

On work...

"I've been tuning full time for about 12 years and using dynos for about seven years.

"About 60 per cent of my work is on scooters and the rest is on racing bikes. I've already done an 85cc and a 100cc for a girl in motocross, and she's going to 250cc at world championship level next year.

"I also work for people doing grass track and racing TZ Yamahas. I have a soft spot for scooters though because you are doing something that shouldn't be done."

On learning tuning...

"I've had help from a toolmaker/engineer called Paul Wallis (Beaker) and also from Richard Trasler who does bodywork on Aston Martins. Richard taught me about pipes: how you beat and shape the metal so you don't create pipes that crack all the time. Most people TIG weld them but I gas weld every section, which stops them fracturing. In the last two or three years racing I've never had a pipe crack.

"Another tuner - Gerry Pell - taught me a lot and now I've ended up doing tuning for him. He does crankshafts and I do heads for him. His bikes have cleaned up in the LC series for years."

On dyno testing...

"A lot of people have dynos but they don't know how to use them. You can look at the air/fuel ratio on one run and it looks perfect, but add some load to the engine and you can see the fuelling change. That's why so many people get a bike set up on the dyno and then put holes in pistons. Interpreting this only comes with experience.

"When I test a bike on a dyno for race conditions I run it through three power runs, then I run it all through the gears - holding it in top gear - then slow it down on the brake and hold it there, then I'll run it again. Only then you can say 'at the start of the race I had XXhp, but two laps later it's dropped down to XXhp...' Then you can adjust your settings to get a consistent motor. Air-cooled engines are a nightmare though - they can drop maybe 5hp - especially when they are scoop-cooled. At a short twisty track a you simply don't get enough airflow."

On power...

"The best I've seen on my racer is just under 40hp with a straight pipe and around 38hp once the pipe was coiled up, but it became just too unrideable coming out of the corners. I've now

retuned it to just under 37hp and come up with two alternative cylinder and head configurations to suit long and short circuits.

"It'll do 100mph with the tallest gearing, but if you put a lighter bloke on it would go even faster. You don't gear it like that for the track though: you gear it to be doing 90mph halfway down the straight and not much more at the end. Pulling strongly out of the corners is more important than top speed.

"I'm sure that you could get the same performance out of a Rapido barrel. There's more material on the Rapido to make bigger transfers but I never bothered. I saw the Mugello, which is Nicasil lined, and thought that was a better bet.

"There aren't many people out there that can get this sort of power out of a two transfer port motor. The closest thing is the guys who race Villiers engines and they get high-20s. That's nowhere near - I got 30hp at the first attempt at an engine and pipe for racing. With the right work a two-port Lambretta engine can make this power, and it can be done within the rules - no matter what anyone else says."

On tuning philosophy...

"People ask if it's my exhausts that have made the difference but it isn't - it's a combination of about 10 different things that have done it: crankcase pressures, big pipes, madder porting, making the gearbox and the clutch work and so on.

"The biggest problem in scooter tuning today is that they are all going down the 'old man's route': which is to pack out the crankshaft to increase crankcase compression, but that's the wrong way.

"Modern motocrossers are down to 1.2:1 crankcase compression but even a standard Lambretta is 1.65:1. Innocenti designed the Lambretta with high crankcase compression because it had a box pipe. They knew nothing about expansion chambers at the time. With a big exhaust you actually need to increase the volume in the crankcase.

"People say that it does make a difference boosting the crankcase compression - well it does if you've got a crap pipe. If you've got a useless, small diameter pipe then the pumping action of the engine and the exhaust are sharing the effort to draw gasses up the transfers. But why not design a good pipe that does 80-90 per cent of that work: that's what they are there for! Low crankcase compression is one of the keys to making good power, but you'll fall on your ass if you don't have the right pipe to work with it.



No knee sliders required. Charlie has a totally different riding style to previous Group 4 champion, SRP Racetec's Stuart Day.

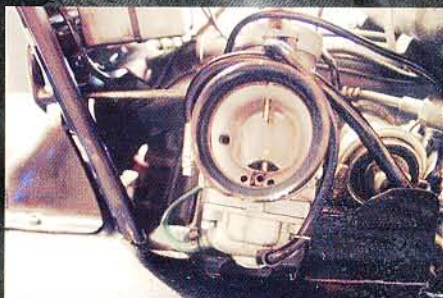
"The other problem with scooter tuning in the UK is that 80 per cent of the tuners will take a pipe and a barrel, and they'll keep tuning the barrel and not change the pipe. The barrel is now ported to work at 9000rpm but the exhaust was designed to work at 6500rpm. What's happening is the components are squabbling with each other - the waves are travelling down the exhaust and arriving at the wrong times. If you've ever looked in a cylinder and seen brown marks inside the transfer ports that's because the pipe is out of sync with the ports. The pulse from the exhaust is returning so early it's stuffing burnt mixture back down the transfer ports. That's also why you see reeds with petals that are all feathered at the tips and burnt away.

"I can see why tuners do it - and I used to do it - because it is cheap. Buy this kit, offer the customer a tune and it's 3hp better, which is great. 'But this is what you could have won with the right pipe - here's 8hp!' The customer says '£500 for an exhaust - I don't fancy that.' OK, but without the pipe you aren't going to get the power."

On exhaust design...

"All the current Lambretta road pipes are about 100mm diameter at the fattest. Mine are 125-128mm at the most. Show that to a scooterist and they won't believe it will fit under the bodywork, but you can fit them if you know what you are doing.

"All the current road pipes work well on the low



The Dell'Orto has been reworked to almost 40mm diameter and fitted with a cable-controlled powerjet.



Thumb operated powerjet lever is used to add more fuel during a race when the motor starts to overheat.



A blank Yamaha 400 head and one of the interchangeable combustion chamber domes.