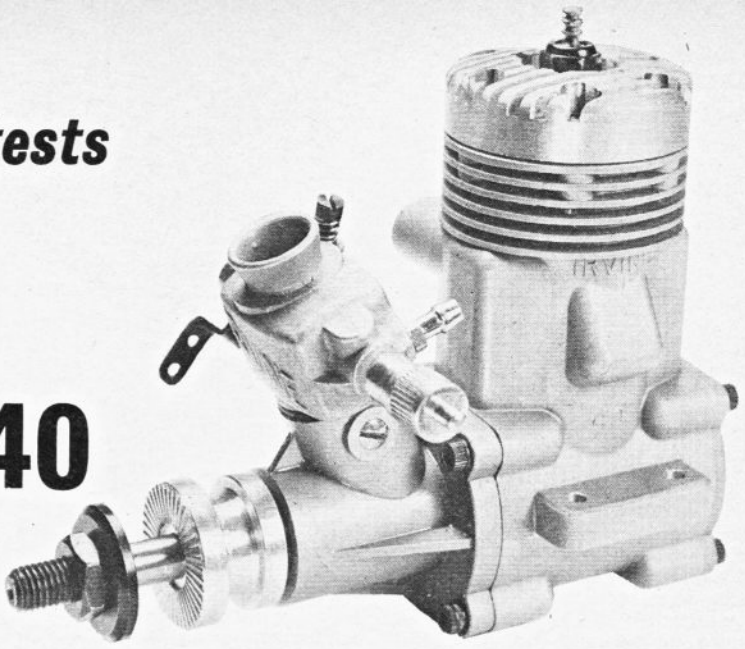
Peter Chinn tests the

IRVINE SPORT 40



". . . very good all-round performance . . . at a very reasonable price"

WELL KNOWN over the past ten years as importers and wholesalers of a wide variety of model engines from the United States and Continental Europe, Irvine Engines of Barnet, Herts, are now manufacturing their own motors, and the Sport 40 R/C was the first of these to go into production. The development of the Irvine 40 goes back some five years, early prototypes having included both front and rear rotary valve units. The production Sport 40 was first announced in 1976, since which time several improvements, including the addition of a new carburettor of Irvine's own manufacture, have been incorporated. Our test report, this month, deals with the current production Sport 40 R/C.

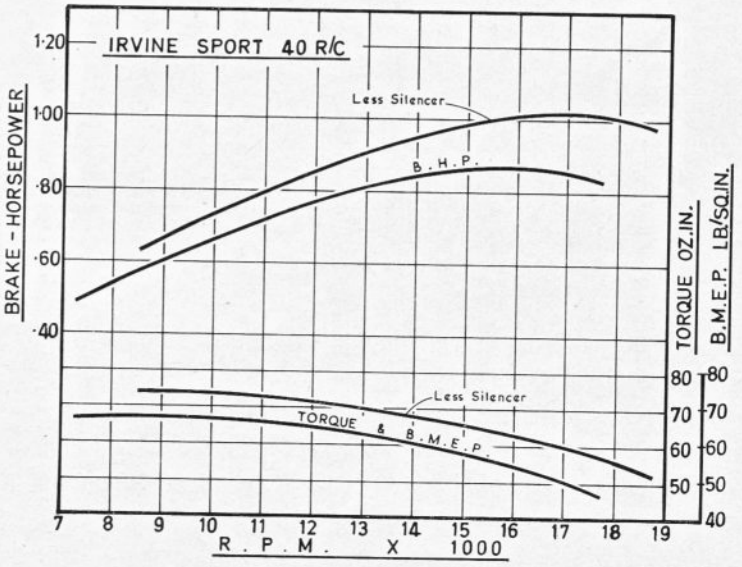
The engine is of modern design. It features Schnuerle scavenging with large volume transfer passages and a generously ported cylinder liner that is made from a steel investment casting, instead of being machined from the solid. The lightweight piston is fitted with a Dykes ring and the cylinder head has the now widely adopted bowl-and-squish band combustion chamber. The only feature that one might regard as being slightly less up-to-date is the $\frac{1}{2}$in. (12.7mm) o.d. crankshaft main journal; most other high performance shaft-valve .40s (with the exception of the HP 40F) having moved up to 15mm shafts, in the interests of larger gas passages and valve ports. In practice, by making the Irvine shaft of nickel-chromium steel, for extra strength, it has been possible, without unduly weakening it, to bore out the main journal for a gas passage that is not significantly smaller than most of those of the larger shaft engines.

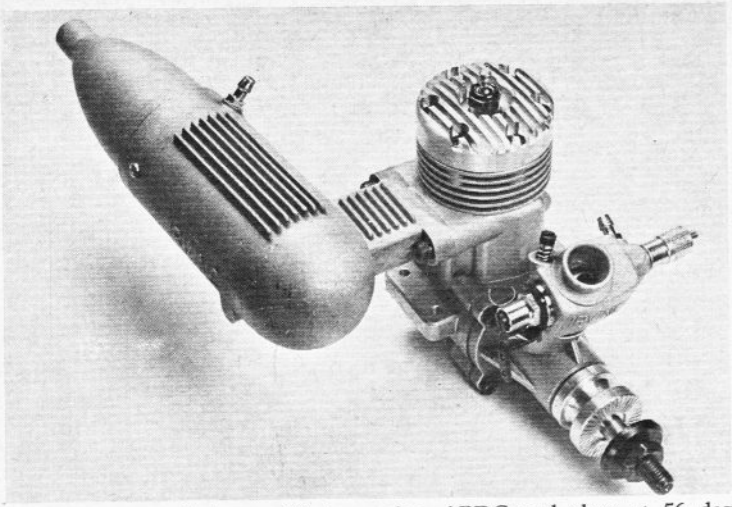
In addition to the aircraft version dealt with here, the Irvine Sport 40 R/C is available in a marine version. This has a water-cooled cylinder jacket and is supplied complete with a flywheel and universal joint, plus an exhaust adaptor for connection to a separate marine silencer.

Design and construction

Main casting. The main casting consists of the crankcase barrel and full length finned cylinder casing in investment cast aluminium alloy. It incorporates three transfer passages, a substantial exhaust duct on the right side, drilled and tapped for silencer attachment, and the usual beam mounting lugs.

Cylinder liner. Investment cast cylinder liner of EN.40 nitriding steel with $\frac{1}{16}$in. (1.59mm) wall thickness, located by top flange and closely fitted to main casting. Centrally bridged exhaust port, timed to open and close at 72½ deg. each side of BDC. Two main transfer ports, flanking exhaust, angled to direct gas to left side of cylinder and timed to open and close at 62 deg. each side of BDC. Rectangular third port, diametrically opposite exhaust, with steeply angled top edge to sweep gas upward and





timed to open and close at 59 deg. each side of BDC.

Crankshaft and front end assembly. Counterbalanced nickel-chrome steel crankshaft with ½in. (12.7mm) o.d. main journal and ¼in. (6.35mm) front journal. Pressed-in solid 0.217in. (5.51mm) dia. crankpin. 8.6mm i.d. gas passage fed by 13mm long valve port timed to open at 34 deg. ABDC and close at 56 deg. ATDC. Shaft supported in one ½ × 1⅛in. 8-ball steel caged ball journal bearing at rear and one ¼ × ⅝in. 8-ball brass-caged sealed ball journal bearing at front.

Investment cast bearing housing, aligned in crankcase barrel by projecting o.d. of rear bearing and secured to crankcase with four 4-40 (American National Coarse thread) Allen cap screws and with paper gasket between joint faces. 13mm i.d. intake boss.

Machined aluminium prop driver via brass split taper collet on ¼in. o.d. propshaft length having standard ¼-28 UNF thread.

Piston and connecting-rod assembly. Investment cast low-expansion aluminium piston with flat crown and single low-pressure Dykes type piston ring pegged to prevent rotation. Rectangular skirt cutaways fore and aft. Rectangular third port transfer window.

Forged aluminium alloy connecting rod, 1.33in. (33.8mm) between centres, with bronze bush and oil hole at each end. Tubular, full-floating gudgeon-pin, 0.203in. (5.15mm) o.d., retained by wire circlips in piston.

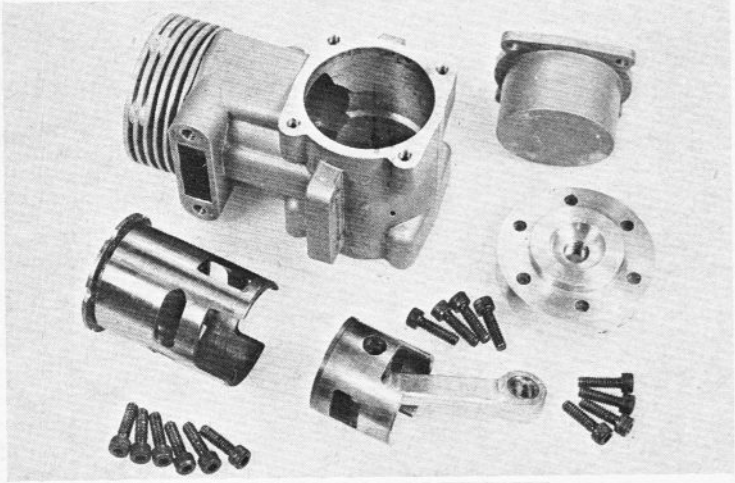
Cylinder head. Machined aluminium alloy finned cylinder-head with bowl shaped combustion chamber surrounded by wide (4.3mm) flat squish band. Head secured with six 4-40 Allen cap screws. No gasket.

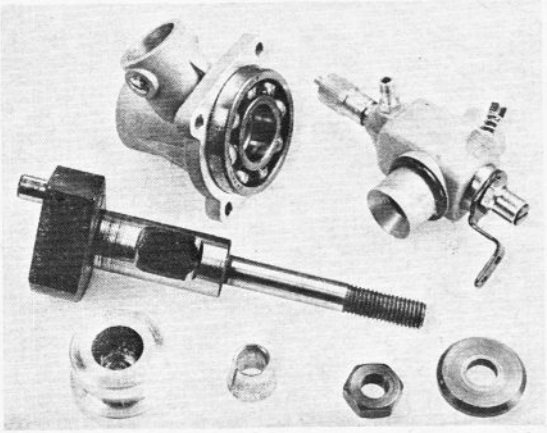
Crankcase backplate. Investment cast aluminium alloy with paper gasket and secured to crankcase with four 4-40 Allen cap screws.

Carburettor. Irvine barrel-throttle, two-needle, automatic mixture control type. Investment cast aluminium alloy body. Ground steel throttle barrel. Needle valve assembly fitted into left side of carb body and including full width spraybar with radial slot type jet hole. Low speed mixture needle, fitted into outer (right hand) end of throttle barrel, enters spraybar and is adjustable by means of recessed screw-head. Throttle barrel guide slot spring-loaded against adjustable throttle stop screw. Both needle-valves fitted with O-rings. Adjustable throttle arm.

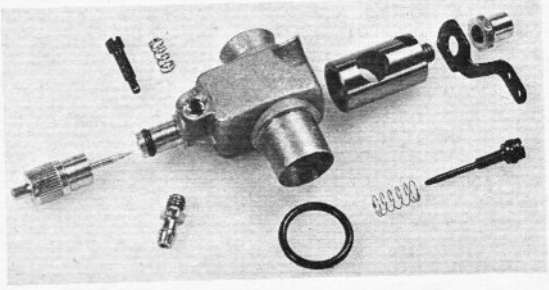
The carburettor has a choke diameter of 0.300in. (7.62mm) and an effective choke area, after allowing for the spraybar, of approximately 25sq.mm.

Silencer. This is very similar to the OS-743 but with slightly larger





Components of the Sport 40 R/C. Carburettor is the Irvine two-needle, automatic mixture control type.



volume (80ml) and a bigger outlet area (53sq.mm). It is fixed to the engine with two Allen screws.

Test performance

Like most of its rivals, the Irvine 40 is supplied without a glowplug. The plug recommended for the engine by Irvine Engines is the American K&B idle-bar type, which Irvine Engines dealers can supply.

Recommended running-in time is not less than one hour on a three-to-one blend of methanol and castor-oil. After this, the oil content may be reduced from 25 to 20 percent and, if the user wishes, 5 percent nitromethane may be added. These recommendations are very much in line with normal practice and were followed exactly for the running-in and testing of our two test motors. For "contest" work, the maker approves the use of up to 15 percent nitromethane. In fact, with its high compression ratio, the Irvine 40 performs more than adequately on standard 5 per cent nitro blend.

Atmospheric temperature at the time of testing was 13°C (56°F), barometric pressure was 1028mb (30.12in. Hg) and relative humidity was 75 per cent. After running in on 75/25 methanol/castor-oil, all testing was carried out on 75/20/5 methanol / castor-oil / nitromethane mixture. Glowplugs used at all times were the recommended K&B long-reach bar type.

Starting and running. Both test units started promptly. The Irvine 40's high compression ratio makes itself felt in a fairly snappy prop movement when one is hand-starting the engine and a good thick finger stall (such as the E.D.) is to be recommended unless, of course, the owner intends using only an electric starter.

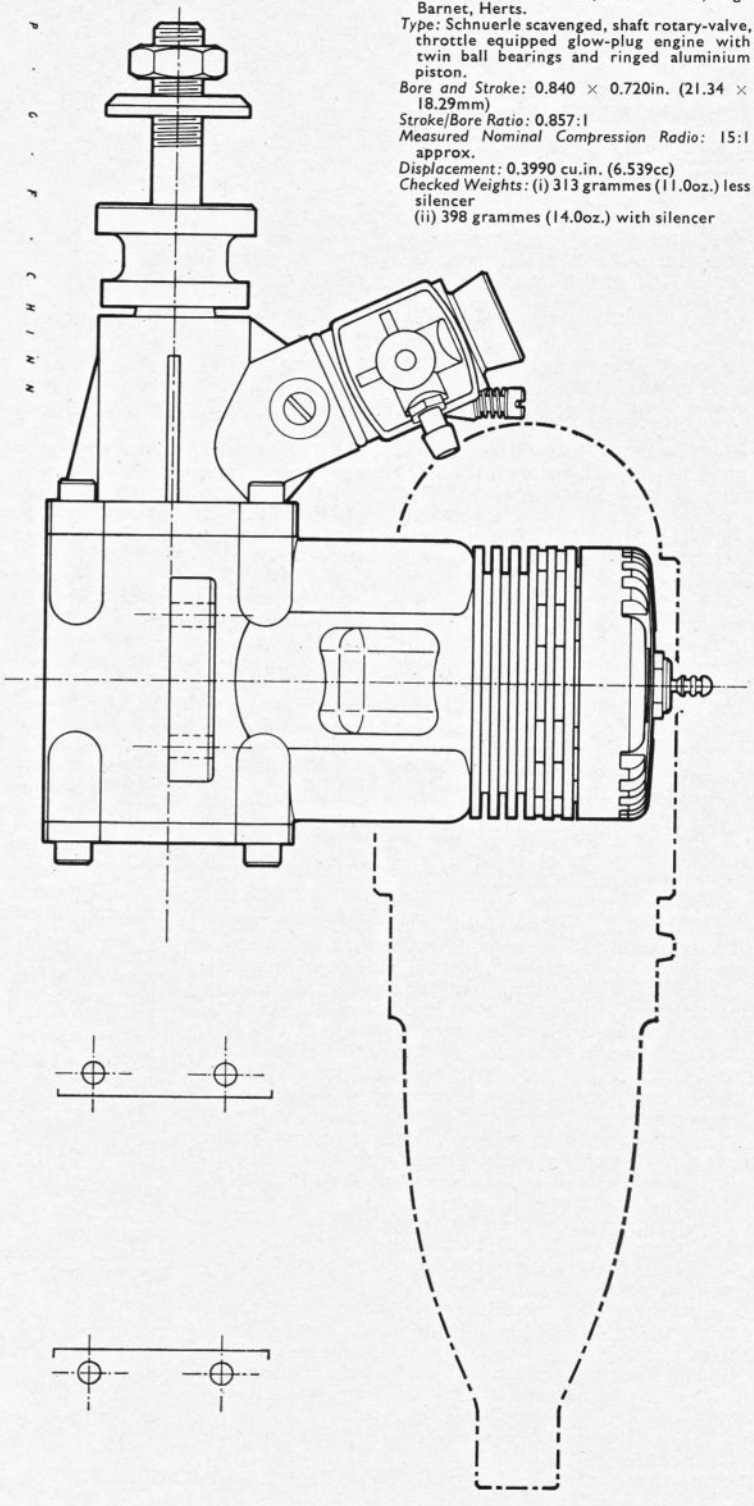
Running qualities on a wide variety of props were good and the two test units were quite closely matched as regards performance after running-in.

After running-in and preliminary testing, one engine was selected for all subsequent testing.

Power—with silencer. The maximum torque indicated on test with the silencer fitted was 67oz.in. at around 9,000 rpm, which is good but not exceptional. However, torque declined quite slowly as load was reduced to raise rpm and, as a result, the power curve, when plotted, indicated a maximum of 9.87 bhp at just below 16,000 rpm. This output compares more than favourably with the figures recorded for other leading Schnuerle scavenged .40cu.in. shaft-valve R/C engines

GENERAL INFORMATION

Manufacturer and Distributor: Irvine Engines, Unit 8, Alston Works, Alston Road, High Barnet, Herts.
Type: Schnuerle scavenged, shaft rotary-valve, throttle equipped glow-plug engine with twin ball bearings and ringed aluminium piston.
Bore and Stroke: 0.840 × 0.720in. (21.34 × 18.29mm)
Stroke/Bore Ratio: 0.857:1
Measured Nominal Compression Radio: 15:1 approx.
Displacement: 0.3990 cu.in. (6.539cc)
Checked Weights: (i) 313 grammes (11.0oz.) less silencer
(ii) 398 grammes (14.0oz.) with silencer

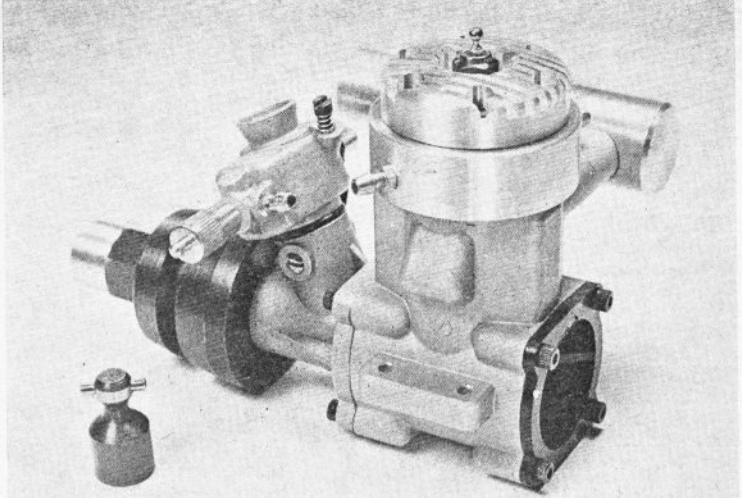


when fitted with their own silencers.

These characteristics are reflected in the rpm figures recorded on a wide variety of props from which it can be seen that for R/C aerobatics, the Irvine 40 is probably at its best when it is fitted with a 10 × 5 or 10 × 6 to keep the revs up. These are, in fact, sizes recommended by the manufacturer. For larger, slower models, an 11 × 4, 11 × 5 or even a "fast" 11 × 6 may be preferable.

Typical rpm figures obtained with the Irvine 40, on 5 per cent nitro, with the Irvine silencer fitted, included 8,900 rpm on a 12 × 6 Top-Flite maple, 10,100 rpm on a 12 × 5 Power-Prop standard, 10,300 on an 11 × 6 Zinger-W maple, 10,700 on an 11 × 6 Top Flite maple, 11,400 on an 11 × 6 Power Prop maple, 12,100 on an 11 × 6 Robbe glassfibre-nylon, 11,000 on an 11 × 5 Zinger, 11,600 on a 10 × 7 Zinger maple, 12,200 on a 10 × 6 Zinger maple, 12,400 on a 10 × 6 Top Flite maple, 12,600 on a 10 × 6 Robbe glassfibre-nylon, 13,400 on a 10 × 5 Zinger, 13,900 on a 9 × 6 Zinger maple and 14,200 on a 9 × 6 Power Prop maple.

Power—less silencer. In order to determine the engine's gross power output, a further series of tests were made with the silencer removed. Maximum torque was increased to 74oz.in. at 9,000 rpm and peak output to just over 1.0 bhp at 17,000 rpm.



Marine version of the Sport 40 R/C, with watercooled head, flywheel, manifold and coupling.

An output of 1.0 bhp is well up to expected levels for a .40cu.in. non-racing type R/C engine on 5 per cent nitro and puts the Irvine 40 among the top four engines of this type tested to date.

Throttling. The Irvine two-needle carb is easy to set up and worked well on test. The instruction leaflet issued with the engine suggests setting the idle for about 3,000 rpm and this was found to be a safe target even when the engine was propped for full throttle speeds of around 13,000-14,000 rpm. Propped for a slightly lower (12,000 rpm) maximum, the idle could be lowered to a safe 2,500 rpm, still with instant recovery and good mid range control. The transition from two-stroking to four-stroking, as the throttle was closed, occurred at between 7,000 and 6,000 rpm.

Comment

A timely addition to the ranks of British made motors, offering modern design, sound engineering and very good all-round performance—power, handling and throttle control—at a very reasonable price.