A TALE OF TWO CARBURETTORS

Strip down and how-to of OS 7 series carburettor.

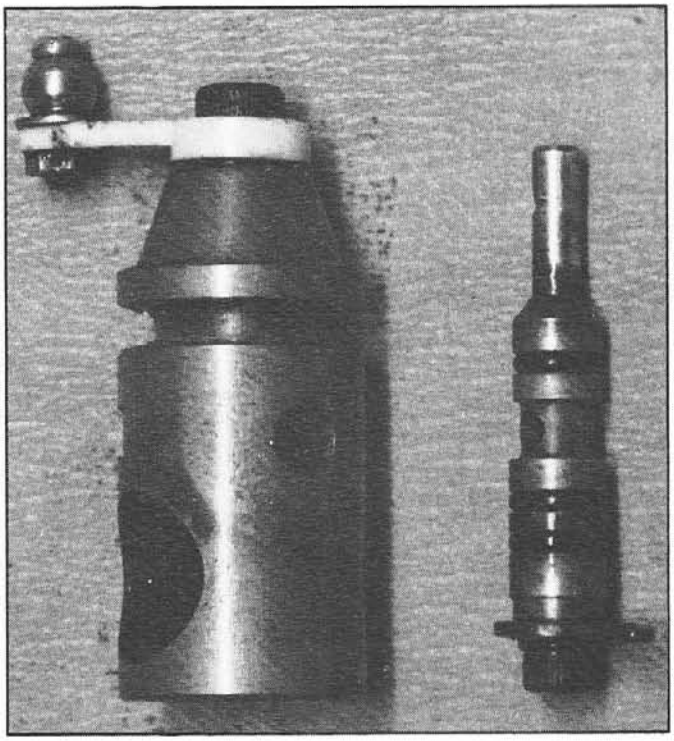
The beauty of the single cylinder, two stroke, glow-fuelled model aero engine is that if you throw fuel and air at it in something like the right proportions, it runs and keeps running. The snag with this is that maintaining that fuel/air ratio at the right value is dependant on the carburettor. This in itself may not seem to be a snag, but the fact remains that of the many black arts that are imbedded in model helicopter flying, the care and feeding of carburettors is one.

When those of us who have been fiddling about with these demented machines for some time first got involved with model aircraft engines, they probably had but one adjustment, the needle valve — yes, I started with diesels too and I know they had two, but don't ruin my story! With a bit of patience, most people could master this one adjustment and only some of us manage to run the engine too lean and wreck it. As time went by and we got involved in radio control, engines had not only fuel/air ratio adjustment for full power, but they also needed to be made to idle reliably.

On the early carburettors, this idle adjustment was simply made by adjusting an air bleed which compensated for the excessive fuel which would enter the engine when the carburettor closed down the air inlet and increased the suck. Of course, we now had two ways of getting it wrong, but once again, with a bit of practise most of us could sort it out. Later carburettors replaced that simple air bleed adjustment by a second needle which came into play as the throttle was closed. On many engines, their scheduling of this was achieved by a sideways movement of the barrel, caused by a pin moving in a groove as the barrel rotated. On others, the metering adjustment was achieved by a slotted tube rotating within another slotted tube, where the two slots were arranged to overlap differently as the throttle angle varied. Idle adjustment was then made by causing one of the tubes to be moved slightly with respect to the other, so altering the point at which the closing of the two orifices occured. Boy, was that a mouthful!!

For the majority of applications, this simple full speed adjustment and idle adjustment carburettor is more than good enough. Provided the designer has arranged for the low speed adjustment to be progressively introduced from the correct point on the throttle travel, then the engine will run smoothly and reliably from full speed to a tick over. It does not take Einstein to realise that the mid range running of the engine will be somewhat dependant on this particular, manufacturer-controlled parameter. Further, we awkward helicopter pilots insist on making our engines spend an awful lot of time in that mid range. After all, if you have a decent amount of power available, your model will hover at around about this setting. So, the fuel/air ratio achieved in the mid range is vitally important for us, much more so than the average fixed wing operator who will tend to fly flat out or parked — with apologies to Hanno Prettner and Ken Binks of course!

Some carburettors, like the Super Tigre, I believe, have a form of mid range adjustment built in by the provision made to rotate the outer metering barrel within the carburettor body. I think it's fair to say, though, that it was OS 7 series carburettors which made the first real song and dance about having a mid range adjustment to set up this all important parameter. In fact, OS produce both a standard aeroplane carburettor and also a special helicopter version which is ball-bearing supported to remove all end float, making it the real bee's knees, as it were.



These are the two important bits. The larger item is the rotating barrel complete with throttle arm. The thinner device is the jet assembly. The jet assembly is moved longitudinally by the mid range adjustment and rotated slightly for the idle adjustment.

The screw in the side of the barrel is indended to retain part of the metering system (see other photos) — it wasn't a Cecil's.

Now, This Is Where The Story Really Starts

It has come to my attention, as they say, that these particular carburettors appear to divide the populus into two distinct camps; those who swear at them and those who swear by them. Regular readers of our sister magazine, R/C Model World, will know that I fly regularly with one Cecil Swan who is not known for liking underpowered machinery. Cecil's answer to providing adequate horsepower, as Rolls Royce say, in his Avant Garde was to install a Picco 61. The particular engine that Cecil had was fitted with a slide carburettor and linking this into the Heim bell crank and differential system presented a certain amount of headaches. Cecil solved this problem by replacing the original equipment carburettor with an OS 7M of somewhat shady origin — never raced or rallied, know what I mean! From hereon, the problems really started!

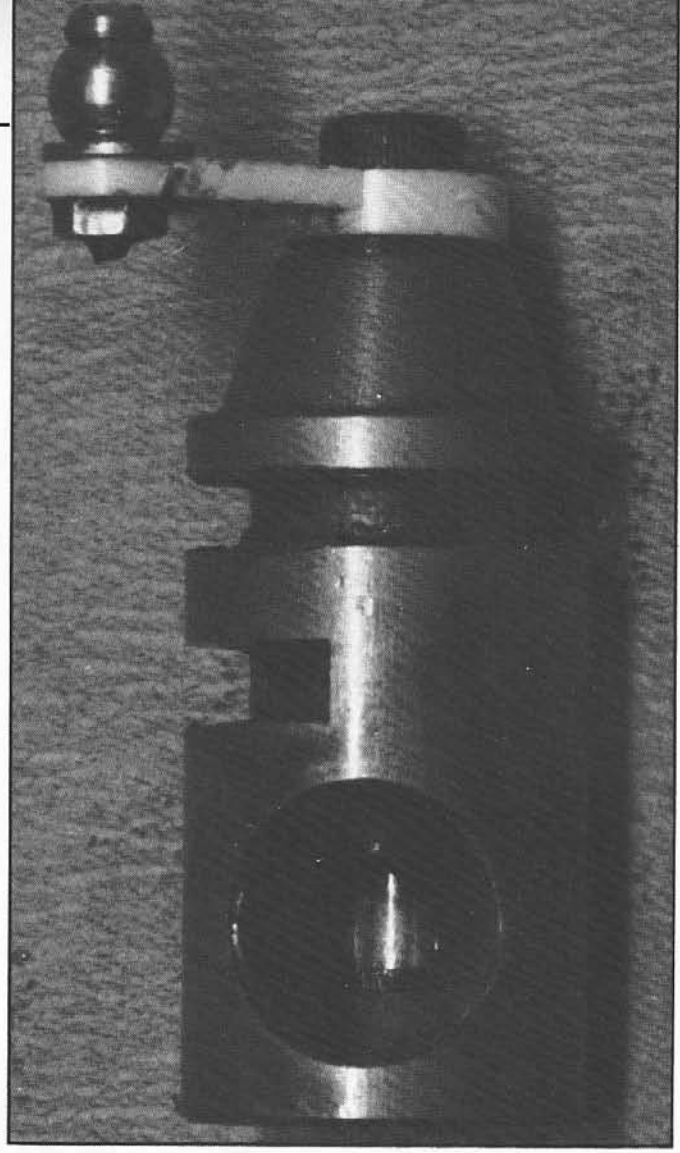
Obtaining a consistent run with this engine was now very difficult. Oh, at full power it went like a dingbat, but obtaining that reliable midrange was difficult and further, the engine had a tendancy to hang on the pipe, something that Heim owners will recognise. This is frequently attacked by making the idle setting very rich, thus causing the engine to load up and "fall off" the pipe when using the throttle hold. However, this could not be done consistently with Cecil's engine. Eventually, he decided that the carburettor had a problem and obtained a 7H, also "never raced or rallied", to replace it. This did not solve the problem. This carburettor had similar, but different problems. Once again, consistency was unobtainable.

Don't Cry Lad

Now Cecil is a man made of stern stuff, he is not one to whom the trembling lip comes easily, but these two carburettors brought him very close indeed! Finally however, the bull was taken by the horns. Boots smoking on the doorstep and two cups of Earl Grey steaming beside the workbench, we got the carbs apart. Having stripped both carburettors, all was revealed. One had one set

of faults, the other a different set. Between the two carburettors, Cecil was, in fact, able to produce one good one which works as OS intended — and save his sanity! Between the two of them, we reckon we've seen all the faults that could possibly occur with this piece of kit.

So, we thought it would be nice to share them with you. Not because we think it's a bad carburettor, far from it. We think it's a great carburettor, but it is rather more complicated than your average and if it goes wrong it can defeat you.



This view of the barrel clearly shows the metering device in the centre of the throat.

The metering arrangements are clearly seen here. Fuel enters through the hole and flows along axis of smaller device. Enters carburettor throat through angled slot which lines up with the aperture in the other part of the metering system within the barrel.

Note, the three O rings which also gave Cecil trouble.

So, what follows, is the low-down on the OS 7 carburettors. Not so much how they work, but what's inside them and what we have seen go wrong.

If you look at the photos with this piece, you will see what is inside the barrel. This particular barrel was taken from the 7M carburettor, not having the ball-race, but is representative of the breed. Also, you will see the jet system. Now, if you look at the jet system you will see immediately that it carries three O rings. One of Cecil's carb's was suffering from either a bad set of O rings or some form of chemical degredation (bear in mind please that it was a second hand carburettor). The result of this was that fuel was able to pass the O rings, rather than be controlled by them. Now, successful operation of this carburettor depends on fuel being steered to the appropriate places. These O rings are pivotal in achieving this result and if they leak, all the fiddling around with the screws on the end of the carburettor you can do, will not achieve correct running.

The evidence we saw was that the lower and mid range adjustments on one carburettor could not achieve a reasonable run. Whatever you did, the engine was always too rich at the lower end. Cecil had actually had to set both mod and idle adjustments to the full lean setting, without achieving anything like a lead idle. So, that's the first problem. Now for the second one.

If you look at the photo in which you can see straight down the barrel you will see that there is, what looks like, an old fashioned spray bar but this particular device has a cut-away in it. This cut-away lines up, partially, with a metering slot in the end of the jet assembly. If you look at the photo which shows the jet assembly in line with the barrel, you will get the idea where these parts go together. Now, this "spray bar" inside the barrel, thus exposing different parts of the metering slot at different throttle openings. The jet assembly can be adjusted both in and out and rotated slightly by the middle and idle setting screws. You will appreciate, therefore, that the relative positions of the end of the jet assembly and this "spray bar" inside the barrel, are absolutely crucial.

Cecil's other carburettor, the one in the photo, had this spray bar assembly slopping around loose. We don't know why this was so, but it was. This, of course, meant that any attempt to attain a consistent setting with this carburettor was totally doomed as whatever you did with the screws would be screwed up by the rattling sleeve (incidently, this particular carburettor being not ball raced and also having had what is best described as a fairly high mileage on it, was also suffering from a lot of end float on the retaining system and was therefore pretty tired anyway). Cecil created a good carburettor out of the two wrecks by taking the jet assembly from the older carb, whose O rings were in fact, in perfect working order and fitted this into the body of the ball raced carb, whose barrel and "spray bar" assembly were well united. This resulted in a first class device.

The carb could then be set up, following the instructions that came with the engine and the engine would run perfectly at these settings. It was hardly necessary to make any further adjustments. Needless to say, since this little escapade, Cecil's Picco has delivered its horsepower without missing a beat.

An interesting side thought from all this is the note that the next range of OS carburettors has had a fixed mid range setting, rather than the variable. We have found that once the 7 type carburettor is in good order, you can set the mid range according to the manual and you really don't need to make any further adjustment. It looks like OS themselves reached the same conclusion. Did they simply pre set it to stop people getting it wrong? So, if you are having trouble with your 7 series carburettor, rest assured that in good working order, it's one of the best carburettors you can come across, so don't curse it, cure it! □