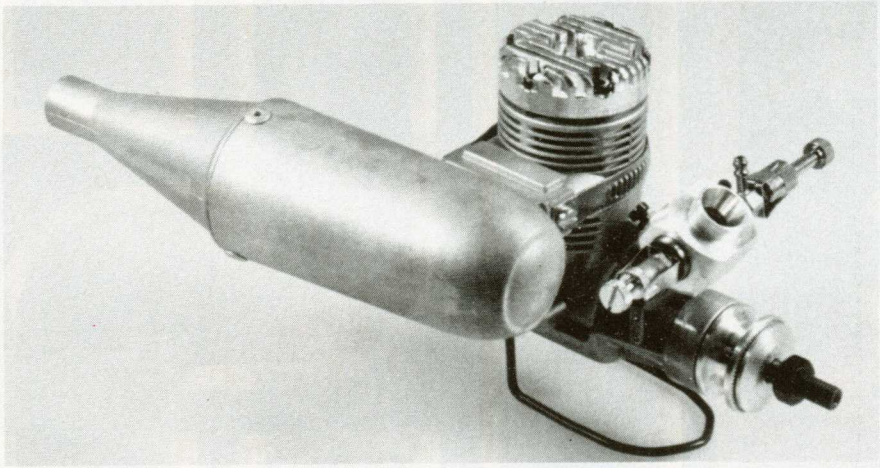
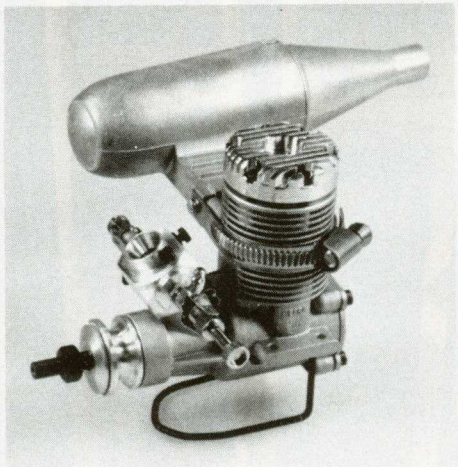
HOBBY DYNAMICS WEBRA SPEED 50

By Clarence Lee

SPECIFICATIONS

Type: Single cylinder, 2-stroke cycle, Schnuerle scavenged, ABC, glow ignition
Bore: 23mm (.906'')
Stroke: 20.06mm (.790'')
Displacement: 8.35cc (.509 cu. in.)
Compression Ratio: 8.4:1
Weight: Bare 12.6 oz. — with muffler 15.8 oz.
Manufacturer: Webra Modellmotoren, Enzesfeld, Austria
U.S. Importer: Hobby Dynamics, Champaign, Illinois

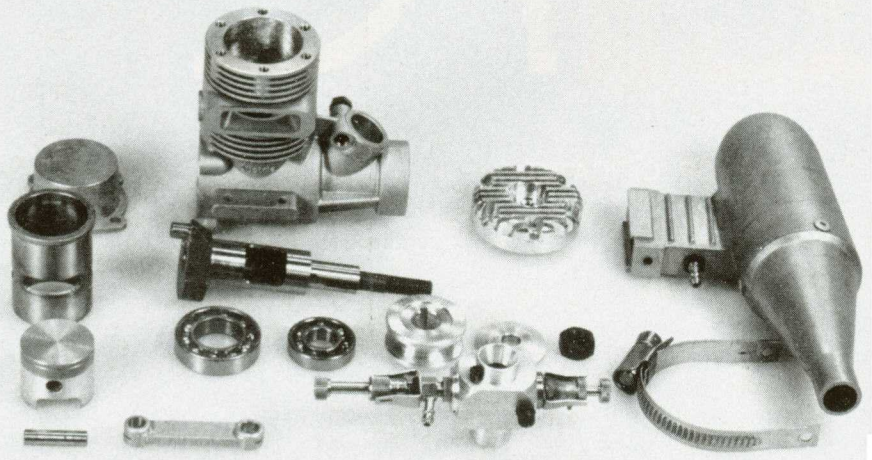


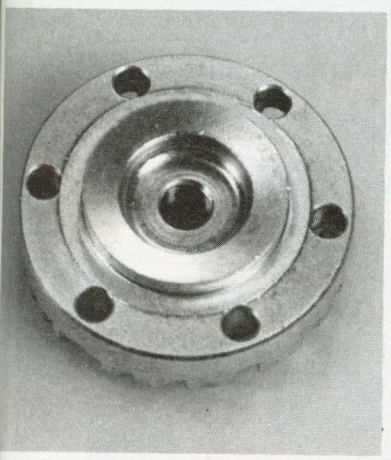


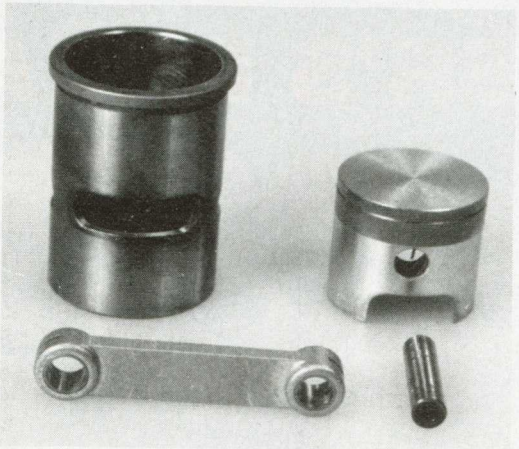
With the acquisition of both the Austrian made HP and German made HB engine lines by Randy Linsalato of RJL Industries here in the United States, Webra now becomes the sole remaining major model engine manufacturer in Germany and Austria. Webra entered the model engine business in 1951 with the introduction of a 2cc (.12 cubic inch) plain bearing diesel engine but it wasn't until 1969 that they really gained worldwide recognition when one of their cross-flow scavenged Blackhead 61s was used to win the World R/C Championships. This was followed in 1973 by the first in a series of Schnuerle scavenged ''Speed'' engines, the Webra Speed 61. Webra has continued to add to their engine line now operating plants in both West Germany and Austria where they currently produce 2-stroke engines ranging in displacement size from a small 1.5cc (.09 cubic inch) engine to the 35cc (2.1 cubic inch) Webra Bully and three overhead rotary valve 4-strokes, the T4-40, T4-60, and T4-80. An earlier version of the T4-80, then called the T4-90, introduced in 1979 was the first 4-stroke model aircraft engine to employ a rotary valve in the head.

Our review engine for this month, the Webra Speed 50, was received earlier this year but due to backlog of engines for review purposes it has only been this past month (August) that we have been able to finally get to the engine. I had been hearing good things about the Webra Speed 50 but was quite surprised by the performance and power this engine develops. The Webra Speed 50 is a real eye opener in the power department developing more horsepower than any other .45 to .50 displacement size engine we have tested to date actually equaling some of the .60 displacement size engines of just a few years past including the Webra Blackhead .61 that is still in production. And oddly enough, the engine is very straightforward in design without any really tricky or unusual modifications other than the piston which has been given a slightly different treatment which will be covered later. The porting, timing, etc., all remain very conventional. Evidently the designers of the engine have hit on exactly the right transfer port angles, areas, shapes, and intake and port timing that together work as a combination to develop maximum power. Transfer and boost port shapes and angles in a Schnuerle scavenged engine are critical with a few degrees or thousandths one way or another often causing a large increase or decrease in power. This is one of the reasons it is not a good idea to play around with radiusing edges, changing shapes or angles, etc., in a Schnuerle ported engine unless you really know what you are doing as chances are pretty good you will end up losing rather than gaining any power as a lot of fellows have found out the hard way.

Crankcase: The crankcase is an aluminum pressure die-casting with the main center portion and front housing cast in one piece. Utilizing a one piece casting such as this will usually result in a stronger casting with less chance of misalignment







LEFT: Flat bottomed bowl shaped combustion chamber with squish band used. RIGHT: Piston, sleeve, wrist pin, and rod assembly. Note only top portion of piston (dark area) provides compression seal. Lower portion .002" smaller. Rod bronze bushed at both ends.

and distortion. Machine work appears to have been performed with conventional rather than CNC equipment, but, even so, all machine work and surface finishes are of excellent quality with all sharp edges having been beveled or deburred, etc. This is a sign that attention has been given to the minor details. One thing I always like to see in a model engine crankcase is final honing to size of the sleeve bore to assure a nice slip fit and base compression seal between the crankcase and sleeve, which Webra has done. To prevent excessive fuel leakage out the front bearing, an annular groove has been cut directly behind the front bearing seat. An approximate 1/32" hole has been drilled parallel to the crankshaft connecting the annular groove with the intake port and the outer end of the hole beyond the groove plugged with a tiny steel ball. Negative pressure or vacuum in the intake then draws any excess fuel that has collected in the annular groove back into the intake port. This is a method now being utilized in one form or another by several of the model engine manufacturers to control fuel leakage out the front bearing. The bearing itself actually does not have anything to do with fuel leakage as many modelers mistakenly believe.

Crankshaft and Bearings: The crankshaft has been machined in one piece from bar stock steel, hardened, and finish ground on all bearing surfaces including the crankpin which is always a desirable feature. The counterbalance is of the constant thickness design milled away on either side of the crankpin for counterbalance action. To further increase the counterbalance weight, the area of the counterbalance disc directly behind the crankpin has also been cut at an angle (see photograph). The counterbalance would balance out the full weight of the con rod, wristpin, and approximately 5% of the piston's weight. This resulted in the engine being exceptionally smooth — one of the smoothest running .45 to .50 displacement size engines we have tested to date.

A 28mm (1.102") o.d. x 15mm (.590") i.d. rear bearing and .875" o.d. x .375" i.d. non shielded front bearing are used. These bearing sizes are the same as those used in many .60 displacement size engines. The 15mm i.d. of the rear bearing, in turn, allows for a larger intake port and .375" diameter gas passage through the crank with the intake port timed to open 38° after BDC and close 49° after TDC for a total duration of 191°. Very conventional crankshaft timing with nothing wild here as might be expected with an engine that develops the power that this one does.

Piston, Sleeve, and Rod: The piston and sleeve are of the ABC type utilizing true ABC metalurgy, i.e., an aluminum piston running in a chrome plated brass sleeve. Chrome, in my opinion, is always preferable to nickle as some of the model engine manufacturers are using. The piston has been machined from a casting and given a somewhat different treatment in that only the top 1/4" actually provides the compression seal with the remainder of the piston being .002" smaller in diameter. Relieving the skirt in this manner is a modification often done to lapped cast iron pistons but not usually done to the aluminum ones. With the brass sleeve having a .003" taper, the piston skirt actually has a .005" running clearance. Due to the high silicon content of the piston, no wristpin bushings are used but the con rod that appears to have been machined from bar stock aluminum has been bronze bushed at both the wristpin and crankpin ends. A 5mm (.197") diameter, tubular, hardened steel wristpin is used that is retained in the piston by wire snap rings.

The engine is of conventional Schnuerle port design with a single transfer port on either side of the single exhaust port and a single boost port directly opposite the exhaust. The exhaust was timed to open 75° before BDC and close 75° after BDC for a total duration of 150°, the transfer ports were timed to open 61° before BDC and close 61° after BDC for a duration of 122°, and the boost port timed to open 57° before BDC and close 57° after BDC for a duration of 114°. All very conventional timing.

Cylinder Head: The head has been machined from bar stock aluminum and utilizes a flat bottomed bowl shaped combustion chamber surrounded by a .160" wide squish band. The measured combustion chamber volume to the bottom of the glow plug hole was .8cc which computed to a compression ratio of 8.4:1 figured with the closing of the exhaust and a full stroke compression ratio of 11.4:1. The compression ratio is just slightly on the high side and this did show up in slight preignition with the larger prop sizes if the engine were leaned much past peak rpm. However, the humidity was also on the high side at 50% the day the engine was being tested and a lower humidity day could well have eliminated this tendency. Of course, fellows living in high humidity areas have to

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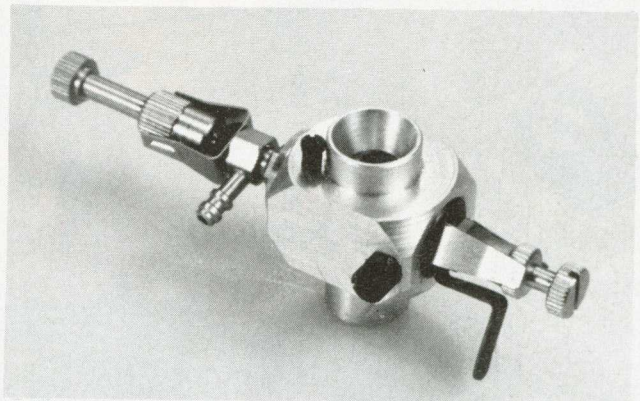
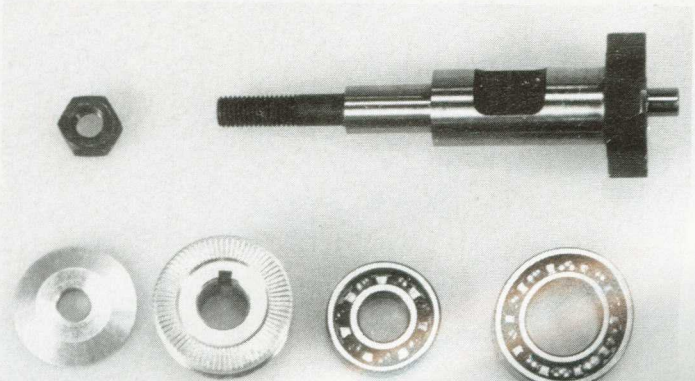




LEFT: Webra TN (two needle) carburetor. Easy to adjust, and performed very well. RIGHT: Crankshaft, bearings, prop washers, and nut. 1/4"-28 US NF thread used for prop nut. Prop drive washer key driven. Rear bearing same size as used in many 61 displacement size engines.

There's a guy near Boston who buys 6 Black Baron Irons every month...

He called and said, "They outlast every other iron two to one. And they hold their temperature just like the ad says".

We said, "Wait a minute. Did you say 6 irons a month? What are you doing with them?"

He said, "We use them in our shoe factory to iron down the padding on the inside of the shoes."

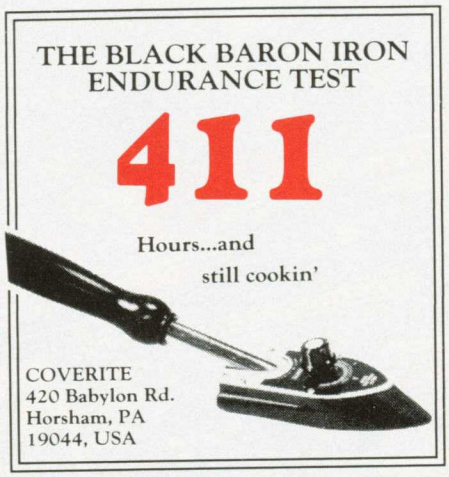
We said, "What's the problem?"

He said, "No problem. Just want to know if there's any way we can get them to last even longer. My people run them 24 hours a day, with the heat turned all the way up."

We said, "There's a little clip you can insert on the knob that will prevent your guys from turning the heat way up. We'll send you a bunch of them."

And that was that. Except that it made us curious. We wondered how long our Black Baron Irons will run at a normal temperature, say 300°F.

So, we plugged one in, and it's been running almost every business day. We have no idea how long it will run, but each month, we'll give you an update in this magazine. It'll look like this:



To make it fun, let's have a contest. Send us your guess on how many hours it will last. If you are the closest guess, you'll win $100. 2nd prize is $50. Third is $25. To be eligible, entries have to be received no later than January 31st, 1991. Send your entry to: COVERITE, 420 Babylon Rd., Horsham, Pa. 19044.

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contend with this problem all the time but I am sure the addition of an extra head gasket would cure any preignition tendencies.

Carburetor: Our test engine came equipped with Webra's TN (two needle) carburetor. Also available as an optional accessory is Webra's more sophisticated Dynamix carburetor intended for use with a pressurized fuel tank or fuel pump. The two needle type of carburetor is used in one form or another by many of the model engine manufacturers due to its simplicity in design and excellent performance characteristics.

In operation, an angled slot in the steel barrel aligns with a hardened steel screw in the aluminum body. Rotation of the barrel moves it in and out, in turn, moving the idle mixture needle mounted in the end of the barrel in and out of the end of the spary bar jet metering the fuel mixture at idle and mid range. High speed mixture adjustment is by means of the main needle valve threaded into the opposite side of the carburetor body. The throat size of the carburetor body is .310'' while the rotating barrel has a .319'' inside diameter. The larger diameter of the barrel evidently is to take into account the reduced area due to the high speed fuel jet and idle mixture needle. .319'' is actually bordering on the large size for a .50 displacement size engine so muffler pressure would be recommended. In actual operation the carburetor performance was excellent and very easy to set up and adjust.

Performance: Webra recommends that a fuel containing at least 20% oil be used while breaking in the engine. No nitro content is specified. For the purpose of our test our standard test fuel consisting of 10% nitromethane, 18% Klotz KL-200, 2% castor oil, and balance methanol was used. As no glow plug accompanied the engine, a K&B R/C (idle bar) plug was used. Webra's 4G muffler was installed on the engine but the muffler is not included with the engine and has to be purchased separately. Following our standard 30 minute break-in period as detailed in the November '89 Engine Clinic column, the following power figures were recorded. The temperature of the day was 70°F, the relative humidity 50%, and the barometric pressure 29.95 inches of mercury. All propellers were Rev-Ups.

10 x 6	16,300
10 x 7	14,200
11 x 6	12,800
11 x 7	12,400
11 x 8	11,200
12 x 5	12,450
12 x 6	11,450
13 x 6	9,500

As can be seen by the preceding figures, the Webra Speed 50 is one strong running engine --- considerably stronger than any other engine in this displacement size we have tested to date. The engine was first run using an 11 x 6 and as I was seeing prop rpm about 700-800 higher than anything tested in the past, I suspected something had gone ape in my BWT Accutac used for these engine tests. It is one of the finest light sensing type tachometers ever made which unfortunately is no longer being manufactured. A second reading was taken with my Swiss made Hassler mechanical tach which requires holding against the end of the crankshaft or spinner. The reading was about 50 rpm lower. A third check was made with an Ace TachMaster II which read exactly the same as the Accutac. The Ace TachMaster is also a very fine tach but the graduations are far too small for my liking. Having verified that there was nothing wrong with my original tach, the testing proceeded. The engine exceeded any previously tested engine in this displacement size with all prop sizes, not just showing its best with the larger or smaller sizes. Pretty darn impressive, especially when you take into consideration the engine was equipped with a somewhat restrictive muffler. The engine was easily hand started when cold but proved to be a little balky at times when hot. Sometimes it would take off in one or two flips of the prop and other times require a little more persuasion. The engine would hold a nice steady 2,500 rpm idle with the smaller prop sizes, 2,250 with the 12 x 5, and I had it idling at 1,950 with the 13 x 6; very impressive when you consider the top end rpm. Acceleration was very good with a minimum of hesitation through top mid range. You could not snap the throttle open with instant acceleration, but with a normal throttle opening speed the engine would follow. Overall, even with all the power the engine develops, it was still very user friendly.

Now all this horsepower does not come cheap, but then what high quality, high performance engine does? The engine has a list price of $199.99 with the muffler selling for an additional $35.99. Naturally, the mailorder houses are selling the engine for considerably less. One thing is for sure, you will be getting the most powerful .50 displacement size engine presently available for your money!

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