How Do You Make Your T Go So Fast?

Part one: Mechanical

By Tom Carnegie

Henry Ford said that the top speed of Model T Fords was 45 miles per hour. A lot of them now days are hard pressed to achieve that speed. Sometimes after someone has taken a ride in my car, they will ask me: "How do you make your T go so fast?" My stock, off-the-cuff reply is that there are only two things to make a T go fast - compression and aspiration. This is essentially true, but is an oversimplification. There are really THREE things! The three things are: 1. Mechanical efficiency 2. Thermodynamic efficiency and 3. Volumetric efficiency. This article will deal with the first issue, mechanical efficiency.

What are we talking about when we say mechanical, thermodynamic and volumetric efficiency? Efficiency is getting as much work done with as little energy (or fuel) spent as possible. Does this mean the best gas mileage possible? It can, but what we are looking for in the Montana 500 is the most power possible given the obvious limitations of the Model T motor. Mechanical efficiency (henceforth M.E.) deals with things such as friction, vibration and wind resistance. Thermodynamic efficiency (henceforth T.E.) deals with things that make the bang of the power stroke stronger. Volumetric efficiency (henceforth V.E.) deals with getting the biggest and best charge of fuel into the combustion chamber.

What are some ways to maximize M.E.? The number one thing to help here is to reduce friction whenever and wherever you can. Let's start at the front and work to the back. Wheels. Bad or overly tight wheel bearings can cause extra friction. Imbalanced, or under-inflated and poorly aligned tires use more energy, as do bent rims. Engine. Within the engine there are many areas where M.E. can be increased. Friction of all moving parts can be reduced by using the best lubricant possible. Some people use S.T.P. and such like that to help reduce friction. Having proper clearances on your bearings, wrist pins and cylinder walls helps. Boring your engine to the maximum size also increases M.E. Wait a minute! I thought that increasing the bang of the power stroke (which a large bore does) fell under the heading of T.E.! Yes, it does. But it also falls under the heading of M.E. It increases T.E. because it causes the compression to rise. It increases M.E., because all other things being equal, a larger piston will apply more force to the crankshaft than a smaller one. It is sort of like a wheel cylinder, the larger wheel cylinders on the front wheels apply more pressure to the brake shoes than the smaller rear cylinders, even though they are both supplied with the same amount of pressure from the master cylinder.

Bigger pistons also slightly decrease M.E due to the added weight and added surface area. These factors are negligible though, and more than made up for by the increase to M.E. that bigger pistons cause. Increasing the stroke of the crankshaft increases M.E. Again it also increases T.E., because it causes bigger displacement and more compression, but it also increases M.E. because it increases the rod angularity, which gives you a mechanical advantage (more leverage from piston to crank pin). This is not allowed on the Montana 500 though and is merely mentioned for the sake of illustration. I presented this article to Steve Coniff to check for errors and omissions. He pointed out that the optimum rod length for a piston engine is twice the stroke of the crank. Since the crank stroke is four inches on a T, the theoretical optimum rod length would be eight inches. The stock rod length is seven inches. The rules allow for increasing the rod length to 7.030".

Reciprocating weight always decreases M.E. Rotating weight decreases M.E. only on acceleration. Vibration and imbalance always decrease M.E. Misalignment increases friction therefore decreases M.E. There is one more mechanical thing that the engine does that I'm not going to go into right now other than to mention it. It really should be under the heading of M.E., but I'm going to go into it in depth in the article on V.E.

After the power stroke the engine has a major job yet to perform to which we don't give much thought. That is, pumping the burnt gasses out of the cylinder. A good deal of effort is required to do this, and there are ways to make it easier on the poor engine. Rear end. Poorly set-up rearend gears decrease M.E., as do bad axle shafts and bad axle bearings. Wind resistance. There isn't much a guy can do for this other than run a 26-7 body, which is a little more streamlined. It also helps to use proper 26-7 springs, which have a lower crown. This sets the car lower for better aerodynamics and helps the ride and rearend alignment too. Another important consideration is weight. On the level, a heavier car takes just a bit more energy to propel at any given speed than a lighter one, probably not a significant amount. Where weight really matters is going up a hill. Of course going down hill weight helps a little, although you never get back the energy that you spent going up the hill. Most driving time is spent on fairly level ground. Therefore I'd say that weight was less important than wind resistance if you had the choice of trading one for the other.

This article doesn't give a lot of specifics, but it should give some food for thought. The article in the next newsletter will be about T.E.