



**SURVIVAL
STRONGHOLD**

SURVIVAL **HIGHWAY** **HANDBOOK**

**QUICK AND EASY
FIXES FOR YOUR
CAR COMMON
PROBLEMS**





HIGHWAY SURVIVAL HANDBOOK

PAGE 1

Introduction

PAGE 3

Having the Right Stuff

PAGE 4

Preparing a Car Survival Kit

PAGE 10

Preparing Your Car for
Travel

PAGE 13

Making the Most of Your
Travel Planning

PAGE 15

Potential Problems on
the Road

PAGE 21

Maintenance Tips You
Should Know

PAGE 24

Don't Let a Mechanic
Rip You Off

Quick And Easy Fixes For Your Cars Common Problems

Maybe it's never happened to you... maybe you've never been stranded in your car. Even so, you probably know what I mean; you're driving down some country road in the middle of nowhere and your car just quits. You might be out of gas or are having some sort of strange mechanical problem caused by gremlins. Instead of that, a sudden storm could hit and you find you can't keep going, or maybe you've run off the road to avoid hitting a cow and you can't get your car out of the ditch. Whatever causes it, you're stranded in your car, in the middle of nowhere and you can't even get a signal on your cell phone to call for help. What do you do?

Through the years, I've been in more situations like that than I'd care to count. I've had cars break down on me in the craziest of places, both here in the U.S. and in Mexico. I remember one time that I was stuck overnight, and I'd forgotten to bring a coat. Other times when I looked in the trunk and realized I didn't have a tool kit with me. There were even a few times when I was stuck in a blizzard in the Colorado Rockies, when I really wasn't sure if I was going to make it out of there or not.

I've had just about every type of breakdown you can imagine on the side of one highway or another. I've done everything from replacing a distributor to rebuilding an engine while traveling. I remember once when I lost my head gasket on a country road about 100 miles west of Dallas. All I had to work with was the tools that I was carrying, but I had to get that engine running again. Fortunately, someone stopped and took me to the auto parts store for a new gasket, but other than that, it was up to me.

If you live in the eastern part of the United States, you may not realize it, but there's a lot of places out west where you can go a long ways without seeing another car on the road. I've been down stretches of highway where it was more than 80 miles between gas stations. You'd better not run out of gas, because it'll end up being an awfully long ways walking or hitchhiking to get your car running again.

Bad weather makes it worse. Now, I don't know about you, but it seems to me that cars



have an affinity for breaking down when the weather turns bad. It's almost like they wait for that bad weather to hit, just so that they can see us struggling to fix something while up to our waist in snow.

The thing is, we never know what potential problem is just waiting to jump up and bite us. We depend upon our cars to get us there, but cars aren't always as dependable as we'd like. Besides, there are a lot of things that can put a stop to our travels besides car problems. I had a buddy once that was stuck in the mountains because he went around a bend and found a cow in the middle of the road. Unfortunately for him (and the cow), by the time he got stopped, the cow was halfway through his windshield.

Most people think their trunk is just somewhere to carry the groceries home from the store. I've learned better; my trunk, or at least part of it, is an emergency kit to take care of as many problems as I can think of. I carry a wide assortment of different things in my trunk, so that I'm ready for the next roadside mishap that I have.

You see, having the right equipment with you can make all the difference in the world, when it comes to getting your car back on the road and you heading for home. Not only that, but it can also help ensure your survival in those situations. Through the years, I've seen way too many stories of people who died in the mountains, just because they didn't have anything with them to help them survive.

The funny thing is, surviving in a car isn't all that hard, if

you just take a few precautions. At least the car provides you with some shelter and is large enough to make it easy for others driving down the road to see. There is very little that can hurt you, as long as you're in that car. While you might face a few uncomfortable moments, there really is no reason for your life to be in danger; nor is there really any reason for your car to be in any danger. You just need to keep your cool and do the right things.

Basically, there are only a few categories of problems you can have while driving down that country road I was talking about:

- The car breaks down
- You run out of gas
- You run off the road or otherwise end up stuck
- A wild animal tries to attack you
- The weather makes the roads impassible
- An angry mob tries to kill you
- Aliens from outer space try to abduct you

While your car might not help you keep the aliens from trying to abduct you, it will help you quite a bit with all of the other potential problems, even dealing with the angry mob. As long as you are inside the car, the likelihood of them getting to you is rather slim.

Of course, I'm making the assumption here that you're going to have a few things in your trunk to take care of yourself with, as well as a little bit of knowledge of what to do. With those few things, you're going to be in pretty good shape.

Remember, police patrol every road in this country at least once per day. So, at the absolute worst, you shouldn't have to wait no more than a day for them to find you. If you can't fix the problem yourself and get back on the road, the police will stop, check on you and get you a wrecker to take care of your car. You may not even have to wait on the police to get there, as there are still people in this country, especially once you get out of the big cities, who will gladly stop and lend a hand.

HAVING THE RIGHT STUFF

Being able to take care of yourself and your car in an emergency is part knowing what to do and part having the right stuff to do it with. You can have all the knowledge in the world and not have anything to work with. Likewise, you can have all the stuff to work with, but not know how to use it. If you want to be ready to take care of yourself in an emergency, you need to make sure you invest in both.

Fortunately for us, companies are always coming out with new products to help us out. Some of these are more laughable than they are anything else, but an awful lot of them are extremely useful. Why, there are products available today which people would have paid dearly to have as little as 10 years ago. Unfortunately for them, they couldn't buy them but fortunately for us, we can. Let me show you what I mean.

The JunoJMPR is a portable Lithium-Ion battery pack, about the size of a smartphone. This amazingly well designed device will charge just about anything you need on the road. Considering how often people's smartphones run out of power in the middle of the day, that's valuable. But that's not all it can do. This amazing compact device comes with a set of battery clamps so that you can use it to jumpstart your car! It is powerful enough that you can jumpstart cars with up to 4.0 liter engines.

How about Fix-a-Flat? This is one of my personal favorites. A can, about the size of a can of spray paint which is capable of repairing and inflating a flat tire. How's that? It doesn't matter if you picked up a nail in your tire or some other small damage, as long as the tire is intact, it will seal the hole and fill it with enough air



that you can make it to the local gas station to fill it up the rest of the way. I don't know how many cans of this stuff I've used through the years.

Here's one more; Scratch Repair. Now, maybe you don't care about your car getting scratched up, but I do. Not because I'm all that concerned with how it looks, but because I'm concerned with how long it will last. I tend to drive my cars till they fall apart. Unfortunately, rust can make them fall apart a little too quickly. Living close to the ocean, with all that nice salt air, that's a real concern. With scratch repair, I can touch up those spots that get scratched by some kid with a key or some housewife with a shopping cart, keeping my car from rusting to death.



PREPARING A CAR SURVIVAL KIT

Having the right equipment and supplies can make all the difference in the world. As long as you have something to work with, your chances of taking care of yourself and your car are pretty good. But if you try and take a trip, without the necessary equipment to take care of emergencies, you will have no way of taking care of yourself and your car if you need to.

Of course, when we're talking about a car emergency kit, we're really talking about two separate types of emergency kits. The first one is for taking care of the car and the second one is for taking care of yourself. You can do a lot of things to temporarily patch up a car and get it back on the road if you have the right stuff to work with. But for those times when you can't get it back on the road, you need to use the car as your survival shelter and take care of yourself until help can come.

When you combine these lists, it may seem like there's a lot that you need to have with you, but it's really not all that much. You can probably fit it all in two medium sized boxes in the trunk, leaving lots of room for the other things that you want to take with you.

FOR YOUR CAR:

Let's start with the lists of things that you need to carry with you, in order to take care of your car. I'm going to break this list down into two parts; one that is just tools and the other that is supplies. In order to be prepared, you really need to have the items in both parts of the list with you.

The right tools are invaluable for taking care of your car and getting you out of a bind when your car breaks down. Don't use the excuse that you don't know how to do mechanic work. There are a lot of things that are simple enough that you can do them, with very little instruction. There's also the possibility that you will run into someone who knows how to fix your car, but doesn't have any tools with them. Having tools is like having insurance; when you need it, you're glad it's there.

Since you're probably not a professional mechanic, you don't need to buy the most expensive tools out there. On the other hand, I wouldn't recommend buying the cheapest ones out there either. If your tools are too cheap, they'll probably break, rather than helping you out. Go one step up from the cheapest, and you'll probably be okay. If you have a Harbor Freight tool store somewhere in your city, they are an excellent source for inexpensive, but surprisingly good tools. I'd highly recommend checking them out.

Your tool kit should include:

- **JACK** – Your car probably comes with one, but some of those are not all that great. Try jacking your car up with the one you have sometime. If you can do it, great. If not, you might want to buy a small hydraulic jack. Most cars come with a scissors jack. These can be hard to work with, but you can make it much easier to work with if you put some grease on the thread and run it up and down to lubricate it.
- **LUG WRENCH** – Like the jack, it probably came with your car. But if you bought your car used, it might be missing. Try using it to loosen a lug nut (tire nut). If you can't loosen it, either the nut is too tight or you need a better lug wrench. The ones that come with cars usually aren't all that good.
- **LUG WRENCH LOCK ADAPTER** – Many cars have one lug nut per wheel that is designed to be theft resistant. To remove this lug nut, you have to have a special adapter, which should have come with the car. However, if you bought your car used, it might be missing. Be sure to check and make sure you have one and that it fits the lug nuts on your car.
- **RATCHET & SOCKET SET** – Most cars today use metric sized bolts, which can save you money. You won't need to buy both metric and SAE fractional sizes. However, if you have an old car, you might find that it has SAE sizes. You want a 3/8" drive ratchet, which is the most common size, with a set of about 7 to 11 sockets. That should take care of just about anything.
- **METRIC COMBINATION WRENCHES** – While sockets and ratchets are great to work with, there are

some places where they just don't fit. For those cases, you need a wrench. Combination wrenches are open ended on one end and closed ended on the other end. Both ends are for the same size bolts and nuts, but you have two different options for how you grab them.

- **PHILLIPS SCREWDRIVER** – Many fasteners on cars use Phillips headed screws. This is the cross shaped screwdriver point, which fits into an “X” cut into the head of the screw.
- **STRAIGHT SCREWDRIVER** – You probably won't find any straight slotted head screws on the car, but these screwdrivers are also great for pry-bars, when trying to remove or install hoses and belts.
- **PLIERS** – Used for grabbing just about anything, including hot parts. You will need pliers for removing the factory installed hose clamps on your car's hoses, as well as attaching cables that become disconnected.
- **VICE GRIPS** – These are a special type of pliers which lock closed onto something. They are especially useful when you can't get a stubborn bolt to come loose. They can also be used to clamp a hose off for emergency repairs.
- **BATTERY TERMINAL CLEANER** – One of the common problems which people have with their cars is that the battery terminals get dirty. When this happens, you need to disconnect the cables and clean them off with a special wire brush. Carrying one of these has saved me many a tow bill.
- **JUMPER CABLES** – Batteries run down at times, especially when we forget to turn off our headlights. With jumper cables, you can get your car started from any other functioning car that comes by.
- **GOOD FLASHLIGHT** – I don't know about you, but my cars prefer to break down when I can't see what I'm doing to repair them. A good flashlight is often the first tool I reach for, when a repair is needed. The new LED headlights are even better than a flashlight, as they will allow you to keep both hands free for working. Make sure you have extra batteries for it as well.
- **FOLDING CAMPING SHOVEL** – Allows you to dig

yourself out, as well as digging a latrine for use while you are waiting to be rescued.

While this list of tools is by no way complete from a mechanics point of view, it does include everything you will need to have to accomplish the most common sorts of repairs. Please keep in mind that there are a lot of specialty fasteners in a car, so if you are going to do a repair, it's always a good idea to check the fasteners before you go to the auto parts store. That way, if you need a specialty tool, you have a chance to buy it.

You don't necessarily need to buy a toolbox to keep your kit in, pretty much any relatively strong box will do. You can also use a drawstring bag for keeping your tools in. I like to make bags out of the legs of blue jeans that I'm going to throw away. Just cut the legs off, turn them inside out and sew the cut-off end closed. Then sew Velcro on the other end, so you have a way of sealing the bag closed. Turn it back right-side-out and it's ready to use.



In addition to the tools, you should have some basic automotive supplies with you. While carrying some of these along with you might seem a bit extreme for running down the street to the grocery store, you never know when a problem might strike. You should definitely have them to go out of town.

These supplies will allow you to perform a few basic repairs or at least band-aid them enough to get you to someplace where you can do a more permanent repair. In some cases, that's all they are going to do for you, while in others, you could conceivably drive for years with the car this way, without a bit of a problem.

- **WATER** – Carry a couple of gallons of clean water with you. One of the most common problems that people have with their cars is overheating, especially in the summer. If you have a couple of gallons of water and can make an emergency repair, you can get down the road, even if it isn't enough water to fill your cooling system. If it is clean water (from the tap) you can use it as emergency drinking water as well.
 - **BRAKE FLUID** – Most people forget to check their brake fluid on a regular basis. Their first indication of a problem is when they push the brakes and the pedal goes to the floor. This doesn't usually mean that the brakes have gone out, just that the brake fluid has dropped real low. Adding fluid may be enough to get you on the road again.
 - **MOTOR OIL** – Oil is extremely important for engines. Without oil, your engine will run about as long as it takes for it to get hot; then it will quit... forever. Keeping a couple of quarts of oil in the trunk, along with your other supplies, ensures that you always have some to add when that pesky light on the dash comes on.
 - **RADIATOR REPAIR** – There are a number of different types of instant radiator repair compounds which you can buy, but the best is the powdered one, which comes in a tube. This also takes up the least amount of space in your box. Add it to a leaking radiator and fill with water. The ground up metal in it will find and fill the hole, allowing you to keep driving for quite a while.
 - **ASSORTED SIZE HOSE CLAMPS** – The factory installed hose clamps on cars are very hard to remove and even worse to install, if you don't have the right specialty tool. If you have to remove one, you're better off replacing it with a new worm gear band clamp.
 - **ASSORTED FUSES** – Automotive engineers put fuses into the electrical circuitry of cars to prevent electrical fires. If a component is drawing too much electrical power, the fuse burns, protecting the car. Sometimes, a fuse will blow because a component in the car goes bad. When the component is changed, the car still won't run because of the fuse. Having some spares gives you the ability to change one out, performing a quick repair.
 - **FIX-A-FLAT** – This wonderful product is a can of instant tire repair. While it won't do much for tires with big holes in them, it works very well for tires that just picked up a nail. The contents of the can are a sticky gooey substance and compressed air. The sticky gooey part plugs the hole and the compressed air inflates the tire; albeit not all the way.
 - **AUTOMOTIVE AIR COMPRESSOR** – Although Fix-a-Flat is excellent, it can only do so much. If your car or truck has large tires, it might not fill them all the way. It's a good idea to have a portable automotive air compressor, which will plug into your cigarette lighter to fill those tires up all the way.
 - **DUCT TAPE** – The fix-all for a million repairs. You'd be amazed what you can do for your car with a roll of duct tape.
 - **GOOD SPARE TIRE** – Most people never check their spare tire. Then, when they need to use it, they don't understand why it's flat. Check your spare from time to time, just to make sure that it doesn't lose all its air.
- With this stock of supplies you can overcome the most common vehicular problems, allowing you to get back on the road. Of course it won't take care of problems which require the purchase of special parts. If you were to try and carry all the parts you would need for all the repairs you might be required to perform on the road, you'd need a pretty good sized trailer following you around.

FOR YOURSELF AND YOUR FAMILY

Being able to take care of your car may not be enough. If you are stranded because of inclement weather, the ability to change a tire or fix a leaky radiator isn't going to do you the least bit of good. You'll need to have the necessary supplies to take care of yourself as well.

The biggest problem with trying to put together a survival kit for yourself is that there is such a broad amount of situations that you might come across, that just trying to come up with a list of what to take can become an endless task. The only practical way to come up with such a list is to look at the most likely circumstances which you could encounter and create a list to help you deal with them.

A car survival kit is much different than any other type of survival kit in that it is intended to take care of you, with the assumption that you are going to be with your car and have it available for shelter. You are also looking at a limited time, as you will be discovered and rescued within a short period of time. Therefore, you don't need all the equipment you would need for surviving in the wilderness for an extended period of time. Nevertheless, keeping some supplies on hand can make a huge difference in your potential for survival and your comfort.

- **FOOD** - While you really don't need to have the classic three days worth of food that you would have in a bug-out bag, you should always keep some food in your car. Concentrate on high energy foods that will take time to digest. In other words, don't bother with the junk food. Instead, go for things like:

- ▶ **HIGH QUALITY ENERGY BARS** – the type they sell in the pharmacy, not the type they sell with the granola bars
- ▶ **BEEF OR TURKEY JERKY** – you could also go for sausage-type beef sticks, although they do have a higher fat content
- ▶ **DRIED FRUIT** – if you have kids, fruit roll-ups are a great form of carrying dried fruit for them
- ▶ **GRANOLA BARS** – while not as good as the energy bars, granola takes time to digest
- ▶ **NUTS** – a great source of protein. If you get trail mix, you'll have nuts and dried fruit together
- ▶ **APPLESAUCE** – one of the best things to give someone who is suffering from low blood sugar
- ▶ **STRING CHEESE** – believe it or not, it will keep quite a while without refrigeration
- ▶ **HOT DRINKS** – coffee, tea, hot chocolate. Great for warming you up when it's cold out. Can also be used to help you keep awake.
- ▶ **MEALS** – you might want to consider having a couple of easy-to-prepare meals on hand as well, especially something that is canned and easy to prepare, such as canned beef stew

- **WATER** – You need to drink at least 8 glasses per day of water. If you are out in a hot climate (90oF or more) you need about 2 gallons of water per day. This can be combined with the water for your car, if it is clean (potable) water. Carry as much water as you can, as you may have trouble finding water wherever you are.
- **BLANKET** – An old blanket will do wonders to help keep you warm on a cold night. If you have several people in the car, several blankets would be appropriate.
- **3 SPACE BLANKETS** – In cold weather, you will want to protect yourself from the cold. Space blankets are one of the best ways of doing so.
- **DUCT TAPE** – I know I already mentioned this as a car repair supply, but you can use it for survival as well.
- **A LARGE, MULTI-WICKED CANDLE** – This, like the blankets and space blankets is for keeping you warm in the winter. You'd be surprised how much a good candle can help you keep warm. The 36 hour survival candles (which come in a metal tin) are excellent for this.
- **STRIKE-ANYWHERE MATCHES** – While you can use your cigarette lighter to start a fire, having matches ensures that you can still start a fire, even if your battery is dead.
- **FIRST-AID KIT** – You never know when you are going to have someone in your party get injured or come across someone who is injured. Being able to apply first-aid can save a life. I'm not much of a fan of commercial first-aid kits, as most of them don't have enough to deal with more than a scraped knee. While your kit doesn't need to be big, it should be fairly complete. Be sure to include:
 - ▶ **CLOTH ADHESIVE BANDAGES** – these are much better than the plastic type, as they are flexible. They will last longer and stick better. While you're buying these, get some knuckle and fingertip cloth adhesive bandages as well. You'll probably bang your hands up repairing your car.
 - ▶ **ANTISEPTIC OINTMENT** – to prevent infection

from cuts and other wounds

- ▶ **ALCOHOL TOWELETTES** – these are the things they use in the doctors’ office to clean your skin before taking a blood sample or giving you a shot. Great for cleaning the area around a wound before bandaging
- ▶ **LARGE BANDAGES** – sanitary napkins work extremely well for this
- ▶ **MEDICAL TAPE** – the new “cohesive” tape is excellent, in that it sticks to itself, not to the person. While expensive, it’s worth it
- ▶ **CLOTTING AGENT** – used to stop bleeding of large wounds
- ▶ **RESPIRATOR MASK** – used to give mouth-to-mouth resuscitation
- ▶ **LATEX GLOVES** – wear these when treating a patient, so that you don’t infect them
- ▶ **ANTI-DIARRHEA MEDICATION**
- ▶ **PAIN KILLERS** – ibuprofen or acetaminophen (interesting note: you can use both of these together for severe pain, as they don’t react with each other)
- ▶ **ELECTROLYTE REPLACEMENT TABLETS** – if you have to work out in the heat to repair the car, you will need more than water to rehydrate your body
- **TOILET PAPER** – Need I say any more?
- **ANTI-BACTERIAL HAND CLEANER** – For use after the toilet paper.
- **COAT, HATS, GLOVES** – If you are going to be traveling in the winter, make sure that you have these with you, even if it isn’t cold enough to need them when you leave. Weather can change for the worst quickly and you can’t always count on the accuracy of the weatherman’s prognostications.
- **LARGE UMBRELLA** – While an umbrella is useful for protecting you from the rain, it’s even more useful for protecting you from the sun. Get a light colored one, so that it will reflect the sun and not absorb it.
- **CELL PHONE CHARGER** – Your best way of getting rescued is to call for help. Today’s smart phones go through batteries quickly enough that you can’t really count on them. Having a charger ensures that you’ll be able to make that call.
- **SMALL BACKPACKING STOVE** – For making your hot drinks and warming meals. Ideally, you want something that will allow you to cook, without having to hunt for food. The Esbit stove is ideal for this. It uses hexamine fuel tablets, which come with it.
- **CANTEEN CUP** – Allows you to make your coffee and warm your canned meals.
- **TITANIUM SPORK** – The world’s simplest utensil; both a fork and a spoon in one.
- **A GOOD FIXED-BLADE KNIFE** – A good knife is useful for countless things in a survival situation. By buying a fixed-blade one, you eliminate the risk of it folding while you are using it and cutting you.
- **MAPS OF THE AREA** – If you manage to call someone, you’ll need to tell them where you are. At a minimum, you should have a detailed road map to use. In addition, it would be good to have a topographical map, especially if you are traveling off the beaten trail.
- **FLARES** – Marking your car with flares will both help prevent someone else from plowing into you and give you a way of signaling that you are in need of help.

While there is a lot you could add to this list, I’m trying to go for a rather minimalistic approach. If you have to fill your trunk with equipment, preventing you from carrying those groceries, putting the cooler in for your picnic or



even putting your luggage in for your trip, you're going to end up leaving the stuff behind. What I'm trying to do is provide you with a list of equipment that won't take up a lot of room, but still allow you to have everything you need to have in order to take care of your car and survive. I keep all of this stuff, from all three lists, in my cars, and I can fit it all in two boxes the size that are used for 10 reams of copy paper. I push it up close behind the seat, where it's hard to get to stuff anyway and still have the majority of my trunk available for other things.

WITH A RENTAL CAR

It may not happen very often, but you might find yourself having to rent a car from time to time when away from home. While rental car companies take excellent care of maintaining their cars (which are new anyway), you can still run into problems. Calling for help is okay, but will end up costing you time. Besides, all they are going to help you with are mechanical problems with the vehicle; any other problems are yours and yours alone.

While you might not need a full emergency survival kit with a rental car, it is a good idea to carry at least some basic equipment with you, in case of an emergency. If you are the survivalist type and have a survival kit, be sure to grab it and put it in your checked luggage. That will give you a good starting point. In addition to that, you should have:

- **WATER** – grab a couple of gallons of purified water and keep it in the car
- **FOOD** – always have some food to keep you going, in case you get stranded someplace; preferably something that doesn't have to be cooked. I like to use high energy breakfast and protein bars, as well as some nutritious snack food. If you want to be more thorough about it, you could grab some canned soup, tuna, and some dehydrated foods.
- **FIX-A-FLAT** – even a new car can have a flat tire
- **SPACE BLANKETS** – the best way to make sure you don't freeze to death
- **SMALL ROLL OF DUCT TAPE**
- **FIRST-AID KIT**
- **WATER PURIFIER STRAW** (actually, this should be in your survival kit)
- **A HEADLAMP TYPE FLASHLIGHT** – great if you have to change a tire on the side of the road

Be sure to stay with the car in an emergency, as it can provide you with shelter. It is also more visible and will stand out to police forces, who are always looking for stranded motorists anyway.

PREPARING YOUR CAR FOR TRAVEL

Besides loading up the emergency equipment and supplies that I mentioned in the last section, you need to make sure that your car or truck is road-worthy and ready for travel. Many common problems can be solved in a few minutes at home, but can cause major headaches while on the road. If you are in the back country when those problems occur, they can be much more of a problem than just a simple repair.

Most of us buy a car with the expectation that we can put gas in the tank and drive it. Those with a little more understanding realize that they need to have their oil changed every once in a while. But few drivers understand which parts of a car are considered maintenance items that need to be replaced on a periodic basis. We tend to ignore those parts until a failure and then act surprised that they have failed.

There are actually many parts on a car which fall into this category of being maintenance items. Fortunately, most of them have large service intervals; often as long as 30,000 miles between servicing. While that makes it easier to drive the car without worry, it also makes it easy to forget about regularly checking the condition of these parts.

The older your car or truck is, the more likely it is that these maintenance items will fail at a moment's notice. Your only protection, short of changing them before they can go bad, is to check them regularly, making sure that they are still serviceable. Taking the few minutes needed to do that can save you hours or days worth of headache in the middle of a trip, as well as keeping you out of a potentially dangerous situation.

You don't want to wait for the last minute to make these checks, as you might find something that requires repairs. Give yourself enough time for those repairs before leaving

on the trip. This may mean checking your car a couple of days before leaving.

So, what parts of your car should you check?

TIRES

Checking your tires may be the single most important thing you check on your car. A bad tire exploding at the wrong time can cause you to lose control, even to the point of flipping the car. You don't need to be going at high speed either, as a blown can cause you to veer off the road even at very low speeds. Most cars that flip do so as they leave the road, either by entering a ditch or by hitting a high spot.

You should check your tire's air pressure and their condition. The correct air pressure for your car can be found on a label that is attached to the edge of the driver's door. This information label also tells you the date of manufacture, if you forget and need that information to buy parts for your vehicle.

Most people rarely check their tires' condition. There are several things that you want to see here. First of all, is there enough tread on the tire? Modern tires are molded with a tread wear gauge built right into them. This gauge will appear in the largest grooves of the tire, molded into it several places around its circumference. If the tire has worn to the point where this gauge is flush with the surface of the tire, it is time to replace the tire.

While you are looking at the tire's tread, check to see



that it is wearing evenly. If one side of the tire is wearing faster than the other, you have problems with your car's alignment. If both outer edges are wearing faster than the middle of the tread, you are running your tires at too low a pressure. If there is more wear in the center of the tread than there is on the sides, you have been running your tires with too much air pressure.

Running tires with any of these conditions can be dangerous. Overpressure can cause the tires to come apart, especially on a hot day. Low tire pressure can cause the rim (the metal wheel) to be damaged going over bumps.

You also want to look at the tire's sidewalls, both on the outside and inside of the tire. This will require laying down on the ground, so that you can get a good look at the sidewalls that are on the inside of the tire. Look for high spots or bubbles forming on the tire. These can pop at any time, causing the tire to lose pressure and possibly cause loss of control as well. Tires with bubbles must be replaced immediately.

One last important detail about your tires; tire shops use an impact gun to install the lug nuts, which means that you may not be able to break them loose. A good habit to form is to loosen and then tighten the lug nuts on your car, after every time you have a tire replace. That way, if you have to remove it on the road, it won't be too tight.

HOSES

The anti-freeze in your engine travels from the engine to the radiator and back through a couple of hoses. There are also hoses attached to the radiator which take hot water to the car's heater for keeping you warm in the winter. Being made of rubber, these hoses will eventually deform from the constant heat in the car's engine compartment. The place where they are most likely to deform is right near the ends, close to the hose clamps.

If a bubble forms in any of the hoses, it will eventually

pop, causing a catastrophic loss of engine coolant.

Fortunately, these bubbles are usually visible, as the hose will swell out beyond normal dimensions, usually forming a bubble all the way around the hose. If you encounter any hoses like this on your car or truck, they should be replaced immediately.

BELTS

Older cars used a series of rubber V belts to carry the power from the engine to the various accessories mounted on the engine that need power (alternator, water pump, power steering pump, etc.). Modern cars have replaced this series of belts with a single belt, referred to as a "serpentine belt." This belt is flat on one side and ribbed on the other. While smaller than the V belt, it is actually stronger. Although these belts do last quite a while, they eventually wear out.

Any misalignment of the various accessories that the belt provides power to or their pulleys will cause very rapid wear to the belt. In addition to the accessories themselves, this belt passes over a crankshaft pulley, an idler pulley and a belt tensioner pulley. Any damage to the belt could indicate a problem with one of these pulleys.

Check the flat side of the serpentine belt for any cracks. As they age, the rubber dries out and will eventually begin to crack. These cracks are a sign that the belt is reaching the end of its useful life. Check the ribbed side for missing chunks of rubber. Missing chunks will indicate a pulley



out of alignment. Likewise, excessive wear to the edges of the belt will indicate a pulley out of alignment.

When the belt is changed, all the pulleys should be checked. None of them should have any wobble or play in them. If you spin the idler and tensioner pulleys, they should not make any noise. Any play or noise indicates that these pulleys need to be replaced.

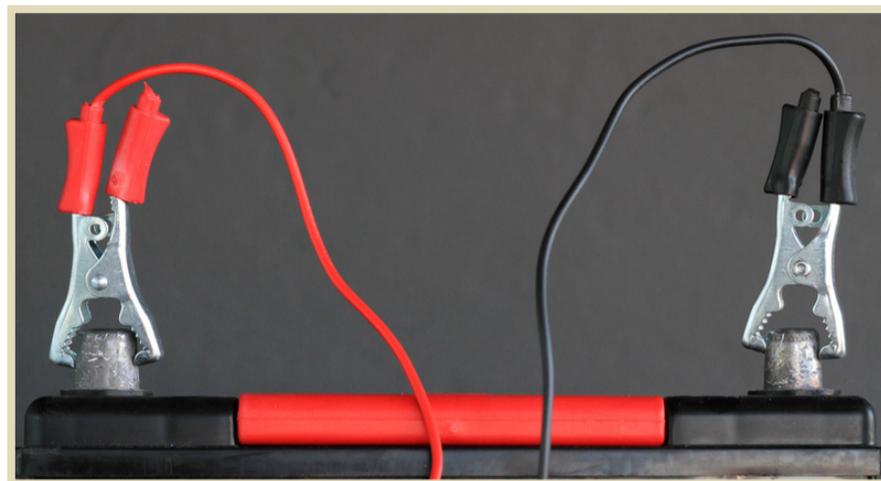
FLUIDS

Your engine has a number of fluids in it, all of which are critical to its operation. Of these, oil is the most important. The one thing that you can do for a car, which will have the greatest potential for increasing its life is to change the oil regularly; every 3,000 miles (longer for synthetic oils).

- Engine oil is checked with a dipstick. There is a mark on the dipstick, near the end, which shows the “full” level.
- Transmission fluid also has a dipstick. It must be checked with the engine warm, running and the car in park. This is the only fluid that should be checked with the engine warm or running.
- Brake fluid is in a reservoir mounted to the back wall of the engine compartment (the firewall) in front of the driver. Always clean off the cap and area around the cap before removing it, so that no dirt gets into the reservoir. Remove the cap and look inside to check the level. It should be almost full.
- Power steering fluid is checked at the power steering pump, if the car has one. The cap will have a short dipstick mounted to the bottom of it, allowing you to check the level.
- In most modern cars, there is no radiator cap on the radiator, as there was with older cars. Instead, the level of the anti-freeze is checked at the overflow tank. The tank will have two lines molded into the side, indicating the high and low levels for the anti-freeze.

Always make sure that you check the owner’s manual for the car, so as to know what type of fluids to add. There are different types of most of these fluids and the engineers who designed the vehicle took into account the exact properties of the fluid they recommend when they were designing the engine.

BATTERY & BATTERY TERMINALS



Car battery terminals tend to corrode over time. If this gets bad enough, the battery will no longer recharge or pass current to the engine so that it can start. Corrosion should be cleaned off with a wire brush and baking soda dissolved in water.

Some batteries are referred to as being “maintenance free” meaning that they don’t need to have water added to them. These batteries are usually easy to identify in that they will not have removable caps for checking and adding water. All other car batteries need to have their water levels checked and replenished from time to time, so that the battery will be able to charge fully. Car batteries with low water in them don’t hold as full a charge as car batteries which are properly filled.

ALL LIGHTS

Check to make sure that the headlights, tail lights, turn signals and brake lights work, all the way around the car. You may need help for this, especially the brake lights, as it is impossible to put your foot on the brake and see the back of your car at the same time.

MAKING THE MOST OF YOUR TRAVEL PLANNING

It seems like there are two types of travelers in the world, those that rush to get where they are going, so that they can have more time to enjoy their destination; and those who make the trip itself a goal, enjoying every mile of the way. Both types of travelers have one thing in common; they need to take the right precautions along the way, so that they can enjoy their trip.

Proper planning, preparation and precautions can make sure that your trip is an enjoyable one, rather than the type you regale to your friends as your own personal horror story. While those horror stories might be fun to listen to, they certainly aren't fun to be a part of.

Any trip starts long before you put the key in the ignition and back the car out of the driveway. It seems that part of the fun is planning where you are going to go and what you are going to do. Even business trips can be fun in that way, as many people try and mix a little bit of pleasure in with their business.

Planning a road trip is more complicated than planning one where you are flying, but most people's planning ends at deciding what roads to take and what cities they are going to stop in for the night. That's not enough. A properly planned road trip will take into times and traffic, making sure that you know where you will be when, so that you can avoid the dangerous times and dangerous places.

Take big cities for example. I never appreciated how dangerous it is to drive through a big city until I moved out into the country. Then, when I'd go back to the city, I saw how bad the traffic was and how dangerous the city highways were. I really got an appreciation for this the first time I drove a motorhome through the city, mistakenly arriving at the city just at rush hour.

The most deadly time of the day to be on the road is rush hour, between 5:00 and 7:00 PM. More accidents and more fatal accidents happen in those two hours, than happen any other time of the day. If there is any way that you can plan your trip to avoid driving



through town during those two hours, you would be well advised to do so.

In the area where I live now, we have one really bad highway intersection. While I try and avoid it, I occasionally find myself having to drive through it during rush hour. At least once a week, we can count on some major accident happening at that intersection, during the hours of 5:00 to 7:00 in the evening.

It's really not all that hard to avoid hitting the big cities at rush hour. All you have to do is arrange your travel schedule to arrive earlier or later. You're actually better off sitting outside of town in a rest area, rather than trying to get through the city at that time. The little bit of time that you save won't be anything compared to the risk that you will take.

While it is important to avoid passing through big cities during rush hour, you also need to watch out for the "shortcut syndrome." You know what I mean, that tempting desire to find a shortcut and take it, just to shave a little bit of time off your trip. I don't care how good those shortcut look, they really aren't quite as good as they seem.

The problem with shortcuts is that they are unpredictable. They are exclusively small roads which may not be well maintained. For that matter, they may not even be paved. So they may be quite good at some times and all but totally impassible at others.

I don't know how many times I was convinced to take one shortcut or another by some well meaning friend when I was younger. Invariably, the shortcut wasn't part of my

original plan and often wasn't even on my map. I'd end up taking it, simply because my friend would know the area better than I did. I'd trust their knowledge and go along with what they suggested. Unfortunately, that often turned out disastrously.

I remember one time that I was on this shortcut in my motorhome, with a trailer behind it. The road was dirt, but it was dry and in good condition. While it was somewhat narrow, that really wasn't much of a problem; there was plenty of room on both sides of the road.

The problem came about when I reached a washed-out bridge. It seems that there had been a flash flood in that area a week previously and the bridge was gone. Fortunately, barriers had been erected and there were plenty of signs to warn me of the coming problem. Unfortunately, those signs didn't provide me with a place to turn around.

My motorhome and trailer were a total of 49 feet long. I'm not sure how wide that two-lane dirt road was, but I can assure you, it wasn't 49 feet wide. I had literally reached the end of the road and there was nowhere to turn around. While the ground on either side was fairly flat, there were trees, so I couldn't even think about using the fields to turn around in; besides, my motorhome would have probably sunk into the soft turf.

The closest place to turn around was one and a half miles behind me. Since the trailer was narrower than the motorhome and I didn't have a backup camera, there was no way that I could back up that far. I ended up having to drop off the trailer, back up the mile and a half, turn my motor home around and then back the mile and a half back to get my trailer, which was heavily loaded and hard to turn around. All in all, by the time I found another way to go and got back on track, I ended up losing four hours, instead of gaining the hour my buddy promised me.

I'd have to conclude that there's a good reason why those shortcuts don't show up on maps; that's because they really aren't shortcuts. What they are is best described as traps waiting to cause people problems. If you spell adventure p-r-o-b-l-e-m, then by all means, take all the shortcuts you can. But if you're like me and like to avoid problems, then avoid the shortcut syndrome.

Once your plans are made, it's a good idea to share them with someone. I don't mean just telling your buddy that you're going on a trip to such-and-such a place, but the details of your trip. That means you're going to have to write them down.

So, what's so important about letting someone know the details of your travel plans? It's a safety measure. As you are traveling, you need to keep in touch with that person and let them know how your trip is going. That way, if they don't hear from you, they can contact the necessary authorities, letting them know that you are missing and where you are likely to be.

Precautions of this type have saved more than one life, especially in situations where people were traveling by less known and less traveled routes. It's one thing to be traveling down a major highway and have your car break down, but totally different to be traveling by some little-used back road and have something happen. In the first case, you might be found in minutes; in the second it might take a couple of days.

This precaution should also be taken for any portions of your trip that are off-road. If you are planning on backpacking or even hiking, you should make that part of your trip plan and share it with your buddy. Every year, people are lost in the Colorado Rockies while hiking and need to be rescued.

Having participated in search parties, I can attest to the importance of having someone know your travel plans. When someone knows your travel plans and passes that information on to the correct officials, it focuses the search party on an area. Even if you wander out of the planned area, it at least provides a starting point. Without that information, the searchers literally have to look everywhere; greatly reducing your chances of being discovered.

Something like a broken leg or even hypothermia can end up being fatal if you aren't found. The sooner police, rangers and other authorities start looking for you, the greater your chance of survival. That's pretty simple, but you'd be surprised how many people never think of it.

POTENTIAL PROBLEMS ON THE ROAD

No matter how carefully you prepare for a trip, you can't count on eliminating all potential problems. Some things are outside your control and others happen no matter how careful you are. While checking your car's belts and hoses allows you to catch some potential failures, there are always some that manage to hide themselves up until the last possible moment. Being careful can't stop those problems from happening.

That's why you need to carry all the tools and supplies that I mentioned earlier; so that you can take care of those problems. Your preparation may not eliminate the problems, but it can do a lot to help you get out of them, without having those problems turn into nightmares.

Of course, knowing what to do with those tools and supplies will make a lot of difference as well. Knowledge is power, as they say and I can think of no place where I'd rather have knowledge give me power than the power to get myself out of a problem, before it turns into a disaster.

There are a lot of different problems that you could run into along the road; anything from a simple flat tire to aliens who want to abduct you in their flying saucer. There's no way that I can deal with all the possibilities in this report, but we'll hit on a few of the more likely. That means you'll have to figure out how to deal with the aliens and their flying saucer yourself.

Flat Tire – Moving Car

While a fairly simple problem, flat tires can actually be quite dangerous. Some flat tires just fizzle out, which just means you have the hassle of changing it. On other occasions, the tire actually explodes, in what is known as a "blow out." This can be very dangerous, especially if it is the front tire that blows out. A blow out can cause you to lose control of the car, wrecking or even flipping it.

Fortunately, the steering systems of most modern cars handle blowouts fairly well. They are somewhat dampened, preventing the car from swerving too bad or even spinning out of control. Unless the driver does



something totally unexpected, such as jerking the wheel hard to make the car spin, you can survive most blowouts with nothing more serious than surprise at the noise and some dirty hands from changing the bad tire.

Everyone has a flat tire once in a while. Since they are actually rather common, you'd think that pretty much everyone would know how to change a tire; but you'd be surprised at how many people don't have the least idea of how to proceed. Worse, modern cars are actually harder to change tires on, as the necessary equipment is better hidden and a little more complicated to use.

The first thing you want to do if you have a flat tire is ensure that you have control of the car. That means that you are going in a straight line, following the road and that the car isn't going to spin out of control or go off the road. Once you are sure of that, start slowing down gradually. Don't try and slow quickly, as that could cause problems controlling the car, especially if the flat is on a front tire. The car will pull to one side. Gradually ease off of the road and onto the shoulder. If there is a paved shoulder, stay on the pavement. Jacks can sink into soft ground. If you are in the city and can get off the road and into a parking lot, that's even better.

Once you've stopped the car in a safe place, take a moment to catch your breath; you'll probably need it. Then you can get out of the car to find out which tire is flat.

Almost all tires used on cars and light trucks today are radial tires. While radial tires make for a smoother ride, they are totally destroyed if they go flat. All it takes is one revolution of the tire to totally destroy it, beyond the

point of redemption or repair. So, don't bother trying to inflate it with fix-a-flat or an air compressor; you'll need to change it.

Most cars have the spare tire (usually a donut, not a full-sized tire) and the jack under the floor of the trunk. SUVs and pickup trucks will have the tire mounted to the bottom of the floor, held in place by a cable winch. To remove the tire, you'll need to crank the winch down. This requires using the bars that come with the jack. There will usually be a covered opening in the bumper to insert the bars through.

Before jacking up the car, use your lug wrench to loosen, but not remove, the lug nuts on the affected wheel. You don't even need to loosen it all the way, just enough that it will turn easily with the wrench. Your lug nuts may be covered by plastic fake nuts, which have to be unthreaded and removed to give you access to the metal lug nut. They might also be covered by a hub cap. These can be pried off, as they are held in place by spring pressure. Use a large screwdriver or the end of the lug wrench to pry it loose.

On many cars, one of the lug nuts is designed differently, in order to prevent theft. The adapter for this lug nut should be with your jack and lug wrench. If you don't have the adapter, you will not be able to change the tires yourself, nor will most roadside services or tow trucks be able to help you.

Modern cars come with scissors jacks. If you haven't already lubed the threads on your scissors jack, then lube it with motor oil. That will make it much easier for you to jack up your car. It is of utmost importance that you find a solid place to jack, so that you don't put a hole through the floorboards of your car. Most cars have jacking pads located directly behind the front wheels and directly in front of the back wheels, at the outer edge of the car's body. If you can fit the jack under the vehicle's axle or front suspension a-frame mounting structure, that's an excellent place to jack as well.

Before jacking the car, you must make sure that it can't roll. If you are jacking up the front of the car, your park brake (emergency brake) can be used to ensure that it can't roll. If you are jacking up the back end of the car,

you must put a rock or section of log under the front wheel to keep the car from rolling.

Jack the car up high enough so that the flat wheel will turn. Then you can remove the lug nuts the rest of the way. Place them aside where you will be able to find them. Remove the wheel, noting which side is in and which side is out.

The new wheel and tire goes on the car the same way that the old one was on it. Before mounting it, press on the tire to ensure that it is fully inflated. If not, use your air compressor to fill it all the way. Reinstall the lug nuts, tightening them as hard as you can.

When tightening lug nuts, it is important to work back and forth across the wheel, tightening opposite nuts. This will prevent you from accidentally warping the wheel, as well as ensure that it is as tight as possible. Once you have tightened all the lug nuts, go back and try to tighten them again, just to check and make sure that they are tight.

You don't need to replace the hub cap, trim rings or lug nut covers at this time. Simply put them in your trunk, with your jack and other tools, to save them for when you have your tire replaced.

Flat Tire – Stationary Car

You might come out of your home or a store sometime to find that you have a flat tire that you haven't drive on. If so, this is actually good fortune. If you haven't yet driven on the tire at all, there is a good chance that it can be repaired. That saves you the cost of a new tire.

In such a case, the most likely culprit for your flat tire is that you picked up a nail or other sharp metal object in the tire. There are several ways that you can deal with this situation. The first is to replace the tire with your spare, as mentioned above. However, you may not need to replace the tire yourself, but merely inflate it and drive to a tire shop to have your tire repaired.

This is where fix-a-flat is extremely useful. Fix-a-flat contains a chemical sealer and pressurized air. When you connect it to the tire's valve stem, the sealer enters the tire in the form of foam. That allows it to fill the entire volume of the tire, so that even if the nail hole is

in the top of the tire, it will still reach it. As the pressurized air from the can fills the tire, it will force the foam into the damaged part of the tire, filling the hole and temporarily patching it.

Please note that fix-a-flat doesn't contain enough air to fill large tires, just small ones. Your tires probably won't be filled fully, although they may have enough air in them to allow you to drive a short distance. You can help this by using an air compressor to fill the tire, once you have put the can of fix-a-flat in the tire. I have driven cars for a considerable distance like this, before getting the tire repaired.

Overheating Car

Cars can easily overheat in hot weather. Generally speaking, if a car overheats, it's because there isn't enough coolant in the radiator. On modern cars, with transverse mounted engines, it could also be because the radiator fan isn't working.

Hopefully your car has a temperature gauge, rather than just a red light to tell you when it's already too late. If you keep an eye on your temperature gauge, you at least have an opportunity to see if a problem is creeping up on you. Without the gauge, you really have no way of telling.

If the temperature starts to get close to the red area on the gauge (overheating) the first thing you should do is to shut off your air conditioner. You'd be surprised how much of an engine's power an air conditioner can use. By eliminating that load, you might prevent the engine from getting any hotter. It would be a good idea to open the windows at the same time, so that it doesn't get too hot inside the car.

The next step to try, if turning the a/c off isn't enough, is to turn on the car's heater and fan full blast. While that will probably make you uncomfortable, it won't be as uncomfortable as being stranded beside the road. Using the heater to draw off some of the engine's heat may be just enough to get you where you're going.

If the engine temperatures still is moving into the red, it's time to get off the road, before it's too late. If it is possible without burning yourself, open the car's hood, so the engine will cool faster. Be extremely careful doing this, as



there will probably be hot steam under the hood, which could burn you.

Once the hood is open, see if you can identify where the steam is coming from. Once again, be extremely careful, as that steam can burn you. Some key places to look are:

- **THE UPPER RADIATOR HOSE** – goes from the top of the radiator to somewhere on the top of the engine
- **THE LOWER RADIATOR HOSE** – goes from the bottom of the radiator to the water pump
- **THE WATER PUMP** – on a transverse mounted engine, this will be located on the curb side of the vehicle, where the serpentine belt is. On a longitudinally mounted engine, it will be located immediately behind the engine fan
- **THE RADIATOR** – check both sides
- **HEATER HOSES** – these will be 3/4" or 7/8" diameter hoses running from the side of the radiator to the firewall (the wall that blocks the engine compartment from the passenger compartment)

Look at the overflow tank as well. This is a milky white plastic tank, where you add coolant (anti-freeze and water) to the engine. It could be located on either side of the engine compartment. Be sure that you have the right one, as the windshield washer fluid is in a similar tank. Check the level of the coolant in the tank.

Once the engine is hot, you must allow it to cool before you can add any coolant to it. Adding coolant to a hot engine could cause the block to crack, totally destroying the engine. It will take 30 to 45 minutes for the engine to

cool enough that you can add coolant.

If steam is coming out of an obvious hole in one of the hoses, radiator or water pump, the hole will need to be plugged. For the water pump, that requires removing the old pump and installing a rebuilt one. If the hole is in the radiator, put some radiator stop leak into the radiator when you fill it with water again. As long as the hole isn't too big, that should plug it. I've driven cars for months with radiators that had been patched in that manner.

If the leak is in one of the hoses, you will need to replace or patch the hose before you can continue. Unless you happen to break down in front of an auto parts store, that usually means finding a way to patch up your hose, at least temporarily. There are many ways which people have tried to do this, but the best I have seen is with duct tape and a hose clamp. You'll need good quality duct tape to make it work, especially one with a good adhesive.

Before applying the duct tape, the hose must cool and be clean. Typically, the hoses in a car's engine compartment gather dirt, just like the rest of the engine. Clean it with water first and then with hand cleaner or diaper wipes. Finally, rinse off any soap residue and allow it to dry.

You will need several layers of duct tape, placed directly over the hole in the hose, as well as to either side of it. Take the time to make sure that you are smoothing the tape onto the hose, without any wrinkles. The wrinkles form places where it is easy for the hose to start leaking again. Don't lose track of where the hole in the hose is as you are working to cover it up.

Place the hose clamp over the duct tape, directly over the point where the hole was. Tighten the hose clamp as much as possible, without causing the hose to begin crushing. Essentially, the hose clamp is going to act as a pressure bandage, helping to make sure that the hot water from the radiator hose can't push the duct tape "bandage" aside.

There are actually a number of different ways in which you can deal with a leaky radiator or leaky hoses. Here are a few more that you might want to file away in the back of your mind:

- **CHEWING GUM** – You can actually repair some radiator leaks with chewing gum. Find the leak and

use the gum like putty to patch the hole. While this won't work for a long period of time, it might work long enough to get you to your mechanic. Just make sure that you chew the gum thoroughly before using it and wipe off the saliva so that it is sticky.

- **BREAD** – Bread can work the same way as chewing gum and is actually easier to work with. Just wad up a piece of bread and hold it against the hole. The escaping water or antifreeze will soften the bread, causing it to break down just enough to turn it into a paste. As bits of bread work their way into the hole, they will plug it. The heat will cook it in place, making a fairly good repair.
- **EGGS** – A poached egg may be just the thing to deal with a leaky radiator. Actually, you want to use a raw egg and allow the hot coolant to poach it. Just crack an egg and put it into the radiator. It should find its way to the hole and get cooked in place, plugging the hole.
- **BLACK PEPPER** – Just like the powdered radiator sealant, black pepper can plug pinholes in a radiator. The moving water will carry the pepper with it to the hole, where the grains of pepper will plug the hole.

There is one other product you may want to consider carrying, which will actually make this process much easier. It's called "Silicone Rescue Tape." It is designed to handle both high heat (600oF) and high pressure (950 PSI). As such, you can wrap it directly onto the hose, once you've cleaned it, and it will make an excellent temporary patch. Please note that even though this is an excellent product, it is still a temporary repair; you will need to replace the hose as soon as possible.

Car Won't Start

The list of things that can prevent a car from starting properly is literally endless. A car is a complex piece of machinery and pretty much all of the pieces need to be working for it to go down the road without any problems. Nevertheless, there are a few common causes which account for a large percentage of the cases in which a car won't start. Before calling a mechanic, you should check these items.

Before you do anything, you need to clearly define the

symptoms. That means listening to the engine as you attempt to start it and hearing what happens or doesn't happen. This can range all the way from not hearing anything but the key turning in the lock to the engine cranking around and around, but not starting.

DON'T HEAR ANYTHING

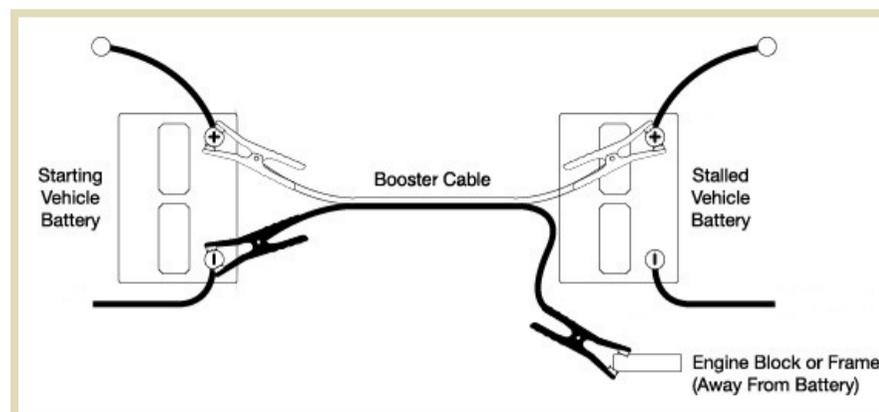
If you don't hear anything when you turn the key, that means that the starter motor, which is supposed to turn the engine to get it to start isn't turning. There are a few possible common causes for this. The first is a dead battery. However, if the battery is dead, you will usually hear the engine turning slowly before it stops turning all together. The only case in which it wouldn't turn slowly is if the battery went dead from the time you turned it off to the time you are trying to turn it back on again.

This can happen from a battery going bad, but it usually happens because the driver leaves the headlights on. Fixing this problem is simple; all you have to do is jumpstart the car.

To jumpstart a car, you will need another car which is running, along with a pair of jumper cables. Attach the red jumper cable to the positive terminal on both batteries and the black jumper cable to the negative terminal on both batteries. If you are not sure which terminal is which, look on the battery. There should be a + molded into the case next to the positive terminal and a - molded into it by the negative terminal.

Make sure that the cables make good contact with the metal part of the battery cable clamp. If there is any corrosion, you won't have good contact. You can usually get through this corrosion by wiggling the cable clamps and allowing the points on the clamp to dig through the corrosion.

Not hearing anything could also mean that the battery terminals are sufficiently corroded that the current from the battery can't pass to the starter motor. This is fairly easy to fix. To clean off the corrosion, loosen the cable clamps one at a time and disconnect them from the battery. Then clean the cable clamps and the battery posts with a battery terminal cleaner. Once cleaned, the metal should be dull but clean. If it is black or has any substance



that looks like salt crystals on it, it's not clean.

In most cases where the terminals are dirty, once cleaned you can start the car, even without any other vehicle to jumpstart the car from. However, if the corrosion was bad enough that the battery wasn't charging, you might still need to jumpstart it.

ENGINE TURNS OVER, BUT DOESN'T START

If the engine just turns round and round when you turn the key, but doesn't start, the first thing to check is to make sure that you have gasoline. It's amazing how many times people think that there's something wrong with their car's engine, when it's just out of gas. I think you can figure out how to fix this one yourself.

If the problem isn't gasoline, you probably have a more serious problem, which requires that the engine be repaired. At this point, you will probably need the services of a mechanic. But if you want, you can check the engine a little bit more yourself. For an engine to run, you need spark, fuel and the starter. You can check to see if you have spark and fuel fairly easily, by removing a spark plug.

When you crank over the engine with one spark plug removed, you should be able to smell gas. If you can, that means that you have gas flowing to the engine. If you can't, you could try putting a piece of rolled up paper towel or paper napkin into the cylinder, sticking it partially in through the spark plug hole (make sure to leave plenty out) and see if it gets wet with gasoline. Most modern cars use fuel injectors, so there really isn't anything that would prevent the gas from burning, if it is getting to the cylinder.

To check if you have spark, reconnect the spark plug

that you removed, to the spark plug cable. Using care to ensure that you are only touching the rubber boot of the cable, hold the tip of the spark plug up to the metal block or heads of the engine and have someone turn the key so that the engine turns over. You should see a spark jump from the end of the spark plug to the engine about once a second.

If there is no spark or no gas, that's the source of your problem. Unfortunately, there are several different things that could cause either of those problems. Determining which one it is requires knowledge of auto mechanics.

Getting Caught in a Snow Storm

While not a vehicular problem, getting caught in a snow storm is a common problem that can happen in a car.

When traveling in the winter, you want to make sure that you are prepared to survive in case you get stuck. Several of the items mentioned in the survival kit above are for this specific instance. It is a good idea to replace the interior lights in your car with LEDs. These use 1/12th the electricity, so they will place less drain on your battery, allowing the car's battery to last longer as well.

There was a family whose car got stuck in a snowstorm, while traveling last winter. By the time the storm stopped, their SUV was buried under four feet of snow. They had to wait for two days to be rescued.

This type of problem is not all that unusual in some parts of the country. Knowing what to do to survive can literally mean the difference between life and death in these circumstances. While there are several different steps you should take, none of them are very complicated.

- First of all, stay in your car. Your car makes an excellent shelter to help protect you from the storm raging outside. Stepping as little as three feet away from your car in a serious blizzard may be enough that you can't find it again.
- Use your cell phone to try and call for help, letting them know precisely where you are. If you don't know the exact mile marker number, tell them as close as you can. Describe your vehicle as well, along with how you are parked.

- Keep your seat belts on. It's not uncommon for a car on the side of the road to be hit by another car that loses control. If your car is hit, you want to avoid injury.
- Use the space blankets and duct tape that you have to coat the inside of your vehicle, making a cocoon for you. You want to cover the ceiling, door panels and all windows. These space blankets are heat reflectors, so they will help keep your body heat inside the vehicle.
- Crack one back window slightly so that you can get fresh air. Your exhaust pipe may become plugged up. If it does, exhaust gases could back up into the car. The cracked window will help to make sure you aren't asphyxiated.
- Run the engine for 10 to 15 minutes each hour to provide heat; no more. Your gas will only last so long, so you want to stretch it out as long as possible. If you need water, use the snow, taking advantage of the time you are running the heater to melt snow. As long as your engine is running, it can even provide you with some heat. To be sure that it can, keep your gas tank full.
- You can also use a candle to provide heat inside your vehicle. While a candle won't provide much heat, it will provide something. With the space blankets to reflect that heat back into the car, it will help.

Another way you can heat your car in an emergency is to burn the spare tire. Tires will smolder, producing heat while they do. Before lighting the tire on fire, be sure to cut the valve stem, so that the pressurized air in the tire can escape. You can light the tire on fire with the vehicle's cigarette lighter.

With the blankets, food and water you keep in the car, you should be in good shape for a few days, as you wait to be rescued. Many modern cars have back seats which will fold down, allowing you easy access to the trunk, without having to leave the vehicle. While designed for carrying long items in the car, this is excellent for a situation such as this, so that you can access your survival gear, without having to leave the vehicle.

MAINTENANCE TIPS YOU SHOULD KNOW

Owning a car means having to maintain it. If you always have to depend on a mechanic to fix your car, you're going to end up spending a lot of money on auto repairs; money that you could spend on other things. You're much better off if you know how to do at least the most common repairs for yourself.

We've already talked about how to change a flat tire, which is probably the number one thing you need to know. Being able to change a flat tire can keep you from standing at the side of the road, waiting for a tow truck to come. All of the rest of these items are just as easy and will help you make sure that you can take care of your car.

The second most important thing is knowing how to take care of a dead battery. We've discussed that one as well, so I won't bother repeating it here.

Head or Tail Lights Out

If one of your turn signals is blinking faster than normal, it indicates that you have a bulb burned out. You can easily identify which bulb by looking at the outside of the vehicle, with the turn signal turned on.

Modern headlights and tail lights are much easier to change than they were on older cars. All of today's car lights plug into a socket, which in turn connects to the back of the light housing. In most cases, the socket can be removed with a quarter turn. Pay attention to the



alignment of the socket in the light housing, as this will help you to reinstall it.

You should avoid touching the new head lamp bulbs with your fingers. The oil on your fingers is enough to cause these bulbs to crack, once they've reached temperature. Hold them with the original package or with a Kleenex to protect the bulb from your skin oil.

Faulty Spark Plugs

You can tell if your spark plugs are going bad by listening to the engine. When they are bad, you will hear the engine running unevenly. It will seem as if it is skipping a beat every little bit. That's caused by a fouled spark plug.

Spark plugs are easy to change. You can find them on the car by following the spark plug wires. There will be one wire for each spark plug. Only disconnect one of them at a time, as they must go back on in the same position that they came off. Failure to take care of this detail may render your engine inoperable. Be careful when you pull the cable off the spark plug, as it is extremely easy to break the connection, instead of disconnecting it from the spark plug. To avoid breaking it, find by feel where the connector attaches to the spark plug and grab it there. You should be able to feel it as a hard contact inside of the soft rubber of the boot.

When you buy your new spark plugs, the clerk at the auto parts store should tell you what the correct gap on the plugs is. This is the space between the two contacts. If they don't tell you this critical piece of information, it will be contained on an information label under the hood of the car. Spark plugs usually come pre-gapped to this specification, but you should always check them with a gap gauge before installing.

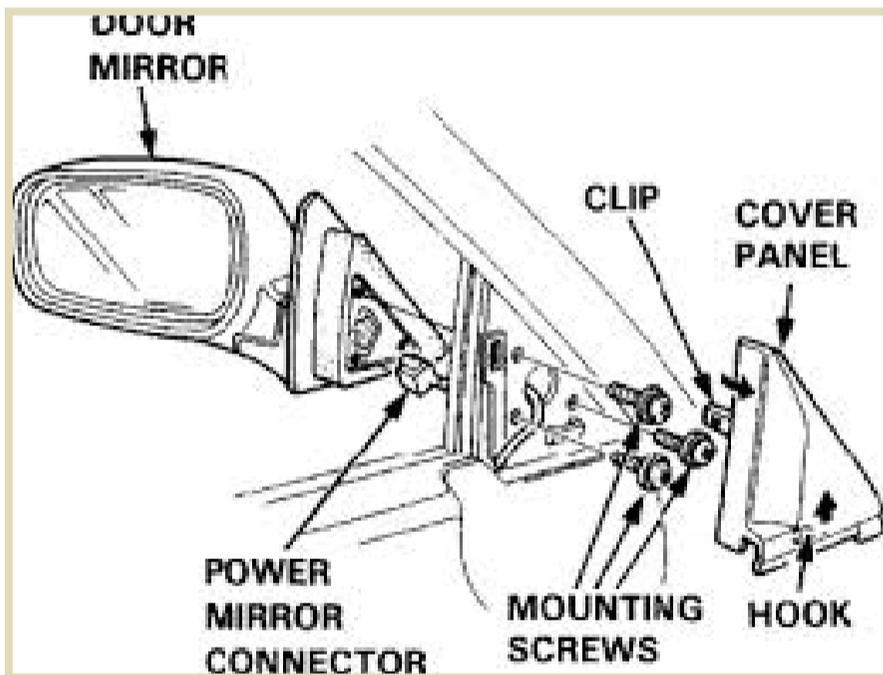
The spark plugs are replaced by unscrewing them one at a time with a deep well socket. Be careful when you remove the cable to pull on the connector and not the wire. You don't want to break the end off. With the old spark plug out and the new one gapped, you merely need to screw the new one in and tighten it. Then, put the cable back on. It should seat with a slight snap.

Broken-Off Door Mirror

Rear view door mirrors seem to have an affinity to breaking off. Most people just try to live with it, thinking that replacing a mirror is much too hard. In fact, it is one of the easiest repairs you can make.

While not all mirrors and mirror mountings are equal, they are just about so. There is usually a plastic panel on the inside of the door, to cover up the mirror mount. This is not part of the main door panel, but an additional panel. That's the first thing that has to come off. It may snap in place or be held in place by screws. If it has a small round cover on it, that's probably covering up a screw, pop it out and you can get access to the screw.

The mirror itself will be held in place by three screws that were hidden by that plastic panel. You may have to remove a foam rubber insulator to see them. Remove these three screws and the mirror will come off. If the mirror is remote control, there will also be an electrical connector to disconnect before the mirror will come off.



That's it; you should now have the mirror loose. Just reverse those steps with the new mirror in order to put it back together.

Oil Changes

Changing the oil is the single most important maintenance item on a car. Regular oil changes will do more to prolong the life of a car than any other single thing. On the flip

side of that coin, failure to change the oil regularly is a good way of guaranteeing a short life for your car. The oil should be changed every 3,000 miles, unless you are using a synthetic motor oil.

Draining the oil is simplicity itself. Place a pan under the car's oil pan and remove the drain plug. This will be a bolt that is inserted into the bottom or side of the oil pan. It is easily identified, as compared to other bolts, in that it will have a wide flange on the head as well as a plastic washer under it.

Allow a few minutes for all the oil to drain out. While it is draining, remove and replace the oil filter. You will need an oil filter wrench for removing it, but you can put it back on finger tight and it will be enough. Before installing the new filter, wet the rubber seal on it with oil.

Once the oil has drained out, clean the drain plug, the plastic gasket and the flange that it seats against on the oil pan. Then you can reinstall the oil pan drain bolt. Tighten it snugly, but there is no reason to really bear down on it and over-tighten it. Put in the quantity of new motor oil that the owner's manual recommends and you are done. You can check the oil level by pulling out the dipstick and seeing how high the oil level is, in comparison with the marks on the dipstick.

Squeaky Belts

The serpentine belt on a car's engine can start squeaking, without any apparent reason. If it does, be sure to check the condition of the belt, to make sure that it doesn't need to be replaced. If it is cracked, or the edges are worn, it might need replacement. Wear on the edges also indicates that there might be a pulley that needs to be replaced.

If there is nothing wrong with the belt, but it is still squeaking you will need to spray the belt with belt conditioner. This should eliminate the problem. Don't use the conditioner excessively, as that could cause the belt to slip.

If the belt is damaged, it will need to be replaced. To replace it requires a serpentine belt tensioner tool. This is essentially a big wrench. The main difference between it and any other wrench is its low profile. This allows it to be

used in the tight confines that are normally found in the front end of an engine.

You will need to find the tensioner pulley and attach the tensioner tool to it. Turning this tool will loosen the tensioner, allowing the old belt to be removed. Before removing it, make sure that you have a diagram of how it was routed, so that you can reinstall it. Many cars have a diagram with this information in the engine compartment, but not all cars do. Don't count on it being there, unless you have seen it. If it is missing, make your own diagram.

Once the old belt is removed, the new one can be reinstalled exactly like the old one was. You will need to use the belt tensioner tool once again to provide the slack necessary for attaching the belt.

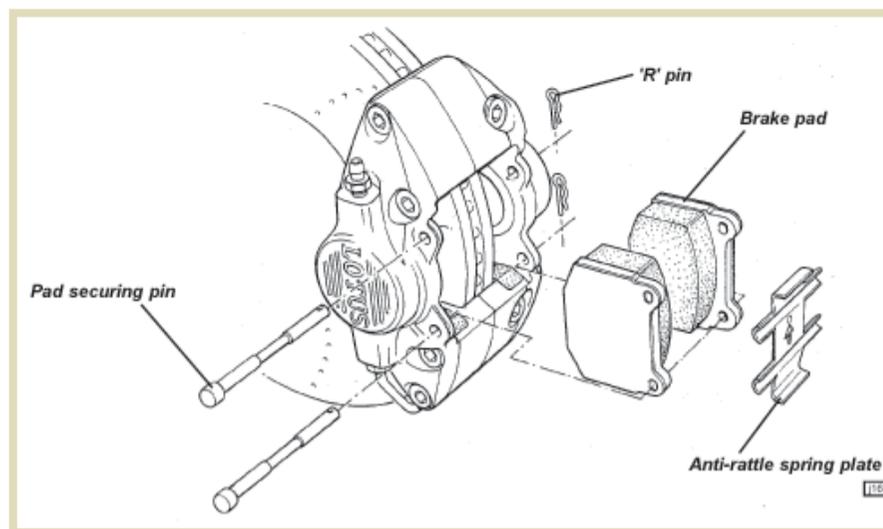
Bad Brakes

Fortunately, most cars today have disk brakes, rather than drum brakes. Disk brakes are much easier to change than the old drum brakes were, with many fewer parts to figure out what to do with. You can tell when it's time to replace your brake pads because they will start squealing when you step on them.

Replacing brake pads is a fairly simple task. You'll need to jack the car up and take the wheel off, so that you have access to the brakes. Before doing any work on the brakes themselves, loosen the cap for the brake fluid reservoir in the engine compartment. Failure to do this important step could cause serious damage to your brake master cylinder.

Most people wait until they have the brake caliper removed from the car before compressing the cylinder in it, but I find it easier to compress the cylinder before removing the caliper. The standard way of doing this is with a large C clamp (6" or larger). You can also do it on most vehicles by using a pry bar through the cutout in the outer edge of the caliper. That is faster, but you need to be cautious that you don't put the pry bar directly on the caliper's plunger, as you can crack it.

The caliper is held in place by one or two guide pins.



These are threaded on the end, so that they can hold the caliper in place as well. You should be able to see the guide pins fairly easily, as they are the only round pins going from the outer part of the caliper to the inner part. The heads will be on the inner side and will probably require a hex bit on your ratchet.

Once the pins are fully removed, the caliper should slip off the edge of the brake disk. Set it on something, so that it isn't hanging by the rubber hose. While fairly sturdy, this hose can be damaged by the weight of the caliper.

The inner and outer brake pads may just be sitting in place in the caliper, but they are more likely to be held in place by some sort of clip, either on the back of the pads or a wire clip over the ends of the pads. Remove the pads, noting any difference in the design of the inner and out pads. The new pads will have to go back in the same place, so if there is a difference, it affects which pad to use in which location.

With the new pads in place, the caliper can be placed back onto the brake disk. You may have to jockey it about a bit to align the brake caliper and to be able to insert the pins. Reinstall the pins and tighten them as much as possible by hand. Reinstall the wheels and brake fluid reservoir cap.

One final detail before you get going down the road; your new brakes may not fully make contact with your brake disks, especially if the disks are worn. Once you start the car, pump the brakes several times to push brake fluid through the lines and seat the new brake pads. Then the car will be safe to drive.

DON'T LET A MECHANIC RIP YOU OFF

No matter how good you are at fixing things on your own, you'll eventually be faced with something that is beyond your capability or the tools you have with you. I've done some pretty major repairs while on the road, but I can't do it all. Some tools, like engine hoists, are too big to fit in the trunk of my car.

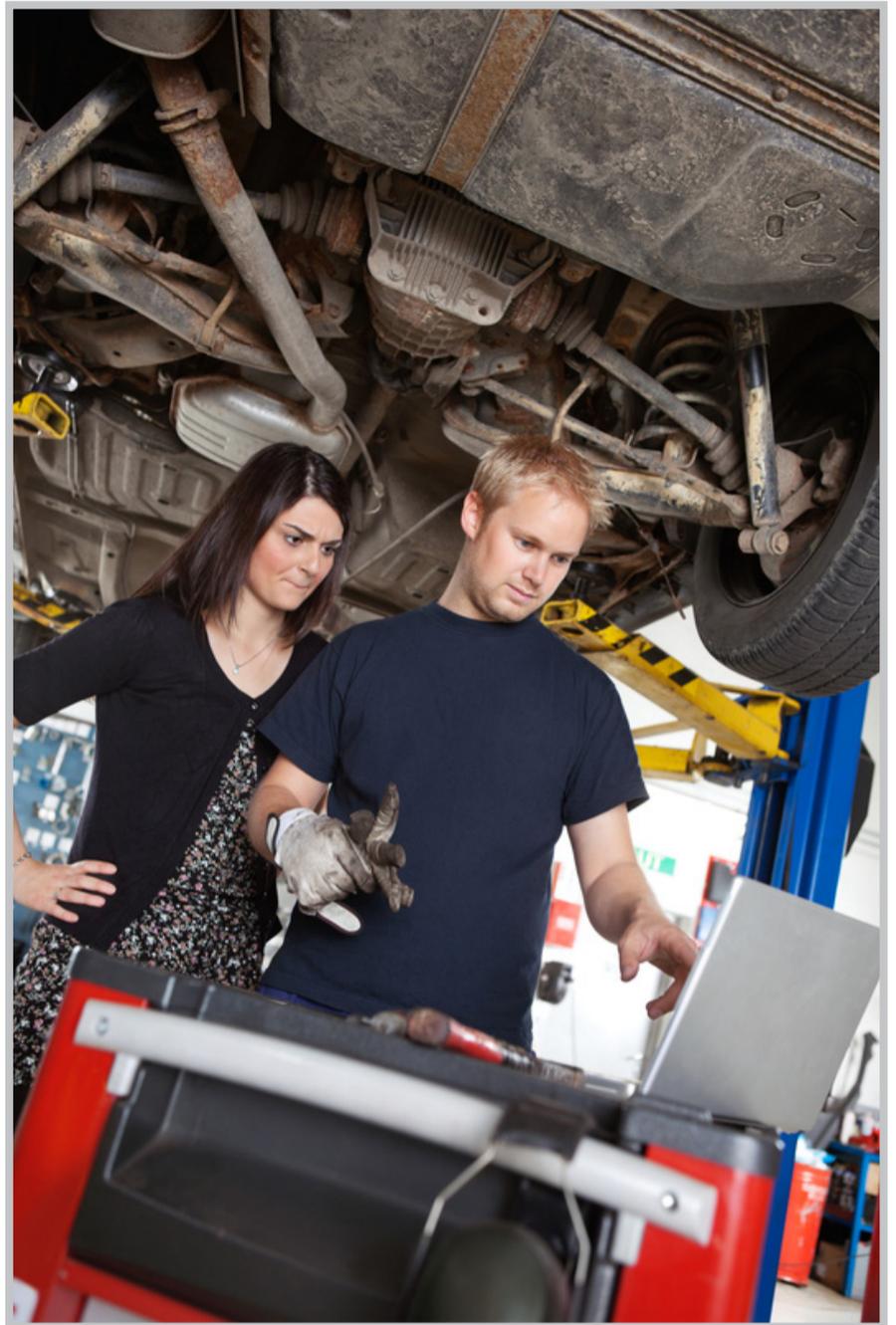
Of course, everyone has a few horror stories about some friend or other who has been ripped off by a mechanic while on the road. It's almost like travelers all have a neon sign over their head which says "Rip Me Off." There's probably nothing that can ruin a vacation faster than having your car break down and some small town mechanic seeing you as the means to pay for his own vacation.

While many travelers end up paying a premium for repair services on the road, that doesn't mean that you have to. With a few simple precautions, you can do a lot to quell the ardor of that mechanic to replace everything on your car and charge you double for it. Here are my top ten tips to getting fair work at a fair price.

Know What You're Talking About

The more you know about your car, specifically how it operates, the less a mechanic can get away with. They are counting on your ignorance to make their profit. Most people are willing to accept whatever the mechanic says, simply because they don't know what he's talking about. Knowing some basic mechanics yourself will allow you to call him out for a liar when he tries to tell you that you need a new Jensen Dynamiter (no such thing).

A common way in which mechanics utilize their customer's ignorance is to tell them that things need repair or replacement, which have nothing to do with the problem. Since the customer doesn't know how the car works, they are quick to believe that they need a new air filter to help prevent their brakes from squealing. It doesn't matter that the air filter doesn't have anything to do with the brakes.



Adding a few extra items like this onto a customer's bill is a great way for a mechanic to pad the bill, making a few extra bucks. They might even change the parts they're charging for, just to appear honest; forget about the fact that the parts didn't need to be changed anyway.

Get it in Writing

When the mechanic comes back to you with an estimate of what your repair is going to cost, make sure that you get him to put it in writing. Honest repair shops will do this anyway, but independent garages may not. If it's in writing, you know exactly what work was agreed on and how much it should cost. If any changes are made to that, they will have to get your agreement first.

While an estimate isn't a contract, it does provide a framework of agreement. It can be argued, and argued successfully, that anything which isn't on that estimate wasn't part of your agreement. As a lot of the "extras" will be afterthoughts, this protects you from them.

Don't Buy the Bank

Remember the air filter I was talking about a minute ago? The reality is that most of us have a number of small things like that which our cars need. Any mechanic worth his salt is going to find them and recommend that they be taken care of. While that can be seen as reasonable, it can also end up being expensive, especially when you are paying a mechanic's shop rate to do something that you can do yourself in five minutes or less.

If you aren't sure that what they're trying to sell you is what you need, you can always go elsewhere. Asking a mechanic for an estimate isn't a contract; it doesn't give them any rights. If you don't like the estimate you get, either because it seems high or because it seems like there are extra things on it, go somewhere else and get a second estimate.

Get the Mechanic to Commit to a Schedule

Most mechanics won't like it, but get them to commit to a completion schedule. Small shops tend to prioritize in different ways than what seem logical. Any friend that shows up is likely to get served first, even if you're standing there. While this is innocent, it can ruin your schedule.

Since the problem is already messing up your schedule, that may not seem like a big deal. But what happens when the mechanic takes a couple of extra days and it looks like you're not going to make it back in time for your kids wedding? Most people are willing to pay anything at that point, just so they can get back on the road. If he commits to a schedule, you can make your plans accordingly.

Follow Manufacturer's Recommendations

Every vehicle manufacturer provides a maintenance schedule for their vehicles. Most of the maintenance consists of simple things, such as getting the oil changed and rotating the tires. Following that schedule can make a huge difference in how well your car will last and how few problems you have with it. I hate to say it, but there are a lot of problems which people have on the road,



which are caused by not getting that maintenance done in a timely manner.

The flip side of that coin is it can protect you from the mechanic who's trying to pad your bill. When he says you need an oil change or your engine is going to fall apart, you can point to the schedule and when you last had it changed. While cars that use regular oil need to have the oil changed every 3,000 miles, synthetic oils can last as much as four times as long. If you have synthetic oil and the mechanic is saying you need to have it changed, because it's been 5,000 miles since your last oil change, you'll know he's trying to take you to the cleaners.

Communicate Clearly

Just because someone is a great mechanic, doesn't mean that they are a great businessman. In fact, they probably aren't. They may not be a great communicator either. So, it's up to you to make sure that you and the mechanic understand each other.

The most important part of this communication is what work they are going to do and how much they are going to charge you. If you don't understand what the mechanic is telling you, then be sure to ask them to explain it. You can't make a good decision about authorizing the work if you don't know what he's trying to tell you.



Take Him on a Test Drive

One of the biggest ways that communications problems happen with mechanics is in trying to describe the problem. Mechanics, like any other professional community, have their own secret language. If you don't talk that language, they may not be able to understand the problem you are trying to describe. The easiest way to solve this is to let them see it for themselves. Take them for a test drive and let them experience the problem that you're having.

Get Recommendations

Hopefully, you have a regular mechanic at home that you have developed a relationship with and have confidence in. That's not going to help you on the road though. You're going to have to find a mechanic that can take care of you, without the benefit of getting to know them first.

The easiest way to make sure that your mechanic knows how to take care of your car is to go to the dealer for your brand of car. Of course, that will probably be the most expensive option as well; not because they are dishonest, but because dealers just charge more.

If you have to have your car worked on while on the road, ask some people for recommendations. If there is

someone there that you know, ask them who they use. If you are stuck somewhere where you don't know anyone, then just ask around. See what others are using and ask them why they like that mechanic.

Look for a Sign

Speaking of recommendations, when you show up at the mechanic's garage, take a quick look around for the AAA approval sign. Repair shops that display this sign are inspected quarterly by AAA, to protect their members. Part of that inspection process is checking customer records and contacting the customers to verify customer satisfaction.

Even if you're not a AAA member, having that sign in the shop window means that there's a whole lot more likelihood that you can trust the people inside to take care of you fairly. Shops that are AAA approved don't want to lose that rating, because they know that it will cost them money.

Get a Guarantee

Guarantees are just about worthless when you're on the road. I remember once that I got a guarantee form an independent transmission shop that worked on my motorhome. The only thing was, to use the guarantee I had to get my broken down motorhome back to the town where the shop was. That guarantee didn't help me at all.

While that type of guarantee doesn't do you much good, there is one thing that guarantees are excellent for. They tell you how much confidence the mechanic has in his own work. Nobody wants to do free work to satisfy a guarantee; so, they won't guarantee it for a moment longer than they are sure it will work. Therefore, if someone is willing to give you a 20,000 mile guarantee or a two year guarantee, they must be confident in their work.

Of course, a guarantee from a nationwide brand will do you a lot more good than the one I got from that independent shop. With a nationwide brand, you'll be able to take your car to any of a number of shops to get the problem rectified. That will save you money, if the problem shows up again.

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