

# PDMCC

Pendle District Model Car Club

[www.pdmcc.co.uk](http://www.pdmcc.co.uk)

## Setup Guide

### **10 tips to make your car go faster**

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#### **10 Tips to make your RC Car Faster**

Here are 10 cheap tricks that are guaranteed to make your radio control car faster without burning a hole in your pocket.

#### **LINKAGE SETUP**

Your engine can't make power if the carb isn't open all the way. When you hit full throttle on your radio, you should see a black hole in your carb.

The carburetor is opened by a linkage attached to the end of a servo arm. If the linkage or radio endpoint adjustments aren't set up properly, the carb may not open all the way and your engine won't produce full power no matter what you do!

To check your carb, simply remove the air cleaner from the engine and pull the throttle trigger on your transmitter. If the carb doesn't open fully, adjust your linkage until it does. If your radio has an endpoint adjustment feature, open the throttle all the way, and adjust the endpoint until the carb is completely open.

If you don't have endpoint adjustment, open the carb more by moving the linkage pivot point farther out on the servo arm.

Engines with a barrel carb have two holes in the throttle arm; the closer to the pivot point on the carb you can go with the linkage, the farther the barrel will open. Make sure that the carb still closes to the idle position when the servo is in neutral. You can adjust this by moving the throttle-return spring to the correct position, i.e., where it puts a slight pressure on the carb to keep it closed.

## **BASIC TUNING**

Sometimes, simply tuning your engine is the most direct way to increase engine power. Just turn the high- and low-speed needles a little at a time until you're happy with your engine's performance.

The easiest way to increase your engine's horsepower is simply to tune it properly. If your engine's fuel/air mixture is too rich (too much fuel), it won't make full power and you will use up your fuel very quickly. An engine that is being run too lean won't have enough fuel to burn, and that will cause it to run erratically. Start the engine and run your vehicle around to get the engine up to running temperature. Adjust the high-speed needle first. You're aiming to tune the engine so that its operating temperature is somewhere around 230 degrees. When adjusting the high- and low-speed needles, alter them by only 1/16 turn at a time until you have the engine running properly.

There are two ways to check engine temperature: with a temperature gauge or with the water-drop test. The temp gauge will tell you the exact temperature, and you can adjust the high-speed needle to richen or lean out the fuel/air mixture, depending on the temp reading. If your engine runs at around 260 degrees, it may be running too lean. If it's running at below 200 degrees, it's a little rich and should be leaned out. The ideal temperature depends on the engine and the ambient temperature on the days you run it.

The water-drop test is a lot less accurate, but it does the job. Simply put a drop of water on the engine head; it should boil off in 2 or 3 seconds. If it just sits there, the engine is not hot enough and is running too rich; if it evaporates very quickly, the engine is running too lean.

When you've set the high-speed needle properly, set the low-speed needle. I test the low-speed needle setting by pinching the fuel tubing when the engine is at idle. If the needle has been set properly, engine rpm should increase slightly for few seconds before the engine dies. If the engine revs for more than a few seconds, the mixture is too rich. If the engine dies as soon as you pinch the fuel tubing, the mixture is too lean.

## **REMOVE HEAD SHIMS**

Under the engine head, there's always a very thin shim that's usually made of metal. Add or remove shims to alter engine compression; fewer shims will increase compression and vice versa.

All engines have very thin shims between the cylinder head and the sleeve, and these shims are used to set the clearance between the two parts. You can increase power by removing shims or installing a thinner shim. This will make the combustion chamber smaller and will increase the engine's compression.

To remove the shims, you'll have to remove the cooling head, so take out the screws that hold it in place. You will see the shims on top of the sleeve, or they might be stuck to the

head where it meets the sleeve. Remove one shim (if there is more than one) and reinstall the head. Be sure to check the piston/head clearance by manually spinning the crankshaft through one revolution to see whether the piston hits anything. If it does, replace the shim you just removed. The shims are very thin and bend easily, so be careful when you handle them.

Don't do this unless you're an experienced engine tuner. Too much compression and/ or insufficient head clearance may damage your powerplant.

### **ADD A HEADER AND A TUNED PIPE**

The small canister-type muffler below left can easily rob your engine of power, but a header and tuned pipe like the ones shown here can really make your engine sing.

These are used because they are very easy and cheap to manufacture. These mufflers can rob your engine of power and make it run hot. A tuned pipe will give your engine more power and keep it running cool. Pulses from the exhaust run through the pipe when the engine is running. These pulses help to keep fuel in the combustion chamber during the exhaust and intake strokes. Your engine will have more power because there is more fuel to burn, and the extra fuel will help to cool it.

It's very easy to install a tuned pipe. Remove the stock muffler and clean the engine's exhaust opening. Install a new gasket on the engine, and screw on the header; don't forget to put Loctite on the screws. When the header is in place, attach the new muffler using a muffler coupling; use heavy-duty zip-ties to hold the header and pipe together. Hold the opposite end of the pipe in place with a piece of wire attached to the chassis.

### **USE THE RIGHT GLOW PLUG**

Glow plugs vary with regard to their heat ranges; .12 engines run better with a hot plug while .21 engines run best on colder plugs.

An engine comes with the proper glow plug installed, but it doesn't last forever, and you'll eventually have to replace it. Don't just buy whatever is hanging on the wall at your local hobby shop. Glow plugs have various heat ranges; if you install one that is too cold for your engine, it will lose acceleration and top speed.

A plug that is too hot for your engine will cause pre-ignition, i.e., the fuel will start to burn well before the piston reaches the top of the sleeve. A .12 engine will work well with a hot plug while a .21 will run better with a colder plug.

### **USE FRESH FUEL**

Make sure that the cap on your nitro fuel bottle is always tight, or with time, the methanol in the fuel will evaporate. If it is stored in a damp place, fuel attracts moisture; water doesn't burn, so the more moisture there is in the fuel, the less fuel there is to burn when the

mixture reaches the combustion chamber. If your fuel is old stuff that has been sitting around for a while, buy a fresh bottle.

### **USE A HIGHER-NITRO FUEL**

Going to a fuel that contains a greater percentage of nitromethane is an easy way to get a little more power out of your engine. Most .12 engines are designed to use 20-percent nitro, and .21 engines are designed to use 30-percent nitro. You can safely increase your nitro percentage by 5 or even 10 percent. If you go to a higher percentage than that, you will have to start playing around with head shims to decrease engine compression; you'll also risk damaging your engine. It is generally best to use fuel that contains the percentage of nitro your engine was designed to use.

If you run 20 percent nitro, you could safely bump it up by 5 or even 10 percent. You'll have to tune your engine for the increase in nitro, but it will make more power.

### **CHANGE THE LENGTH OF THE EXHAUST HEADER**

Use a shorter or longer header and pipe to obtain more low-end or high-end power from your engine.

When you change the exhaust header's length, you alter the dynamics of the pulses from the exhaust throughout the pipe and header. If you have a long header, the pulses will be slower and will give the engine more bottom-end power. A short header will speed the pulses' flow, and your engine will have better top-end power. To maximize power, adjust the header's length until the pipe and engine are in sync.

You can alter the length of your header simply by adjusting the gap between it and the pipe. If you need to make it any longer than the coupler permits, buy a longer coupler. If you have moved the pipe back so far that it is about to touch the header and you still need to move it farther back, cut the header. Cut off only about 1/8 inch at a time, and run the engine after making every cut. Shorten the header until you are happy with the amount of power your engine produces.

### **IF YOUR ENGINE HAS A PULL STARTER, REMOVE IT**

If you remove the engine's pull-starter, you'll save a lot of unnecessary weight, but you'll have to buy a starter box to start your engine

A pull-starter is nice because it allows you to start your engine easily wherever you are, and it saves you the expense of a starter box. If you remove the pull-start assembly, there will be less drag on the crankshaft and, consequently, more power. Your vehicle will also be lighter. The only drawback to doing this is that you'll need a starter box.

Remove the pull-starter by unscrewing the four screws that hold it in place. The backplate is held with four screws, too; remove them and set them aside (you will need them later). Remove the cylinder head, the sleeve and the piston so that you're able to remove the crankshaft. At the end of the crankshaft, there's a small nub that you'll have to remove with a rotary tool and a cutoff wheel. When you've done that, clean the crankshaft and reinstall it, followed by the piston, the sleeve and the head. The old backplate has a large hole that will prevent the engine from running; install a backplate for a non pull-start engine in its place. Before you do this, clean the backplate and engine-block mating surfaces. Put a little oxygen sensor-safe sealant between the two to eliminate any chance of air leaks. Secure the new backplate with the screws you removed from the old one.

### **OPEN THE PORT ON THE HEADER**

Before fuel can enter the combustion chamber, the spent gases (exhaust) must leave the engine. The better the exhaust flow, the better your engine will perform. Some headers have a flange opening that's smaller than the opening on the engine's exhaust port, which it is supposed to match. You can enlarge it to match the exhaust port with a rotary tool and a small grinding stone. To maximize exhaust flow, be sure to grind the opening at an angle and do not remove too much material; you want the exhaust to exit via the pipe not the header.

### **PRO TIP**

Compression check. When you buy a new engine, it will have lots of compression. Using a compression gauge, check its compression after it has been properly broken in. After every three or four tanks of fuel, check the compression. When you see a drastic drop, you'll know it is time to replace the piston and sleeve. When the engine loses compression, raw fuel is able to pass the piston and sleeve on the compression stroke, so there's less fuel to burn, and that means less power.