

Peter Chinn's

# MOTOR MISCELLANY

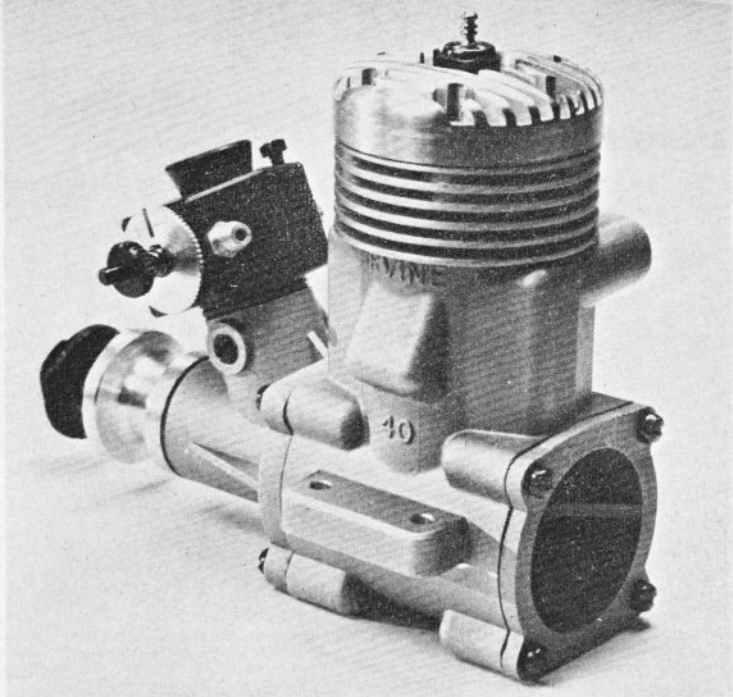
The long awaited Irvine 40 has finally emerged as front induction model, although rear rotary-valve version may be available later. This is one of a pilot-run batch and is fitted with a Perry carburettor.

IRVINE ENGINES, the Hertfordshire based model importers and wholesalers, entered the model engine business as distributors in 1968. Later, they began to move into the accessory and kit fields, followed by R/C (first MRC and then Sanwa) but it was always Ron Irvine's ambition to produce his own engine.

For quite a long time now it has been an open secret that Irvine Engines have been engaged in developing a .40 cu.in. motor. Originally it was intended that this would take the form of a pylon racing unit, but with this type of event becoming more and more specialised and support for it tending to contract rather than to expand, it is clear that future market prospects are somewhat limited and that any new manufacturer entering this field will have an enormous uphill struggle trying to match the performance of the K&B SR.II or the Prather modified ST X-40. Therefore it is quite a relief to find that the first production Irvine 40 is to be a front rotary valve engine that should meet the requirements of a much wider market. A rear induction version will probably be offered later.

Our photographs are of a pre-production unit. It will be observed that this is fitted with an American-designed, German-made Perry carburettor. Orders have been placed, however, for British-made carburettors and it is hoped that production engines fitted with these will be obtained shortly.

Structurally, the Irvine 40 makes extensive use of investment castings. An earlier project (1973) was to have been assembled around gravity



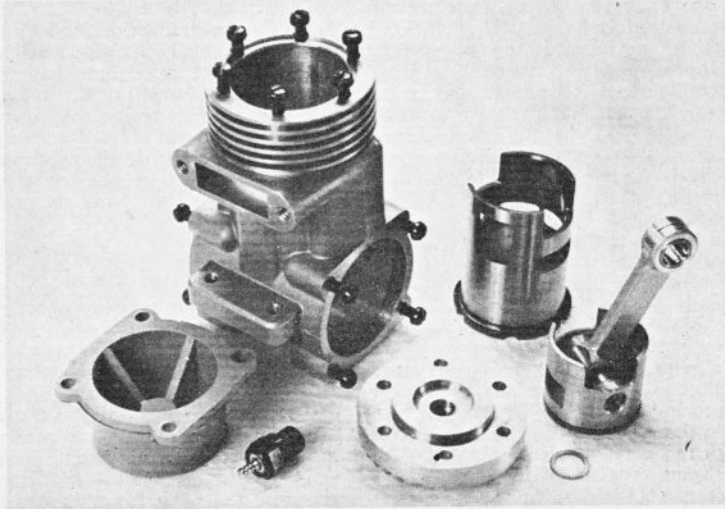
castings but, on delivery, these were considered, by Ron Irvine, to be below the standards he intended to maintain and the entire consignment was scrapped forthwith. The present castings, however, are certainly well up to the standards that a discriminating enthusiast expects in a modern high-performance model motor.

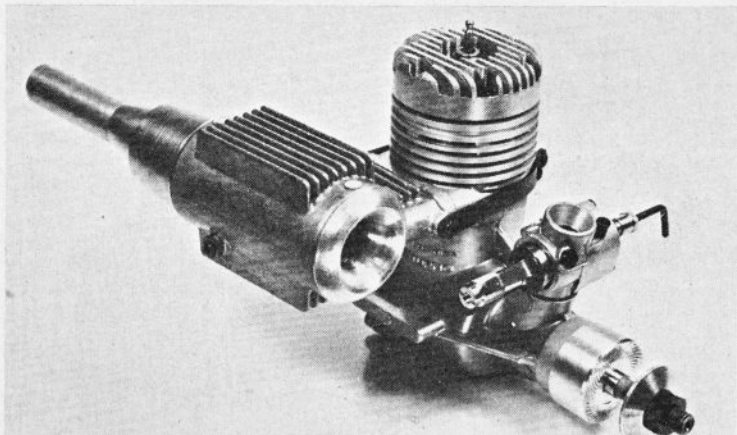
Apart from its use of investment castings, rather than pressure castings (as used by most other makes), the Irvine 40 follows orthodox modern practice. If it owes anything at all to any existing 40 engine, it is to the K&N 40 range. Ron Irvine's entry into the model business was via a U.K. exclusive distributorship for K&B (which he still holds) and he admits to a high regard for

K&B products. Thus, the Irvine 40 has the same bore and stroke as all the K&B 40s (0.840 x 0.790 in.) and bears some resemblance in certain respects to both the standard K&B (formerly "Torpedo") 40F front induction model and the later K&B Schnuerle scavenged motors.

Actually, the Irvine 40F fills, to some extent, the gap between the present two basic K&B 40 motors the 40F and the rear exhaust K&B RS-II pylon-racing unit. Like the 40F it has a Dykes-ringed aluminium piston running in a ferrous liner fitted to a unit crankcase/cylinder casing with side exhaust. Its crankshaft has a  $\frac{1}{8}$  in. (12.7 mm.) main journal and a  $\frac{3}{16}$  in. front journal mounted in a separate front housing with the usual intake boss for the

Irvine 40 parts include investment-cast aluminium alloy crankcase/cylinder casing, Dykes ringed piston, forged conrod with bronze bushed bearings and a head machined from bar stock.





On test, Super-Tigre proved easy to handle with useful performance and good throttle response. Engine tested was most up-to-date (and possibly final) version of this old-established ST model. The now superseded open-front silencer caused virtually no power loss but was much too noisy. Engine weighs 12.6oz. bare, 15.8oz. with silencer.

carburettor. However, the K&B 40F is now a fairly old design basically (it first came on the market just 10 years ago) and, in the interests of extra performance, the Irvine 40 features Schnuerle scavenging and is a little heavier but, unlike the latest Schnuerle K&B, the Irvine does not use an ABC set-up. Incidentally, the engine is put together with American NC 4-40 fillister head screws, exactly the same as are used for the K&B. Mounting dimensions are similar but the Irvine 40 has slightly more frontal overhang and is a little heavier than the K&B 40F.

As unusual feature of the Irvine 40 is its extremely thick (11 mm.) crankweb. This provides a firm anchorage for the separate crankpin, which has a nominal diameter of 7/32in. and is solid. The shaft is bored 0.345in., giving a gas passage of just under 8.8mm. i.d. This is fed from a rectangular valve port approximately 13.9mm. long. Unlike the K&B engines, the Irvine 40 has an integral prop shaft length of 1/2in. dia. and the machined alloy prop driver is mounted on this by means of a split taper collet.

The shaft is carried in 8-ball brass-caged ball journal bearings, a 1/2 x 3/8in. at the front and a 1/2 x 1 1/8in. at the rear. The connecting-rod has bronze bearings and oil slits at both ends. It is coupled to the piston by means of a tubular 0.203in. o.d. crankpin and is retained by wire circlips. The piston has rectangular skirt cutaways fore and aft and a rectangular window on the left side to line up with the third port. The piston ring, as already stated, is a Dykes type and this is prevented from rotating by means of a steel

roll-pin inserted radially through the ring groove.

The cylinder head is machined from aluminium alloy bar stock. Its combustion chamber shape consists of a 12.7mm. (1/2in.) dia. central bowl surrounded by a 4.3mm. wide squish-band. In contrast to the K&B, O.S. and some other engines using this head shape, the squish band is quite flat—i.e., it does not slope upwards towards the centre. The cylinder-liner is a push fit in the main casting and has the usual Schnuerle scavenge arrangement of two angled transfer ports each side of the exhaust and an upwardly inclined third port diametrically opposite the exhaust.

The weight of this particular example of the Irvine 40 checked out at 293 grammes or just over 10.3oz. but it is necessary to emphasise that the engine described here is a pre-production model and that some small changes may be seen in the actual engines that will appear in the shops. For this reason too, port timing, choke area, compression ratio etc. are not given at this stage. Further details including performance data, on the Irvine 40 will be given in R.M. as they become available.

### Super-Tigre ST.51

It was our intention to run a full report on this engine in the R.M. Engine Test series with power and torque curves and a full size drawing. However, although the ST.51 has been in production, in various forms, since 1960 and may not be ready to retire from the scene for a while yet, it appears that no more 51s are being made for the present.

Its companion model, the ST.60 (not to be confused with the heavier and more powerful G.60) is still being offered but neither the ST.56 nor the ST.51 is listed in the 1976 catalogue. There are quite a few 51's around and there may still be a few in the shops but, on the assumption that the 51's withdrawal from production is just as likely to be permanent as temporary, it was felt that to devote an entire article to the engine could not be justified and that it would be more appropriate to limit our coverage to a condensed report instead.

### Design & Construction Summary.

To quickly cover the main design and construction features of the engine, the ST.51 is a twin ball bearing, shaft rotary-valve, cross-flow scavenged engine with ringed aluminium piston and a large diameter crankshaft. The main casting, comprising crankcase, full-length cylinder casing and front housing, is produced from the same die as the ST.60 casting but its cylinder casing is machined, inside and out, to smaller diameters to suit the 51's smaller bore. The 51's bore and stroke are 23 x 20mm. (instead of the 24 x 22mm. of the ST.60) giving a swept volume of 8.13cc. or 0.5071 cu.in.

The hardened and ground crankshaft has a main journal o.d. of 15mm., is bored 11mm. i.d. for the gas passage and has a rectangular valve port located for a nominal induction timing of 30 deg. ABDC to 50 deg. ATDC. The cylinder-liner is a close fit in the main casting and has a chromium plated bore. It has four exhaust ports, timed to open and close at 72 deg. each side of BDC and four transfer ports timed to open and close 62 deg. each side of BDC. The piston is machined from a gravity casting, has a straight baffle, a single compression ring and is fitted with a 6mm. o.d. tubular gudgeon-pin with aluminium pads. The connecting-rod has plain unbushed ends but is machined from a high duty aluminium alloy having satisfactory qualities as a bearing metal. The cylinder head is machined from the solid and has a bell-shaped combustion chamber. It is secured with six screws and a 0.6mm soft aluminium gasket.

The carburettor is a Super-Tigre "Mag" pattern with a ground steel throttle barrel and adjustable automatic mixture control via a second (idle) needle. It has an effective choke area of approximately 20sq mm. *Performance.* At the time of testing the engine, the quieter type Super-Tigre silencer had been announced,

but one for the ST.51 was not then available and, for our test, we had to use one of the noisy open fronted type ST units as illustrated. The engine was fitted with a Super-Tigre long reach bar type glowplug. Air temperature at the time of testing was 13 deg. C and barometric pressure was 1020 millibars.

The ST.51 showed pleasant handling qualities and was notably free-running even when brand new. From the beginning, it always hand-started promptly from cold and, once the ring had bedded in, was also easy to restart hot.

After about one hour of running time, the ST.51 was dynamometer tested using our standard 5 percent nitromethane test fuel and with the open front silencer fitted. A torque of 70 oz.in. was recorded at between 7000 and 9000 rpm, declining to 54 oz.in. at 13,000 rpm. From the torque v. rpm figures obtained, a peak output of just over 0.75 bhp at 12,000 rpm was determined. This, incidentally, is better than the manufacturer's own claim for the ST.51, which they rate at 0.71 bhp at 12,000 rpm. Possibly the factory rating is based on straight methanol/castor fuel. Even so, it became clear, as load was reduced and rpm were raised, that the engine was running too "cool"—i.e. that the ignition point was then retarded and that it would probably respond to a hotter fuel, hotter plug or higher compression ratio.

This was confirmed by switching to a 15 percent nitro fuel. The higher nitromethane content made very little difference to bottom end torque but effectively delayed the decline of the torque curve at above 10,000 rpm and as a result the speed



Parts of the Super-Tigre ST 51. Well built engine has large diameter crankshaft, chromed liner bell-shaped combustion chamber and easy-to-adjust carb with automatic mixture control.

at which maximum power was realised was raised to approximately 12,700 rpm where an output bettering .80 bhp was recorded. A check on static revs on various props using 15 percent nitro fuel gave 9,300 rpm on a 12x6 Top Flite maple, 10,100 on an 11x7 Top Flite maple, 10,600 on a 12x5 Power Prop standard, 11,100 on an 11x6 Top Flight maple, 11,750 on an 11x6 Power Prop maple and 12,700 on a 10x6 Top Flite maple.

Running qualities were noticeably smoother and steadier on the higher nitro fuel and, on the most used prop sizes, this fuel was worth between 200 and 300 extra rpm. Any ST.51 owner who suspects that his engine is suffering the effects of late ignition might, therefore, care to try a higher nitro content fuel. A cheaper alternative would be to

try raising the compression ratio by using a thinner head gasket—for example: 0.4mm. instead of the present 0.6mm.

The Mag carburettor worked well. Using an 11x6 prop, our test motor idled happily at 2,400 rpm after opening up the idle needle setting very slightly. It gave a good mid-range response and excellent recovery at all times.

To sum up, we found the ST.51 a likeable motor. It is easy to handle, has adequate power, runs well and has a good throttle. Last but not least, it is a very well engineered and nicely finished product. We hope that the factory will see fit to continue to produce the occasional batch of ST.51's for the benefit of the many fly-for-fun modellers who need an engine of this type.

Front end parts of the Irvine 40. Note unusually thick crankweb. And now for something completely different!—From Japan comes this photo of OS's new 10c.c. OHV four-stroke aircraft engine, the FS-60, due for early release. Note conveniently located carb above timing case with induction pipe to inlet valve in head.

