



### How Many Teeth On Your Crankshaft?

As many of you know, we've been heavily into GM's LS series of engines for a while now. When Chevy decided to redesign their small-block that has served them so well since the '50's they knew that they couldn't just make some minor modifications. They had to make a quantum leap in the technology. Ultimately they didn't disappoint!

When Chevrolet came out with the LS-1 in the '97 Corvettes, it was a huge leap forward. The engines ran smooth, made great power and even got good gas mileage. Soon after, the performance industry starting coming out with high performance parts for these engines and everyone wanted one in their hot rod or muscle car. It took a little while but soon the technology was available to transplant these engines into other vehicles.

These engines have been gaining in popularity for engines swaps since a lot of them are now available in wrecking yards and companies like Painless Performance are offering wiring harnesses and even plug-and-play computers and wiring to facilitate the installation of these engines. We've seen the sudden rise in popularity of the truck versions of these engines since they've become so reasonably priced lately.

Once you've installed one of these engines in another vehicle making it run is easy. Painless makes an excellent harness for these engines and we have PCM's preprogrammed to run the engine and transmission perfectly.

One thing to check for with any of the newest LS engines is whether it has a 24-tooth or 58-tooth reluctor wheel on the crankshaft. A reluctor wheel is a ring on the crankshaft that has teeth. As each tooth passes by a sensor located in close proximity to the wheel, a signal is generated that the PCM uses to control the engine. From these signals, the PCM can determine exactly the position of the crankshaft at any given moment and use this information to

decide when to activate the coils that fire the spark plugs and determine when to spray fuel from the injectors.

The PCM also uses this information to determine whether the engine has a misfire in any of the cylinders. It does this by noticing that the crankshaft slowed down slightly when a given cylinder is supposed to be firing. The misfire, along with the cylinder in which it occurred, is recorded and, if the number of misfires reach a predetermined threshold will turn on the vehicle's check engine light to alert you to a problem.

So why should you care if the engine you're buying to put in your street rod has a 24- or 58-tooth reluctor wheel? It's important because it's more complicated, and expensive, to get an engine with the 58-tooth reluctor wheel to run in your vehicle.

It takes a different engine computer and wiring harness to run the 58-tooth engines and, if your running an automatic transmission with this combination, you'll need to use a separate GM transmission controller if you're using a 4L65E or 4L80E transmission. If you want to run your 58-tooth engine with the older style 4L60E transmission, you'll need to use a separate after-market transmission controller which adds quite a bit of expense and complexity to the project.

Even though some of the LS crate engines that GM sells use the 58-tooth wheel, GM doesn't have any electronics available to run these engines. They're in the GM performance parts catalog but they're not available.

So how do you know which reluctor wheel an engine might have? First if it's made before 2006 it's almost certainly a 24 tooth variety. After 2005, it can be hard to say. The only way to know for sure is to pull the crank sensor located above the starter and look inside. If you see two rings parallel to one another, you've got a 24-tooth engine. If there's a single wheel it's a 58-tooth engine.

### I Want a Big Cam in My TBI!

There are millions of GM Throttle Body Injected (TBI) trucks out there. GM built these trucks from '87 through '95. As with any Chevy truck, people can't resist turning them into off-roaders, street cruisers or maybe show trucks. The common denominator with these trucks is that everyone wants to get more power out of them.

These are great systems and very reliable but they never made a lot of power. What we see is folks doing the same thing that they would have done with a carbureted engine. They build an engine with more compression and a big cam. Maybe even some high flow cylinder heads.

The problem is that the TBI engines don't respond very well to these modifications for a couple of reasons. First, the TBI injectors just don't flow that much fuel. A typical TBI 350 engine came with two 55 Lb/Hr injectors. In comparison a TPI engine out of a 350 Camaro had 22 Lb/Hr injectors but instead of two injectors it has eight. So a stock TPI has a capacity to flow 176 Lb/Hr of fuel where a stock TBI has a capacity of 110 Lb/Hr. That's a big difference!

Second the TBI throttle bodies don't have the capacity flow large quantities of air. Finally, the computers used in particularly the early TBI's are not very fast and don't react very quickly to the needs of the engine. At idle, with a larger camshaft, the pressure changes erratically in the manifold and, because this happens very quickly the computer has trouble keeping up.

We can get better performance from these engines through reprogramming of the computers and can even compensate, to some extent for larger cams. We also, add adjustable fuel pressure regulators so that we can coax the injectors into providing more fuel. If you have a TBI engine and you want to get more power give us a call but be careful with those big camshafts!