

Auto ELECTRICIAN'S handbook

*Recommendations of scientists
and some tips*

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Autoelectrics

Stable auto electrics - driving your car without problems!

Usually the work of an auto electrician takes place in car dealerships and technical centers, but there are also circumstances when this specialist has to go out on the road. This is the case with the so-called on-site technical assistance.

Car owners who are often out of town and are afraid that their car will break down at a distance from the repair shop or service station usually order such service. In this case, an on-site car electrician, who will not only determine the specific defect that caused the breakdown, but also eliminate it as soon as possible, can help them.

Useful tips about car electrics

Approaching the vehicle and opening it with the remote control of the central locking system, the owner immediately activates the electrical equipment. Then the key is inserted into the ignition switch or the car start button is pressed and all sensors, instruments, equipment is brought into readiness, because the electrical circuit of the car is filled with current.

It's the force that sets the vehicle in motion - the starter starts the engine, from which torque is transmitted to the gearbox which converts it into forward motion through the force which makes the drive shafts rotate and with them the wheels. This is why a good auto electrician is valued among motorists who understand modern automotive engineering.

Machine equipment and auto electrician

The battery pack (battery) and the alternator are the constant contributors to moving the vehicle in space and providing a comfortable driving environment for the driver and passengers.

These two elements are the main providers of driving electric power. The rest of the electrical equipment is supplied with electricity from these elements, i.e. the condition of the car primarily depends on the condition of the battery, the generator and the starter. After all, the electrics of a modern vehicle have important functions:

1. **Lighting.** Lights, warning lights, interior and dashboard illumination in dark surroundings;
2. **Diagnostics.** Collecting, analyzing incoming signals, processing parameters, comparing them with optimal data and outputting the information to the dashboard, computer display. To carry out on-site diagnostics for this purpose it is sufficient to carry out
3. **Comfort.** Climate control, electric seat adjustments, controls, heating functions for individual elements, multimedia devices;
4. **Adjustment.** Adjustment of working parameters of units, units of the vehicle with the help of the control unit, on-board computer of the machine;
5. **Safety.** Almost all passive and active safety systems are connected to sensors, which transmit data to the control unit, and it, in turn, processes the information and gives commands to the devices. For example, the airbag of the car opens depending on the impact force, its filling with gas also depends directly in proportion to the force applied in the contact patch;
6. **Optional.** Some cars are fitted with equipment to improve comfort and increase the economy of the vehicle. For example, the gas equipment. Its proper operation depends on the correct installation of the equipment in the electrical system of the car.

Situations when an auto electrician is needed

Many machines equipped with a huge bouquet of modern equipment when any element of the electrical circuit fails, prefer to stop, because further movement to bypass the breakdown can cause damage to expensive equipment. In such cases, an on-site auto electrician will help figure out the reason for the stop and put the vehicle in motion.

Other manufacturers allow cars to be operated with malfunctioning electrical circuit components, but emergency lights will be lit on the dashboard in front of the driver, signaling a malfunction in the system. It is not only unsafe for the driver and passengers of a particular vehicle to operate a defective vehicle, but also for surrounding road users.

It is problematic for a motorist without experience in repairing electrical equipment, diagnostics and special tools to understand the cause of the problem on the spot. It is quite costly to take your car to the service station in terms of time and finances, so calling an electrician is a popular service. A specialist arrives with the

equipment and tools necessary for a particular case. Individual approach provides a solution to the problem in a short time and with minimal material costs.

An auto electrician with an on-site visit to the vehicle, after getting acquainted with the breakdown described by the owner, prepares tools, spare parts that are suitable for the described symptoms. Therefore, qualified employees are able to repair or replace the failed elements, equipment, devices on the spot.

Consequences of lock defroster

Among the winter troubles of motorists, the second on the scale of troubles, after problems with starting the engine, is the freezing of the door lock. If it was slushy yesterday and minus 20 in the morning, it is very difficult to open the door. Sometimes neither repeated pressing the button on the alarm key fob, nor attempts to turn the key by hand help. You have to resort to special means. What are they?

First of all, to the folk ones. The easiest way to defrost a lock is to heat a key over a lighter flame and then try to insert and turn it lightning fast. Not at the first attempt, but it may work. The second option is to pour something non-freezing, say, antifreeze, windshield washer fluid or "brake fluid" into the lock latch. But if to take into account, that these supplies are in a trunk of the closed automobile, it is necessary to run to the nearest store - for vodka. With its help, the door is sure to open, if you manage to pour a few drops into the lock.

I am amused by the naivety of the recipe, for a long time promoted on TV commercials for electric kettles: splash boiling water on the door, and, they say, the interior will thaw. Well, firstly, for boiling kettle one should run to the apartment, then take it back; secondly, the varnish layer of car door would hardly withstand such momentary temperature difference; well, thirdly, even if it is possible, the next opening in a frost is also impossible: the water, and its additional portion would freeze in the lock again, now thoroughly. Both lighter and ash will hardly help here. There is one more way - "man's" way. True, its application bears the costs of previous one - in that part that "it will freeze again". You can just piss on the door around the lock and if the desire to pee in this case was great, ie pouring continued for 10-15 seconds, reception simply guarantees the unlocking (tested!).

Avoid amateurish, often simply unaesthetic means of defrosting the car door lock, special means will help. They are produced by both foreign and domestic industry, represented by so many brands that just can not be counted. Mostly in the form of spray cans. So as not to advertise each name, let's take the composition of

the liquid as a criterion for selection. Let's say right away: many foreign-made products do not have Russian text, we will have to decipher the Latin alphabet.

Numerous tests are available on the Internet on the effectiveness of aerosols for defrosting car door locks. The choice is up to the consumer. Some are better, some are worse, and some are no good at all. Firstly, one mustn't buy any defroster which includes methyl alcohol (methanol), though it gives the fastest defrosting effect. But liquids containing it are forbidden for sale in Russia-just remember a series of lethal relapses on New Year's Eve or the mass poisoning of Russian women in Turkey about five years ago.

So, the most effective "defrosting" sprays were those based on isopropanol (isopropyl alcohol), possibly with the addition of ethylene glycol. Both are moderately hazardous substances, that is, if you do not sniff or lick, no harm to the body. Additives in the form of white spirit, acetone and propylene are good for fluffing up, but increase the rate of corrosion of iron. Oils also have side effects.

On the one hand, adding oils to the compositions is a definite plus, since in addition to defrosting effect the compositions with their presence bear the function of lubrication of rubbing parts of the lock and its actuators. On the other hand, the speed of defrosting is considerably reduced (in alcoholic compositions it is not more than fifteen minutes, while the line on the label of the canister "lubricant for locks with defrosting additive" should prepare the owner to wait for an hour or more). That is, it makes sense to use oil-containing compositions as a prophylactic against freezing: to inject them somewhere in the late autumn and repeat the procedure once or twice a month throughout the winter.

What else you should pay attention to is the volume and shape of the bottle, as well as the configuration of the spray nozzle. The first indicator is from 20 to 400 ml, which means that not every bottle can be carried in your pocket all the time. As for the atomizer, there is also a lot to choose from. The stream of sprayer can be wide, up to 120 degrees, and can be directed narrow, exactly under the opening of the lock latch. The second option is used just for emergency defrosting. Telling the truth, there are not many variants of such kind on store shelves. More often spray cans are equipped with a pipe, put on a nozzle. It is attached to a container with a scotch tape. That is, after the first use of aerosol, the narrow tube is most often lost forever. When buying, you should pay attention not only to the shape, size of the can, its contents and construction of the sprayer, but also to the tightness of the packaging, especially the caps-caps.

And finally, the most advanced option for quick defrosting of the car door lock is electric. Trinkets with "antiwinter" function are simple devices in the form of pocket retractor with a retractable blade, which can be worn on the keychain. In this case, the blade is a stylus, which can penetrate into the slot of the lock latch.

When extending out of the key fob it is quickly heated to a temperature of 100-150 degrees, it is inserted into the lock, and the defrosting effect occurs in a couple of seconds. It is also convenient in that the key fob is equipped with podsvetkoy. LED light turns on automatically when the probe is pulled out of the case. The disadvantages include the danger of injury, if the key fob gets to children, high power consumption (ie, the built-in charge "little" battery lasts for 2-3 start), and the risk that the thickness of the dipstick does not fit the groove of the lock your car. And this happens often.

Malfunctions of car electrics, caused by rodents

With the onset of cold weather, there is a lot of extra hassle in a motorist's life. Even if you have made every effort to prepare your car perfectly for the winter season, you may suddenly find yourself in danger. The reason of unexpected troubles may become small rodents that took a fancy to the engine compartment of your "iron friend", finding there a long-term source of warmth and a place for comfortable night shelter.

If only it was limited to sleeping and eating, which the rodents persistently drag under the hood. But any experienced car electrician has a lot of stories about how much damage these uninvited guests can do to the car. Still not found a logical explanation of the fact why rats and mice are so fond of chewing drive belts, pipes, rubber hoses and have a special interest in the insulation materials of electrical wiring. It is the car electrics of your car that are at higher risk.

What is the risk of rodent damage to wiring?

It is worth making it a rule to check the engine compartment regularly before driving, especially after a long period of parking. Otherwise, you will be reminded of the visits of small pests:

- Alarm failure
- Sudden failure of main sensors
- Failure of devices and units that are elements of electrical circuits
- Fire due to a short circuit in electrical wiring

All of these troubles can most often be avoided by regularly looking under the hood of your own car.

Auto electrics do not tolerate fuss.

If you unexpectedly have problems with the car's electrical system, and after looking under the hood, you found traces of rodents (food remains, excrement, etc.) - do not try to find and fix the problem yourself, especially if you do not have the appropriate skills and professional equipment for testing the electrical wiring. It's also dangerous to start driving a malfunctioning car toward the nearest service station. As the engine heats up, there may be a risk of shorting and sudden wiring fires.

In such a situation, only a professional auto electrician can provide qualified assistance.

First, the damage can be in hard-to-reach places and their detection will be an impossible task for a layman.

Second, rodents are pack animals and most likely acted collectively. And this can mean that there will be several damages. Only an experienced specialist will be able to detect all problem areas at once.

Thirdly, - it is not enough to detect a problem, it must be immediately eliminated, and this is only possible with certain skills, professional tools, as well as a set of necessary spare parts and materials.

Services of an auto electrician with an on-site visit to the site of the breakdown involves a comprehensive approach to solving the problems encountered. In this case, it is best to trust the professionals.

We all, unfortunately, know what can be the consequences of negligent treatment of faulty auto electrics!

How to protect your car from the "gray scourge"?

Universal means to protect your car from the teeth of the tailed pests, unfortunately, does not exist. Advertised ultrasonic repellents are not a panacea, although they help in some cases.

Trying to poison rats and mice is not worth it - you will spend a lot of time looking for dead animals in the bowels of the engine or condemn yourself to the presence of unpleasant odor.

Folk remedies in the form of pepper, garlic, hair of dogs or cats left under the hood will only make the tailed breed laugh. Mice and rats are practically omnivores, and they enjoy using animal hair to create nests.

Under-hood chemicals also do not provide a 100% guarantee.

The only sensible solution is not to leave the car for a long time in the vicinity of rodent habitats (basements, garbage cans, littered outbuildings) and to inspect the engine compartment as often as possible.

Car Diagnostics

Car owners resort to diagnostics by specialists in two cases: if the terms of maintenance (stipulated in the instruction manual) have come up or if the driver felt discomfort while driving (extraneous sounds, inadequate reaction to the steering wheel, instability of engine operation, increased fuel consumption, etc.). When visiting a service station, not only specialists, but also the owner of the car should know about the algorithm of actions of the mechanic, electrician and locksmith.

The first and main object of diagnostics, of course, is the engine. In the era of carburetors, it was possible to adjust its stable operation independently, having elementary knowledge and locksmith skills. Today's systems with electronic fuel injection require the intervention of "specially trained people" and sophisticated equipment in the form of test scanners, computers, gas analyzers. But still the first step is up to the owner.

This means washing the engine and the entire underhood before diagnostic procedures, so you can determine the condition of electrical wiring and contacts, clamps, as well as the absence of microleaks in the engine cooling system and fuel supply. It would seem, what is easier - to wash. But in practice, the wrong choice of washing method (dry steam, water with shampoos, method of "auto-cosmetic", etc.) can lead to problems with immediate engine start, in the worst case - to premature wear of electronic stuffing. It is worth paying special attention. But this is a separate topic.

Electrical diagnostics

After driving the car to the service station, it is necessary to control at least four actions of the personnel who diagnose the engine. The electronically checks the conformity of the control unit performance (its operability is also tested) with the normative parameters of a particular brand and type of engine. Based on the results of the tests, the optimal "surgical" intervention scheme is worked out.

Minor parameter deviations can be corrected immediately, by entering corrections into the memory of electronic "brains". The car electrician should also test the whole power supply chain of the units - current consumers. Electronic diagnostics should be performed after there is no doubt in the absence of mechanical influences, which can affect the engine operation. That is, the procedure of electronic

testing is preceded by checking the condition of the air filter, spark plugs, compression in the cylinders, oil pressure.

It happens that, getting into the car in the morning, you can not start it, and if started, the engine is unstable, the check engine light is lit on the panel. Yellow - you can move (carefully, watching the instrument readings), but if you perfectionist and reinsurer, it makes sense to call the service field diagnosis car. As a rule, the waiting time is not more than 20 minutes. If the driver is not friendly with the car, they will come in handy.

First of all, to start the car if it has been left unattended all night with the lights on and the battery power is not enough even to excite the voltage in the network. However, the field car electrician, equipped with portable devices for computer diagnostics, is able to determine such "defects" as a failure in any of the electrical circuits, the presence of problems in the generator, starter, fuel pump and other failures. Most often they are eliminated on the spot - or by introducing amendments to the control unit, or by alternative inventions of the same auto electrician (by experience: these people are masters of all hands).

Self-diagnosis of the car is possible, but only in the absence of two problems: the wrong hands grow from there and the lack of electronic software. If with the first condition everything is clear, then the second requires clarification. To determine the source of engine malfunction the Internet is required. That is, the availability of gadgets capable of downloading the necessary information: Software for maintenance of the electronics of a particular engine, decoding of possible errors and other data. There are inexpensive PC adapters for sale, which have downloaded the parameters of the engines of almost all popular car brands with instructions for the user (such as VAG-COM, OPCOM, "Tom diagnostician").

In domestic cars, even "Tom diagnostician" may not help. In our models, the Internet recommends looking for the root cause of the failure "by noises". There is a simple tool for such diagnostics - a wooden stick, a kind of stethoscope. It is attached with one side to the suspicious unit (cylinder block, pump, alternator, etc.), and with the other side to the ear. Rattling, tapping and other extraneous sounds will help determine the source of the problem.

Car computer diagnostics

With the scheme "PC plus adapter" everything is a bit more complicated: exchange of information between the gadget and control unit takes place with the help of electronic protocol, which is individual for each car manufacturer. Then it is necessary to ensure compatibility of your and on-board car computer, trace downloaded information, decode errors (and they are received on the monitor in the digitized form)... In a word, it is not so easy to understand.

What is more reliable the carburetor or the injector

For more than a year there has been a debate as to which fuel system is more efficient. Nowadays, there are cars on sale that have both the first and the second type of engine, and as for their cost, it is also about the same. Therefore, let's try to look at this question in more detail and answer it.

History of Creation

The most popular carburetor systems, under the name ICE, were obtained back in the last century. The device itself, acts as a node, which is responsible for preparing fuel with the necessary composition, mixing fuel with air in the required consistency. The working mixture, which is dosed by the carburetor, is sucked into the combustion chamber thanks to pressure. If we talk about the algorithm of work, it is quite simple. This method was used absolutely in all branches of mechanical engineering of the last century, and was also used in aviation. This apparatus demonstrated high performance and level of reliability performance. But already in the 70s of the last century, the popularity of such systems begins to fade, and at the beginning of the 21st century, almost all concerns stopped producing cars using this device.

If we talk about the injector engines, they conquered automotive production in the 80s. If we talk about technology, then here gasoline is injected into the intake manifold or directly into the combustion chamber. The injection itself is due to the injector, which is also known as the injector (derived from the English name injector). To date, direct and distributed injection is often used. In its work, this system is guided by such sensors as:

Detonation sensor; Mass air flow sensor; Crankshaft position sensor; Throttle position sensor; Inlet air temperature sensor; On-board voltage sensor; Vehicle speed sensor; Others.

Experts believe that the injector, is a more reliable system, in the case if the fueling is carried out with quality fuel. As you understand, this device acts as a more advanced model compared to carburetors. At the same time, there is also a certain catch. This is due to the fact that. The more parts and components in the device, the greater the probability of breakdowns.

Peculiarities of operation of the injector engine

But still, given the good quality of gasoline, the injector engine will be much more efficient and reliable. For example, in this type of engine we can find an electronic control unit, which independently performs the tracking of the spark formation moments. This indicator greatly reduces the risk associated with the possibility of valve warming, which can be caused by late ignition and high-octane gasoline. There is also a Lambda sensor, which is responsible for the accuracy of the fuel composition. That's why, when this type of engine works, there is much less sediment and fouling in the chamber. At the same time, the tendency associated with detonation from low-quality fuel is also suppressed, due to which the pistons and baffles formed between the rings can be resolved.

Features of carburetor operation

As for the carburetor engines, they are much less responsive to changes in wheel load, due to which, the fuel consumption increases. If we talk about the device of this type of engine, it is much simpler, due to which and the proportions are prepared quite approximately. Here we will also feel the lack of stability in the work, because this type of engine always prepares the same proportion, regardless of changes in the environment. Also this type of engine is much less responsive to the way the load on the wheels changes during the drive.

All this, caused by the fact that the carburetor settings have a static nature and they should be adjusted manually. On the other hand, this moment, gives an opportunity to do tuning. Thus, an auto electrician can pour special firmware into the ECU, which will tweak the system settings, emphasizing their work on greater dynamism.

If we talk about why the world community still completely abandoned the carbureted engines, then the answer is quite simple. This was due to the fact that there were introduced stricter measures on the toxicity of engines. Thus, the injectors are much more environmentally friendly, and are able to keep the exhaust within the limits specified by law. And the carburetor was able to meet only the Euro-1 standard, and further suffered a crushing defeat.

Based on all of this, we can see that experts believe that injector-type engines are more profitable and reliable solution, although we can find its positive features in the carburetor engine.

Estimating the real mileage of the car

When buying a vehicle, every buyer is interested in knowing the true mileage of the car. This indicator directly indicates how soon the new owner of the car will need to repair or restore the vehicle.

Of course, when buying a car, you should not only evaluate all of its technical characteristics, but also carefully inspect the interior and the body for defects and damage, as well as the condition of the odometer. Unscrupulous sellers can twist the odometer to sell their car more profitably. That is why it is so important to have the vehicle diagnosed by a car electrician with extensive experience, who will be able to determine if the seller is hiding any information about the car from you.

Cars with mechanical odometer

If the car is equipped with a mechanical odometer, the buyer should be especially careful, because on such devices it is easy enough to twist the data on the mileage. An experienced field car electrician will be able to quickly understand the principle of operation of the device, the features of the dashboard and what is under it.

Cars with electronic odometer

As for a car with an installed electronic variation of the device, it is quite problematic to make a correction of the mileage information. But if the seller is very eager to sell his "steel horse" at a higher price, he can hire a professional, and a qualified car electrician will be able to understand the peculiarities of the design of this device and correct the real data of the meter.

Evaluation of secondary signs of wear

Buyers of a used vehicle should pay attention to the presence of secondary signs of auto wear and tear. The evaluation should be made carefully, not missing the slightest detail. If the owner of the car was able to hide from you the real indicators of the odometer, the appearance of the car and the condition of its parts will still give away deception.

First, you should pay attention to the condition of the interior of the car and its body, to determine whether the results of the inspection correspond to the information on the mileage. If the components are heavily worn, and the meter readings are small, then the twist is obvious.

The next step is the under-hood inspection of the vehicle. Be sure to inspect the belt of the device that distributes the gases. In most car models, this belt should be replaced every 100,000 km. In case it has a worn look, and the mileage is

indicated 120000 km, it is likely that the real indicators are more than 200000 km. Also the data on the number of oil changes indicates the true distance traveled.

Generators

Generators are indispensable away from power lines to create the usual comfortable living conditions. They provide power for household appliances, gardening equipment, and construction equipment. In automobiles, generators turn the torque of the engine shaft into direct current for the ignition system and the operation of all appliances, including lights and the onboard computer.

Generator design and application

On the car generator is not much different from the domestic and industrial generator. The main components are:

- Engine;
- The shaft that transmits the torque;
- Rotor with an excitation winding;
- The stator, in which current is generated;
- Rectifiers, diodes, voltage regulators.

The excitation on the winding is turned on by the starter when the ignition key is turned. The rotor creates a magnetic field which penetrates the stator. Between the plates of the fixed part there is a wire, on which the alternating current is generated. Depending on the design - the number of windings, two- or three-phase.

Alternator malfunctions can be electrical or mechanical. A locksmith or electrician with a subspecialty will not be able to properly diagnose and determine the cause of abnormal operation. Do not disassemble a complex mechanism on your own. You can break the electrical insulation, cooling system, hermetic sealing and create conditions for serious breakdowns.

The wiring diagram of rectifiers, stabilizers, current converters depends on the characteristics of the power consumption sources. The quality depends on the type of motor.

Stationary and portable power plants – alternators

To supply electricity to construction equipment, farms, orchards and construction sites, stationary and portable generator:

- Diesel;

- Gasoline;
- Inverter.

The structure of the generator - power plant is similar to an automobile generator. There are a few differences:

- At the output you get alternating current;
- The body of the generator has sockets for connecting consumers of electricity;
- A complex electrical circuit.

Portable models are repaired in the workshop. Stationary gensets are serviced by a field car electrician at the site of installation. Generator repair and maintenance firms get their parts from the manufacturers all the time. Replacing parts with similar parts made on the same assembly line ensures long life of the equipment.

Before starting the repair, a specialist determines the type and cause of the generator malfunction and tells the customer what work needs to be done. The repair of minor defects is carried out on site. Serious breakdowns require special equipment and stands available in the workshop.

Diesel generators are the most durable

Diesel models are used to permanently supply a building or construction site with electricity. They are massive and heavy. Noise and vibration level is higher, if compared with gasoline models. The output current sine wave is unstable. The design of the generator with a two-stroke engine allows it to work without stopping for several days.

Inverter models give a stable current

Inverter generators are complex models of gasoline generators. They have a circuit with diode equalization of three-phase current. The operation of the engine is regulated by the load of the consumers. Malfunctions of the generator are often connected with a complex system of automatics. It prevents serious damage by shutting down the unit.

Starters

The starter is one of the most important and active parts of your car. If it fails, you simply won't be able to start your car's engine. Therefore, it is important to monitor the precise operation of all components of the starter and to take timely measures for troubleshooting.

The starter is a small DC motor. So what can happen there that makes our car not want to start?

The main causes of starter failure are:

- Damage to electronics.

The starter does not crank fast enough or has stopped cranking at all. In this case you need to check the whole chain of wires and contacts from the battery to the starter. Simple procedures can solve your problems, for this you will have to inspect all contacts, carefully clean and tighten the terminals.

- Mechanical damage to parts of the starter.

If no external damage is detected, then the cause should be sought in the starter itself. To do this, you will have to disassemble it and carefully inspect all components. The main factors causing the failure include: failure of the retractor relay, brushes not sufficiently in contact with the collector, the armature collector is worn out.

If the starter cranks, but you can't start the engine, the following reasons are possible: the release lever is broken or loose from the axle, the clutch is slipping, or the buffer spring is not fulfilling its function. When you hear an atypical sound or rattle when you turn on the ignition, this tells you about the following faults: flywheel teeth are worn, starter mounting bolts are loose, armature is rubbing the stator housing.

Malfunctions can occur not only when the engine is started, but also when it is already running. It is a variant in which the starter does not stop working and continues to crank.

Why does this happen:

- Traction relay jammed
- The contacts on the relay are stuck
- Drive lever jammed
- Worn out ignition cutoff spring or slack clutch

In such a situation, you should immediately disconnect the starter terminal, and then conduct an inspection to detect malfunctions. Theoretically, the life of the starter varies from 70 to 200 thousand kilometers. If you have not yet encountered the problems listed above, but the starter does not behave as it should, it is worth paying attention to it and understanding why this is happening.

What symptoms will help you diagnose future breakdowns, and avoid serious problems:

- The starter does not seize immediately and starts to rotate only after 2-3 turns of the key. This indicates burned contacts.
- The rocker arm is not engaging as well as the flywheel ring. This indicates wear of the gear teeth.
- Battery is normal, but rotor is starting to spin hard. This tells us that the bearing needs to be changed or the brushes are worn.

Analyzing the above, let us repeat the main idea that the starter is one of the most important parts of the car, and on its clear operation depends the start of the engine. This means that it is necessary to closely monitor its functionality and take timely action when malfunctions are suspected.

Choice of fuses for your car

Purpose and principle of operation

One of the simplest but very important parts of a car is a fuse. They protect the electrical systems of the car from failure in the event of an abnormal situation. Stable operation of mechanisms and controlling electronic systems, health and life of people depend on them (in case of fire in case of use of non-standard and low-quality products or incompetent repair).

A blown fuse is the first sign of trouble in the circuit in question. This can occur intermittently or dramatically (the fuse fails after replacement). The protective function is that the failure of the fuse must occur in time, before irreversible changes occur in the elements of the circuit to be protected.

Design and layout

The simplest versions in a plastic transparent housing may be flat, consisting of two conductive contacts connected by a fusible link. The maximum amperage

value is printed on one side and duplicated with the color of the housing. A thin strip of fusible metal is used as the basic element. It is inserted into spring contacts grouped in separate enclosed boxes, protected from moisture, dust and located in easily accessible places. Options for placement under the hood, in the car interior, taking into account the minimum number of wires involved.

Quality Choices

All circuits are divided into groups according to their overcurrent value and their purpose for protection:

- Powerful vital systems (starter, alternator, ignition system, cigarette lighter heater, etc.);
- Power supply for service mechanisms (wipers, power windows, exterior lights, direction indicators, signaling devices);
- Secondary electronic devices, comfort elements that do not affect the main functions of the car.

There are quite a lot of offers from different manufacturers, but it is quite difficult for the average consumer to determine the quality. It is necessary to focus on the presence of maximum information on the label and the appearance (presence of a chamfer on the contact plates for easy installation, external contacts for easy determination of the voltage drop). Only an automobile electrician, experienced in the use of various types of fuses and control devices, can determine the quality of the product.

Replacing fuses

Replacement is not difficult for a driver who knows where the safety unit is located. One obstacle may be a solid manicure, although its owner is unlikely to imagine the location of such devices. In this case, the problem can be solved by a field car electrician. Having the necessary tools and instruments, he will detect at the first signs and timely prevent possible serious consequences.

To work on your own, it is necessary to have a spare kit and to adhere to the two main rules:

- Do not install fuses of inadequate capacity;
- Do not use auxiliary materials.

The replacement algorithm is quite simple:

1. Identification of a faulty circuit.
2. Find the corresponding contact in the unit using the diagram on the back of the box cover.
3. Inspection of the removed fuse.
4. In case of malfunction (blown fuse) - replacement with a similar one.
5. Verification of electrical equipment operability.

Short circuit of electrical wiring and appliances in the machine

Electric current flows through the wires like blood through blood vessels, supplying the organs of the vehicle with life-giving energy. Just as in the case of the human body, internal or external damage to a blood artery has unfortunate consequences, so too do violations of the integrity of wires and their contacts threaten severe disease of electrical circuits, devices, equipment and the vehicle as a whole.

The first symptom that a shorted electrical wiring in a car shows is the frequent blowing of the fuse element of the fuse. The owner actively replaces blown light bulbs, fuses, relays that fail with frightening frequency. Often motorists who face such a tragedy spend the same amount of money per month on electrical elements as the cost of filling the car with fuel, but the idea to contact an auto electrician does not arise.

The logical result of such operation of the vehicle will be a visit to the service center, because the short circuit, manifested in this way, replacement of fusible elements is not repairable. It continues moving on wires and devices, heating up, melting the insulation, plastic. As a rule, the result of such exploitation is in the best case the breakdown of the electric equipment because of the short circuit of the electric devices in the car and expensive repair, and in the worst case - inflammation of the wiring and fire. According to numerous eyewitness accounts, a car burns down within 7 minutes before the paint on the body of what used to be called a car is completely burnt out.

Without diagnostics, there is no complete package

It is extremely difficult in some cases to independently detect a short circuit in the car's wiring without the necessary tools and experience. Specialists insist on full vehicle diagnostics to have a complete picture of the breakdown:

1. The source of malfunction. Its elimination is paramount. This prevents recurrences;
2. Spread throughout the vehicle. It is necessary to check the integrity of the elements and the operability of all devices hit by the malfunction. For modern mechanisms it is very relevant, because almost all elements are interconnected and unstable operation of one of them brings imbalance in the whole system;
3. The feasibility of repairing a particular device, section of circuit. It is not uncommon to find that it is more efficient to replace than to repair. It can also be argued that the opposite is also possible;
4. Upon completion of the repair field car electrician carries out diagnostics to assess the result and guarantee a positive result in further operation.

Electrical short circuits in a car can occur at any time. Up to the most inappropriate situations, when the car is moving at high speed in the middle of the steppe, where there is not a single living soul and it is dark. Melting of the wiring is accompanied by the emission of acrid smoke. Its appearance indicates the high temperature in the wires and the danger of the beginning of fire. In such a situation, you should act promptly and according to the tried-and-true scheme:

1. Stop the vehicle as close to the curb as possible, turn off the engine, turn off all appliances;
2. Open the door, take the fire extinguisher in your hands. If you have managed before ignition, you must pull the hood lever and remove the terminals from the battery;

Replacement of ignition locks, contact groups and their repair

It seems that there is no easier operation than starting a car engine. After all, it does not take much - turn the key and the heart of the car will hum, start vibrating, thereby enabling the driver to move forward. But there are times when everything goes wrong, when after turning the key in the ignition switch nothing happens in the propulsion system, nothing at all. In most cases, this is caused by malfunctions in the ignition system.

Breakdown options



Of course, there can be a large number of options for ignition switch failure. The most common are malfunctions, the main cause of which is related to the contacts - they oxidize or melt. This usually occurs as a result of a sudden voltage drop, and this is simply unavoidable at the moment when the engine is started. When the heart of the car starts up, the temperature of the electrical wire rises. As a consequence, gradually, time after time, year after year, the insulating part gradually burns out.

In this situation, replacing the ignition locks is not necessary, and it all comes down to replacing the contact group. Which is more attractive on a budget. Important point! If you do not want to make a replacement, and this kind of problem has arisen for the first time, you can simply clean the contacts. At first this will be quite enough, and not only an experienced auto electrician, but also an ordinary motorist can cope with this kind of work.

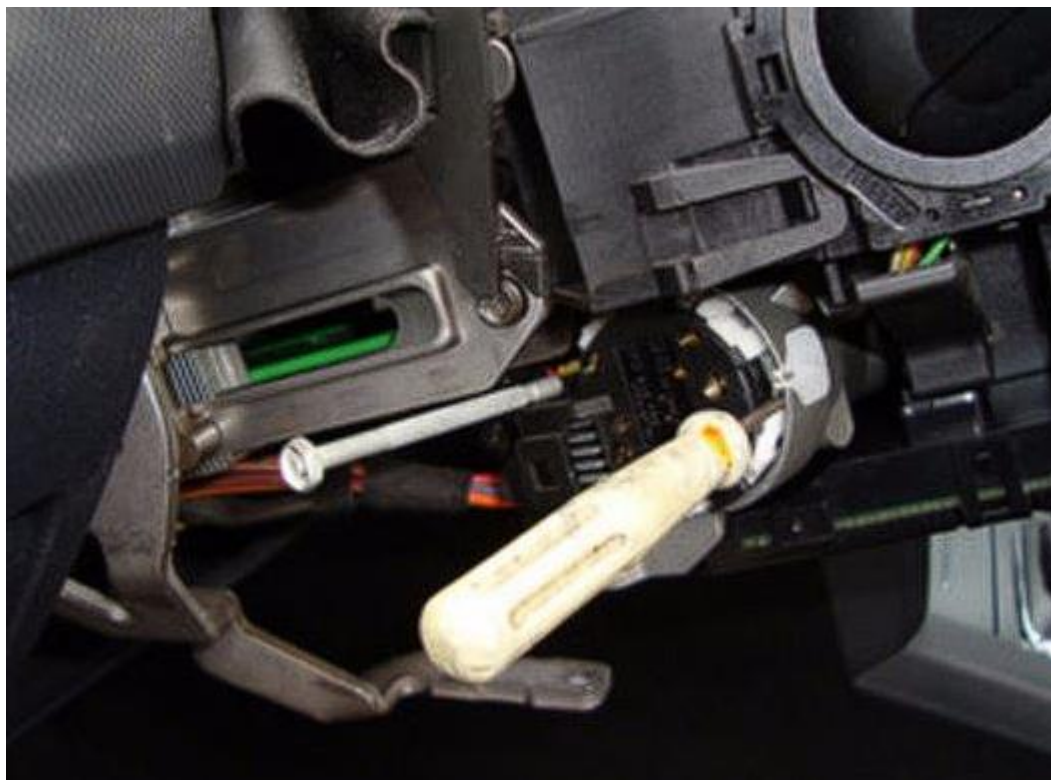
Contact group - typical faults

In general, the repair of contact groups and their faults (basic) can be varied. Before we dwell on them in detail, it is necessary to understand the contact group itself. Its main task is to connect the necessary electrical consumers. The most important sign that the contact group is faulty is the simultaneous failure of a group of electrical devices. This is due to the fact that each individual contact within the group has power to several consumers simultaneously. For example, activation of turn signals, reversing lights, high beam and dipped beam is possible only if ignition switch is on.

It is for this reason that as a result of a malfunction of even one contact, which passes through to other power consumers, all of the above devices will "stop" working. There are cases when several devices stop working at the same time, and often seemingly unrelated to each other. When such a situation arises, the cause is a problem with the contact group. Very often the problems are so serious that it is necessary to

Another "weak link" is the fuse box. The fact is that several consumers are connected to each of its sockets at once. Therefore, malfunctions in the block can also become the reason of failure of several systems at once. By the way, it can be done independently, if you have the knowledge, skills and experience. In the absence of such, it is better to call a field car electrician.

In addition, this assembly may have damage that will be mechanical in nature. Many motorists are confronted with the situation when turning the key is accompanied by various difficulties. For example, the key jams, it slips, it is difficult to insert or remove. When this kind of problem occurs, the main cause is a malfunction of the lock cylinder itself. The lock cylinder can break for a variety of reasons, e.g. as a result of dirt, dust, factory defects, etc.



It is not uncommon for other unpleasant situations to arise. For example, car owners lose their last keys, or their cars are tried to be stolen, as a result of which the lock becomes unusable. Such problems always entail the need to replace the

ignition lock. It is very difficult to do this kind of work by yourself, especially if you do not have the skills.

Repair of electric radiator cooling fans and heater

Every modern car is equipped with a heating and ventilation system. Thanks to combined air conditioning and heating mechanisms, motorists and passengers do not depend on the temperature conditions outside the car. The trip is always comfortable.

The **repair of electric fans** and similar breakdowns will be repaired by an experienced technician. Due to the mobility of the company, the worker will be able to reach the customer in a short time and fix the problem. The first thing to check is the fan terminals. If the voltage is unstable, then the wiring sensor, control unit or the integrity of the wiring is damaged. The car owner must immediately sound the alarm when the engine "boils" (overheats), otherwise large-scale problems cannot be avoided.

Diagnostic and repair work for an auto electrician of a proven firm is not a problem:

- flushing the heater radiators;
- flushing of cooling systems;
- troubleshooting or complete replacement of fans;
- replacing furnace radiators and more.

Radiator cooling repair is a frequently rendered service of automotive service, so the restoration steps and parts replacement process are brought to perfection. During the restoration work, the customer receives a number of useful tips on the proper operation of "capricious" devices.

Internal parts of the vented and heating system:

- filter to clean the air coming in from the outside;
- deflectors;
- air ducts;
- heater and heater fans.

In modern models of transport, specialists know all about the repair of electric radiator cooling motors. This type of restoration activities is labor-intensive. Electric fans work in extreme complexity: moisture, dust, temperature fluctuations can not but have a detrimental effect on the work of the entire system. In the latest cars, the

engine cooling device and air conditioner are served by only one fan. Such load will sooner or later make itself felt. Car manufacturers consciously make such design decisions to reduce the total production cost.

Repairing electric fans through a reputable firm is always relevant. A complete replacement of the air intake system is quite expensive, so customers ask the auto electrician to fight to extend the life of the former factory parts.

The operation of the electromagnetic clutch. The air intake system is improving every time. In the past, the air intake mechanism took too much power from the engine due to the constant operation. This has been replaced by viscous thermocouplings, which have a more rigid meshing as the motor heats up (when the motor operation is reduced, the impeller speed slackens, the stiffness decreases). Such mode of functioning is sparing the "heart" of the car.

The electromagnetic clutch works from the thermal sensor. The mechanism has a shock activation, which is a disadvantage. Therefore, this detail is used only in a number of foreign car models. It is worth taking into account that the employees of a well-known car service are aware of.

Wiper mechanism repair

For safety in any car journeys it is important to have a good overview. And not the least role in this is played by wipers, or rather their proper operation. For this purpose, it is worth timely preventive maintenance and cleaning of the wiper mechanism. But if so happened that the wipers failed, you can try to fix the problem yourself. But not every motorist has such skills, a qualified specialist - auto electrician will help in this situation.

The design of the wiper mechanism.

The modern windshield cleaning system was invented in 1903, and many different designs have been invented since then. But the "tandem" scheme, which is more practical and effective, has gained great popularity among car manufacturers. The structure of the wipers uses a generally accepted technology:

- An electric motor connected to the gearbox is responsible for a more precise movement of the wipers,
- The trapezium, through a system of levers, creates a reciprocating movement, and regulates the synchronization of the brushes.

- Operation mode controls the wiper relay, which is controlled by the steering wheel switch or on-board computer. And if the car is equipped with a rain sensor, it is possible to adjust the wipers automatically.

- Replaceable in the design of any wipers are only brushes, which is attached to the lever latch. The adapter can be a fixed part of the wiper blade, as well as a separate one. For greater efficiency in the operation of the wiper, it is necessary that the wiper blades are pressed against the glass with a certain amount of force. Proper adjustment of the wiper blades when replacing the wiper blades fulfills this function.

The wiper system can also be vacuum or mechanical. They are usually used to control the rear windshield wiper.

Whether the wiper mechanism is easy or difficult to repair.

Initially, it is worth checking whether the fuse is burned out, because very often the wipers refuse to function because of this. If all is well, use a tester to test all contacts, thereby eliminating the possibility of breaks in the power supply of the wiper mechanism.

You are lucky if the cause of the failure can be eliminated by simply replacing the wipers or the fuse. But as practice shows, the repair of the wiper mechanism is not an easy task. Only a qualified auto electrician can deal with a serious problem. This applies to repair or complete replacement of the trapezium, or the rear windshield wiper as a whole. The specialists of our company will help to cope with problems of varying complexity, to fix the wipers with any system of drive, providing a quality repair service and fast.

There are many reasons why the windshield or rear window cleaning system does not work properly, and only a competent auto electrician can help you to eliminate them. We will tell you about it in more detail:

1. The appearance of longitudinal streaks on the glass indicates that dirt has got under the wiper blades. If the problem persists after flushing, the wiper needs to be replaced.
2. The cause of the occurrence of small spots, most likely, is a deformed rubber. Such a failure also leads to the complete replacement of the unit.
3. If the wiper motor does not work, there may be several reasons for this:
trapezoid deformity
 - presence of foreign objects in the mechanical elements of the wiper
 - winding short circuit in the electric motor

But there are situations when the breakdown occurs on the road, or simply there is no opportunity to deliver the car to the service. In this case services of the

auto electrician on a call are very convenient. A specialist of our company in the shortest possible time will drive up to the location of your car, will diagnose the causes of the breakdown and make the necessary repairs. After that will advise how to avoid what happened next time.

Under no circumstances try to repair such malfunctions by yourself. This may lead to more severe consequences, because there are many nuances and peculiarities in the repair of the car's electrical system.

About ABS repair

The purpose of installing anti-lock brakes on cars is to prevent the wheels from completely locking up, because otherwise the car would become uncontrollable and simply go into a skid. The ABS is designed as a combination of wheel speed sensors, brake pedal sensors, a hydraulic pump and an electronic control unit.

The ABS system is triggered as follows:

- Sensors read and transmit information to the control unit.
- When you press the brake pedal, the ABS system is signaled and activated.
- The hydraulic pump supplies the brake fluid.
- The brake pads begin to contract and uncompress frequently, thereby eliminating the possibility of complete wheel blockage and skidding.

If any component fails, further successful operation is impossible and ABS is disabled and the system icon lights up on the dashboard. Such a problem can only be solved by a specialist - car electrician.

The first thing to do when starting a repair is to do such a thing as an ABS diagnostic, which will correctly and quickly identify the malfunction, and determine where it occurred. This procedure requires wiring diagrams and good diagnostic equipment, which is often expensive. When the ABS breaks down, it is imperative that it be disconnected, it will only be possible to start it up after the diagnostics have been performed.

The most common cause of sensor failure. There are several reasons for their failure:

- Breaks in the wiring;
- Oxidation of connectors;
- Wear and tear on the comb;

- Wear of hub bearings.

The second place in the ABS faults rating is given to the hydraulic module. Failures occur in the electric motor of the hydraulic pump, less often in the valves of the hydraulic system. The motor may simply jam, because of dirt and rust. The central connector of the wiring harness, to which the sensor contacts are connected, is weak. This is caused by oxidation due to excessive moisture. Repair of ABS in the hydromodule part is done by disassembling the electric motor of hydraulic pump and fixing the breakage. If this is not the cause of the malfunction, it is replaced with a new one.

The ABS diagnosis reveals the need for mandatory replacement of sensors, bearings and gears. Only the wiring problem is correctable. It can be eliminated by soldering, heat shrinking and installing nylon plastic ties.

Also, the ABS icon on the dashboard may light up for minor reasons. For example, dirty wheels or a sensor. You can fix it yourself without the help of an on-site auto electrician.

10 malfunctions in the car that you can't ignore

A number of breakdowns in the car are not critical, so their solution can be postponed "for later". However, there are also those, at the appearance of which, the car should be immediately taken to the service, otherwise the risk of an accident increases.

Control lamps

All the most important information on the road the driver receives from the control lights, so the breakdown of these indicators is a big threat and increases the likelihood of an accident. First, it is necessary to diagnose and repair the power supply, as they are one of the most frequent causes of malfunction.

Brake system

No one disputes that if a minor leak occurs, the car can still be used for a certain amount of time. However, sooner or later, the leak will increase to a critical size, so failure will occur.

Steering

The list of the most critical ones includes failures that significantly reduce driving safety. Unfortunately, steering faults are included in this list. At the slightest risk or suspicion of failure - contact our car service to check the auto.

Running gear

Many drivers are used to ignoring this type of malfunction. But the consequences are serious. For example, a hub bearing takes out the entire wheel after a while.

Cooling system

As statistics show, any breakage carries a large potential risk of failure, which will cost you an expensive repair or a complete replacement.

Fuel system

There is no point in dwelling on this point, because every motorist knows that any gasoline leak can turn into a fire.

Operating fluids

As practice shows, there are many fluids, the condition of which should be closely monitored. The number of them may surprise anyone, but in fact everything is not so terrible, if you check the transport in time. For example, if the pressure in the engine is low, you can save money for a new one - the engine will not last long.

Transmission

If you notice that the behavior of the transmission (both manual and manual) is not standard, such as constant jerking and the like, you should have the transmission diagnosed. The aforementioned malfunction is a consequence of transmission or control failure. As a result, the load on the power units increases several times, which contributes to an increase in the rate of their wear. It is worth noting that often the breakdown leads to the complete replacement of the unit, significantly beating the pocket, despite the seemingly insignificant breakdown.

Power

Lack of function on the charging side of the battery or alternator should not be overlooked. In fact, it is allowed to move a little on the charge side. However, most of all modern vehicles, with almost no exceptions, are powered by the on-board network. As a result, at most you will drive 30-40 km on a single charge.

Wiring

The last point and one of the most critical. Any breakdown of electrical wiring leads to a fire in an indefinite time (everyone is different). It is better to check the car in time in the service than to risk your life.

The starter does not start the car

The starter does not start the car:

- Power and ignition system breakdowns.
- Problems with electronics.
- Blocked the car with the alarm system
- Filled with low-quality fuel.
- Faulty timing belt.
- Clogged injectors.
- Clogged filters.
- Low pressure in fuel system.
- Heavy contamination of air filter.
- Lots of debris in idle valve.
- Plugged spark plugs.
- No spark.

All this can lead to the fact that a field service technician is required. Of course, you can not exclude such trivial causes as freezing condensation in the exhaust pipe in the cold and a discharged battery.

There are some not obvious reasons why the car does not start the starter does not start. This may include your inattention, for example, forgetting to turn off the alarm. In addition, someone could play a prank on you, and put a stone / handkerchief / potato in the exhaust pipe and others. We can't rule out crime: they wanted to steal your car, but something went wrong with the intruders.