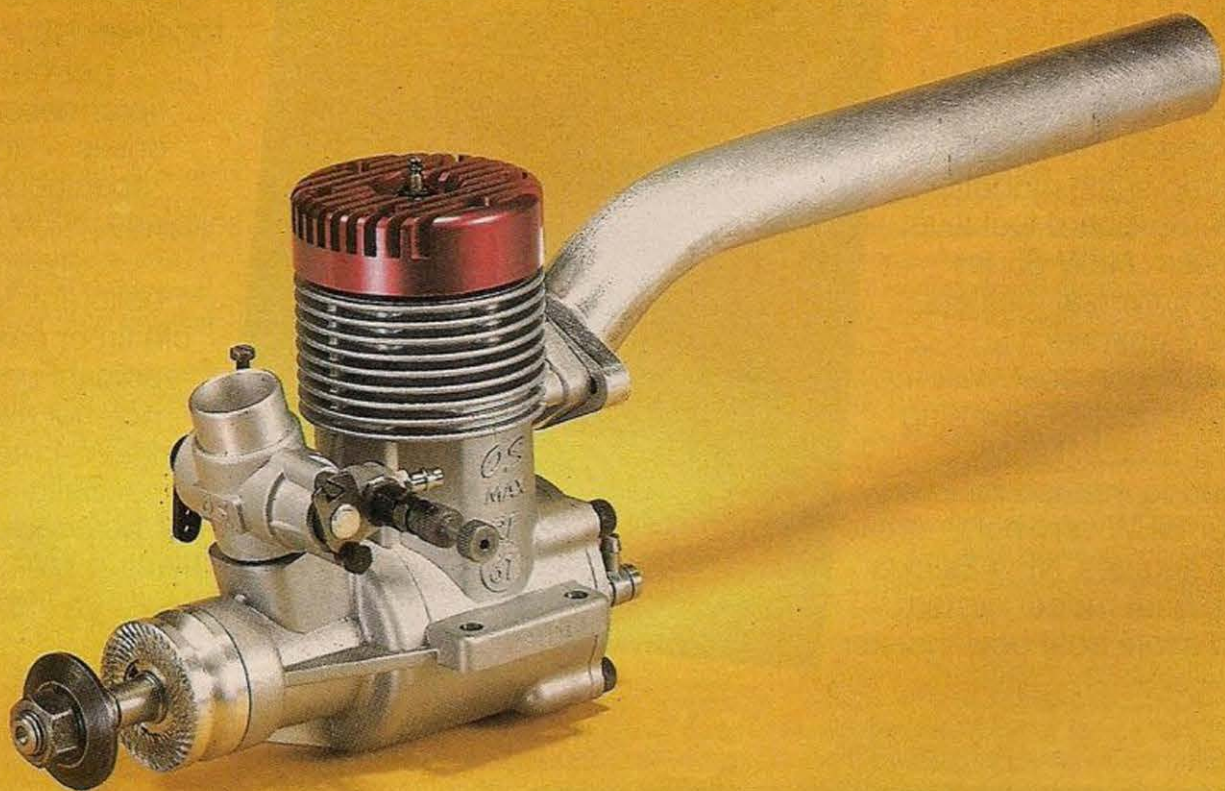


O.S. MAX .61RF 'HANNO SPECIAL'



Thirty-inch overall length of the engine, manifold and pipe gives the required 9,000 rpm for today's F3A Pattern contests.



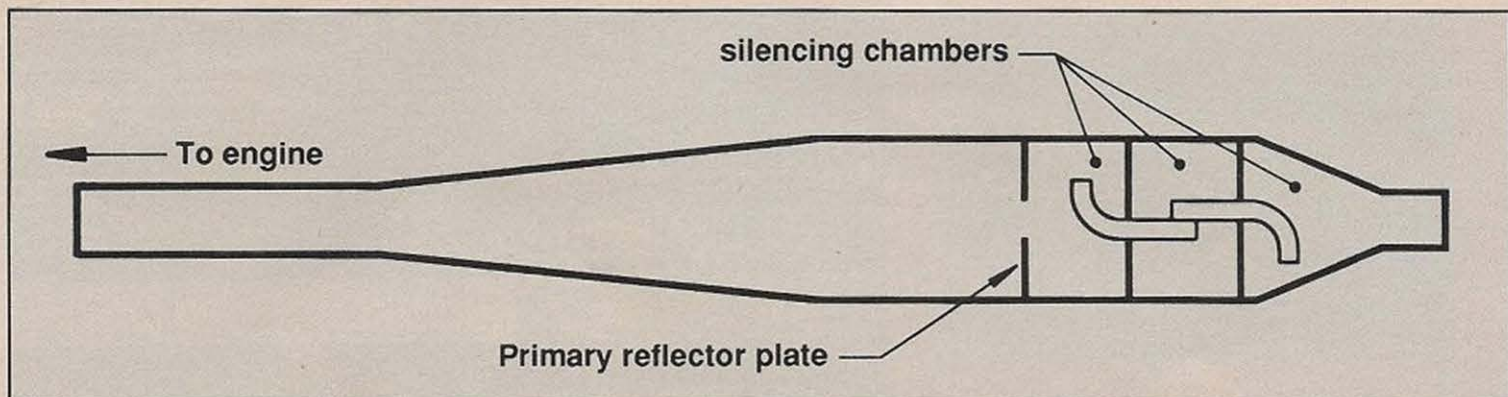
No one beats O.S. when it comes to design and craftsmanship. The .61RF features an ABC piston/cylinder, a massive 17mm crankshaft journal and an aluminum bar stock conrod with bushings at both ends.

The "Hanno Special" 10cc two-stroke RC pattern engine continues and intensifies the O.S. policy of producing top-of-the-line engines for certain specialized and prestigious competitive modeling areas. The most prominent of these engines are the FS1.20 supercharged four-stroke; the .21 RX-R (for RC cars); the new Pylon .40; and this .61 long-stroke engine, which has been linked with the fortunes of 1989 World champion F3A flier, Hanno Prettnner.

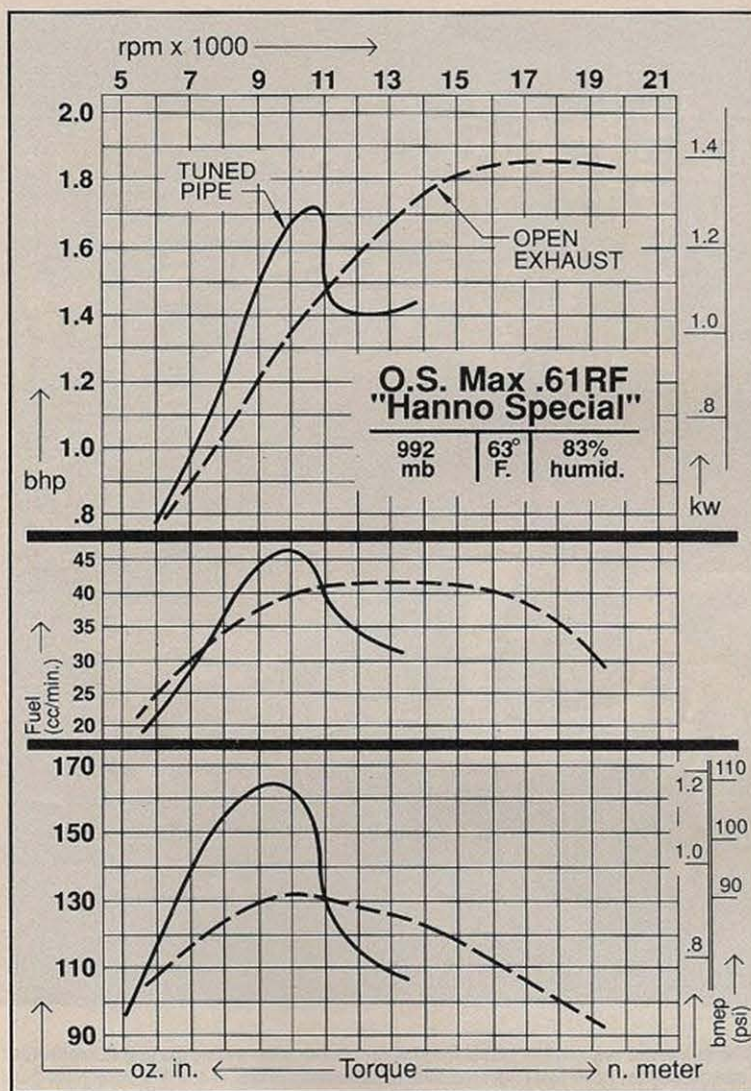
Initially produced as a specially modified unit for his use, the engine has subsequently become more widely available as a numbered, limited edition replica of that original.

The CIAM's position on the reduction of sound levels in the F3A class is well known, and their success has also set useful precedents for other aeromodeling areas. O.S. shares this concern, so it's inevitable that the Hanno Special was designed to operate at the necessary low and quiet rpm. Equally inevitable is the continuing very high quality of construction—seemingly of permanent "eyebrow raising" standard.

Certainly the very fierce competition in



The O.S. T4010 tuned pipe as used on the Hanno Special.



the international F3A Precision Aerobatics event has forced both design development and a rising technical standard in the engine department, the battle currently between the YS .60 long-stroke, YS 1.20AC four-stroke, O.S. 1.20 Supercharged four-stroke, Webra .61 long-stroke, and this O.S. .61RF Hanno Special being a sight to behold!

MECHANICAL DETAILS

The O.S. .61RF adheres closely to current thinking, where low rpm, reliability and rock-steady running under varying G-forces are all required.

The one-piece crankcase/front housing is soundly designed with structural webbing at

steeply angled squish band at 13° and a clearance of .016-inch. The resultant effective compression ratio of 8.7:1 (with one .016-inch aluminum gasket) is nicely suited for modest nitro. Use of the extra gaskets supplied will probably be advisable, if nitromethane content up to the maximum recommended 30% is anticipated, whereas "straight" fuel may call for just one .008-inch brass gasket. With no gasket at all, there is virtually zero clearance between the head and piston; running in this condition would clearly be hazardous to the engine.

The new O.S. 6P carburetor, with its 9.9mm bore, is almost unobstructed at full throttle,

critical points. The exhaust stub is part of the casting and is milled out at its upper edge to align with the widened exhaust port in the liner, which provides a more powerful exhaust acoustic pulse than from a normal width port. In conjunction with the relatively quite large blowdown period of 18° crank angle, the tuned pipe/engine combination becomes a very dynamic setup when the system is correctly "in resonance."

The brass cylinder liner with its 152° exhaust timing continues with the favored O.S. "Nikasil" plating and associated high-silicon aluminum lapped piston.

The anodized red cylinder head and combustion chamber is in one piece, with a

SPECIFICATIONS

Capacity	6076 cu. in.
Bore	.9435 in.
Stroke	.9435 in.
Stroke/Bore ratio	1.049:1
Timing Periods:	
Exhaust	152°
Transfer	115°
Boost	105°
Front Induction Opens	38° ABDC,
Closes	51° ATDC
Total period	193°
Blowdown	18°
Combustion volume	.9cc
Compression ratios:	
Geometric	12.063/1
Effective	8.72/1
Exhaust port height	.285 in.
Cylinder head squish	.015 in.
Squish band width	.160 in.
Carburetor bore	.355 in.
Crankshaft diameter	.6685 in.
Crankshaft nose thread	5/16-24
Engine height	4.04 in.
Width	2.39 in.
Length	4.17 in.
Width between bearers	1.69 in.
Weight: Bare	20.6 oz.
With manifold & tuned pipe	27.7 oz.

PERFORMANCE ON 10% NITRO

Maximum BHP:	
1.85 @ 18,890 rpm (open exhaust)	1.71 @ 10,568 rpm (O.S. Quiet tuned pipe).
Maximum Torque:	
164 oz. in. @ 9,217 rpm (O.S. Quiet tuned pipe)	131 oz. in. @ 9,794 rpm (open exhaust)

RPM ON STANDARD PROPS

	Open Exhaust	O.S. Tuned Pipe, std. length
15x8 Graupner	7,270	7,592
13x10.5 MK	8,016	9,066
12x12 APC	8,575	9,592
14x8 Airflow	8,892	9,691
13x6 MK glass	11,341	11,268
12x6 Mastro	12,120	11,247
11x10 APC	12,246	11,263
11x6 Graupner	14,551	13,360
10x6 APC	17,097	16,228

PERFORMANCE EQUIVALENTS

	Open Exhaust	O.S. Tuned Pipe, standard length
BHP/cu. in.	3.04	2.53
BHP/lb.	1.43	.99
Oz. in./cu. in.	215.60	269.90
Oz. in./lb.	101.50	94.80

Manufactured by O.S. Engines, Osaka, Japan.
 Distributed in the U.S. by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021.

continued on page 84

save for a small spray bar protruding halfway across the throat. Mid-range and idle adjustment is via a tapered slot in the spray bar sub-assembly, and is controlled by an eccentric adjuster screw that allows only a small angular movement. Main fuel needles are supplied in either fine or coarse taper. The latter was used on this test, and was very predictable even though it was sufficiently sensitive to affect engine performance with even one click of needle movement.

This carburetor is clearly designed to be reliable and simple to adjust, and so it presents a minimum of distraction to the user under competitive conditions.

Pushing fuel into the carburetor is the PD-05 diaphragm fuel pump, mounted in the rear crankcase cover. Responding to crankcase pressure pulses, it alternately sucks fuel from the tank and then delivers that fuel to the carburetor—similar to the pumper carburetors fitted to industrial two-stroke chainsaw engines, which have to run properly even when upside down, etc. There is, therefore, no requirement here for the usual separate pipe-pressure feed to the fuel tank, and so the tank remains open to atmospheric pressure.

O.S. advises that when soft-mounting the engine (to further reduce noise levels), a loss of up to 600 rpm could be experienced as compared to solid mounting. That translates to about a 10 percent power loss. This appears to place the competitor between a rock and a hard place when deciding the degree of soft-mounting required.

The manufacturer's instructions are exceptionally comprehensive, and will be of particular help to those who wish to achieve the best resonance point, either by adjustments to pipe length or variation of load and rpm. As supplied, the overall tuned pipe length is 19-1/4 inches from the piston face to the internal flat reflector disc, and provides nominally correct resonance at around 9,800 air rpm. Given the pipe's inherent operational flexibility, it can tolerate ground rpm from 9,000 to 10,400. However, the nearer you come to these extremes, the greater the likelihood of less satisfactory operation in the air. So, as the O.S. instructions imply, getting the engine/pipe combination running near the middle of the range (on a given pipe length) is the most satisfactory way of proceeding.

Of course, using different props/rpm will mean changing the pipe length, which again should be pitched at the median position following tests using different pipe lengths as described. To this writer, it has always seemed easier to vary the load rather than the pipe length, and is certainly a lot quicker, provided the new noise level is acceptable.

PERFORMANCE

An O.S. #8 plug and 10% nitro fuel with 20% ML70 synthetic oil was used both for

break-in and the subsequent power tests. In open exhaust form, the O.S. 61 RF exhibited the now familiar wide band of usable torque, but which is now quite unusable on the majority of our flying fields. With the O.S. T4010 tuned pipe, the engine is transformed into a rock-steady, low-rpm, low-noise machine more akin to a powerful electric motor.

The power graph vividly shows this transformation, and also clearly shows that the malleable two-stroke is an extremely useful and multi-purpose device. The two-stroke 10cc engine is, however, still operating at a disadvantage in power relative to the burgeoning 20cc four-stroke scene, and that fact alone indicates the superiority of the two-stroke's other virtues of simplicity, steadiness and predictability of operation. The battle continues, as it does in other areas of I.C. engine competition performance.

IDLING

Using a tuned pipe of standard length, 10% nitro and a 12x12 APC propeller, an idle speed of 2,600 rpm was the lowest sensible.

DB LEVELS

Decibel readings ranged from 90 dB at the rear to 99 dB at the front, measured with a 12x12 APC prop turning at 9,300 rpm. The writer's normal test environment is over hard concrete, and the engine mounting is very solid. Therefore, it could be expected that over grass and with soft-mounts the various dB limits would be more nearly approached than under these test conditions.

SUMMARY

The O.S. story continues, of keeping up with or heading the competition, as well as undeniably setting their own standards of construction and workmanship. The .61RF is another very fine engine, in danger of using up superlatives. **MB**

