WORLD SPEED RECORD ATTEMPT MACHINE

Max Lambky ***MPH 584*** ***Page 24***

Part three

Air shifter. An air shifter for the transmission is utilised for several reasons, not least being the shifting linkage would have been a nightmare to run from the cockpit back to the rear engine; it's a lot easier to run a 1/8 inch diameter plastic hose. The air shifter is simple and makes a positive shift every time. The system requires a small air pressure tank, a switch to the ignition system, an air time delay valve and an air cylinder. When the shifter button is pushed with the thumb, air from the air storage tank is directed to the air switch in the ignition system circuit. Then engines are shut off for a split second during this time, while air is then directed to the air cylinder, which in turn makes the shift. Again simple, but it provides the 'liner with very smooth and positive shifts.

Volumetric efficiency. Just a word on this subject. All engines differ as to the actual horsepower they develop in relation to their displacement or size. If you and your buddy bought two brand-new Vincents, say, in 1950, and you were both the same size, and you took them out and ran them as fast as they would go, rest assured, one of the bikes would be a little faster. This is because one bike has a higher volumetric efficiency than the other.

A Vincent in standard form developed around 55 horsepower, so each 500cc cylinder was making about 27.1/2 horsepower. Now consider our 1938 500cc Norton International Manx racer: it produces about 29 horsepower, not much higher than the standard Vincent, which tells you the Vincent engine has a rather high volumetric efficiency. So when building a racing engine it is best to start out with something that has these characteristics. The next thing to look at is the overall design. Can the components be made strong enough to withstand large amounts of horsepower. One of the best ways to assess this most important factor is to look at others who have used the design and observe what success they have had in obtaining record-breaking horsepower. It has been clear to me for the past 30 years that the Vincent engine was and is a masterpiece in design and strength. You only have to look at what has been achieved by Vincent racer builders such as Dave Matson, Clem Johnson, Roland Free, George Brown, Brian Chapman, Marty Dickerson and others. So, in my quest for the world land speed record for two wheels, my engine choice was simple: the mighty Vincent.

Back to volumetric efficiency, not to make light of such things as friction, light valve trains, compression ratios, rod angles, square engines versus over-square engines, rotating mass and so on. All of these things play a part in the efficiency of an engine, but the most important of all is how it breathes. Development in this area is where you will gain the most horsepower from a given displacement. The more air you get into the cylinder the more fuel you can burn, the more horsepower the engine will produce. After you have done all the things to make the engine breathe, ie, big ports, big valves, cams, big carburettors, exhaust pipe size and length, intake length and angle, valve shape, port shape, all directly affecting air flow, are developed to a high state, there are only three more ways to increase the horsepower of a normally aspirated engine, and that is: take the normal out and replace .with the word `supercharger', then add something other than gas *(Petrol -Ed.)* to burn, such as alcohol or nitro or a combination of both, and finally add a nitrous system.

All of these things are a guaranteed way to burn more fuel, lots more fuel! - ie, more horsepower! Now you are at the point where you have to wonder how much horsepower the internal parts of the engine can take before disintegration occurs. This is the ultimate factor in how much volumetric efficiency you can achieve from a given displacement, and the rule of thumb is this: a high volumetric efficiency normally aspirated engine running on gas produces about 1.1/2 horsepower per cubic inch of displacement; adding alcohol fuel you should expect another 15 per cent horsepower increase. Add, say, 90 per cent nitro and you will get almost *double* the horsepower. So with nitro we are talking about three horsepower per cubic inch. Now it gets a bit hairy. You add 30 lb manifold pressure with a supercharger and we are talking about doubling that horsepower, so now we have six horsepower per cubic inch of displacement. Add a nitrous system (your choice of the amount of horsepower you want) and you are on the way to making real horsepower!

Once again, an engine can be thought of as having two entities: one, the top end, dictates how much power can be produced; and two, the lower end absolutely controls the level of *reliability* possible at those power levels. The first being near useless if unaccompanied by matching levels of integrity down below. Supercharging and exotic fuels can be thought of as extensions of the top end in their effect. All marvellous, but still enslaved to the strength of the bottom end.

Supercharger. The supercharger selected for the 'liner is of the Roots type made by Weiend. The size of any Roots blower is in the volume of air that it is capable of moving from the intake side to the manifold side with one 360 degree rotation of the rotors. The size of the Weiend unit is 133 cubic inches, which is more than adequate to provide just about any manifold pressure desired. All that is required is to speed the blower up in relation to the engine rpm

for higher manifold pressure, or to slow it down for lower manifold pressure. This is done by changing the diameters of the belt drive pulleys, and this is the main reason a Roots blower rather than an exhaust-driven turbocharger was selected. It gives you much more flexibility in manifold pressure. However, the Roots has one disadvantage, it takes about 50 horsepower to drive the blower at, say, 25 lbs manifold pressure boost, while a turbocharger would take much less horsepower to achieve the same 25 lbs boost. The engines would make the same horsepower to the rear wheel in both cases; however, in the Roots application, the internal parts of the engines would have to withstand another, say, 50 horsepower of stress. I feel this sacrifice is well worth the advantage to be gained by having a Roots blower.

Fuel injection. Hilborn fuel injection is used for the same reason, its flexibility. Just about any fuel curve can be achieved for any type of fuel used by simply changing the metering springs, the pill (jet) sizes, nozzle sizes, and adjusting the leak down of the barrel valve. Our system also employs a ten position high speed pill selector. High speed fine tuning of the mixture is accomplished by the turning of a dial. Also, I might mention that I run approximately 30 per cent of the fuel delivered to the engine through the blower and 70 per cent of the fuel is directed to the cylinders with port nozzles. This really helps to equalise the amount of fuel delivered to each cylinder, as well as lessening the possibility of a destructive explosion within the ducting.
Nitrous system. In the event we need more horses to set the record, I have employed a 150 horsepower nitrous system, all of which is directed through the blower when activated. We will only use this system if it is necessary, rather like after-burners and the need arises to `go for broke'.

Finally, the crew: Stu Rogers, Don Vesco and I, would like to extend our thanks to all you kind people who have contributed financially to this grand project. We are getting close to the money we need; to date we have raised a little over $20,000 and if the contributions keep coming in as they are, we should reach the $35,000 goal. When you send in your contribution it is important that you write your name clearly, as a trophy is being made which will display all the sponsors' names. This trophy will hopefully be kept by the President of the Vincent Owners' Club and displayed at rallies and special events. Before the finalisation of the names to appear on the trophy, the list will be sent to *MPH* and other magazines, so keep a look out, and if you have contributed and your name does not appear, let us know. Also, if your name is not spelt correctly, let us know. Major sponsors will be displayed in a bold fashion on the trophy.