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Tuning Made Easy

"...the art of tuning a carburetor has been lost and you have now provided this information in an easy-to-understand manual."

Jim Turney, Technical Support Manager, Summit Racing Equipment

Do you want to improve the performance of the engine in your car or your boat? Then this book is for you. It explains what you can't read about in conventional engine repair manuals, which are normally focused on ordinary, stock engines. Until now you have probably had to rely on guesswork to properly set up your performance engine, but no more.

This is the last book on engine tuning you'll ever need.

Preface

Warning

I have to start with a warning. Both for legal reasons, but also because I mean it. Dealing with several hundred horsepower is potentially very dangerous. Whether you take the advice in this book or not, making sure it’s done in a safe and responsible way is your responsibility, not mine. The main risks come in three categories. First, if you drive stupidly, when testing or whenever, you can kill people including yourself. Secondly, having your arms, hands, long hair, jewelry or even your tie in the engine room while the engine is running is dangerous. Think! Thirdly if you go wrong in your adjustments, if you go too lean on fuel and/or too early on ignition, you can kill your engine in a few seconds.

To avoid all this happening is your own responsibility. Good luck!

History

On what do I base my knowledge, why do I feel qualified to write this book? First I want to say that I don’t want you to substitute your judgment for mine. You know your car better than I do. But I’ve tried so many things in 30+ years that maybe I can help you get to a good result quicker, and probably even a better end result.

Most of my experience has been with 300–600HP American V8s. But if you read the instructions, you'll see that they apply to any internal combustion gasoline engine. The procedure and sequence for jetting a carburetor or redoing the distributor curve is the same regardless of the engine configuration.

But back to the history, where did I pick up all this information? I used two out of the three sources available. The first source is from articles in magazines like Car Craft etc., and from books like "Power Secrets", "How-to-Hot-Rod-…" etc. I've read innumerable articles and books on this subject, desperately looking for that piece of information that would help me win a race. The second source is my own blood, sweat and tears. All the procedures and techniques on these pages are things that I've tried in real life. I haven't just read about it, and compiled it into this book. I've done it all in real life. Many times.

So what's the third source, the one I haven't used? It's called "Good advice". Through the years I've heard so many people claiming that they knew things, and telling the world about what had worked for them. Some gave me good advice, but many did not. I've heard comments like "this engine is so wild it simply can't have decent idle" and "the bigger the carburetor, the more power". Neither of these statements is true, sorry to say. And while I recognize that this advice is given with the best intentions, it's often about a specific situation, and therefore not relevant for other situations.

So what have I had to play with? I have tuned and developed many small-block Chevys, some normally aspirated, one with a tunnel ram, one with a blower, one with nitrous. I've also had a few Ford Clevelands, with up to 600 HP, a few big-block Chevy Marine engines with blowers

(550HP) in a boat, and a boat with two engines. I've had a 600HP purpose-built race engine, stuffed in an ordinary car. Most of these I've used to go racing. I've won many races, most in fact, and what makes me proud is that I often have won races against cars with theoretically more power, with bigger engines and a lot more money spent. But those cars were probably not well-tuned, so they didn't live up to their full potential, they didn't make the horsepower and torque that they could. One car I tuned was running pretty well before, but after spending a day tuning and testing it, it was 1.5 seconds faster 0–60 mph. That is like finding 100 HP for free!

Now it's your turn. When you've read this book and applied the learning in it, your car will be much more fun to drive, it'll be faster and you'll know it's living up to its full potential. And if you go racing, you'll be surprised at the high $ combos you can beat. Knowledge is power – horsepower!

Which parts to buy?

What's the aim?

These days there are so many parts available to you, if you want to improve the performance of your engine. That’s good and bad. It’s good because it makes it possible to find parts that are almost ideal to help you achieve your goals. But it’s bad, because all the options before you can be confusing. Stop right here and think hard. What’s that aim of adding these components to your engine? Do you want the fastest car in town (don’t we all?)? How much money can you spend? Is it also your daily driver? Will it need to drive on ice and snow? Or do you have another car for such mundane things? Is it to be a high-rpm screamer that’ll wake up the neighborhood when you cruise to the grocery store in second gear to stay in the rpm range the engine likes? Or is it going to be a sleeper with a good idle that can surprise when needed?

Most of the tips on these pages can be used for any of the above. However my experience is that people that choose to go all-out, always seem to end up with cars that don’t see much mileage because they are so unpleasant to drive on a routine basis. Why have the fastest, loudest car in the world, if it’s parked at home and you’re driving your Yugo XYZ when you meet a fast car? I know this message is fundamentally against what most people want to hear. They want the fastest, no matter what. And of course the choice

is yours. But actually driving your car, maybe on a daily basis, is worth considering.

The following parts-choosing tips are based on getting the fastest, sweetest-running car that could be a daily driver. Cars that are trailered to the track can, of course, go more overboard. It’s up to you, but again, balance is important here.

Think ahead

So you’ve got the money saved to buy a new carburetor, and want to know which one to get. Well, it depends. Is this the last part you want to add? Or will it be a new camshaft next time? You need to decide what the end scenario is. Will this be a carb and intake change only, or do you plan headers, camshaft, higher compression and maybe nitrous also?

What’s ABSOLUTELY CRITICAL is to match the parts to each other and to the engine rpm. Let’s start with rpm. If you talk to a good speed shop about them building you an engine, the first question they should ask is in what rpm range you want the power. Here I’m talking big V8s, which perform very well in the 2000–6000 rpm band. You can buy a cam and an intake manifold and size the headers to give fantastic performance in the 4500–8000 rpm range, and some people do this. However there are two drawbacks to this approach. The first is that the car will be a pain to drive around town. Secondly, unless internal components like crank, rods, pistons etc. are changed, the engine won’t survive very long at that rpm. In fact it’s likely you’ll have one smile-inducing run at the track, and then have to get someone to drag you home…

You should first decide which rpm band to be in, and unless you plan buy a stronger crank, rods, pistons etc. you should stay below 6500 rpm on most V8s. Then you buy all the parts so that they match that criterion. Companies like Edelbrock sell carb/intake manifold/camshaft packages that take the guesswork out it, and they work great. You don't have to buy parts with the same brand name though, but if you do they often match a little better. For some things it's a definite advantage to stay with one brand. If you buy an MSD Ignition box and an MSD distributor, the wiring will fit together. On the other hand, it doesn't matter if the plug wires are MSD or another brand.

Where do people often go wrong? Mae West said that too much of a good thing is wonderful. Clearly she didn't tune her own cars, because with regards to parts selection, too much is terrible. The most common mistakes are running too big a carburetor or a camshaft with too many degrees duration. The too-big carburetor makes tuning difficult and gives sluggish response except above 5000 rpm. Too big a camshaft gives a lousy idle and not a lot of power below 4000 rpm. So drivability and economy will be terrible. The car will be powerful, but only in the high rpms where the engine will not survive long anyway.

One comment on how a car feels: A car with too much carb and camshaft may feel very powerful the first time you try it, because the power comes in when you reach 4000–5000 rpm. Suddenly you get a kick in the back. It can be a lot of fun; it feels like you suddenly have two engines. But that's actually a bad sign; it means that the car has too little power below the rpm where the power finally kicks in. An engine is an air pump that, based on parts choice, has a certain max HP. As I've stated before, the best (i.e. fastest and most fun to live with) car will have that power at all rpms. The car in this example has lost that below 4500 rpm,

and it does not have *extra* power above 4500 rpm, it just has the type of power it should have had all throughout the rev band. Engines' power does vary with rpm, that's unavoidable, but if power comes on very suddenly at a certain rpm, the engine is not well-tuned and is losing potential power below that rpm.

-Sequence of adding new parts

I would put parts into three categories:

1) Below $1000, mostly external work
2) Below $1000, internal engine parts, engine needs to come out
3) Above $1000

1) would contain carb, intake manifold, exhaust manifold, camshaft, ignition, cylinder heads
2) would contain crankshaft, connecting rods, pistons
3a) would contain blower, turbo, nitrous
3b) crate engines

On 1): Assuming the current ignition and carb work fine, the most bang for the buck on a V8 will be achieved by freeing up the exhaust. Stock exhaust manifolds are quiet, don't get excessively hot and last forever, just what the car factories are looking for. But they're restrictive; replacing them with headers can produce a lot of power. The intake manifold is all about shape and design. Stock intake manifolds typically aim to produce the most power in the 1500–5000 rpm band, while a good dual-plane manifold moves the power to 2000–6500 rpm. A new carb is not necessary if the stock one is working fine, but often on cars with mileage they're dirty inside and throttle shafts are worn, making finding a good idle difficult. Ignition parts are great to add, because they