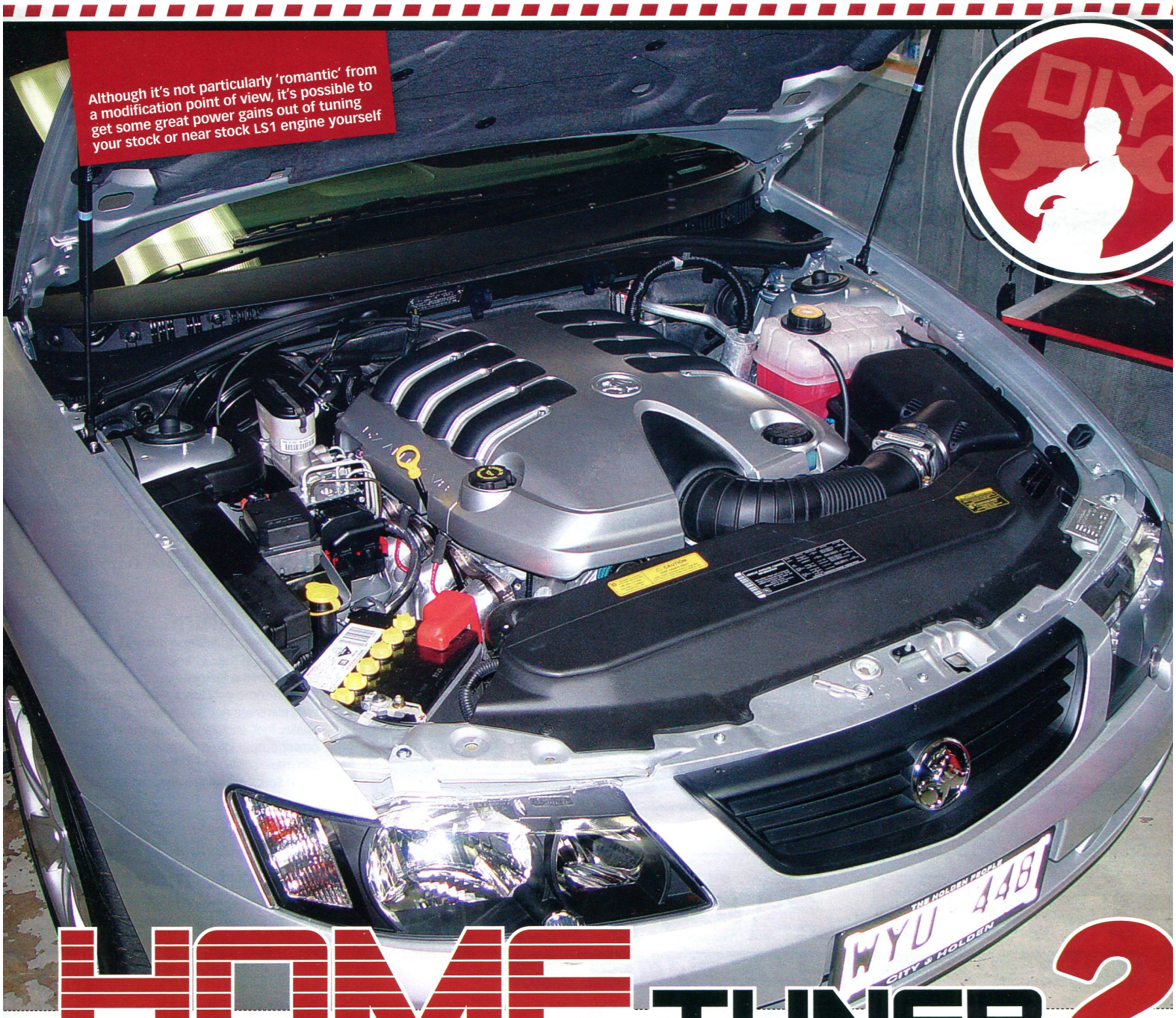


Although it's not particularly 'romantic' from a modification point of view, it's possible to get some great power gains out of tuning your stock or near stock LS1 engine yourself

HOME TUNER 2

WE CONTINUE OUR SERIES ON TUNING YOUR OWN LS-EQUIPPED COMMODORE

STORY AND PICS BY MARTIN DONNON

With all the right tools in hand, it's now time to start tuning your LS1-powered Commodore. For the purposes of this text, we will be performing all of the tuning duties using the well known HP Tuners software and hardware. While it has some differences to EFI Live in the screen layout and table operations the theory remains the same, so transposing information from our HP Tuners-based course into EFI Live shouldn't be too difficult.

PICKING THE CAR

In this very first instalment of real world tuning, we will look at the simplest tuning process you can initially perform, and that's the conventional MAF tune on a VT–VY LS1 powered Commodore. This is something you can do yourself without too much trouble, and with very good results. Our test car in this instance will be a totally stock VX manual 6-speed Commodore. It's a great place to start, so start we will.

Before doing anything else or even reading the computer, ensure that you have the scanning software that comes with HP Tuners talking to the system. With the engine running, you should be able to log all of the engine parameters, and see them as live dials and readings on the screen. You need to be actively logging RPM, MAF frequency, Inlet Air Temperature, Ignition Timing, and Knock Retard. Other logged items can be added, but these are your fundamental building blocks of tuning.

THE BASE RUN

You should have already selected a dyno shop that can help you out with getting a base run on your car. Having a starting point that shows you where the basic parameters of the engine currently sit is a great thing to have, and will allow any gains (or losses for that matter) to be measured accurately, and ensure complete consistency across your tuning. Make sure that you always use the same dyno so you are in fact comparing apples with apples.

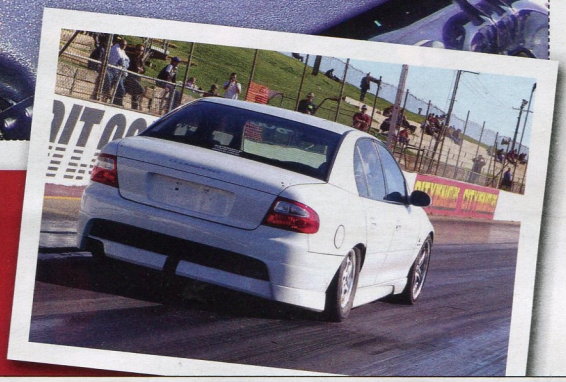
When the car is run for the first time on the dyno, ensure that the data logger is active, and that you record the session and save it for later analysis. In fact, every time you run the car on the dyno, ensure that you log, it costs nothing (you are already paying for the dyno, right?) and will be a valuable tuning resource as you get further into tuning the car. Also ensure that you have the correct fuel in the car, and that means 98 octane premium unleaded, to get full advantage of the power gains on offer.

THE READ

Once the dyno session is completed, you can take a base read of your LS1 computer. This is a simple task, and is only a matter of following the bouncing ball on the menu selections of the software. At all times make sure your battery is nice and charged, and that you don't interrupt the process by fiddling with the car, opening doors, turning lights on and off etc. Just let the laptop do its thing, and after around two minutes or so your laptop will prompt you asking for a filename to save under.

Even the small changes we have shown you here will be enough to get your LS1-powered Commodore close to a 12sec pass provided the rest of the set-up in terms of suspension and tyres are up to the task

We will be covering a MAFless conversion in the next instalment, but there is no reason to rip the MAF off the engine straight away, unless going for the ultimate in power. There are still good gains to be had with it in place



Make sure you use a sensible file name. In this case being a stock VX manual I would suggest something like this – ABCDEFvx-manualstock – where ABCDEF is the actual registration number of your car. This way when you need to reference the stock file at a later date, you will be able to find it easily without any kind of confusion or angst. This is an important thing to remember.

THE FILE IS OPEN

Now you will have a menu bar of options available to you for perusal, and it's here you determine where to start. I always go from the reverse end of the software back to the front which I quaintly term 'reverse tuning', but when you try it there is a lot of sense involved in the process.

The first thing you will see is a tab in the software labelled 'Torque Management', which is directly under the 'Engine' tab. Although there is very little Torque Management in manual transmission-equipped cars, it's a good idea to zero this whole table out, so move to Spark Retard vs. Torque Reduction and set it to zero as pictured, simple as that.

SPARK TIMING

Now we need to address the issue of ignition timing in the LS1 engine. These engines come from the factory extremely detuned and run some very low ignition timing to both eliminate any issues running on poor quality fuel, and also to keep the engine power output low and under control. We can make some massive changes to the 'Main Spark Advance – High Octane' table,

which in turn will generate a lot more engine power on 98 octane unleaded.

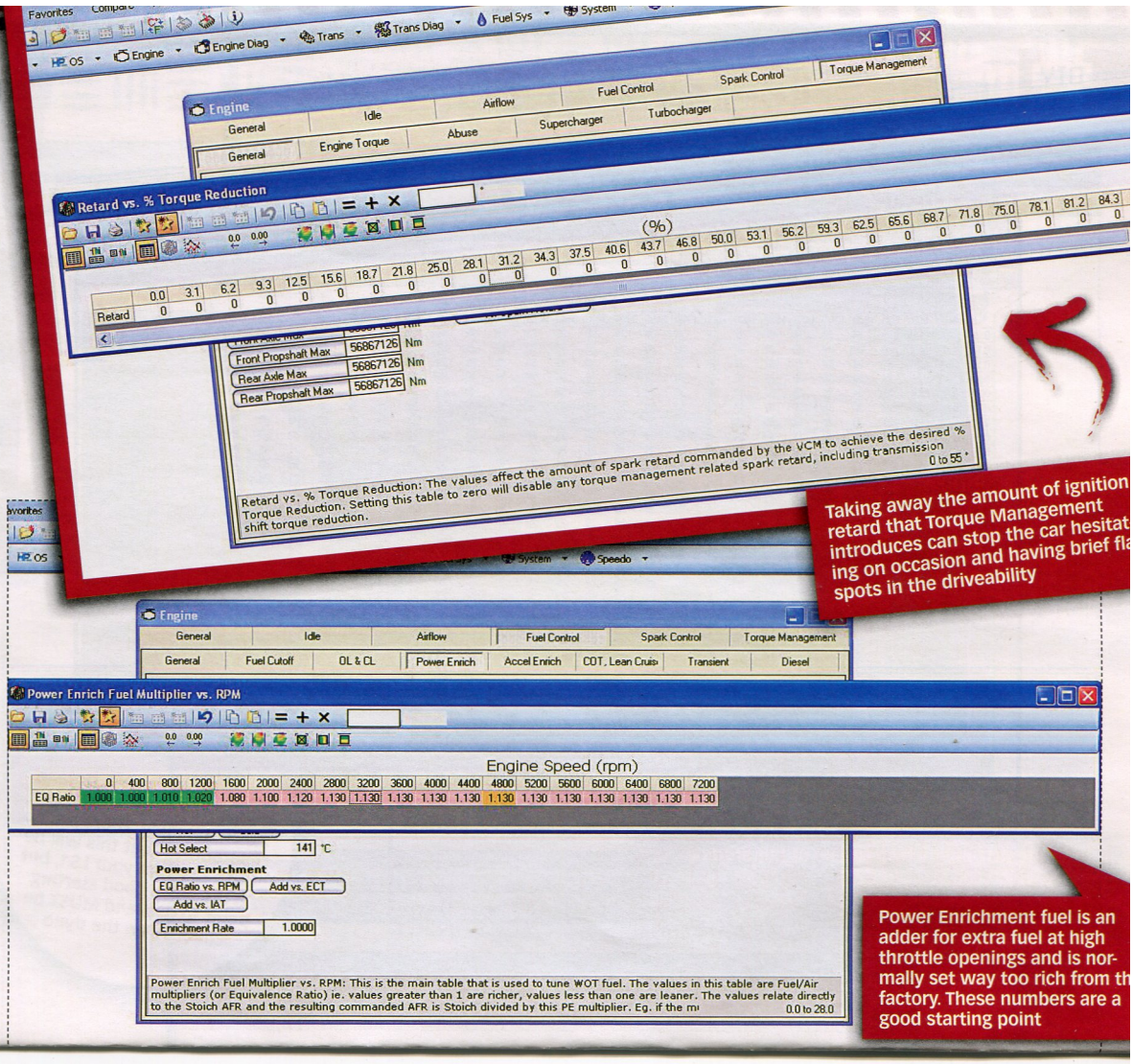
We have included a picture here of the kind of numbers you should be looking for in the High Octane timing table that will be perfectly safe to use on 98 octane fuel, but this doesn't mean you can drive with abandon before checking the state of the tune again on your chosen dyno. We have based these numbers on the figures that HSV themselves released in the VY Clubsport, so they are validated and will work extremely well in most applications.

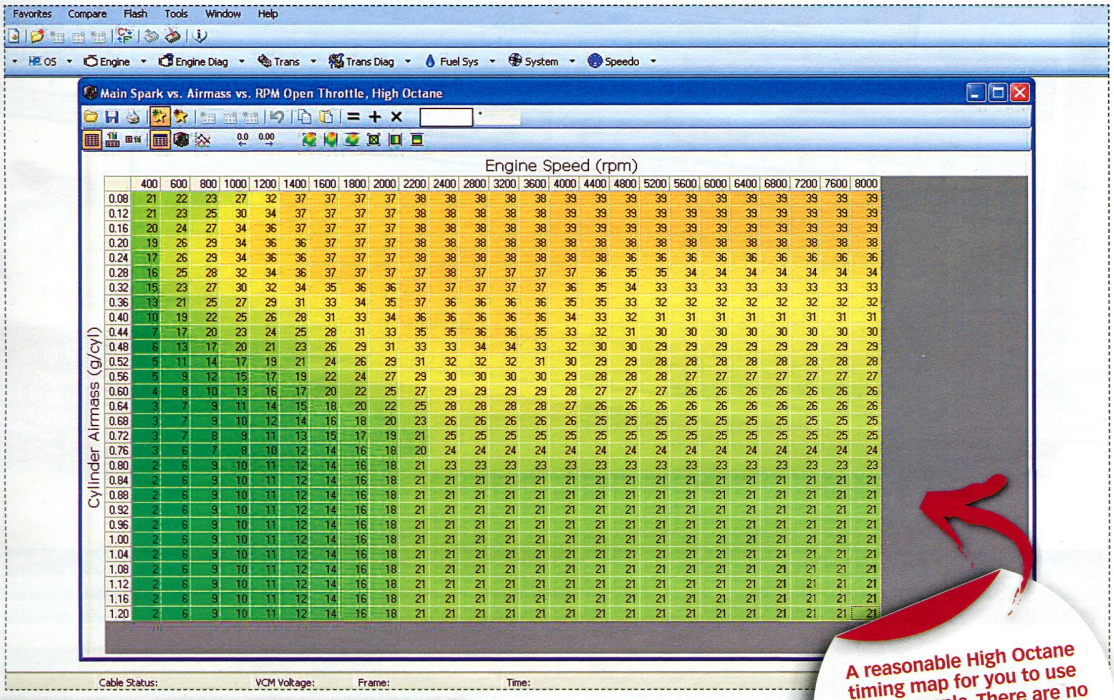
At this stage you can leave the low octane timing table alone (the table right next to the high octane table), as this is the ignition timing that the system will slowly learn to should the fuel quality change or the engine experience any kind of detonation. We have now completed some basic timing changes to the system, so now it's time to get on with having a look at the fuel setting, as the dyno operator would have already told you it is quite rich and wasteful.

FUEL

On the top tab that we have already referenced sits 'Fuel Control'. It is right next to 'Spark Control' and it is here that we can alter the full load mixture settings of the engine to give some more power and a leaner fuel mixture to boot. There are a couple of changes you can implement here, but the most important and significant from a power production viewpoint is to get the 'Power Enrich' setting correct.

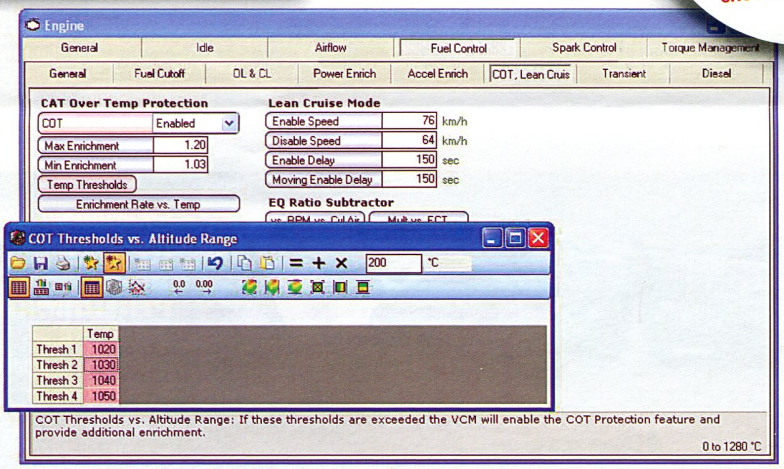
Clicking on the 'Power Enrich' Tab and then selecting 'EQ Ratio vs. RPM' will bring

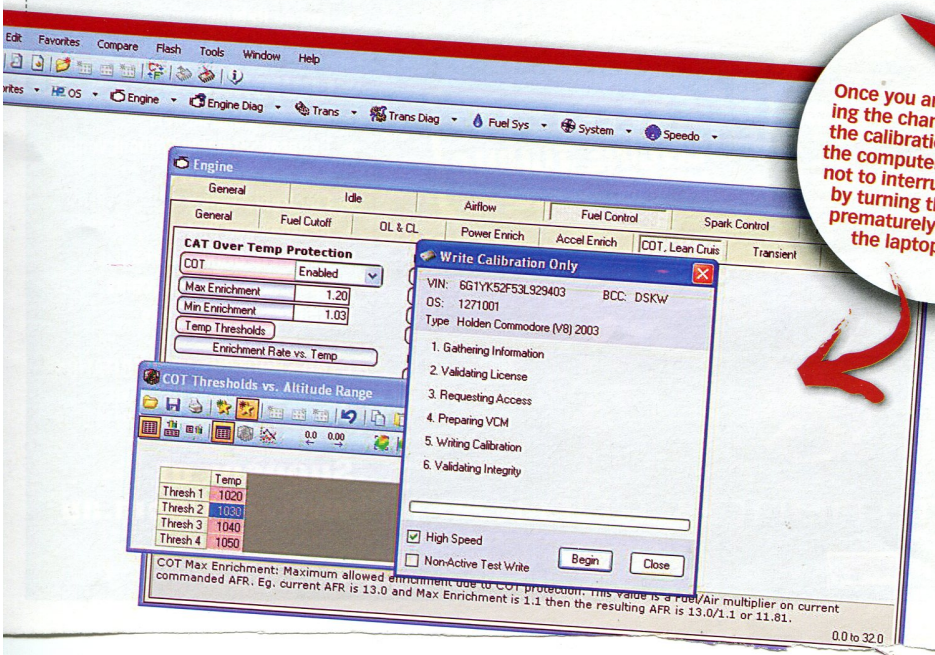




A reasonable High Octane timing map for you to use as an example. There are no guarantees that this will be 100% right for your LS1, but it is a fairly good starting point to use, and MUST be checked on the dyno

Raise the COT points by a couple of hundred degrees, which can still offer protection to the catalytic converters, but also stops the LS1 computer from dumping fuel in every time you run it on the dyno





Once you are finished making the changes, then write the calibration (file) back to the computer and be careful not to interrupt the process by turning the ignition off prematurely etc. Do what the laptop tells you!

up a single line table that represents additional fuel to be added to the engine when the throttle is over a given high load setting (more on that later). The numbers you will find in this table are quite big normally, up to 20% greater than we will be running in the modified example table that we have supplied for you to use. Plug them into your map.

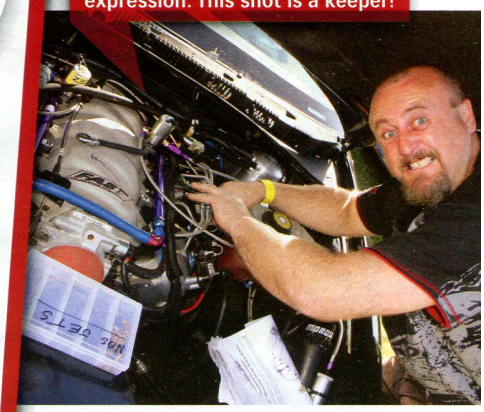
Now proceed to the 'COT, Lean Cruise' tab in the software and make sure your table looks like our example. We don't believe in turning COT (Catalytic Overtemp Protection) off altogether as it's there for a reason; that being to dump excess fuel into the catalytic converters should the system think that they are too hot, as lean running and excess heat can damage them. You will be able to see from our COT Thresholds vs. Altitude Range table that we have given the table another couple of hundred degrees leeway before the protection over-temp point is reached and fuel gets dumped in.

PUT IT BACK

At this point save your file to a new name, simply add 'tune1' text to the end of your existing file name, and make sure you don't accidentally overwrite the original file from your car. Then it's time to put the file back in to your LS1 computer, which can be performed simply by switching the ignition to the second click 'On' position and selecting 'Flash – Write Calibration Only' from the top of the screen. Do not touch the ignition key again until the system informs you it is finished this process.

BACK TO THE DYNO

With this simple half hour or so of work, you have completed some of the basic building blocks of your LS1 tune and you will have gained your car a few kilowatts, possibly around 15rwkW, which is a great start for the budding home tuner. The car will need to be power run on the dyno again and the mixtures and knock (if any is present) logged on the dyno under the guidance of a professional and experienced operator to ensure that the numbers are all correct and that everything is operating correctly.

This is by no means a complete or sophisticated tune in anybody's language, but it's a start, and it will give you the confidence to go on with further tuning as your budget and time allows you. Remember, getting a process like tuning correct requires lot of small changes, and plenty of dyno testing and tuning along the way. Don't shortcut any of the steps, and you will be right! SC

There is a certain amount of joy from doing the job yourself as you can see from 'Staties' pained expression. This shot is a keeper!