ford Escort. At that point it would make good financial sense to bite the bullet and replace the car.

The June 2010 issue of Kiplinger's Personal Finance Magazine contained an excellent article on "Should You Keep Your Old Car?" They recommend keeping a car and taking care of it until it drops, saving you money all around (even if you have to spend some money on maintenance and repairs, you still come out way ahead). Of course there does come a 'tipping point' where the cost of maintaining the old car finally outweighs the cost of acquiring the new one. Where that tipping point is is dependent upon you. It's helpful to layout the costs of both kinds of vehicle and compare where the numbers come out.

Comparison Items

- Upcoming cost of repairs (the biggest line items for keeping any older vehicle)
- Insurance costs
- Registration cost of new car
- New monthly car payment
- Depreciation of the new car (a real expense if you're planning to trade it in)

Conclusion

With everyone looking to cut costs and eliminate personal debt, older cars are staying on the road longer. Following some of the guidelines in this Resource Guide should help you keep your older vehicle around longer.

Bell Performance has been around a long time itself, first started in 1909 by Robert Bell. Bell's flagship **Mix-I-Go** treatment for ethanol and gasoline was first introduced in 1927 and has stood the test of time with customers who need better performance and mileage from their cars, old and new, while protecting their investments from the effects of ethanol.

If you'd like more information on the topics discussed in this Resource Guide, and for more helpful information and educational resources on fuels and fuel additive, please go to Bell Performance's web sites: www.BellPerformance.com and www.WeFixFuel.com.

