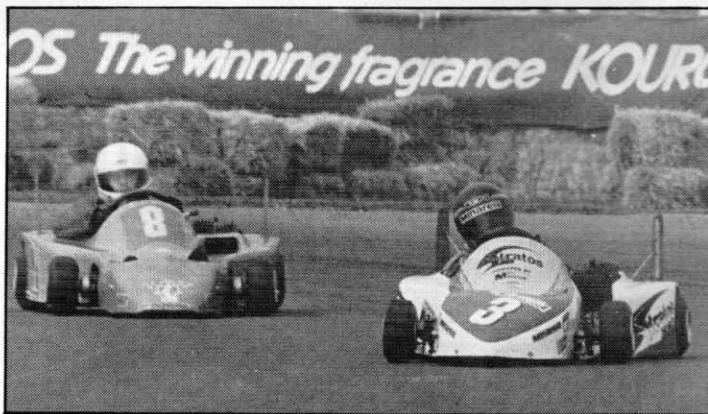


Whilst the heading of this chapter may seem a strange choice, to quite a number of us (and certainly while you're learning the two stroke ropes) it is accurate. Quite a lot of people are in the former category where black art is the best term to apply, for it is apparent to everybody (well nearly everybody) where the air goes in and where the fuel goes in. The big gap in their knowledge is what happens inside the carburettor and does this have any relevance to what the rev-counter needle is telling them as they circulate on the track in a state of ignorant bliss. The latter description applies to those of us who have been fortunate (or unfortunate) enough to try to understand what actually happens when you put your right foot down.

We were forced to consider this in detail during the course of the 1986 season when initial development of the Minarelli 125cc motor was being carried out by our race team. As stated in the last chapter all our previous work had been with Mikuni carburettors; Dellorto, whilst now very popular, were almost unheard of at that time. For obvious reasons on the supply side, we had to be seen to be using the carburettor that was standard issue with the engine so our initial forays were with the PHBE



Silverstone 1986. The author set a new 125 National lap record of 103.03 mph in the heats and won the G.P.

125cc ENGINE RACE DEVELOPMENT AND PREPARATION

By Paul Molloy

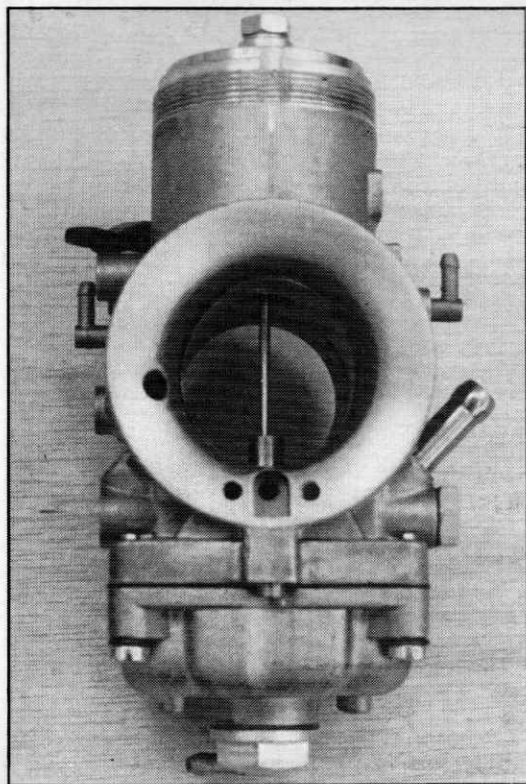
KARTPRO STRATOS LEISURE

PART THREE

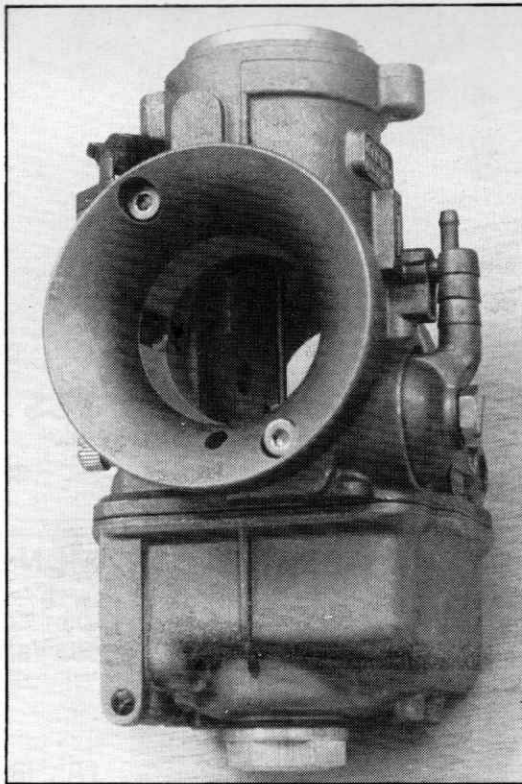
Carburation: Black Art or Invisible Science?

model of 36mm bore. This was an increase in diameter for us as the Rotax engine had been happiest on a Mikuni

35mm model which was actually a bored out version of the 34mm Motocross unit supplied with the engine by



▲ Dellorto PHSB 'smooth bore' carb.



▲ Dellorto PHBE carb.

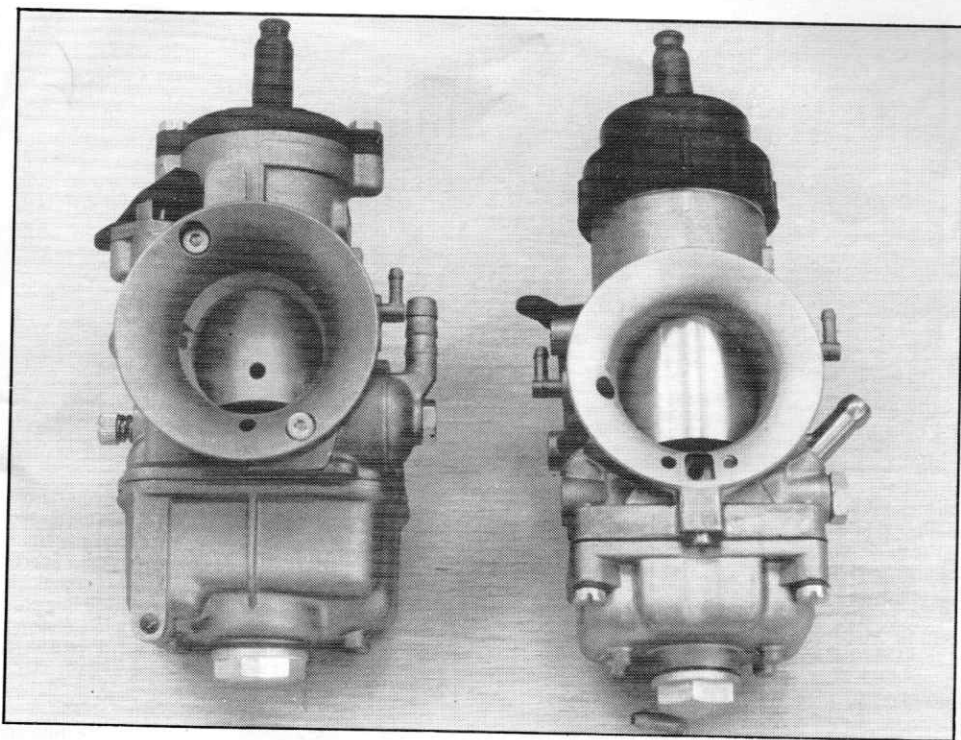
Rotax.

We felt very macho with our larger Dellorto carb but our early results were only adequate, not sensational. We also had to contend with a much shorter inlet tract (an advantage, if you know what to do with it) and what appeared to be a demand by the engine to use less enthusiastic angles of opening on the rotary valve if it were to co-operate with us. We settled for the factory figures of opening at 57° ABDC (After bottom dead centre) and closing at 82° ATDC (After top dead centre) which allowed us to concentrate on the carb settings.

We had been using the standard parts in the carb that came with the motor and had reasonable results. We could not decide what part of the equation was lacking in order to put us on even terms with the Rotax, so a decision was taken to try a Mikuni unit at Cadwell that Spring. The performance of the engine improved to the point that I actually led the final on the day but with two laps to go suffered battery failure (we were experimenting with dry cell batteries) so this showed us that we should now investigate the carburation more fully.

The next series of questions to be answered were based on the visible differences between the Mikuni and Dellorto. The diameters were different, the Mikuni had the effect of lengthening the inlet (to say nothing about the change in volume created), the internal parts were different, the weights were different (which would change the shaking of the carb) and the main jets were calibrated differently. So how do you sort that lot out? The answer is, basically, one at a time.

A distinguished friend of mine pressed some calculator buttons and produced conversion charts for the main jet problem so that we could convert one to the other. We used extension pieces to create both the length and volume that the Mikuni would represent, we also measured all the internal arrangements affecting fuel flow. The weight problem wasn't evaluated as the solution was discovered before this was due for examination. There was also one other difference between the carbs that we had discovered during the Rotax days when we had eventually been able to make



◀ The introduction of the Dellorto PHSB (right) prior to the 1986 Silverstone G.P. gave increased airflow over the PHBE model (left) which the team had been using.

eted 'GP' plates on our Minarelli motor. For me, the nicest part was that we had done this in spite of being told by several people, who thought they knew better, that, in their opinion, we would never be able to produce strong horsepower with this motor because . . . (they would then give their reasons). The moral of the story is that if you really try hard and believe in your own (or, in this case, team) ability you can surprise even yourself.

During this period, we had concentrated on fuel delivery into the engine and our alternative avenues of improving power had, to a certain extent, taken a back seat. The work we had carried out on carburation illustrates the importance of **all** the features in the carburettor as, when we had eventually achieved a good turn of speed from the motor, we were, broadly speaking, using the same sort of main jet size as we had at the start of the season.

Of course, you cannot say when you have perfect carburation, as you only have this situation to suit other variables in the engine equation. We had only dialled-in the carb to suit our existing engine, and we had been rewarded for our effort (the majority of which was in fact off the track). The next stage of development was to look at the ignition system and see what part this played in the game and how this affected other engine requirements.

a 124 air cooled accept a Dellorto PHBE carb without the engine seizing. This is our trade secret, but I would say this much; Dellorto subsequently (not at our behest I might add) incorporated it into their design on later models and it is to do with the breathing of the carb. For those of you out there who think you know about carburation, I'll buy you a pint if you can both tell me what this is and how it controls the performance of the carburettor.

The conclusion that we came to was that although the length and volume argument did have an influence on the situation, the largest discrepancy was internally. Having reached this conclusion we went to Knockhill in June, armed with a selection of needles, atomisers, slides and jets. We also carried with us the hope that we would not require a box full of pistons to achieve our aim. Our measurements had shown that there was a tremendous difference in the available area between the needle and atomiser on full throttle, the Dellorto having the larger annular area by far.

The question next on the list was, what is the optimum, as far as we were concerned. If the difference involved produced the increase in power that we had seen when the Mikuni was fitted, was there more potential in the Dellorto if we were to take this feature and develop our thinking on it? The answer wasn't long in coming and by careful testing

and checking we were able to reduce our lap times by 1.5 seconds as the meeting progressed simply by changing the needle and atomiser and nothing else at all (including, at this stage, the main jet).

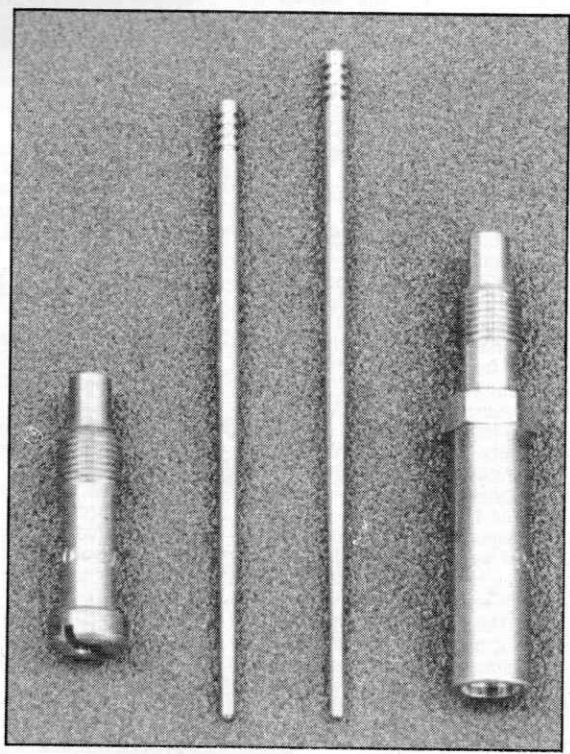
We were absolutely amazed and although we ended up with a compromise between using a needle that was too rich low down we were able to mask this by the use of a very weak slide. In this less than perfect format we took everybody by surprise, including our greatest adversary, and won the meeting, our first and very sweet, victory on this make of engine.

It was obvious to us that we should now intensify our work in this area and even more careful consideration was given to what could be done to optimise the carburettor. We decided to link the area of the annular ring between needle and atomiser to the area of the main jet to see how the control of the carburettor was changed as we experimented with the ratio between the two. The introduction of the PHSB smooth-bore model, just before the Silverstone Grand Prix, served to intensify our effort and the same thinking was applied with the added bonus that a higher airflow could be expected from this model type.

We arrived at Silverstone all charged up and raring to go. The kart was really flying on the Saturday and the lap record on the old Grand Prix circuit was well and truly

smashed. We recorded a lap speed of 103.03mph which won't be broken as the circuit was changed the following year. The editor of *KARTING* magazine was forced to put his hand in his pocket and buy me a beer as he'd just lost a bet we made with him about the lap record being broken by us a week before the meeting had started!

The next day was to be one of the highest points in my racing career as we won the Grand Prix title and those cov-



▶ A 'U' series atomiser and needle from a PHBE carb (left) and a 'K' series needle and atomiser from a PHSB carb.