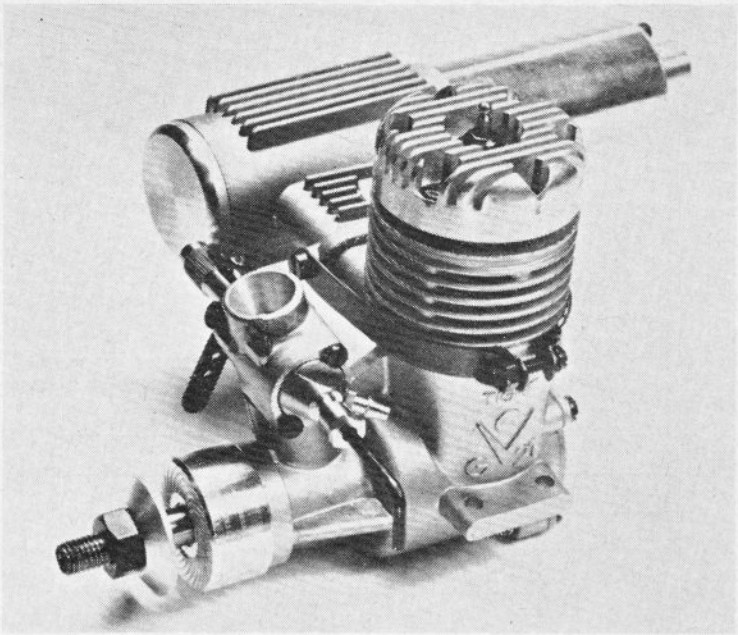
Peter Chinn tests the

SUPER-TIGRE G.21/46



THE Super-Tigre G.21 range covers engines from 4.8 c.c. to 7.5 c.c. and the G.21/46 is the largest of these. These motors have been developed over a very long period; some 11 years in fact.

The current G.21/46 R/C version is fitted with a Super-Tigre Mag-III carburettor with automatic mixture control and a moderately sized choke to ensure good fuel suction. The engine is intended primarily for aerobatic use and is one of the most popular Super-Tigre R/C engines, being well suited to the requirements of the average "Sunday Flyer" who may favour a smaller and cheaper-to-build model than the typical 60-powered contest machine.

Except for the location of its valve intake (offset in the direction of shaft rotation to promote a tangential gas flow) the G.21/46 R/C is of fairly orthodox design with crossflow scavenging, twin ball-bearings and a single-ring aluminium piston. Refinements include a chromed bore cylinder liner and bronze bushes at both ends of the connecting-rod. Construction is to high standards throughout.

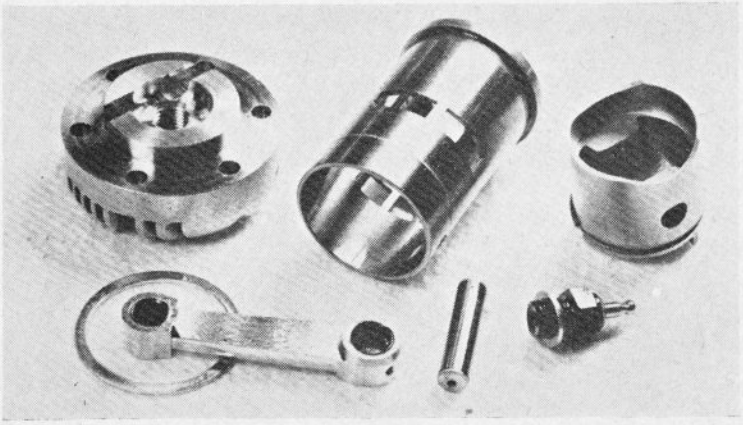
"... A well made 7·5 cc engine of moderate weight and excellent performance..."

Design and Construction Summary

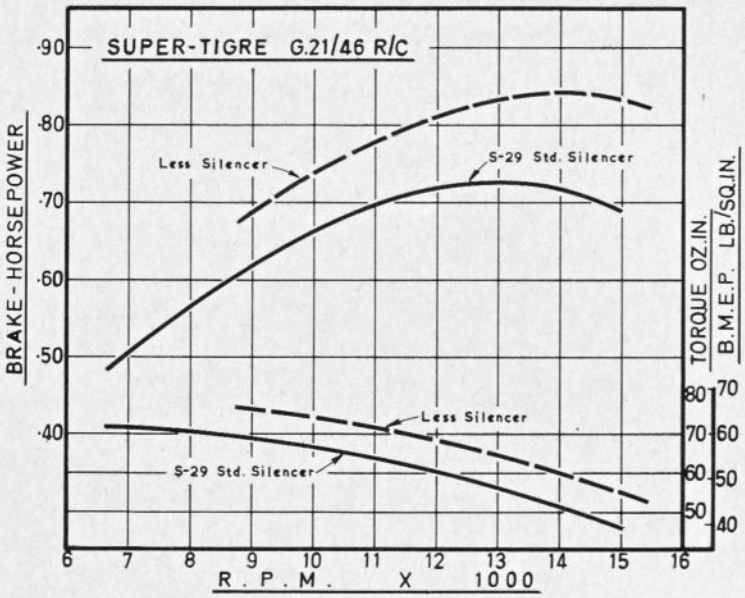
Main Casting. This comprises the crankcase, front housing and full-length cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs and a short exhaust duct on the right side.

Cylinder. Finned cylinder casing integral with crankcase and fitted with chromed steel liner. Four exhaust ports timed to open and close at 66 deg. each side of BDC. Four transfer ports timed to open and close 57 deg. each side of BDC.

Crankshaft and Prop Drive Assembly. Counterbalanced hardened steel crankshaft with 12 mm. dia. main journal and 7 mm. front journal. Integral 6 mm. dia. hollow crankpin. Rectangular valve port timed to open at 28 deg. after BDC and to close at 53 deg. after TDC and admitting gas to 9 mm. bore gas passage through main journal. Shaft supported in one 12 × 28 mm. 8-ball brass-caged GMN ball journal bearing at rear and one 7 × 19 mm. 8-ball brass-caged GMN ball journal bearing at front. Machined aluminium alloy prop driver fitted to



Squish head and porting show clearly in this shot.



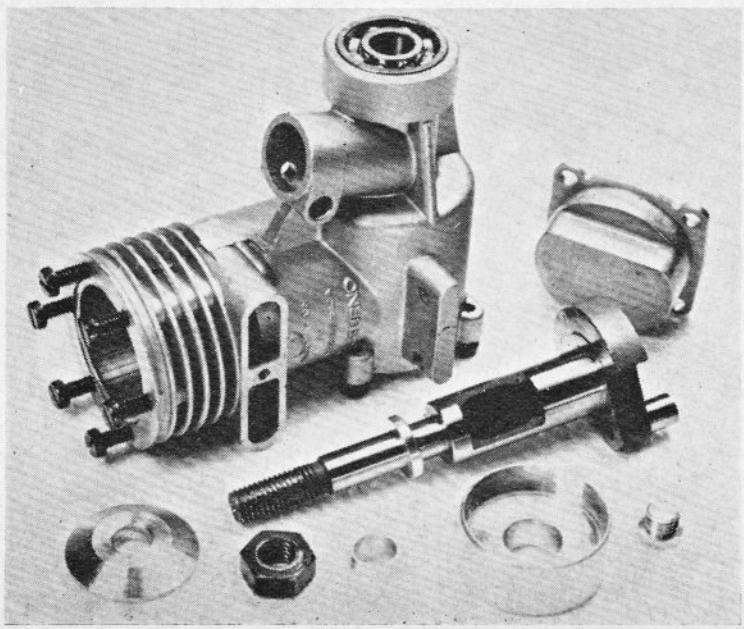
aluminium split taper collet on shaft.

Piston and Connecting-rod Assembly. Gravity-cast aluminium alloy piston with flat crown, straight baffle and single compression ring. Machined aluminium alloy connecting-rod bronze bushed at both ends with two oil holes at big-end and one oil hole at small end. Fully floating 5 mm. o.d. tubular gudgeon-pin with aluminium alloy end-pads.

Cylinder-Head. Machined aluminium alloy, finned, with 4.2 mm. wide squish-band, slotted for piston baffle clearance. Bowl shaped combustion chamber with centrally located long-reach Super-Tigre standard glowplug. One 0.6 mm. soft aluminium gasket. Head secured to main casting with six screws.

Backplate. Pressure diecast aluminium alloy, secured to crankcase with four screws. Paper gasket.

Carburettor. Super-Tigre "Mag-III" barrel-throttle type with automatic fuel metering. Pressure diecast aluminium alloy body. Steel throttle barrel having 7.5 mm. choke. Fixed 4 mm. o.d. brass spraybar. Effective choke area 16 sq. mm. Low-speed mixture needle mounted in outer end of throttle barrel with tip located in spraybar to control exposed length of slit type jet. Barrel moves inward as it rotates to closed position, reducing fuel flow through jet.



Offset intake is biased to right of centre line. Shaft port also advanced.

Silencers. Super-Tigre silencers for this engine are the S-29 series units. These comprise the original S-29 standard expansion chamber type and the S-29 air scavenged or extractor-tube type. The standard type has a 6.4 mm. i.d. outlet giving an area of 32 sq. mm. for reasonably effective noise suppression. The air-scavenged type has an 11 mm. i.d. tailpipe and a 12.7 mm. intake vent giving an effective outlet area of 222 sq. mm. for minimum power loss.

Modified extractor type Super-Tigre silencers with much smaller outlet areas are now being manufactured, but one to fit the G.21/46 was not available at the time of testing.

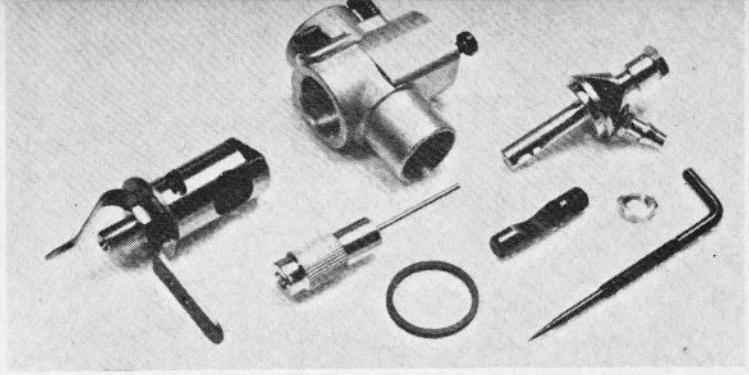
Test Performance

Our test motor came from the U.K. distributor. It was a perfectly standard example and was given a nominal running-in period of 60 minutes accumulated in the usual manner in a series of short runs, with cooling off periods between each, starting off rich and then, towards the end of the series, leaning out to full power. A straight fuel mix of 3 parts methanol and 1 part castor-oil was used for all running-in.

For actual performance tests we used our standard R/C test fuel containing 5 per cent pure nitromethane. Atmospheric temperature at the time of testing was 12 deg. C (54 deg. F) and barometric pressure was 1022 mb (30.18 in. Hg). The glowplug used was the Super-Tigre long-reach standard type as supplied with the engine.

Starting and Running. On props of 10in. diameter or larger, the G.21/46 R/C was easy to hand-start, cold or hot. On smaller diameters it began to get slightly vicious but, in fact, there would seem to be little point in using anything smaller than a 10 × 6 prop, particularly where orthodox models are concerned, as a 10 × 6 is fairly well matched to the engine's power curves, irrespective of the silencer used. Anything that allows the engine to turn much faster will simply mean that the G.21/46 R/C will run beyond the peak of its bhp curve in the air and simply waste power.

Running qualities were good. The G.21/46 R/C was not fussy as



"Mag III" fuel metering carb assembly. Low speed mixture control is at rotating end.

regards fuel and could be operated quite satisfactorily on economical fuel mixtures such as a straight blend of methanol and castor-oil. On such a mixture it ran steadily and was only 200-300 rpm slower than on a 5 per cent nitro mix.

Power. According to data published in a recent Super-Tigre catalogue (in which the G.21/46 is illustrated in its non-throttle equipped control-line stunt version) this motor is rated at 0.65 bhp at 12,000 rpm. It is not stated whether this is with a silencer fitted but, even allowing for the fact that this C/L stunt version may have a slightly smaller choke area than the R/C version (the engines are identical except for the carburettors) the figures appear to be uncommonly modest ones compared with the 0.80 bhp and 0.95 bhp at 19,500 rpm (fuel unspecified) claimed, respectively, for the more highly tuned but considerably smaller G.21/29FI and G.21/35 FI models. We were not surprised, therefore, to find that our test model G.21/46 R/C performed better than the manufacturer's figures suggested. In fact, the G.21/46 R/C did even better than we had expected, recording, on 5 per cent. nitro fuel, 0.84 bhp at 14,000 rpm less silencer and 0.72 bhp at 13,000 rpm with the S-29 standard expansion chamber.

In terms of prop revolutions, we obtained readings (with S-29 expansion chamber silencer) of 10,400 rpm on an 11 × 6 Punctilio wood prop, 10,700 rpm on an 11 × 6 Graupner Super nylon-glassfibre, 11,200 rpm on an 11 × 6 Power-Prop wood, 11,300 on an 11 × 5 Top Flite wood, 12,000 on a 10 × 6 Punctilio wood, 12,100 on a 10 × 6 Top Flite wood and 12,700 on a 10 × 5 Graupner Super nylon glassfibre.

Removal of the silencer added up to 700 rpm to these figures. Substituting the S-29 extractor silencer for the older type resulted in similar gains—i.e. this silencer caused no power loss at all. This unit is, however, very much noisier (and slightly heavier) than the expansion chamber type which does give reasonably good suppression.

Throttling. The Mag-III carburettor is undoubtedly the best of the many Super-Tigre R/C carburettors that have been produced over the past dozen years. On the G.21/46 it works very well indeed, being easy to set up and giving reliable idling speeds of around 2,500 rpm with progressive mid-range control. Adjustment is quite simple. Having adjusted the main needle for full power, the throttle is closed to the idle position and the second needle is then adjusted in exactly the same manner as the main needle until the correct idle mixture is obtained. The approximately correct mid-range mixture is then obtained automatically. Fuel suction is good.

Comment

A well-made 7.5 c.c. engine of moderate weight and excellent performance. Should be a good choice for the smaller type of aerobatic model of around 500-550 sq. in. wing area and 5-5½lb. all up weight.

GENERAL INFORMATION

Manufacturer: Jaures Garofali & Co., Bologna, Italy.
U.K. Distributor: World Engines Ltd., 97 Tudor Avenue, Watford, Herts.
Type: Throttle equipped, shaft rotary-valve glowplug engine with two ball-bearings and ringed aluminium piston.

Bore & Stroke: 22.0 x 19.8 mm. (0.8661 x 0.7795 in.).
Stroke/Bore Ratio: 0.900 : 1.
Displacement: 7.527 c.c. or 0.4593 cu. in.
Checked Weights:
(i) 271 grammes—9.6 oz. (less silencer).
(ii) 342 grammes—12.1 oz. (with S-29 standard silencer).
(iii) 362 grammes—12.8 oz. (with S-29 extractor silencer).