Fox 29 M.S. Super

Hopped-up engines hit market. This one a team racing special.

► When a man wins 11 team races in a row on top of 48 straight heats with the same engine and aircraft, people begin to get agitated. There are whispers of special equipment and military secrets and the perpetrator of such an embarrassing record of successes becomes almost morally obliged to clear his enviable reputation of such innuendos.

This is the background that put modeler George Moir (Model Motors Service) of Mantua, N.J. into the engine business. His friends more or less told him it was his duty to society and it would be hard to think of a more worthy reason. The story therefore goes like this: performance created demand; demand created business.

This is not big business, with large capital invested. It is simply a case of a diligent modeler's finding out some engine facts during long evenings in the cellar, proving their worth on the field and then going in a hole for equipment to enable him to pass on those hard-won facts to his fellow modelers. It is by no means certain that George will get back what he has put into this spare time enterprise and indeed, the history of such ventures is against him. So take this at its face value: by intelligent high quality reworking of Fox engines, Model Motors Service is able to offer you team racing engine performance and economy that appreciably surpass anything in this writer's experience and without any apparent sacrifice of other desirable qualities. Now for the details.

Every surface in the M.S. Fox that is exposed to the movement of fuel or gases is polished to a mirror finish. The air enters a polished intake passage, draws fuel past a polished jet needle, enters a polished crankshaft passage and flows into a' polished crankcase where it circulates around a polished crank disc and end cover and is agitated by a shiny conrod. From there it rushes through a polished bypass into a polished combustion chamber, is burned, and the waste products expelled from a polished exhaust stack. The fact that you are tired of reading the word polished is an indication of the work involved in but one phase of the super-tuning process.

In all the spheres of engine interest in cars, boats and planes, large and small, there are people to be found polishing and porting and, in nine cases out of ten at least, they are making a ghastly mess of either a perfectly good engine or flogging a dead horse that above all needs a rebore and pistons. Polishing runs the gamut from a collection of clumsy gouges with a hand grinder, and radii where there should be corners, to a meticulous and laborious job of intelligent mirror finishing with no slips. The moral is, of course, never to attempt polishing unless you have the time and extreme patience to do it properly and, if it seems a kind of elementary thing to be paying' money for, just try it on an old engine and convince yourself.

Most of the modifications in. this engine arc directed toward improving volumetric efficiency or breathing capacity by reducing internal fluid friction, as distinct from improving it by altering port timing. The latter method results in a gain at the top of the rpm scale and a loss at the bottom with an increase are undesirable qualities in a team racing engine. A pure speed engine, on the other hand, has only one main requirement: extreme top end performance. Hot timing is essential and, while polishing helps, its benefits are not so noticeable where ports and passages are enormous in the first place.

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Reducing fluid friction, gases in the physical sense being fluids, has the effect of raising the torque curve throughout the rpm range, with no change in characteristics other than an all-around improvement in efficiency, efficiency being work produced for fuel consumed.

The cylinder ports of a model engine have two important dimensions, height and width. Multiplied by one another, they give the port area. Port area governs the gas velocity through the port for a given pressure and consequently determines the amount of gas which can pass at that pressure in a given time, or conversely the time required for a given volume of gas at that pressure to pass through the port. Increasing the area speeds up the flow, or allows greater volume to pass at the same speed. Therefore, at a given speed, the greater volume of gas induced and expelled produces higher torque, or at the increased speed made possible by easier gas flow, a higher bhp value. That is, provided there is no bottleneck elsewhere in the engine.

An increase in port area can be effected by an increase in either dimension or both, but since port height in a two-cycle engine also governs port timing and consequently controls the type of performance produced, any alteration to height should be executed with extreme caution. On the other hand, the only two important considerations where an increase in area by increase in width is contemplated are cylinder strength and adequate seal between the adjacent bypass and exhaust ports. If the engine as originally manufactured is generously endowed in these regards, then there is nothing but good to be gained from in-creasing the port width. This is exactly what George Moir does to the M.S. Fox and, to get the utmost gain, he polishes a radius around the outer edges of both ports.

By considerable experiment he has also found that a slight increase in port height is an all-around advantage; however, since Fox liners have changed from time to time in the course of development, there is no definite figure that applies to all engines. The controlling dimension is the distance from the crown of the piston at bdc to the upper edge of the ports, which he measures on each engine, modifying the port height accordingly. The actual port height, therefore, varies from engine to engine and so cannot be given here. However, on the average, exhaust area is increased by 47 per cent and bypass by 53 per cent.

In recent years the bypass port area and the bypass passage cross-section have steadily grown larger and every increase has, in the case of racing engines, produced a little more urge. Increases in exhaust port area have not produced such marked results and it seems that anything which eases the path of the relatively low pressure charge from the crankcase will show a profit. However, there is a practical limit to the size of a bypass passage, as the gases are not only required to get through at high rpm but also at fairly high velocity at flipping speeds. Large passages are a hindrance to easy starting and. as already mentioned, small passages limit performance. Therefore, a compromise is reached.

Since easy starting is vital to a team racing engine and economical high performance very' desirable, the M. S. engines feature an interesting modification for gaining top end performance without hindering startability. The bottom edge of the cylinder liner beneath the bypass port is cut away 1/8 in. up from the bottom. The portion of liner left between this cutaway and the port is ground and polished to form a shallow radius to conform to the path one imagines the gases try to take. As the piston is approaching bdc at the moment at which gas transfer takes place, the piston skirt is also cut away to match the liner. Moir says that he tried this modification with some reservation as he expected the piston to distort, but over a considerable time on several engines which he has measured frequently, he has found no increase in ovality or rapid wear, although in the Fox, the bypass is on the major thrust side of the piston.

If one starts with an engine that has port areas throughout, which balance or suit one another, and then increases the area of the bypass without correspondingly increasing the intake, it is probable that the gain will be very small, since the bypass cannot transfer extra mixture that did not get through the intake into the crankcase. By some very tedious work the M.S. rotary valve port has been enlarged by 28 per cent without any appreciable increase in venturi diameter. The valve port in the crankshaft has been enlarged to match but without any change in valve timing. In other words the extra area has been derived from lengthening the port axially in both cases. To enable the venturi to pass the extra air without any reduction in fuel suction at the spray bar, the venturi has been polished to a high finish and, owing to the port enlargement beneath the spray bar, has, unlike many front rotary intakes, the correct contour for expansion of the mixture after picking up its fuel.

Since the stock crankcase rear cover, because of its projection into the crankcase, to some extent baffles the bypass passage, it has been radiused on one side to help direct mixture toward the bypass from the very bottom of the crankcase and its surface is probably the only easy bit of polishing on the whole engine.

The piston crown and baffle have been brought to a high finish and the baffle thinned and radiused at the edges. The polished combustion chamber has been the object of considerable experiment with regard to compression ratios and fuels. Although under certain circumstances a reduction in compression ratio with the use of heavily nitrated fuels has shown a small gain, it has been found that on the average the stock ratio is the best with the recommended fuel.

Fuels are obviously an important item in the over-all picture of engine performance, but there is no great mystery about them and any talk of a magic brew can invariably be taken with a pinch of salt. However, an engine and fuel must be matched for ultimate performance and a bad engine can never be salvaged by a fuel formula, although an apparently bad fuel can usually be made to give good results by tailoring the engine to suit. People are very inclined to condemn fuels on a poor showing simply because the fuel is not suitable for the particular engine under the prevailing climatic conditions. The M.S. Fox, for instance, apparently gives very high initial power on Supersonic 1000 and then falls off slightly from overheating. A reduction in compression ratio eliminates this fall-off. Fox fuel behaves in a similar manner. Under cool, humid conditions both fuels would probably be quite satisfactory with the stock ratio. George Moir has found that Power mist Infant Thimble Glow with the addition of ¾ oz. of castor oil and 20 cc of Wynne Friction Proof to each pint can is a good fuel compromise with stock compression ratio under normal conditions (in this particular engine Editor.)

With regard to the airborne performance of the M.S. Fox Super .29 Hi-Power, the following should impress. By AAA timing, with the engine in George Moir's New Rambler team racer, 10 mile times of 7.57, 7.59, 7.51 and 7.54 have been put up, including pit stops. In proto speed, in a team racer, an official speed of 106 mph was achieved. Not .bad for an economical, easily-starting engine in a large airframe.

In addition to the Hi-Power .29, Model Motors Service also puts out a Fox Hi Torque .35 which is modified for stunt use.

In concluding this test, we really feel that George Moir has something to offer. He is providing modelers who have neither the time nor facilities for successful improvement of their engines with winning material which, in view of the work involved, can only be described as a gift. Let us hope he finds it practical to apply his talents to engines for other types of competition.

TEST: M.S. Fox Super .29

Plug: OK long reach, as supplied
Fuel: Supersonic 1000
Running Time Prior to Test: 30 minutes (run-in as received)
Bore: .738
Stroke: .700
Weight: 5 ¾ oz.

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Power Prop	RPM
9 x 8	13.200
9 x 6	14.250
8 x 8	14.600
8 x 6	15.400
7 x 9	15.300
7 x 8	15.800

Top Flite	RPM
10 x 8	11.100
10 x 6	12.000
9 x 8	12.350
9 x 6	13.250
8 x 8	13.800
8 x 6	14.550

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