

Basic Car Knowledge

Introduction

This book is to help people maintain and perform basic repairs on their vehicles. The purpose of this book is to give general information not specific information. For specifications on the vehicle, always refer to a repair manual for the vehicle. When owning a vehicle, it is important to know some basic information about maintenance and repair to save money and time and keep the vehicle on the road. First and foremost, safety is the most important. When working to maintain the vehicle it's important to know what to look for and have a plan if repair is needed. Tools are important for every project and working on vehicles require specific tools and knowing the proper uses. This book helps vehicle owners to perform visual inspections by checking belts, fluids, the battery, tires and even brakes. A vehicle owner will learn how to maintain a vehicle and the importance of developing a maintenance schedule for vehicle systems. Some scheduled maintenance includes guidance in changing oil, air filters, battery, belts, hoses, and coolants. Roadside repairs will help readers learn to address what might go wrong on the road. Readers learn how to change a tire, what to do if the vehicle overheats, and to know some symptoms of a battery issue or a check engine light. The next several pages will guide vehicle owners on what to look for on a vehicle, what to maintain on a vehicle and how to make basic repairs.

It is extremely important to always wear safety protection gear when working on vehicles. A person should use safety glasses or face shield, especially when working with a battery. Wearing rubber or nitrile gloves when working with fluids and grease will protect and keep your hands and nails clean. When working on repairs, often a jack is used to raise the vehicle. A Jack stand to safely support the vehicle once you have raised it off the ground. In order to protect yourself and before getting under a vehicle make sure the jack for the vehicle is in good working order. Most often a jack is made specifically for that vehicle, but there are floor jacks that can be used for other vehicles. When working around a running engine, it's important to be careful. Loose clothing or long hair can get caught in moving parts and cause serious injury. Before starting a maintenance or repair, remove necklaces, rings and watches. Often these items get caught in tight

spaces, short circuit against battery cables or terminals and cause serious burns or get caught in moving belts or pulleys. By wearing safety equipment such as safety glasses and gloves and removing jewelry, a vehicle owner repairing a vehicle can avoid an accident. It's important to be safe!

1. Check it out!

In this chapter, a vehicle owner learns basic items to look for under the hood and under the vehicle. This is a learning section because at this point a vehicle owner is not actually repairing the vehicle. This is the opportunity to compile a list of items that will need attention. The vehicle owner will be looking at the following items on the vehicle: belts, fluids, battery, tires and brakes. Once the list is complete with all the items needed from the parts store, it's important to research if the items need to be ordered and purchase everything needed in one trip. It is not unusual that some parts may have to be ordered. Be patient, compile the list, order the parts and plan to do the work in the next few days.

Visual inspection

Look before you act! The visual inspection is the starting point. All the work from this point on is based on what you discover during this process. Many automotive shops have created a checklist that technicians follow, and this is a great idea for the vehicle owner. This section guides the vehicle owner to look at major systems important to the operation of the vehicle. The vehicle owner's manual most often has a checklist for the vehicle maintenance and the mileage for these items. The vehicle checklist is tailored to the specific vehicle and is very helpful in making sure the vehicle stays on the road for as long as possible. The internet is a great resource if the vehicle owner's manual is missing. A vehicle owner has a responsibility for keeping their vehicle in proper order to maintain transportation. This section allows the reader the knowledge of what to look for, what should happen to keep the vehicle running and an organized approach to keeping the vehicle on the road.

Checking Belts

Belts aren't just for pants! A vehicle owner's first check for a functioning vehicle are the engine belts. Vehicles have one or more belts that allow engine systems to function. Often belts break and may not be there, causing engine systems to work improperly. Some systems use several belts, and other systems use one belt to drive all the accessories. The serpentine belt is a one belt drives everything system. Belts are important because they drive the alternator, power steering pump, water pump and on some vehicles the engine cooling fan. In the visual inspection, belts should be inspected for cracks, wear, fraying, slipping and glazing. When a car is started and there is a loud squealing noise from under the hood, that may mean the belt is slipping and needs to be tightened or replaced. If the vehicle has a serpentine belt, this may require a replacement of the automatic tensioner and the belt together. If the vehicle has several belts, inspect the belts to find out which one is squealing. When the engine running and the belt squealing, a vehicle owner can carefully spray each belt with soapy water from a spray bottle to help detect. When the squealing stops, the culprit is found. It's important to check part of the belt that contacts the pulley. If it's shiny and the owner's fingernail slide across the surface like glass, then the belt needs to be replaced. If it's not shiny and the surface is not like glass, then tighten the belt and make sure the squealing has stopped. If the vehicle owner has found a belt that is soaked by oil, the belt needs to be replaced. Just cleaning the belt won't work because once a rubber belt is soaked with oil in time the belt will disintegrate and fail. Don't just replace the belt, find and fix the oil leak. If this repair isn't made, then the belt will continue to have issues. A vehicle owner should also continue to look for the issues when finding a shredded belt, discovery of what caused the failure and correction will help avoid damage to the new belt. The belts are important to engine systems working properly. This section troubleshoots engine belt maintenance so that vehicle owners have knowledge of proper working engine belts.

Checking Fluids

Engine Fluids are the life blood of a vehicle! It's important to check the level and condition of the vehicle fluids because these fluids help keep the vehicle running. Fluids are used as lubricants, coolants, and cleaning agents. The fluids to be checked include, coolant, brake fluid, engine oil, power steering fluid,

transmission fluid, differential fluid and windshield washer fluid. A dipstick is used when checking engine oil and transmission fluid. Other fluids, like brake fluid and engine coolant, are in viewable reservoirs that can be checked without opening them. With differential and manual transmission fluids, it requires the vehicle to be raised and checked from underneath. Fluids are an important factor in a properly functioning engine system because they help lubricates systems, cool systems and clean systems.

Checking the Battery

The battery is the heart of the vehicle! Knowing how to check the battery is crucial to keeping the vehicle running. If the battery doesn't work, then most of the engine systems won't work. In checking the battery, it's important to look at the battery case for cracks, leaks, and bulging. The terminal connections need to be tight and clean. Sometimes corrosion or liquids on top the battery case, may be cause a poor connection. It is important to also check the battery tray and hold down mechanism because if the battery is not secured, it can move out of place and be damaged. If the battery moves out of place, it could cause the terminals to touch the hood or fender and damage the vehicle or cause a fire. Another check is the battery voltage. A fully charged battery should show 12.6 volts with the engine off. When cranking the engine, the battery voltage should not drop below 10 volts. If it does, there may be a problem with the battery or the starter. When the engine is running, the battery voltage should be between 13.5 to 15 volts max. If voltage is less than 13.5, there may be a problem with the charging system or a loose belt. If voltage is greater than 15 volts, there is a problem with the charging system. At this point further diagnostics and taking the vehicle to a professional should be considered. For a thorough check of a vehicle battery it's requires inspection the battery case, battery terminal connections and voltage of the battery.

Checking Tires

Tires are what keeps a vehicle rolling down the road! When checking tires, a visual check for any punctures or unusual markings. A vehicle manual will provide recommendations for tire size and air pressure requirements. This information can sometimes be found on the inside of the driver's door. It is important to keep tire pressure at the recommended level to avoid tire damage and unsafe driving conditions. It is equally important to check the tread of the tire. The tread depth

can be checked several ways. The most accurate is to use a tread depth gauge. This tool measures the depth of the tread in thirty seconds of an inch. Another way is to use a penny (U.S. currency). When a penny is placed with the top of Lincoln's head down in the tread, and the top of his head is visible it's time for new tires. There are tread wear indicators also known as wear bars made as part of the tire. Wear bars are at the bottom of the tread grooves around the circumference of the tire, so as the tread wears down, the wear bars become more visible. This is an indicator of the amount of tread left, and it being time to replace the tires. Once the wear bars are even with the tread, it is time to replace the tire. In a visual check of the tire, it is important to check the condition of the sidewalls and valve stems. The sidewall of the tire should not have any bulges, cuts or abrasions. Any type of puncture or marking can weaken the tire and may cause the tire to leak or worse, cause the tire to fail or "blowout". Looking for small cracks or "weather checking", would also indicate the need to replace the tire. This is an indicator of the tires age. As tires age, the rubber dries out and becomes less flexible. This can lead to an unexpected failure and an accident. Even if the tread looks good, it's important to look for weather checking. Finding cracks would indicate the need to replace the tire. When checking the tread, it should show even wear across the face of the tire and around the circumference of the tire. If the tread is showing wearing on one side, an alignment may be needed to prolong the life of the tire. The tire valve stems should also be checked during tire inspection. Look for looseness and leaks at the rim. If tire valve caps are missing, make sure they are replaced to keep dirt and water out of the stem. Valve stems should be replaced when new tires are installed. In checking the tires, it is important to check for the appropriate size and pressure in the vehicle owner's manual when starting the process. A vehicle owner should check to condition of the tire by looking at the air pressure, tread levels, cracking or marking and valve stems to make sure the tire is effective for a safe driving experience.

Checking Brakes

Things are getting dirty! Checking the brakes is a dirty job. Firstly, find the most level area to park the vehicle. It should be a solid surface, either concrete or pavement is best. Never jack the vehicle on an unstable surface such as sand, dirt or grass. Before conducting any checks on any vehicle, make sure the vehicle is in

park and the park brake is set. Chocks or blocks should be placed behind the tires not being lifted off the ground. Before jacking the vehicle, use a lug wrench to loosen the lug nuts or bolts on the tire. It's important to not take the lug nuts or bolts off yet, just break them loose. The vehicle can now be lifted, using the proper jack and jacking points on the vehicle. Proper jacking points for the vehicle can be found in the owner's manual. Carefully jack the vehicle until the tire is no longer touching the ground. Once the tire is off the ground, set a jack stand under the vehicle so that it will contact a solid frame member. Then remove the lug nuts or lug bolts holding the wheel on the vehicle and remove the wheel. At this point, the vehicle owner can see the rotor or disc behind the tire. It is important to look for scoring, hot spots and signs of metal to metal contact on the disc. The disc should have an even, smooth almost mirror like finish on both sides. If there are any deep gouges or scoring measurement will need to be taken to determine the thickness of the disc for machining or replacement. Then checking the thickness of the brake pads is crucial to see if replacement is needed. The pads are located within the caliper and are the only part that is supposed to touch the disc. The pads are often visible without removing the caliper. Inspect both pads, inside pad and outside pad as it is not unusual for one pad to wear more than the other. However, if one pad is worn drastically more than the other, this can indicate a problem that may need professional attention. The pads should be at least $\frac{1}{4}$ of an inch thick. If the pads are close to $\frac{1}{4}$ of an inch, it is time to replace them. This procedure should be done on each wheel. When replacing pads and discs, they must be replaced as an "axle set". This means that you would replace both front and/or both rear brakes. When checking the brakes, it is important to properly prepare the vehicle by finding a level stable area and making sure jacking the vehicle is done based on the specific vehicle lifting points. Once prepared to check the brakes, look at the disc and pads for wear and replace as needed.