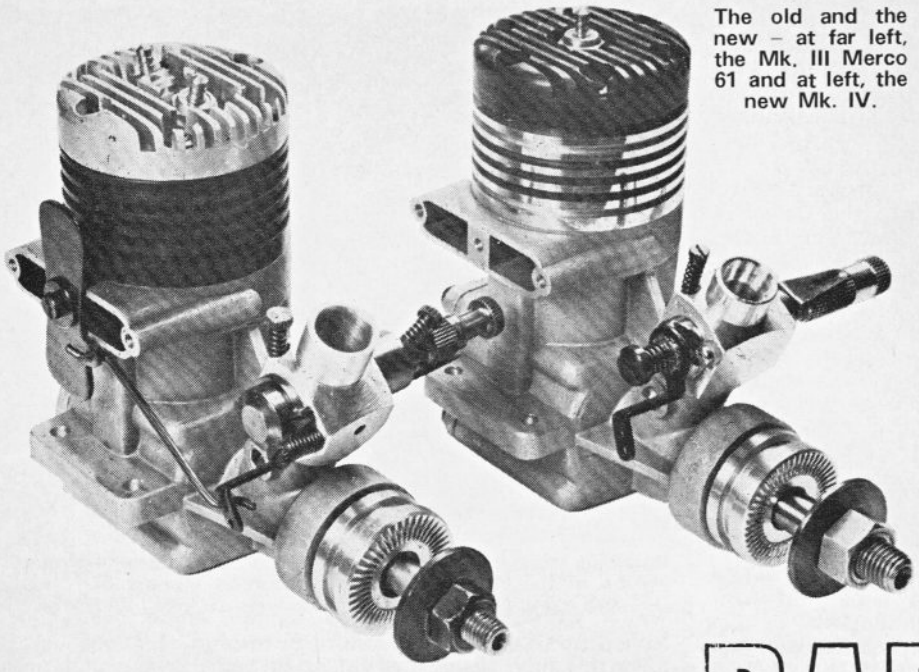


The old and the new – at far left, the Mk. III Merco 61 and at left, the new Mk. IV.

RADIO MOTOR COMMENTARY

By Peter Chinn

Latest Merco 61

The last Merco we had for test was the 1968 Mark III, distinguished from the Mk. I and Mk. II by a new casting, a new cylinder with integral fins and the Merco Micro-Flo carburettor. This engine was subsequently developed into the 'Black Streak' series, retaining the same casting but discarding the complex Micro-Flo carb and reverting to the original Merco set-up of a plain cylinder-liner and a separate aluminium finned cooling jacket.

Recently, some further changes have been made, the most obvious outward difference being the re-adoption of an all-metal carburettor in place of the previous plastic bodied carb and the abandonment of the twin-plug cylinder-head that has been a Merco feature since the mid Sixties. One of these latest models has just been received and its performance will be reported upon next month.

A closer examination of the new Merco and comparison with the Mk. III reveal many interesting modifications. Firstly, although it still has only four exhaust ports, port sizes have been increased from 4.76 mm. to 5.57 mm. square, increasing the areas of both the transfer and the exhaust ports by 36 per cent. Also aimed at improving breathing are modifications to the engine's timing. The exhaust period has been increased from 134 deg. to 140 deg. of crank angle; the transfer period from 112 deg. to 120 and the rotary valve from 190 deg. to no less than 220 deg., closing at nearly 70 deg. after TDC. (This is 20-40 deg. longer than for other leading 10 c.c. R/C motors but is not quite so extravagant as it sounds as, on the Merco, the port in the shaft housing is round, instead of parallel sided, so that very little gas is admitted during the first and last few degrees of the induction period.)

Apart from its single central glow-plug, the cylinder head is not significantly different. The hemispherical combustion chamber has a very slightly smaller diameter and is bordered by a squish band, approximately .050 in. wide, of minimal area. Compression-ratio is slightly higher.

The crankshaft main journal o.d. remains at $\frac{1}{2}$ in. (12.7 mm.) with a $\frac{3}{8}$ in. (9.5 mm.) gas passage and a 5/16 in. front journal but is no longer stepped down at the front end. Instead, the shaft continues forward to terminate in a 5/16-UNF, instead of a $\frac{1}{4}$-UNF, thread for the prop-nut. The crankshaft has also been re-balanced to reduce vibration and now carries a machined-in crescent counterweight as well as having cutaways each side of the crankpin. Crank radius has been increased (but not crank-throw – piston stroke remains the same) and, to clear the counter-balance at BDC, the piston now has a small cutaway in the skirt at the front. The piston continues to have skirt ports and bronze-bushed bosses and both ends of the forged con-rod also have bronze bearings.

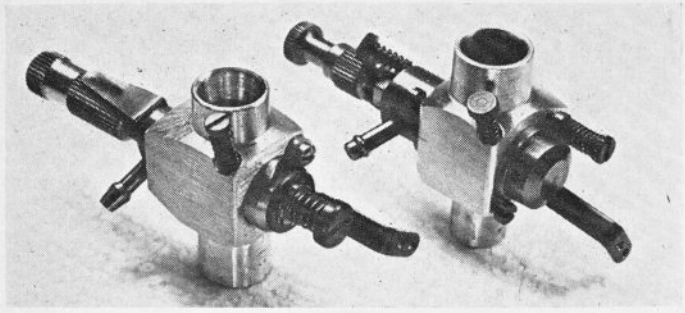
The new carburettor follows current design trends in that it features the two-needle system first used on the Webra Blackhead and now employed, in principle, by HP, Super Tigre and several other manufacturers. In this, the carburettor barrel moves inwards as it rotates towards the closed position and carries with it an adjustable idle-needle which enters the jet and progressively reduces fuel flow. On the Merco carb, sideways movement of the throttle barrel is controlled by an external cam face which bears against a nylon washer and the idle needle has a large head with sensibly sized screwdriver slot to enable the idle mix to be adjusted while the engine is running. The carburettor has a 5/16 in. choke which, after allowing for the jet tube and idle needle, gives a fairly generous choke area of 36 sq. mm.

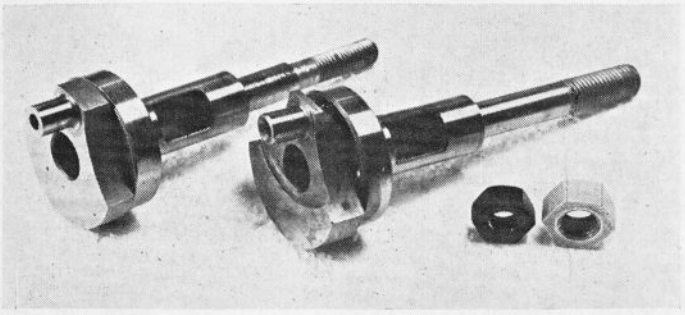
One advantage of having gone back to aluminium cooling fins is a substantial reduction in the weight of the cylinder assembly, so that, even with its heavier shaft, the new motor is 1.2 oz. lighter than the Mk. III. Checked weight of the latest model, less silencer (and without baffle), was 13.7 oz., which is rather below average for a 10 c.c. R/C motor.

Although many other makes have improved considerably in quality over the years, the Merco which, in its original version nearly 12 years ago, set new standards, is still one of the better made R/C motors.

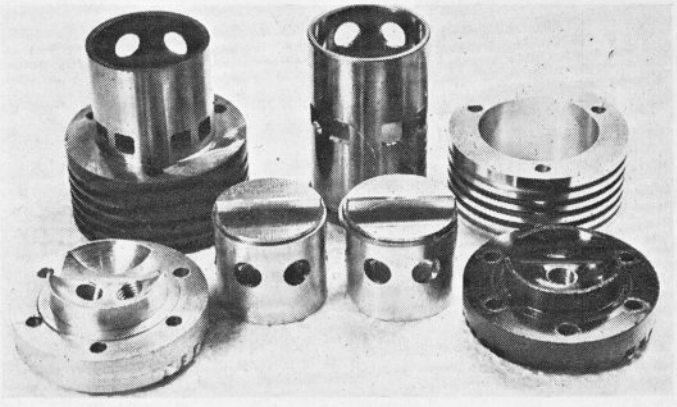
News from the U.S.A.

Our most recent news on the pylon engine front, from the United States, indicates that, so far as Formula I is concerned, the Schnuerle scavenged K&B 40R special is still very much the vital item of equipment. In the Western Formula I Championships event at the Bakersfield Air Races sponsored by *Model Airplane News* magazine, K&B's took the first nine places (Terry Prather's Super Tigre was 10th) and Bob Smith returned two heat times of 1:22.2, one of 1:22.3 and another of 1:22.4 . . . Bob was apparently using one of a number of K&B special-specials, as was his brother Chuck, also Bob Violett, Cliff Weirick and Kent Nogy and none of them, we are reliably informed, survived the 2-day event: Violett's and Nogy's were wiped out in a mid-air collision and the remainder





Left: a feature of the Mk. III was the complex Micro-Flo carburettor (right of picture). Latest engine's carburettor does equally good job with fewer parts. Below, left and right: parts of new Merco 61 (right) and Mk. III equivalents. Note more heavily-counterbalanced shaft, larger cylinder ports and separate cooling fins.



were crashed for various other reasons . . . Expensive business, this pylon racing . . .

Some of the top American aerobatic flyers have been trying out the new Billes-designed, Austrian-built, Schnuerle-scavenged Webra 61 – presumably pre-production examples since the engine has not yet been released generally. It seems that they have run into problems with the engine's high fuel consumption. Ron Chidgey has apparently had to drop the idea of using his for competition work, for the moment, as it is getting through a 12-oz. tank of fuel in six to seven minutes, which is two to three minutes short of the time he needs to complete his pattern. Putting in a half-litre tank is not the answer for most people since current American aerobatic models, in general, are not designed to take anything larger than a 12-oz. tank.

Yamada 60 Tested

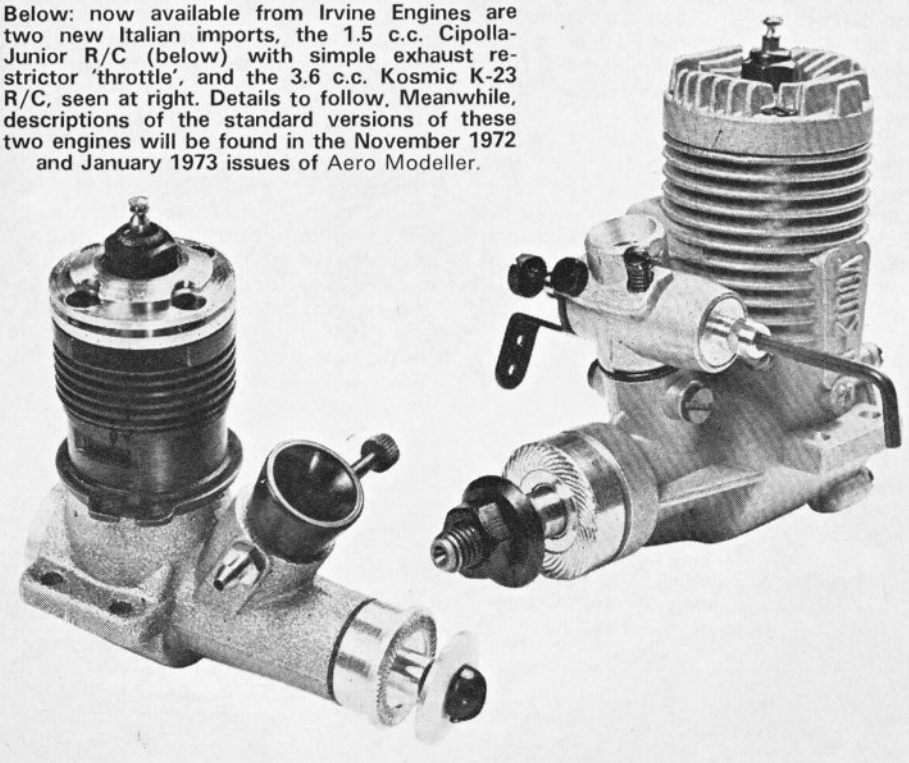
High fuel consumption is something which could also affect the acceptability of the new Japanese Yamada YS-60. We have recently had one of these on test and, although no specific consumption figures were taken, it was quite clear that even allowing for its above average performance, this engine did burn fuel rather more rapidly than the average, more orthodox, R/C .60. The reason for this, we suspect, is less complete fuel atomisation resulting from the engine's enormous intake. The carburettor choke has a cross-sectional area of 74 sq. mm. – which is between two and three times larger than the average choke area for a 10 c.c. R/C motor. It is made possible only by the engine's unique high-pressure fuel system which, by means of a special built-in fuel regulator, force feeds fuel to the carburettor in the quantity needed to meet the engine's needs, irrespective of tank location, fuel level or model attitude.

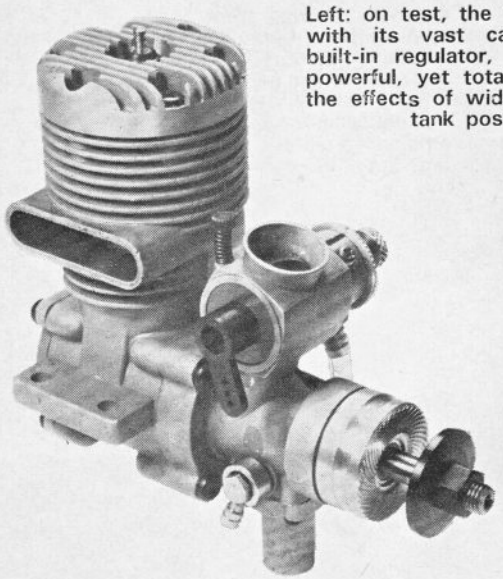
On test, we found that the YS fuel system worked extremely well, controlling the effects of unheard-of variations in fuel head (e.g. five or six feet), while the engine's big carburettor and generous porting contributed to a well above average performance. The motor is supplied with a silencer having interchangeable front ends – closed or vented – and with the open front the following prop r.p.m. figures were recorded on 5 per cent nitro fuel and with a Fox bar-type glowplug:

8,900 r.p.m. on a 14 x 6 Top Flite maple
11,100 r.p.m. on a 12 x 6 Top Flite maple
10,800 r.p.m. on a 11 x 8 Super nylon-glassfibre
11,000 r.p.m. on a 11 x 7¾ Bartels epoxy-glassfibre
12,000 r.p.m. on a 11 x 7 Top Flite maple
12,200 r.p.m. on a 11 x 7 Super nylon-glassfibre
13,000 r.p.m. on a 11 x 6 Top Flite maple
13,500 r.p.m. on a 11 x 6 Power prop maple

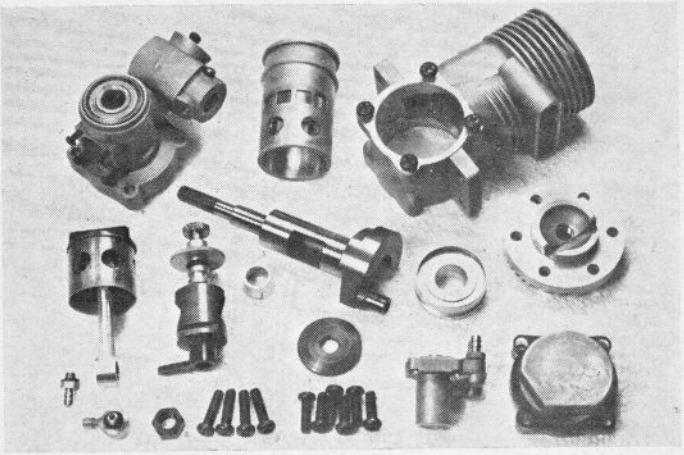
With its vented front end, the YS silencer causes no power loss up to about 12,000 r.p.m. but, beyond this speed, torque falls off more rapidly, causing the power curve to flatten out earlier. With the silencer removed, our test motor peaked at some 16,000 r.p.m. with an output of 1.35 b.h.p. Fitting the vented-front silencer reduced the peak to 14,000 r.p.m. with a 10 per cent drop in power. Thus, on a fine pitch prop (e.g. 11 x 6) aimed at getting the YS up to its peak performance in the air without a silencer, the power loss resulting from adding the silencer would be quite

Below: now available from Irvine Engines are two new Italian imports, the 1.5 c.c. Cipolla-Junior R/C (below) with simple exhaust restrictor 'throttle', and the 3.6 c.c. Kosmic K-23 R/C, seen at right. Details to follow. Meanwhile, descriptions of the standard versions of these two engines will be found in the November 1972 and January 1973 issues of Aero Modeller.

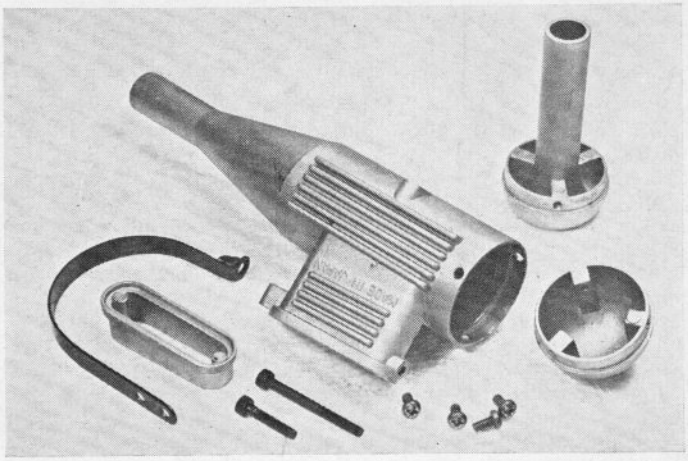




Left: on test, the Yamada YS-60 with its vast carburettor and built-in regulator, proved to be powerful, yet totally immune to the effects of wide variations in tank position.



Above: parts of the YS-60. Spacial fuel regulator unit is in lower right of picture, next to backplate. Cylinder liner is of chromed aluminium.



YS-60 silencer. Interchangeable nose units give a choice of expansion chamber or vented front type. Note also, optional short extension duct.

noticeable. On an 11 x 7, however, there would be only a slight difference in the air (and a barely measurable r.p.m. difference on the ground) while, on an 11 x 8, there should be no difference at all.

Of course, like all silencers of this type, the YS silencer with the vented front is not exactly quiet. There is a substantial improvement when the closed nose cap is substituted – to the accompaniment of a reduction in torque over the whole speed range equal to an r.p.m. drop on normal prop sizes of between 400 and 600 r.p.m.

The Yamada YS-60 does, in fact, lend weight to the argument that, so far as the present state of silencer design is concerned, big intakes and effective silencers just don't mix. Aided by its vast intake (matched by generous porting including an 11.9 mm. shaft passage – the biggest of any shaft-valve 60) the gross (unsilenced) output of the YS-60 is impressive. However, fitting a reasonably effective silencer reduces b.h.p. to a level that, while still good, is not significantly different from other leading 60's. Until someone comes up with a silencer that is effective without restricting an engine's breathing, we cannot, quite frankly, see much advantage in using enormous choke areas.

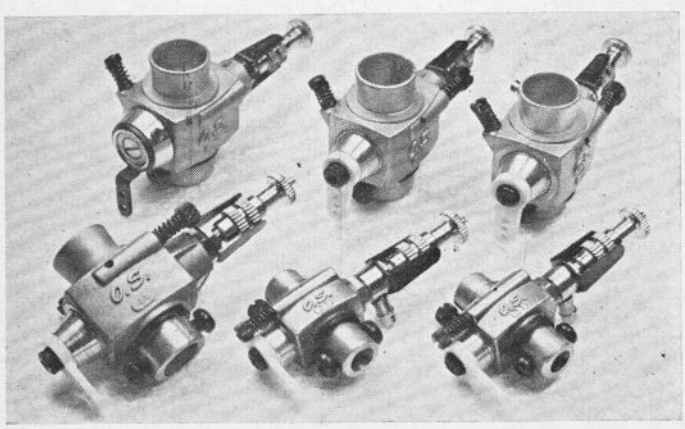
The YS-60 is, nevertheless, an ingenious and worthy attempt to produce something different. The pressure-regulated fuel system worked faultlessly on test. Not only does it virtually eliminate all the problems connected with fuel tank location and reliable operation through wide changes in fuel head, such as occur in aerobatics; it also meters the amount of fuel delivered to the carburettor in accordance with the actual throttle opening. There is no flooding when the engine stops – fuel flow to the carburettor is automatically cut off.

The YS-60 also has several other unusual features. The engine is of the conventional crossflow-scavenged type with a single-ring piston but, instead of the usual steel cylinder-liner, it has an *aluminium* liner with chromed bore. Louis Ross, in the U.S., has been experimenting with chromed aluminium liners and, of course, chromed aluminium cylinders are not unknown in the world of full size two-strokes but, to the best of our knowledge, the Yamada is the first model engine having this feature to be actually marketed.

The YS-60's large choke naturally demands a large throttle barrel (it is actually 18 mm. o.d.) but weight and bulk have been kept down by making the barrel of aluminium and enclosing it in a fairly thin-walled body that is cast as an integral part of the engine's front housing. The carburettor is offset to the right – i.e. in the direction of shaft rotation – to promote a tangential gas flow through the rotary-valve which remains open for 198 deg. of shaft rotation, closing at 56 deg. after TDC. The carb also includes an automatic mixture control device, adjustable by means of a large disc concentric with the needle-valve as on the Perry carburettor.

Despite a quite hefty appearance, the YS-60 is compact, is no heavier than the average R/C 60 and scales a very reasonable 14.9 oz. bare. The silencer adds between 2.8 and 3.3 oz. to this, depending on whether the open or closed front and/or extension duct are used.

For the benefit of readers who wish to know just how the YS pressurised fuel system works, we shall be including a detailed description of this in a later article.



New O.S. carburettor range covers all O.S. R/C engines from Max-III to Max-H60F. Top left is latest 'Series 73' automatic carb for H60F Gold-Head.