

Test Bench

JAPANESE RED HEAD



O.S. Max 15RX. (1/10 IC Circuit)

This new 2.5cc. engine entry into the 'Easy to Drive' 1/10 circuit class finds the field already inhabited by strong performers from Italy. In essence the rigid performance limiting specification which any engine must abide by to gain entry does of itself prevent costs from escalating as has occurred in the 1/8 class. In addition these engine 'specs' were expected to achieve quite mild, easily controlled power characteristics which would also improve matters for any Newcomer to the sport.

E.F.R.A. SPEC

Briefly, the EFRA/BRCA engine regulations require the following:

1. 2.5cc. max.
2. 4 ports only.
3. Max. exhaust port height - 4.5 mm.
4. Stroke not less than 14 mm.
5. Crankshaft induction bore - 7 mm. max.
6. Carb. bore - 6 mm. max.
7. Methanol fuel only with 16% max. Nitro.
8. EFRA approved pipes only, having max. outlet dia. of 5.2 mm.
9. Different bearings permitted, no other mods.
10. No "turbo" heads or "turbo" plugs allowed.

Needless to say, the new OS 15RX conforms with all of these, and the resulting performance, on the Dyno, at least, reflected the hopes of the EFRA rules committee.

Above: Japanese Red Head.

Mechanical details

The striking matt-black engine finish with contrasting and prominent red heat-sink cylinder head probably does little to keep costs down... but is a sales point and also keeps engine temperatures down somewhat. In the usual rigid one-piece style, the crankcase is constructed with all the customary OS flair. Evidence of the care they take is the almost unseen small gusset bracing the front bearing housing against the carb. housing. The housing bore between the 2 ballraces is heavily relieved in the bottom 2/5 position, which provides a fuel-oil "reservoir" to keep front bearing from "oil-starvation".

The head itself sits on top of liner (rather than the more common "plug-in" method). This makes assessment of actual squish clearances more simple, whilst at same time helps to keep costs down. Effective compression ratio is highish at 8:56/1... but this is probably so because a very strong tuned-pipe 'supercharge' was not expected because of the pipes built-in restrictions.

Lacking the various refinements which most 1/8th engine's crankshaft usually have, means that the 15RX shaft is a very simple, inexpensive, though highly finished and accurate piece. It does however feature the diagonally drilled "crankpin to induction bore" lubrication hole which is such an effective centrifuging method. Crankweb counter weighting appears quite small, though probably reflects the very low piston weight of .1 oz. (2.8 g.).

The RX 15's chromed brass liner has the usual Schnuerle porting with modest timing and a final blowdown period of 17 deg which will only allow moderate-tuned-pipe performance gains. At the top of the liner is a substantial distortion-proof upper flange against which the head seats.

Piston construction is in hi-silicon alloy, and has circular cut-aways to assist main transfer breathing, which also keeps weight down.

The light connecting-rod in alum. alloy is bushed at both big and little ends, but neither of them are drilled for lubrication assistance, as is often done.

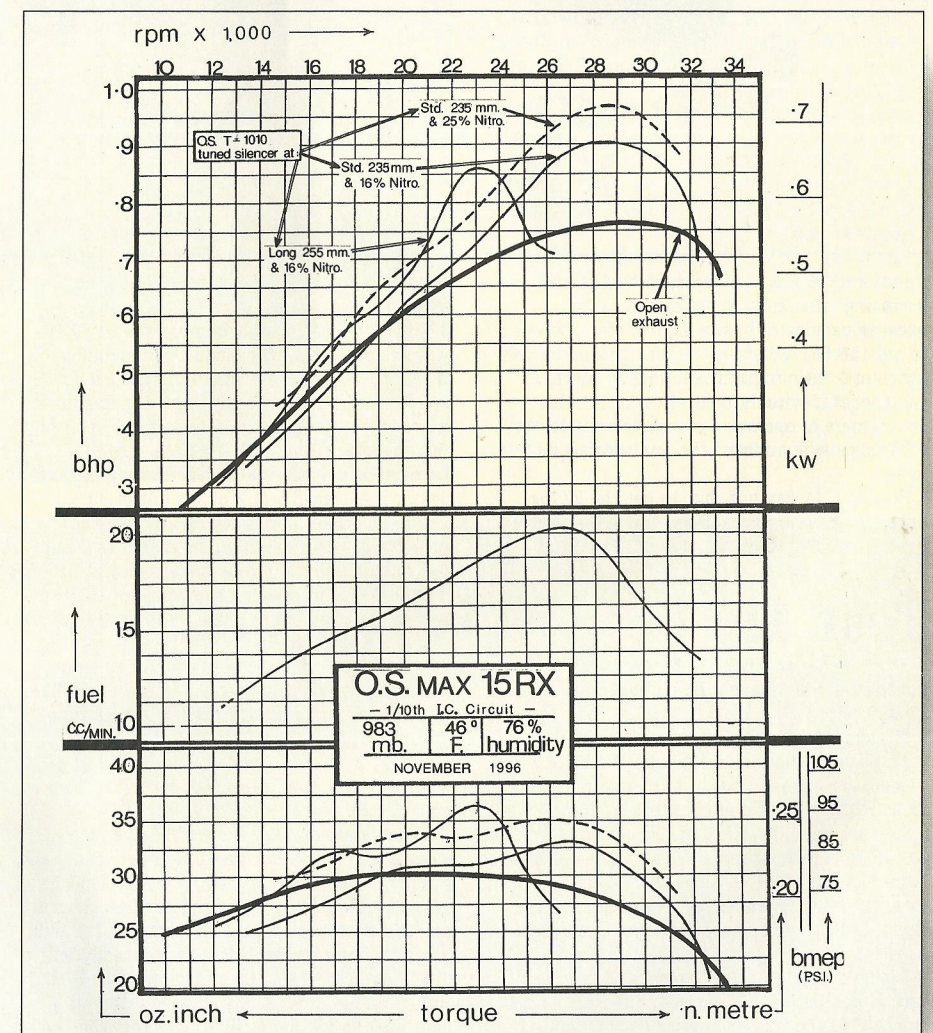
The usual slide-throttle carb is fitted with secondary and vertically mounted main needle controls - all "0" ringed for vibration security and proof against air-leaks. An insulation sleeve is fitted between carb. and main crankcase which keeps carb. temperatures more constant and therefore settings more consistent.

Performance

With all various engine restrictions built-in, the expectation was of quite mild but flexible performance... certainly there could be no emulation of the top 1/8 class specific HP/cc. figures being reached here, because it would not be logical... and surely neither was this being sought. However the Mfrs. claim of 1.18 HP at 28,000 RPM (1.2 PS) is a high 84% of the HP/cc. given by the typical 2 HP of the best 1/8 class engines, and so suggested some interesting moments to come...



With the OS air cleaner and the T-1010 tuned pipe, the 15RX is a smooth running, predictable and long lasting addition to the 1/10th arena.



Cox 5.5 x 4

First problems centred around the acquisition of a few suitable propellers to allow correct RPM placement of this quite small engine. The writer's normal Taipan 7 x 4 (used for 3.5cc. engines) proved much too heavy a load and thus kept RPM's down in the 21K area. An APC 7 x 4 only slightly improved matters, so a forcible decision to use the seemingly unlikely

Cox 5.5 x 4 proved the answer... though readers should be warned that bench running of this engine with that particular propeller is not really the most satisfactory position, unless the hub hole is kept reasonably small... because there is not that much material there to stand high RPM centrifugal forces.

Anyway this placed RPM just in the 28/29K area. During this early familiarisation period, it became clear how very smooth and vibration-

Note the deep recess in the top of the crankcase to accommodate a very thick liner flange. Construction throughout the RX15 is up to OS's normal high standard.



free the RX15 was... so much so that it was becoming an anxious time for the writer because paradoxically vibration is of assistance to get the heavy Dyno swinging against the inherent "static friction" such heavy mechanical devices inevitably incur. In addition this smoothness of operation covered a considerable RPM range which must have implications for racers.

However, no way out, but to get the RX15 onto the Dyno... where it was promptly dwarfed by its surroundings...

Test 1:

Open exhaust. Fuel 5% Nitro. 14% ML70 synthetic/ 6% Castor oils. balance Methanol. Plug OS R5.

Oil percentage and plug type are in accord with OS recommendations, whilst the Nitro. percentage was used solely to maintain comparisons with earlier Car engine tests.

Starting at 10,000 RPM and finalising at 33,300 RPM., smoothness of operation was outstanding, such that at times the sound levels were the only dynamics on offer. Touching the Dyno itself gave little indication of a machine at work!

During this educational exercise, Torque itself was as normal being measured, but with no certainty that the full value was "getting through". The situation the writer has been waiting for during the Dyno's 20 years existence had at last arrived! ie. an engine just too small for this Dyno and more than likely too much of a handful for the 1/4 scale version of the same Dyno which last saw an airing with the much less powerful Super Tigre X11 sports engine.

This Dyno. also previously proved sensitive enough to deal with the Brown CO2 engine of .03 cc. and so is capable of easily discriminating 1/10 oz.in.

The question was: would the 15RX car engine be much too much for it? Well, the answer should have been clear... because the OS RX15 was so smooth that the small Dyno actually proved easily capable of handling what for it could have been almost too large and dominating an engine; whilst the interesting matter of just how much Torque the 15RX had been deprived of on the large Dyno. (if any) was now clear... it averaged just 2 oz.ins out of 30 oz.ins. That's an inaccuracy of 6.6% for the large Dyno. when handling an engine as small and smooth as this particular car engine, but enough to justify moving the whole of the test over to the much more sensitive smaller Dyno.

Final HP of .76 at 29,200 RPM was proof of the restrictive effect of the new engine regulations. To have relatively equalled the OS 21 RXR (for example) would have needed .90 HP from this new, but quite restricted 2.5cc. engine.

Tests 2, 3 and 4. OS tuned Pipe T-1010 at differing lengths. Fuel now EFRA Spec 16% Nitro. with one HP curve using 25% Nitro.

OS provide their own exhaust header pipe (connecting engine to tuned pipe) which as standard is 70 mm. long. Using overall lengths as measured from "plug to end of pipes silencer can" translates to a standard length of 235 mm.

As the graph shows, this length actually led to the highest HP figures of this test... a little surprising because usually some shortening of pipe leads to yet more HP. In this test shortening to 215 mm. led to a reduced HP of .78 at 30,400 RPM., probably resulting from the general breathing restrictions within the engine itself, and the restricted pipe outlet.

This particular result has been omitted from graph because of visual confusion with the other curves.

Contrarily, going to a longer length of 255 mm. substantially raked back the best RPM point to the 23K area where a modest .86 HP resulted, which is however a significant jump

over the Open exhaust figure at that same RPM. As can also be seen, the best result using 16% Nitro. (ie. the full EFRA 'works'), was a figure which the writer could not improve on - of .91 HP at 28,500 RPM.

Subsequent discussion with your Editor centred on the likelihood that the Mfrs. figure of 1.18 HP may have been obtained using higher Nitro. percentage around 25% (more commonly used in Japan). Therefore a further test on this higher Nitro. revealed an expected jump, though only to .97 HP. Clearly the use of yet higher Nitro. would allow the engine to reach almost to the Mfrs. claim, but without clear information on their test equipment and conditions, there is much to speculate upon.

Of much more importance during the whole test, was that remorselessly smooth, effortless running characteristic remarked on earlier, and which transcends specific queries concerning actual power levels particularly where the initial EFRA "requirement" was pointed in such a different direction. The actual 'power picture' itself may become clearer to this writer when dealing with certain other 1/10 engines yet to arrive.

Summary

Inevitably, the condition of the 15RX at test termination was virtually unchanged - following 75 power runs, the majority of which were at full throttle. As a class these new 1/10 "mild" engines offer much to any newcomer, plus a welcome security of purpose even to the more experienced.

Acknowledgements are due to Trevor Tennant for the detail concerning the EFRA 1/10 engine specs.

O.S. Max 15RX (1/10 IC circuit car engine.) (2-stroke glow-plug.)

The dramatic appearance of the 15RX hides all the high quality internal work.



Weights and Dimensions:

Capacity -	.1522 cu.in. (2.495 cc.)
Bore -	.591 in. (15.01 mm.)
Stroke -	.555 in. (14.097 mm.)
Stroke/Bore ratio -	.939/1
Timing periods -	Exhaust - 152° (angled down 15°)
	- Transfer - 118° (angled up 15°)
	- Boost - 110° (angled up 60°)
	- Front induction - Opens 34° ABDC
	- Closes 59° ATDC
	- Total period 205°
	- Blowdown 17°
Combustion volume -	.23 cc.
Compression ratio -	Geometric 11.8/1
	- Effective 8.56/1
Exhaust port height -	.168 in. (4.27 mm.)
Cylinder head squish -	.016 in. (.41 mm.)
Cylinder head squish angle -	4°
Squish band width -	.131 in. (3.33 mm.)
Carburettor bore -	.236 in. (5.99 mm.)
Crankshaft diameter -	.472 in. (11.99 mm.)
Crankshaft bore -	.275 in. (6.99 mm.)
Crankpin diameter -	.1755 in. (4.46 mm.)
Crankshaft nose thread -	.248 in. x 28 TPI (1/4 UNF)
Gudgeon pin diameter -	.1575 in. (4.01 mm.)
Connecting rod centres -	1.062 in. (27.0 mm.)
Engine height -	3.43 in. (87.13 mm.)
Width -	1.77 in. (44.96 mm.)
Length -	2.36 in. (60.02 mm.) (Backplate to front bearing.)
Width between bearers -	1.173 in. (29.8 mm.)
Mounting hole dimensions -	1.456 in. x .826 in. x .131 in. holes. (37.0 mm. x 21.0 mm. x 3.34 mm. holes.)
Weight -	8.35 ozs. (238 grams.) (With OS pipe, manifold and Air cleaner.)
	11.15 ozs. (317 grams.)
Crankshaft weight -	1.25 ozs. (36 grams.)
Piston weight -	.10 ozs. (2.5 grams.)

RRCI

Performance:

Maximum BHP :- .97 @ 28,800 RPM. (25% Nitro./OS pipe @ 235 mm.)
.91 @ 28,500 RPM. (16% Nitro./OS pipe @ 235 mm.) E.F.R.A SPEC
.77 @ 29,300 RPM. (Open exhaust/5% Nitro.)

Maximum Torque:- 36.5 oz.ins. @ 22,900 RPM.
(16% Nitro./pipe 255mm.)

:- 33.2 oz.ins. @ 26,900 RPM. (16% Nitro./pipe @ 235mm.)
:- 31.0 oz.ins. @ 20,500 RPM. (5% Nitro./Open exhaust.)

RPM on Standard propellers:

(*)	OPEN EXHAUST & 5% Nitro	OS PIPE@ 235mm & 16% Nitro	OS PIPE @ 255mm & 16% Nitro	OS PIPE @ 235 mm & 25% Nitro
7 x 4 Taipan	20,900	21,120	22,430	—
7 x 4 APC	21,200	21,700	22,720	—
5.5 x 4 Cox	28,670	29,340	27,340	30,100
BHP/cu.in.	5.06	5.98	5.65	6.3
BHP/cc.	.309	.365	.345	.3
BHP/lb.	1.47	1.30	1.23	1.3
BHP/kilo	3.23	2.87	2.71	3.0
Oz.in./cu.in.	203.7	218.1	239.8	230.0
Oz.in./cc.	12.4	13.0	14.6	14.0
Oz.in./lb.	59.4	47.6	52.4	50.2
N.metre/cc.	.089	.095	.104	.100

Manufacturer:

O.S. Engine, Osaka, Japan.

U.K. Distributor.

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