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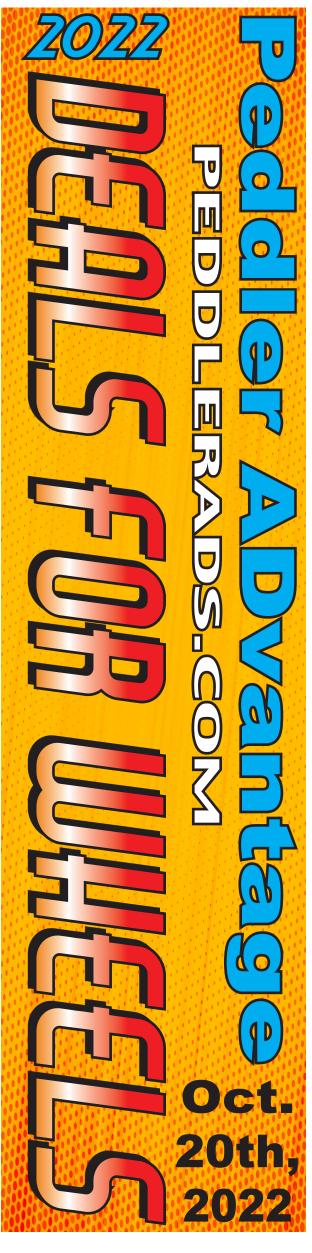
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THE INSAND OUTS OF ENGINE OIL

Auto maintenance can be daunting, even when it comes to something as seemingly basic as motor oil. Based on the make and model of your vehicle, you need to consider the oil's type, viscosity grade, service classification and whether it meets additional industry standards or proprietary specifications required by the manufacturer

of your vehicle. Fortunately, you don't have to be an expert to provide your automobile with the right oil. All it takes is your owner's manual and an understanding of some easy-to-learn symbols and numbers printed on the engine oil packaging.

OIL TYPES

Motor oil has come a long way since

the late 19th century, when crude oil was first being refined into lubricants for the steam engines of that time. Contemporary offerings now include everything from conventional formulations to synthetic oils that offer superior performance. There are also oils designed to extend the lives of older engines in cars with many miles

on the odometer. Here's a quick primer on the most common oil types currently in use:

· CONVENTIONAL:

Refined from crude oil and commonly recommended for older engines with simpler designs that are not expected to endure high-performance demands while driving. Conventional oil is typically less expen-

sive, but generally requires more frequent changes.

THETIC: A blend of conventional and synthetic oils (see below) that provides enhanced performance at a lower price point than a full-synthetic oil. Most latemodel cars require semi-synthetic oil to meet automakers' specifications.

· SYNTHETIC:

Oils that are chemically engineered at the molecular level to reduce impurities, flow more easily at low temperatures and resist breakdown at high temperatures. Synthetic oils are more expensive, but offer the highest level of protection. The engines in many premium luxury cars and high-performance models require the use of synthetic oil.

• HIGH-MILE-AGE: Designed for engines with 75,000-plus miles of use, high-mileage oils contain additives that help limit common problems such as oil leaks and increased oil consumption.

OIL SPECIFCATIONS

Oil type is impor-

tant, but there's more to know before topping up or changing the oil in your vehicle. Automakers and industry organizations have developed various oil standards, which appear on motor oil packaging in the form of two symbols called the "donut" and the "starburst". The information provided by these symbols includes:

• SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) VISCOSITY

CRADE: The SAE viscosity grade—in the center section of the donut icon—refers to an oil's weight or thickness, and indicates how easily it will flow to lubricate moving engine parts. Because

outside temperature impacts viscosity, most modern vehicles call for multi-viscosity oils that perform well in a wide range of temperatures throughout the year.

AMERICAN

PETROLEUM

INSTITUTE (API) SERUICE **CATEGORY:** This code appears in the top half of the donut symbol and designates which API standard(s) the oil meets. The testing required to meet API standards involves a wide variety of requirements, from engine protection and performance to emissions control and compliance with government regulations.

Each category consists of a two-letter code, beginning with "S" for gasoline (spark) engines or "C" for diesel (compression) engines. The second letter denotes how current a standard the product meets, with "SN" and "CK-4" represent-

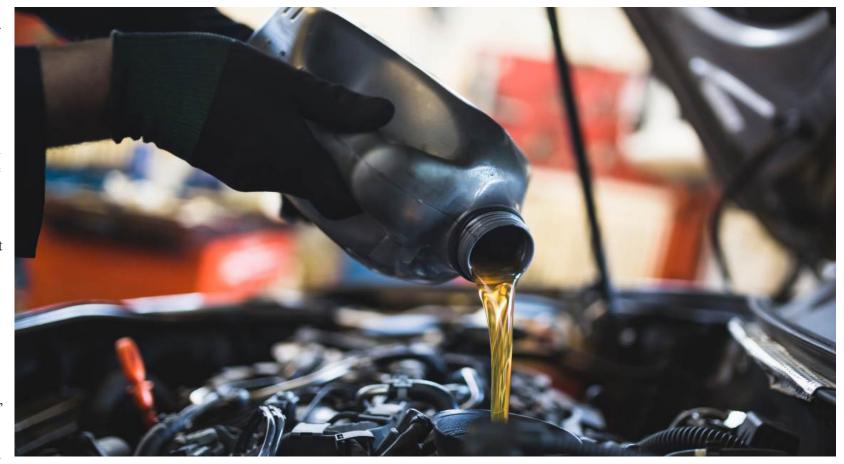
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ing the most current standards as of January 2018.

In gasoline engines, you can use a newer service category of oil than that required by the vehicle manufacturer —for example, "SN" can be used in engines that call for "SM". But, it is never okay to use oil with an older service category than that specified. The situation is more complicated with diesel engines, where the latest oil service category is not always compatible with earlier engine designs. Always follow the automaker's recommendations for these engines.

• INTERNATIONAL **LUBRICATION** STANDARD AND APPROUAL COMMITTEE (ILSAC) STAN-

DARD: This rating for oil performance and engine protection is established by ILSAC, a standards organization made up of American and Japanese automakers. "GF-5" is the most current standard as of January 2018, and the presence of the starburst symbol on an oil package indicates compliance with the standard's requirements for emissions control, seal compatibility, protection of turbochargers and



pistons against high-temperature deposit formation and more.

• AUTOMAKER & DIESEL ENGINE MANUFACTURER STANDARDS: In

addition to the industry standards described above, most automakers and diesel engine manufacturers have proprietary motor oil standards designed around the unique needs of their powerplants. The standards are identified by alpha-

numeric codes that appear in owners' manual and on the packaging of oils that meet the necessary requirements.

PROTECT YOUR ENGINE

Your engine is the heart and soul of your automobile, and using the right type of oil is essential to both its performance and longevity. When selecting motor oil to service your car, always refer to the owner's manual to

determine the specific requirements of your particular vehicle.

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LIFE . HOME . CAR . BUSINESS



There is no simple answer to the question of how long a car battery will last, but it is possible to offer some generalizations based on decades of industry experience. To begin with, we know that the life of a car battery varies based on three key factors: time, heat and vibration. Let's take a closer look at each.

Time

Like people, car batteries age over time and have a finite lifespan. Even in ideal operating conditions, batteries gradually deteriorate until they can no longer provide enough power to start an engine. Automobile usage patterns also contribute to battery aging. Cars

driven mostly on short trips may not allow the battery to fully recharge, and batteries in vehicles parked for extended periods naturally self-discharge. In both of these situations, using a maintenance charger like AAA's Battery Tender will keep the battery fully charged and extend its service life.

Heat

Heat facilitates the chemical reaction batteries use to generate electricity, but it also increases the rate of battery degradation. In cooler northern climates, a battery may last five years or longer, but in hot southern locales around three years is more typical. Batteries also live in a harsh underhood environment where temperatures can easily exceed 200 degrees Fahrenheit in hot weather. To combat this heat, automakers may mount the battery in an isolated area, install a heat shield over the battery, or relocate the battery outside the engine

compartment, often tery ages. Finally, under the back seat or trunk floor.

Vibration

The last key factor in battery life is vibration, which causes physical breakdown of internal battery parts. To minimize the effects of vibration, special hold down hardware secures batteries in place and prevents them from moving about. Missing or loose hold downs can significantly shorten battery life.

Other Considerations

While less common

than the factors above, a malfunctioning charging system will also reduce battery life. Persistent underor over-charging accelerates battery aging. Some newer cars with absorbent glass mat (AGM) batteries require careful control of charging rates for maximum battery life, and the automaker may even alter the charging strategy as the batallowing any car battery to go completely dead will take a big chunk out of its lifespan, even if it can be recharged and put back in service.

Weak Battery Warning Signs

You may have a battery problem if the starter motor cranks the engine slowly or the Battery/Charging warning lamp is illuminated. Another weak battery indicator on older cars is dim incandescent headlights, particularly at idle. However, not every failing battery reveals itself through obvious symptoms.

To avoid being stranded by a battery problem, have the battery inspected at every oil change to make sure the cable connections are clean and tight, and the hold down hardware is secure. Once a battery reaches three years of age, have it tested annually.

The test will identify if the battery has deteriorated to the point where replacement is recommended to prevent an unexpected failure. In most areas, members can call the AAA Mobile Battery Service to have a battery tested and replaced (if necessary) at their home or work.

Battery Selection **Tips**

There is no "onesize-fits-all" battery suitable for every car. The battery type, physical size, terminal configuration, and cold cranking amps (CCA) or amphour (Ah) rating are all important factors that ensure the proper fit and function of a battery. Installing an incorrect battery can adversely affect the electrical system of your vehicle, and cause major damage if the terminal locations create a short circuit with nearby components. If you are unsure about



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which battery to buy, ask your car mechanic or consult the vehicle owner's manual.

Battery Type

Batteries are either conventional leadacid or the more advanced AGM design mentioned earlier. Most cars on the road today use conventional batteries, but some models use AGM batteries that are highly spill resistant and better able to handle repeated discharging and recharging, as occurs in cars that have engine stop-start systems to improve fuel economy. Because charging systems are often optimized for the battery type, AAA recommends always replacing a battery with the same type that came in the car from the factory.

Group Number

The group number, for example Group 24, is an industry standard that defines the battery's physical size, its hold down configuration, and the type and location of its terminals. Selecting a battery with the same group number as the original equipment battery will ensure a secure fit, adequate

clearance, and no cable/terminal issues. It will also allow for proper reinstallation of the important battery heat shield, where equipped.

Some imported vehicles use batteries that conform to European or Asian battery standards. In many cases, a standard group number battery will fit with minor or no modifications, but pay special attention to ensure that the installation does not pose any problems. Application guides are available where batteries are sold. In a limited number of cars, the vehicle design makes a factory replacement battery the only viable option.

Cold Cranking Amps Rating

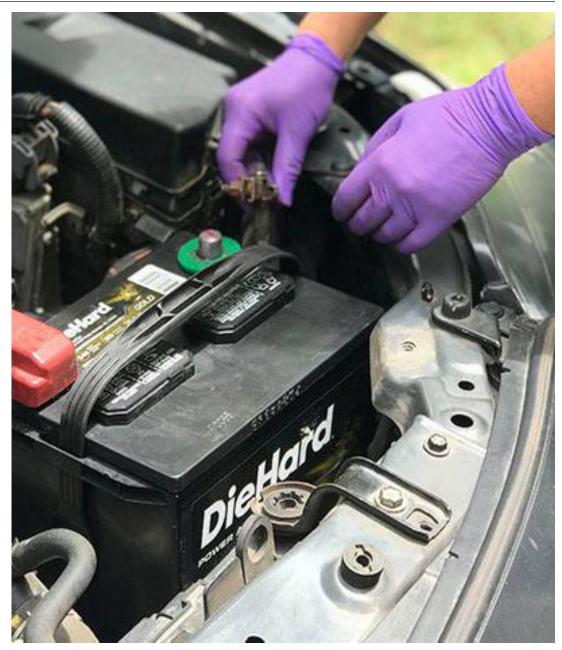
The cold cranking amps rating, for example 650 CCA, is an industry standard measure of how much electrical power a battery can provide at zero degrees Fahrenheit. Never confuse this rating with "cranking amps" (CA), a rating based on an easier test that produces inflated numbers. Some import automakers state battery power requirements using an amp-hour rating, for example 78 Ah. This rating is based

on the number of minutes a battery can provide a specified level of electrical current, typically 20 amperes.

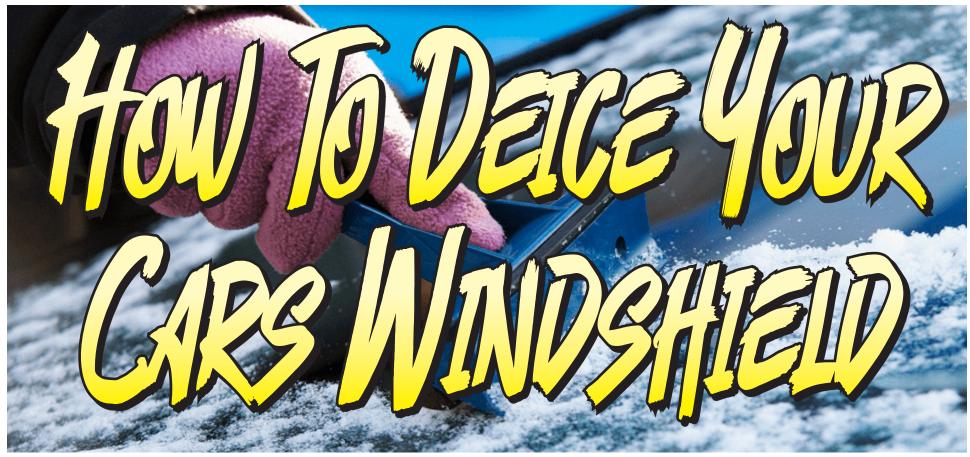
To avoid electrical system problems and a visit to the repair shop, never install a battery with a CCA or Ah rating that is lower than that recommended by the vehicle manufacturer. A higher-rated battery will also work if it fits properly, but is usually unnecessary and may have a shorter service life in hot climates.

Conclusion

When your car needs a new battery, always purchase one from a high-volume seller with fresh stock. You do not want a battery that has already lost a good portion of its service life sitting on a shelf. Also, look for a battery with an extended full-replacement warranty. Quality batteries offer free replacement for three or more years if there is a problem within that period. A warranty that enters a prorated replacement period sooner will require a partial payment to replace the battery once the full-coverage term expires.







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One of the more bothersome challenges of winter is removing ice from your car's windshield on frosty mornings. Here are some tips from AAA on how to prevent and remove windshield ice.

PREVENTATIVE MEASURES

The old proverb that an ounce of prevention is worth a pound of cure definitely holds true when it comes to ice on vehicle windshields. You never have to remove something that is not there in the first place, which means the most effective way to prevent ice on a windshield is to park your car in a garage. Even a covered carport can help reduce ice formation in some situations.

If sheltered parking is not an option, covering your windshield will work nearly as well. Use a tarp, large towel or old

sheet folded as necessary. Hold the cover in place using the wiper blades, weights, magnets or some other method so it will not blow off. Auto parts stores sell windshield covers that typically have magnets built in to help hold them in place. Note that a cover may scratch paint if the finish is dirty and/ or the cover moves about in the wind. Also, windshield covers are best used when little or no snowfall is ex-

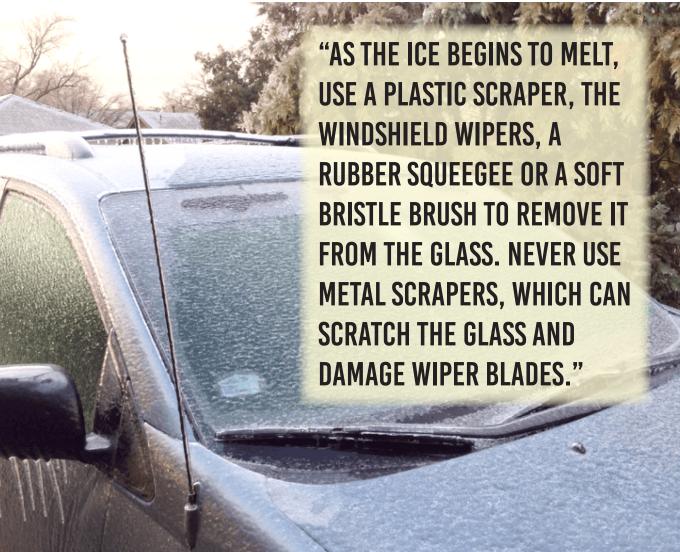
pected; heavy snow deposits can make removing a cover difficult.

To aid in ice prevention and ease removal, some do it yourselfers soak cloth windshield covers in a solution of one tablespoon salt to one quart water. The damp cover can be stored in a plastic bag or container between uses.

Commercial sprayon ice and frost "shield" solutions are also available to pretreat the windshield, although these can be pricy at up to \$15 a quart. In addition, some ice prevention products contain ethylene glycol, which is poisonous to pets if swallowed.

Do it yourselfers often use a home-





made windshield pretreatment, consisting of three parts white vinegar to one part water. The solution is applied with a spray bottle the evening before and then wiped off. Leaving the liquid on the glass is ineffective because its freezing point is just barely lower than that of water, and some glass professionals caution that extended exposure to liquid vinegar may cause micro pitting of the windshield glass.

Before the weather turns cold, fill your automobile's windshield washer reservoir with winter fluid or a "de-icer" solution that will not freeze

removal. Be sure to operate the washers long enough to flush any summer solution from the lines. When snow or freezing weather is expected, fold the wiper arms up off the glass or place small pieces of wood (or other objects) under the wiper arms to hold the rubber blades off the windshield. This will prevent them from freezing to the glass and ease snow and ice removal. The use of one-piece beamtype wiper blades or rubber encased winter wipers will minimize snow and ice buildup on the blades and help speed the removal of both.

and can aid in ice

ICE REMOVAL

To remove ice from a windshield, follow these simple steps:

- Start the engine
- Set the heater to defrost
- Adjust the airflow to recirculate
- Move the temperature control to full heat

If your car has an automatic climate control system, simply set it to defrost. If your car is one of the few with an optional electrically-heated windshield, turn it on to rapidly clear ice from the glass.

If desired, apply a commercial glass deicer spray to the windshield. These

products generally contain methanol, which is the best form of alcohol for deicing. However, like pretreatment sprays, they tend to cost up to \$15 per quart and may contain pet-hazardous ethylene glycol.

Some do it yourselfers use a homemade deicing solution made of one part isopropyl (rubbing) alcohol and two parts water. The isopropyl alcohol sold in stores ranges from 50 to 90 percent purity. Higher purity provides a lower freezing point and better deicing capability. A few drops of dish soap added to the mixture will act as a surfactant to help coat the ice

more evenly. Apply the solution with a spray bottle and, if practical, store it indoors so the added warmth can aid the deicing process. Alcohol-based deicing mixtures freeze at around 5 degrees Fahrenheit versus 32 degrees for water.

As the ice begins to melt, use a plastic scraper, the windshield wipers, a rubber squeegee or a soft bristle brush to remove it from the glass. Never use metal scrapers, which can scratch the glass and damage wiper blades. Another no-no is hot water, which can crack glass by causing thermal shock and result in an expensive auto

glass repair. For the same reason, never try to melt ice with any type of torch. Finally, tapping on the ice with a ball-peen hammer or other tool in an attempt to break it up is just asking for a windshield replacement.

VEHICLE PROTECTION

Vinegar-based pretreatments, alcohol-based deicing solutions and dishwashing soap are not directly harmful to your vehicle's paint. However, they do remove car wax and over time will leave the finish exposed to the elements and corrosive chemicals such as road salts. Windshield covers soaked in a saltwater solution pose similar concerns. If you use windshield pretreatments or deicers on a regular basis, keep in mind the need for total car care and periodically wash and rewax any affected

areas of the car as weather permits.

VISION SAFETY

It can be tempting to remove the least amount of ice necessary before driving off on a frigid winter morning. However, the proper procedure is to remove ice and snow from all glass on your vehicle. If you cannot see clearly out of the car in every direction you are driving in an unsafe manner and your odds of being involved in a collision go up. In order to avoid bodily injury or a costly car repair, it is best to play it safe and remove all snow and ice. In addition, at least 11 states have laws that require snow and ice removal before driving a vehicle. Failure to do so could result in a citation ... or worse.











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TREADTELLS WHEN TO SHOP FOR NEW TIRES

The tires are the only parts on your car that have direct contact with the road, which means they have a major effect on ride, handling, braking, and safety. For optimum performance, tires must be properly balanced and inflated, show no signs of physical damage, and have adequate tread depth. Proper inflation, regular rotation, periodic inspection and wheel alignment when needed will all contribute to maximum tire life.

Car tires must be replaced when their tread wears below a certain level. However, other

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types of problems can result in the need for earlier replacement. If you don't invest time and money in regular car maintenance, you risk reducing the lifespan of your tires. Also, road hazards such as potholes, rocks and debris can damage your tires. If you notice anything unusual about how your car drives after running over a hazard, AAA recommends that you take the vehicle to the nearest auto repair shop for an immediate tire inspection.

TIRE PROBLEMS TO LOOK FOR WHILE DRIVING

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VIBRATION OR THUMPING:

Unusual vibrations or thumping noises can indicate an outof-balance tire, one with tread that has a flat spot due to locking the wheels in a panic stop, or a tire with a separated belt (see below).

PULL TO ONE SIDE:

While driving at a steady speed, a steering pull to one side may indicate an underinflated or damaged tire on that side of the car. It could also be caused by a brake system or wheel alignment problem.

TIRE PROBLEMS TO LOOK FOR DURING INSPEC-TION

WARRANTY

OVER INFLATION:

Too much air pressure causes mostly the tire's middle section to contact the road. This causes increased wear in the center of the tread, with less wear at the tire's edges.

UNDER INFLATION:

Too little air pressure causes mostly the tire's outer edges to contact the road. This causes increased wear on both edges of the tire tread, with less wear in the center.

WEAR ON ONE EDGE OF THE TREAD:

This type of wear indicates worn

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suspension components or a wheel alignment problem.

ERRATIC TREAD WEAR:

Alternating high and low spots around the tread, called cupping or scalloping, may indicate a wheel out of balance, but are more often a sign that you need to replace worn shock absorbers or other suspension components.

SIDEWALL CUTS AND TEARS:

Impacts with road debris and curbs can damage the rubber tire sidewalls. You can usually ignore cosmetic damage, unless accompanied by a bubble or bulge (see below). However, if the cords of the tire carcass are exposed and damaged, bring your vehicle to your local auto repair shop to have the tire replaced.

BUBBLE OR BULGE:

A bubble or bulge on the tire sidewall or tread indicates one of the belts inside the tire has separated from those around it. Re-

place any tire with this type of damage as soon as possible.

MEASURING TIRE TREAD DEPTH

Adequate tread depth is necessary for a tire to maintain traction and shed water on wet and slippery roads. You can measure tread depth with an inexpensive gauge available at any auto parts store. Alternatively, you can use the traditional quarter and penny tests.

Insert a quarter into a tread groove with the top of Washington's head facing down. If the top of his head is not visible, your tires have at least 4/32" of tread and are fine for continued use. If you can see above the top of Washington's head, it is time to start shopping for new tires. Take multiple measurements across the tread to help ensure accurate results.

You perform a penny test the same way, except that if you can see above the top of Lincoln's head

your tires have less than 2/32" of tread, which is below the legal minimum in most states and cause for immediate tire replacement. Tires worn to this level will also have visible wear indicators (thin bald strips) running from side to side across two or more tread segments.

AAA and the Au-

tomobile Club of Southern California's Automotive Research Center tested new allseason tires and all-season tires worn to 4/32" in wet conditions. Compared to new ones, the worn tires increased stopping distances an average of 87 feet for a passenger car and 86 feet for a light truck – longer than a semi-trailer truck. Given these results, AAA suggests you put the penny in your piggy bank and instead use a quarter to check tire tread wear and determine when it is time for replacement.





Oil changes every 3,000 miles. Car batteries last 5 years. A car warranty is voided if you go somewhere other than the dealer for service. Brake fluid doesn't need to be changed. Tires shouldn't be replaced until the tread reaches 2/32".

Sound familiar? We've all heard these car maintenance tips before but are they myth or are they fact? AAA is ready to break each one down to make sure you are treating your car right.

Oil Change **Frequency**

A recent AAA survey found that 45% of people believe their oil should

be changed every 3,000 miles. Myth or Fact?

MYTH! Most engine oil today contains lubricants and other additives that extend the life of the oil. This means for cars 15 years or newer, oil changes are recommended at intervals of 5,000 to 7,500 miles. If you opt for full-synthetic oil, it might go as far as 15,000 miles between services.

The bottom line: always follow the manufacturer's maintenance schedule for when to change your oil

The Life of Your Car's Ballery

AAA found that

42% of people believe a car battery lasts for 5 years. Myth or Fact?

MYTH! Typically, a car battery lasts between 3 - 5 years and sometimes longer but driving habits and climate are both big factors in affecting battery life. AAA responded to 2.1 million batteryrelated calls last summer and expects the volumes will return to 2019 levels and possibly even increase.

The bottom line: if your battery is approaching the three-year mark, the only way to know for sure its condition, is to get it tested. Let AAA help! We offer members free testing of a vehicle's

battery and electrical system through our mobile battery program.

Keeping a Vehicle Warranty Valid

AAA's survey also found that 31% of people believe that in order to maintain a vehicle warranty, all service must be performed at the dealer. Myth or Fact?

MYTH Consumers can have regular maintenance and repairs done at any facility of their choice

The bottom line: consumers always need to document any work done by a facility

other than the dealer or manufacturer in order to maintain the warranty.

Changing Brake Fluid

AAA found that 19% of people believe that brake fluid doesn't need to be changed. Myth or Fact?

MYTH! The brakes are the most important safety system on your vehicle. Most manufacturers recommend replacing brake fluid at two- or three-year intervals.

The bottom line: it is important to follow this schedule since brake fluid attracts and absorbs water, which can

corrode internal brake system parts and lead to failure or other costly damage.

Replacing Tires

It is recommended that tires not be replaced until the tread reaches 2/32". Myth or Fact?

MYTH! AAA research found tire performance in wet weather deteriorates significantly at 4/32" and therefore, recommends consumers buy new tires when they reach this tread depth.

The bottom line: your tires are the only thing keeping your vehicle connected to the road. Tires that are worn past 4/32" will need additional stopping room, especially in wet conditions, and could put you at unnecessary risk for a crash.







Not All Automatic Transmissions Are Created Equal

If you are in the market for a new or used car, you probably want one with an automatic transmission. Compared to a manual, automatic transmissions are easier to use and particularly convenient in stopand-go traffic. If you have been out of the auto market for some time, you may not be aware that there are now several types of automatics in use, some with driving characteristics quite different than those to which you may be accustomed.

Understanding Common Transmission Types

Conventional automatic transmissions, which shift smoothly, but are heavy, complex and expensive to purchase and repair, are still the most common type. In the past, this type of transmission reduced fuel economy, but modern computercontrolled conventional automatics often provide better gas mileage than a manual transmis-



sion in the same car. They can also be programmed to shift much more quickly than in the past.

Continuously Variable Transmissions (CVTs) offer up to a 10 percent increase in fuel
economy by providing an infinitely
variable range of
gear ratios. When
a car with a CVT
accelerates, the
engine rpm rises
fairly high and
remains there while
the transmission

gear ratio is varied to increase vehicle speed. Many drivers do not like this, so some CVTs are programmed with gear ratio "steps" that simulate the operation of a conventional automatic.

of automatic, the dual-clutch transmission (DCT), is essentially two manual gearboxes operating in parallel. A DCT has two shafts, one for the odd-numbered gears and one for the even-numbered gears, each controlled by its own clutch. A computer uses several inputs to preselect gears and apply one clutch or the other as necessary. DCTs can shift very quickly and, like a CVT, offer up to a 10 percent improvement in fuel economy. A DCT automatic transmission also contains fewer and potentially more durable parts provided proper car maintenance is performed. DCT downsides can include abrupt clutch engagement when leaving a stop, and short delays in shifting when the needed gear is different than the one preselected.

The newest type

Test Transmission Types as You Shop

When shopping for your next vehicle, it's important to understand what type of automatic transmission it

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has and how it will change your driving experience. Then, take a thorough test drive where you can operate the car at various speeds, travel uphill and downhill, and rapidly accelerate and decelerate. If the transmission behavior is to your liking, great. If not, try out vehicles with other transmission types to find the one you like best. What might seem like a minor glitch on a test drive can turn into a major annoyance as time passes and the miles add up.

Regardless of your final automatic transmission choice, a friendly word of caution is in order. To avoid a premature visit to your repair shop, always use the brakes to hold the vehicle in position when stopped on an uphill grade; never use the throttle. Using the accelerator can overheat the transmission fluid and will cause accelerated (and expensive to repair) clutch wear in some CVT and all DCT transmissions.

For more in-depth information on automatic transmissions, click here to read a comprehensive AAA Automotive Technical Update on this topic.



RV-Winter Storage: Out Of Sight, Out Of Mind?

For most RVers, winter means putting our RVs into storage for several months, and in the upper Midwest, sometimes up to 6 months! Hopefully most of us take the typical precautions for winterizing such as adding antifreeze to the fresh water system, emptying out the water heater, and preparing for rodents! However, most RVers walk away from their stored rigs and think they can easily come back in the spring to bring them out of hibernation. Unfortunately, there are a few RV winter storage items that should be conducted throughout the maintenance process.

Batteries 12-Volt Deep Cycle House Batteries

12-Volt deep cycle batteries are designed to provide continuous power for interior lights, roof vents, and other appliance for an extended period of time. They will be discharged from a fully charged 12.6-Volts to

10.5-Volts and recharged repeatedly which is called a "cycle". These are different than automotive batteries which maintain a constant charge and are designed to provide a large amount of current for a short amount of time, or "Cold Cranking Amps" to start a vehicle.

Once the car is running, the alternator provides the power for the vehicle and the automotive battery just maintains its charge. Automotive batteries are not designed to be drained more than 20% of charge,

otherwise they will weaken and become defective. Deep cycle batteries typically have thicker plates and higher quality materials used such as paste, separators, and grids. The house battery or batteries are designed only for energy storage. There are four different types of 12-volt deep cycle batteries:

Lead Acid/Flood-

ed –These batteries are constructed with a hard plastic shell, lead plates, and an electrolyte fluid containing sulfuric acid and

water covering the plates which is referred to as "flooded".

As the energy is used, or the battery is discharged, lead sulfate crystals form on the lead plates. This condition is termed Sulfation and will limit the storage capacity of the plates. The lead acid battery needs a multi-stage or desulfation charge once a month that will break up the lead sulfate crystals on the plates, and then adds an equalizing and float charge. To get this

charge, you need a converter or battery charger that has this capability. Most converters are simply a charger that senses when the battery drops to 10.5-Volts and provides a 13.6-Volt charge until the battery reaches 12.6-Volts. This does not condition the batteries and they will become sulfated.

Most large (2000w+) inverters have this function, as well as larger solar panels with a controller. If your rig does not have this function, you will need to get a

different charger, or install a Battery Minder which applies a high impact wave initially to break up the lead sulfate crystals and condition the battery. If you do not have power available to your

rig in storage, you can get a Battery Minder with a solar panel, or remove the batteries and apply a multi-stage charger in your garage. If you do not have electricity and do have a multi-stage charger,







keeps the tires from weather checking, and keeps sealants from drying up. However, heavy winds and other environmental factors can wreak havoc with covers, and they should be inspected on a monthly basis to make sure they are not torn or coming off. A torn cover can flap in the wind and cause severe damage to the side or top of an RV as well as letting rain or snow to get under the tarp.

you will need to go to your rig once a month and start the generator or bring a portable generator to condition the batteries which might take several hours!

One more issue with lead acid bat-

teries. During the initial high voltage charge, the acid will actually boil and gas will emit from the vent holes which will deplete the acid in the battery. You will need to check and add distilled water once a month so the

fluid level does not get below the lead plates.

Gel Batteries –

The gel battery utilizes the same core construction with a gelling agent (usually fumed silica) added to the acid. This battery is totally sealed so it requires no fluid level maintenance, however it still can become sulfated and requires conditioning although much less than lead acid batteries. Therefore the Gel Battery does require the same multi-stage charging conditions as stated in the Lead Acid description above for units that are plugged into a 120-volt source, or not.

Absorbed Glass Mat (AGM) –

AGM batteries are

also sealed so there is no fluid maintenance and they are less prone to sulfation similar to the Gel, however not completely! AGM batteries were developed in the 1980's with a very fine fiberglass mat to absorb the sulfuric acid for the military and UPS to provide a spill proof and lighter battery that requires less maintenance and can be shipped without a hazardous material label. They can be layered with plates similar to the lead acid battery or can be "spun" in a circular manner. An AGM battery can sit in storage without a charge longer as they have less self-discharge in colder temperatures and only need a desulfation charge every six months.

Lithium Ion –

Since the late 1800's lead had been the primary component used for battery plates in lead acid, gel, and AGM batteries. Lithium was introduced as a storage component in electronics for cell phones, laptops and other devices but had some issues with combustion situations in the early phases. The new chemically engineered Lithium Ion batteries introduced to the RV market have

been proven win-

ners and provide extended battery power and limited maintenance. However they come at a higher price point.

Generator

If you have an onboard generator, it should be "exercised" every month which consists of running the generator under a 20 amp or more load for at least 30 minutes. This lubricates the seals and reduces varnish build up in the gasoline versions. This is a maintenance task that few RV owners do, therefore there are several cases of generators not performing well or not starting at all due to varnish build up.

RV Cover

A cover is a great idea if your rig is stored outside as it helps reduce harmful UV rays,

Other Inspection Tips

It's also a good idea to visually inspect the unit for water leaks, rodents, odors or anything else that may be unusual to prevent it from getting worse. Last winter a local owner had a squirrel chew through the cover vent and made a nest inside the roof air conditioner. During the winter it completely chewed up the foam insulation inside the roof air, and in the spring he fired up the AC and it blew white foam "snow" all over the inside!

Inspecting the rig for leaks and damage often may allow you to catch it early enough to fix or repair before it becomes major!

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2000 FORD EXPEDITION, \$3000, 160K miles. 1996 Suburu Legacy, 1 owner, less than 98K miles. 3500. 270-492-8614..

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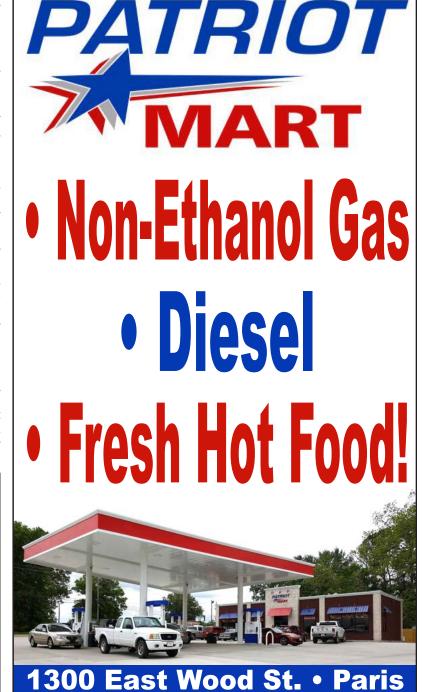
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