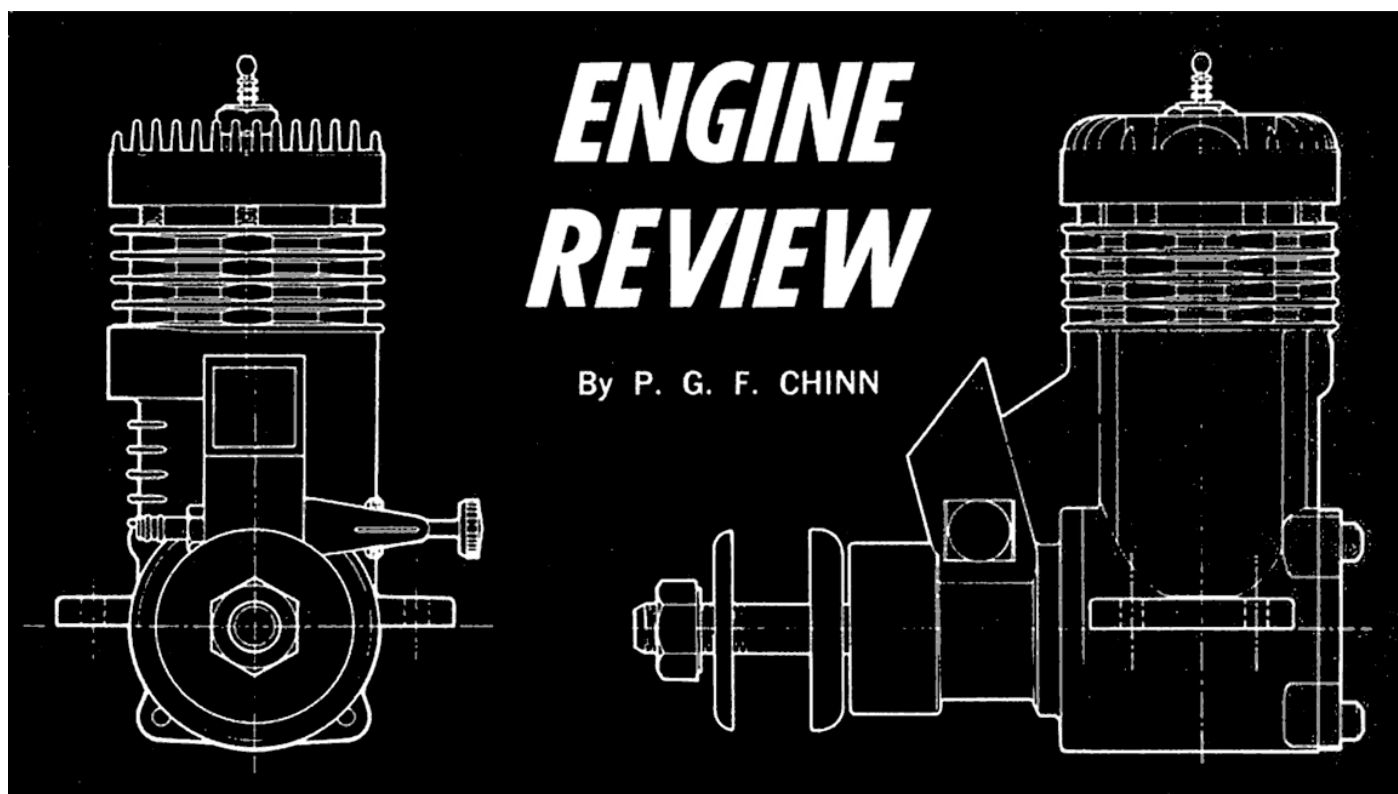


Fox 40 BB STD



'64 FOX.40BB

OUR REVIEWER CLAIMS THE HIGHEST POW-ER/WEIGHT RATIO OF ANY ENGINE TESTED TO DATE FOR FOX'S LATEST POWERPLANT.

► Our test model of the "Golden" Fox 40BB was submitted direct by Duke Fox and was one of the improved 1964 models. Compared with the 1963 40BB, this has a number of changes, most of which are not externally visible.

Firstly, a new and stronger crankshaft is used. The intake hole through the shaft is now 0.340 in. bore instead of 0.375 in. and the crank web, not quite so heavily cut away each side of the crankpin, is wider. The working length of the crankpin is now 0.300 in., instead of 0.250 in. to accommodate a wider conrod big end. A stronger wrist-pin is fitted, which has the same diameter as before, but solid, instead of hollow with brass end pads.

Modifications have also been made to the cylinder liner. The "picture-window" bypass port has been abandoned and replaced by a new, shallower (0.184 in. instead of 0.312 in.) but slightly wider port. Exhaust port depth is very slightly increased, Exhaust timing is unaltered but the bypass period has been extended slightly.

As received, our 40BH was nicely loosened up and bore evidence of having been broken-in with the aid of a running-in compound. In reply to our enquiry as to whether this was normal practice. Duke Fox stated that, with 40BB's currently selling at \$24.95. the factory can afford to take a great deal of care and attention in liltling and running them in and assured us that our test sample was typical of 40BB's presently leaving the factory. "All these motors have been carefully fitted and run until they come up lo full power, stopped and hand-started several times." said Duke. "If they seem slow coming up to full power, we bring them back in and refit the cylinder and piston.

Model Airplane News Magazine October 1964 by Hlsat

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Easily distinguished by its gold finished castings. Fox 40BB sports ball and needle bearings and has been evolved specially for rat racing.

Unfortunately, this amount of attention we cannot afford to give our lower priced motors." As part of the regular initial run routine, a little Lustrax polishing compound, mixed with oil, is introduced via the intake, the object being to smooth the working surface which should extend the life of the engine as well as bring it up to full performance more quickly.

Judging by the terrific performance of our 40BB (of which more anon) this extra attention has certainly paid off.

The 40BB is, of course, the successor to the original plain-bearing Fox 40 which first appeared in 1961 and was dealt with exactly three years ago in our October 1961 Engine Review. Apart from having the same bore and stroke and a general family resemblance to it, however, little of the original 40 is to be found in the 40BB.

The most obvious external change is in the adoption of a new crankcase and body casting, with a bigger front housing and cavernous rectangular air intake. The new casting is basically similar to that of the current Fox 36X and 35X models but has the lower and side webs on the crankcase nose omitted. Internally, the differences between the earlier 40 and the latest variant are more marked. In overall dimensions the new model is the same height, but is $\frac{1}{4}$ in. longer and $\frac{3}{16}$ in. wider across the beam mounts, which also have wider bolt hole spacing.



Parts of latest 1964 Fox 40BB include new and stronger shaft wrist pin.

Weight has gone up by 8 percent to 8.2 oz. but this is more than compensated by the increased performance. The 40BB has, in fact, one of the highest power/weight ratios of any engine tested to date.

The 40BB has no startling new' innovations. Obviously, the Fox recipe for success is continual experiment with, and development of, basic design concepts. The lineage of the present 40BB can be traced back through at least six .35 - .40 cu. in. models over the past seven years. New variations on well-known Fox themes appear pretty frequently, and every so often one of them hits a really winning combination right on the button. If this sounds like a fearfully rule-of-thumb way of finding the ultimate engine design, let us say, right away, that nobody ever designed an internal combustion engine, model or full size, that was 100 percent right when it was built and couldn't be improved with further development. There have been plenty of expertly designed engines that, on paper, had everything, and, the more clever they were, the longer it took to get them to perform and keep on performing.

After this little discretion, let's have a quick look at the parts of the 1964 Fox 40BB.

If memory serves us correctly, the 40BB is the first regular production model Fox to have a ball-bearing since the 29R of 1956. (The Combat-Special and 35X dealt with previously' in this series were, of course, needle-bearing engines).

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The 40BB has a ½ in. i.d. x 1 1/8 in. o.d. 9 ball journal bearing supporting the rear end of the shaft. This is supplemented by ½ in. i.d. needle-roller bearing at the front end, having 27 needles running in direct contact with the hardened shaft journal. The shaft, incidentally, is now hardened all over, including the parts previously masked. Between the bearings, the shaft is an easy fit in the crankcase material and is extremely free running in the bearings. The shaft has a 3/8 in. square valve port which registers with a rectangular intake aperture in the main bearing to give quick opening and closing for the 200 degree intake period. Measured intake timing on our test engine was: intake opens 30 degrees after piston reaches BDC, closes 50 degrees after piston reaches TDC.

As we mentioned at the beginning, the "picture window" bypass port, which has been a feature of previous models, has been dropped and, by raising the top edge of the bypass port, exhaust lead has been cut in this latest 40BB to a mere 3 degrees which is very short indeed. Actual measured periods of port opening on our test engine were: exhaust. 140 degrees: bypass. 134 degrees. The leaded steel cylinder sleeve is otherwise of typical Fox design and wall thickness is unaltered at .037 in. The Meehanite, lapped piston has a straight baffle, tin internal annular stiffening web above the wristpin bosses and couples to the machined dural connecting-rod via the now solid 5/32 in. dia. full floating wristpin.

The cylinder-head is identical with that of the previous 40 and 35X, deeply finned and featuring a wedge pattern combustion chamber. A glow plug of Fox manufacture is now tilted. Two .010 in. soft aluminum gaskets make the joint between the top of the cylinder liner and the cylinder head. Six screws secure the head. The back plate is fitted as standard equipment with a screw-in brass pressure fitted for connecting to a scaled, pressurized fuel tank. No venturi insert is fitted, although anyone wishing to convert the 40BB to suction feed could do so quite easily by fitting a 35X venturi insert and replacing the back plate nipple with a 3/16 in. 4-40 screw and fiber washer.

Although our 40BB was, for all practical purposes, ready broken-in as received, we added, in a series of 1 to 3 minute runs, a further one hour of running time to the engine prior to dynamometer testing. Starting was excellent at all times and the engine ran evenly and smoothly. One of the nicer features of modern high performance engines is that they are often just as easy to handle as a beginner's motor and the 40BB is a good example of this. Gone are the days when hard starting and vicious handling characterized the "hot" engine.

For our tests, we used the standard 30 percent nitro test fuel which we usually employ for tests on rat-racing and combat motors. The engine was hooked up to a Veco Series 31 pressure tank.

We started by loading the 40BB for a speed of just under 9.000 rpm and an indication of the performance to come was immediately apparent in the high torque developed, at this speed, of nearly 70 oz. in. As load was reduced and speeds pushed up, torque rose to just on 74 oz. in. at 11.000 rpm before beginning to decline. At this speed the engine was already topping 0.80 bhp. It reached 0.90 bhp at 12.600 rpm and finally levelled off at nearly 0.98 bhp at 16.000. This, of course, is really excellent, especially as, so far as this particular motor is concerned, there would obviously be no difficulty in pushing power up above the magic 1 hp mark with a still hotter fuel.

Incidentally, we have heard of some rat-racing fiends propping their 40BB's for speeds of around 20.000 rpm on 50-50 percent nitro fuel, although, on the strength of our tests, it would seem that, even allowing for, say, a 1.000 rpm higher peaking speed plus another 1.000 rpm for better acceleration. 18.000 would be a more realistic in-flight maximum. However, the final proof of the pudding is in the flying, and, if modelers get more speed by using smaller props than the recommended ones (which hold rpm nearer to our test curve peak), we are not arguing. . . We'll merely say; please avoid weak props and don't be in the line of fire when an overstressed prop throws a blade!

Rat-racing apart, with nearly 2 horse power per pound weight, the 40BB ought to make quite a

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potent piece of Class C free-flight machinery. We checked it out on one of two free-flight props and recorded 12.500 on an 11 x 5 Top Flite wood, 14.700 on an 11 x 3 Top Flite wood and 16.100 on a 10 x 3½ Top Flite wood.

Summary of Data

Type: Loop-scavenged two-cycle with shaft rotary-valve induction.

Weight: 8.2 oz.

Displacement: 0.3971 cu. in. or 6.507 c.c.

Bore: 0.800 in.

Stroke: 0.790 in.

Stroke/Bore Ratio: 0.9875 : 1

Specific Output (as tested): 2.46 bhp/cu. in.

Power/Weight Ratio (as tested): 1.91 bhp / lb.

Price: \$24.95.

Manufacturer: Fox Manufacturing Company,
5305 Towson Avenue, Fort Smith, Arkansas.



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