HODAKA

Turn your 100 into a giant-killer with progressive modifications.

BY JIM MCMURREN

Since its first appearance here in the land of the Big Deal in 1964, the PABATCO wonder machine has enjoyed tremendous success. The Hodaka was first made available as a 90cc machine with a four-speed gearbox and was later enlarged and refined into a 100cc five-speed. Almost overnight the Hodaka became a favorite of sportsman racers. It's a tough, sporty-looking, simple machine that lends itself particularly well to performance modifications. More speed parts, accessories and knowhow are available for improving the performance of this machine than for any other in its field. If you have a Hodaka and want more power, the extra urge can be obtained easily enough—and that's if you want just enough muscle to dust off your brother-in-law's 142cc PAZAZZ, or you want the full race thing for sportsman TT, flattrack, or whatever. Up to double the stock horsepower is available: you can turn your hundred into a regular giant killer.

We'll start with the cheapest modifications at the top-end and go from there into the more sophisticated (and expensive) changes. We're dealing with the 100cc model, so if you have the earlier 90, the first thing to do is convert it into a 100 by boring the cylinder out 2mm and fitting the 100cc piston.

Top-End Bolt On: Expansion chamber, high-compression head and larger carburetor. You can perform the first three modifications in a matter of a few minutes each. The cylinder needn't be removed and the gain in horsepower will be noticeable throughout the entire rpm range, which makes these first steps ideal for the beginning trials, motocross or desert racer.

The largest single improvement to be made on the Hodaka is also the simplest: installation of an expansion chamber. You get an amazing increase in torque as well as in top-end horsepower, and the only drawback is that the exhaust noise gets louder.

Expansion chambers for Hodakas are available from your Hodaka dealer; or F&M Enterprises, Box 2126, La Mesa, California; or B&N Supply, also of La Mesa—for about $40. The F&M chamber is a good idea if you plan to modify your engine later for a reed valve. To build your own chamber, the dimensions are included in the diagram (fig. no. 1). If you can get the pieces rolled, and you have the welding equipment and the necessary talent, the job isn't too difficult; otherwise you'll be better off spending the money.

The next step is to install a special cylinder head. We do not recommend milling the stock head. The special head is a must because it has more fin area and more material over the combustion chamber to compensate for the extra heat and pressure generated by the increased compression.

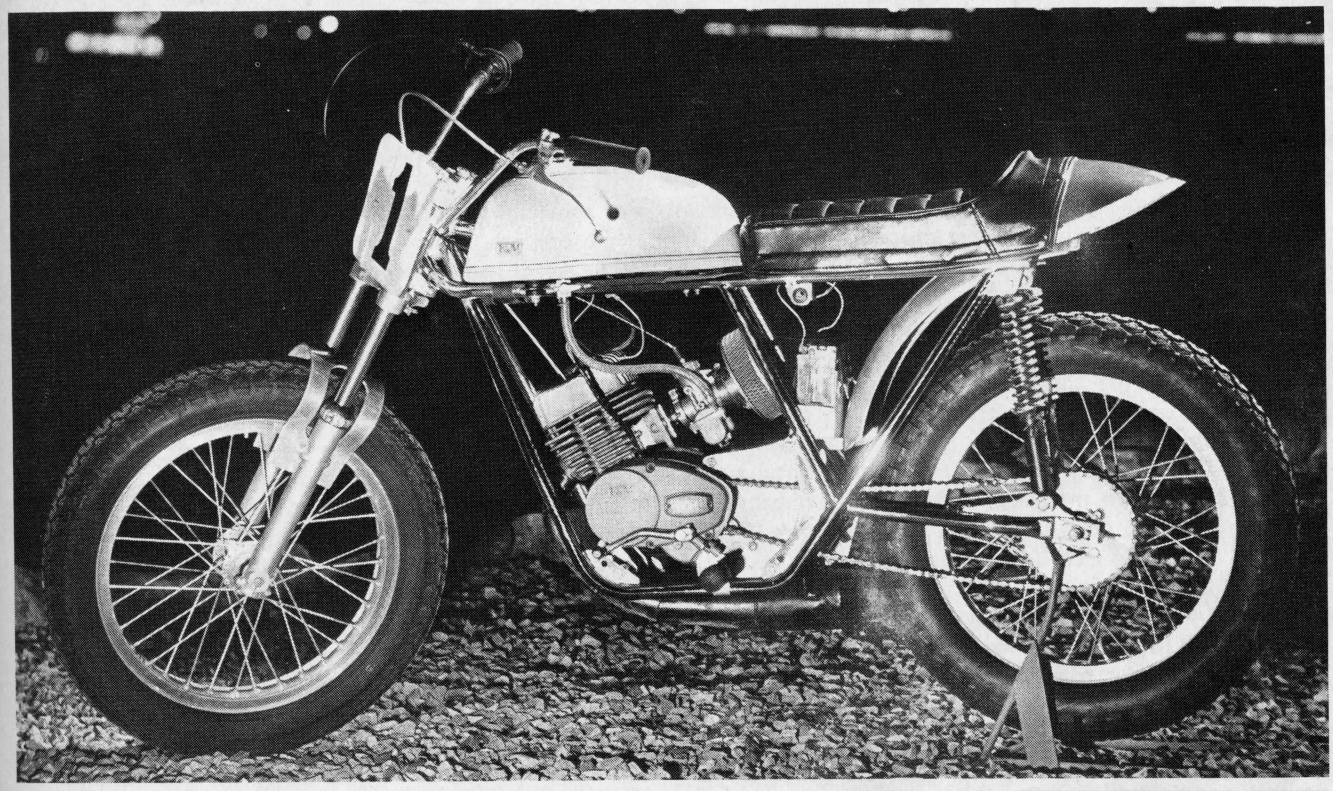
Hodaka has a 12:1 racing head which sells for $30. Webco makes a similar head for $24.

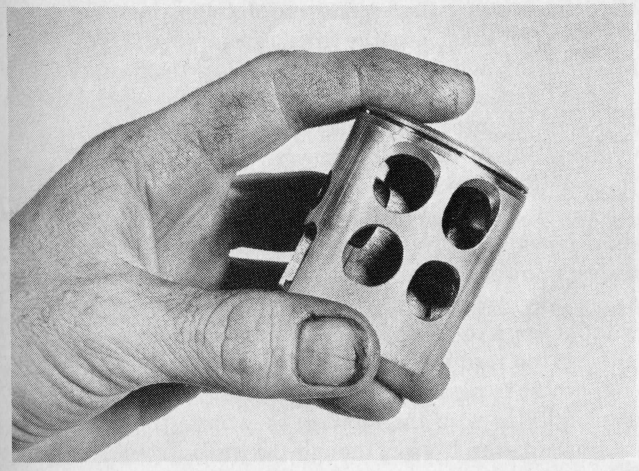
Now that the engine can use its fuel/air mixture more effectively, we can give it a little more carburetion. Any of several carbs from 22 to 24mm can be used, but the easiest to mount and adjust is the Hodaka 22mm carb and manifold. This carb and manifold are available from your dealer at a cost of $24. The carb will need a main jet somewhere between 330 and 370; always start on the rich side. A plug about two heat-ranges colder than standard (about an NGK B-10HN or equivalent) should be used. The ignition advance should be cut back to 22° of crankshaft rotation, or 2.25mm of piston travel BTDC. This setting allows the engine to run cooler than the factory-recommended 25° and produces more power, too.

These three simple bolt-on modifications will give a very noticeable improvement in power over the entire rpm range. Horsepower will be 10 to 20% higher than stock, and you will notice a considerable improvement in acceleration. Hills that used to be a struggle to get up will now be easy to climb, and sand and loose dirt that bogged the engine before can now be negotiated with greater ease. You should now be able to keep the front wheel in the air all the way down the block, much to the amazement of friends and neighbors. If all this doesn't quite meet your requirements, you can go further, but not without getting *inside* the engine.

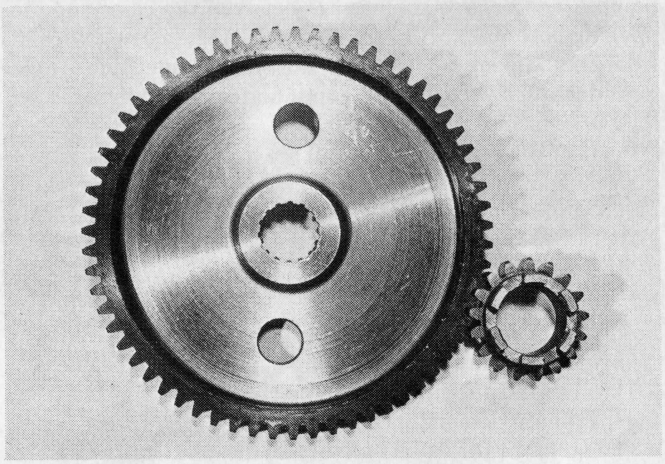
Porting: There are two ways to go to gain more performance. For motocross, desert, or rough scrambles racing, we can improve the performance along the entire rpm range (or at least not lose much at lower rpm), with little or no fussiness in starting and slow running. For TT or flattrack, we tune for greater power output at higher engine speeds and accept a loss of low-rpm performance. We'll cover the milder (and cheaper) motocross tune first.

A very simple and no-cost way to gain a little more hp is to add two more transfer ports to the cylinder. This gives the cylinder two more paths to get the fuel/air mixture from the crankcase to the combustion chamber. To make the extra ports, cut two grooves about 1/8-inch deep and 1/4-inch wide into the wall of the cylinder. These grooves should start between the inlet and transfer ports level with

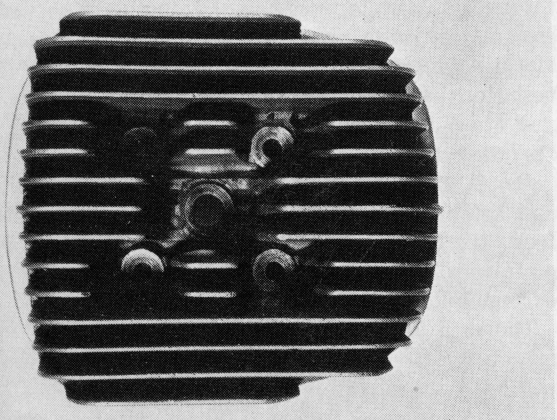




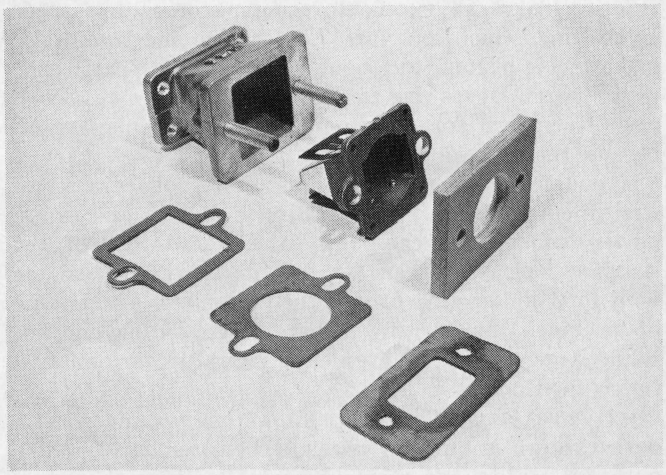
Holes have been added to the piston to accommodate reed-valve.



Straight-cut primary gears are noisier than stock; save power.



High-comp head offers more cooling area over combustion chamber.



Reed-valve intake manifold has been proven effective on Hodaka.

PHOTOGRAPHY BY WIN MULDROW

HODAKA You can bolt on a 20% horsepower increase. If you can

the top edge of the transfer port, and run diagonally across the curved wall of the cylinder, dropping downward to open into the transfer port cutouts in the bottom of the cylinder. To cut the ports, use a 1/4-inch diameter, ball-shaped rotary file, preferably mounted in a high speed (20,000 rpm or more) motor. A 1/4-inch drill-motor can be used, but the higher the speed of the rotary file, the less likely it is to catch momentarily and skip around in the cylinder and make a mess of things. These new ports (known as five porting) will not affect the lower rpm unless the other ports are modified, and they will improve the performance all through the rest of the rpm range (fig. no. 2). Then drill a 1/4-inch hole in the piston, just below the ring land and in line with one of the new grooves cut in the cylinder. If you intend to do much porting you will need an assortment of rotary files of various sizes and shapes.

If you want a bit more top-end power, at some cost to the lower rpm performance, you can raise the top of the exhaust port to 30mm from the top edge of the cylinder. Then widen (don't raise) the transfer ports in the cylinder. Smooth and enlarge the passage between the cases and the opening into the cylinder (fig. no. 3). Remove two mm from the bottom of the piston skirt on the inlet side. These modifications will deliver good performance in a rough scrambles or motocross machine.

If you plan on racing TT (but are not using a reed valve), you can port the cylinder as in fig. no. 4. These are fairly radical port specs and will not give good low rpm power. If you use these porting specifications, F&M Enterprises will port your cylinder for whatever performance you desire.

Pistons: Piston-to-cylinder-wall clearance in any Hodaka used for racing should be from .0035 inch minimum to .006 inch maximum. Proper ring gap is from .004 inch to .012 inch, and the rings should be changed every other race for maximum performance.

The stock piston is satisfactory if the revs are to be kept below 9000; otherwise, ring breakage will probably occur. Hodaka makes an excellent racing piston with a single Dykes ring, which sells for $7.50. Wiseco and Webco also make racing pistons, for about the same price. The Webco piston uses a Dykes ring at the top, and a standard second ring; it is ideal for a motocross, desert, or play-motor, because the rings will last longer.

If you feel like spending a few more dollars, a set of straight-cut primary gears ($18) will reduce the horsepower-stealing drag caused by the side thrust of the standard helical-cut gears. At this point, we are near the limit for a conservative play-on-the-weekend or learner type of machine. However, if you have progressed beyond this riding stage, we can get even more radical in performance-tuning the Hodaka.

Reed Valve, 32mm Carb, Close-Ratio Gearbox: For years a device known as the reed valve has been used in two-stroke outboard motors and chainsaw engines with great success. For some mysterious reason, the reeds have seen little use in motorcycles until recently.

The reed itself resembles a saxophone mouthpiece in construction, and acts as a one-way demand valve. It consists of four blades attached to a wedge-shaped aluminum casting. The reed is placed between the carburetor and the inlet port, allowing the air to flow only one way. When the pressure in the engine case is below that of the atmosphere, the reeds open and allow air to pass. When the piston starts back down and the case pressure goes up, the reeds close, trapping the fuel/air mixture in the cases, where it is held pressurized until the transfer ports open and allow the mixture to fill the cylinder.

Without the reed valve, any radically-ported two-stroke engine tends to blow a goodly portion of the fuel/air mixture back out the carburetor at low rpm, because the inlet port is left open as the piston starts back down in the cylinder. Some of the fuel/air mixture which has just been sucked into the crankcase through the inlet port is blown back out of that port. At higher rpm, the air is drawn into the inlet port at a faster rate and develops inertia. It tends to keep traveling into the crankcase even though it is no longer being pulled in by a pressure less than atmospheric. As this inertia increases at higher rpm, the column of air being drawn into the engine counteracts the pressure in the cylinder caused by the downward travel of the piston, and the radically-tuned engine begins to function efficiently.

Naturally, any racy port job will considerably narrow the rpm range through which a normal two-stroke engine delivers power. Not so with the reed valve. Since the reed is a one-way valve, very radical port timing can be used without harm to the low-rpm performance.

Using the reed system, holes are cut into the piston skirt (fig. no. 5) to pass the fuel/air mixture. Thus, the crankcase is being filled with the mixture as soon as the piston starts its upward travel, even though the piston skirt is covering the inlet port.

Reed valves tailored to the Hodaka can be obtained through F&M Enterprises or B&N Supply. The reed system gives a very wide power range and good horsepower. Jim McGuire, manufacturer of the F&M reed and one of the best Hodaka tuners in Southern California, has obtained 16 rear-wheel horsepower on Don Vesco's dyno, with an operating range of 4000 to 11,500 rpm.

Jim is the number-one 100cc rider in AMA District 38 and has been building and racing Hodakas since 1964. He feels that this reed valve gives better horsepower at any given rpm, and he has a couple hundred wins against some extremely tough competition to prove it.

The reed valve which Jim manufactures is built inside a manifold onto which a 32mm Amal concentric carburetor will bolt with no alterations. Other carburetors can be used (McGuire has used up to 34mm), but the 32mm Amal seems the best choice.

ase. If you want more, for serious racing, you have to go inside the engine. Here's how.

After installing the reed system, you will need to make additional modifications to the engine. One is the drilling of holes in the piston, and the other is a radical porting system which is best explained by the pictures. The finger ports of this system reach upward from the inlet port to a point level with the top of the transfer ports, which are raised to 37mm from the top of the cylinder (fig. no. 6) and are extended downward as far as possible without going through the cylinder spigot. The exhaust port is raised to 27mm from the top of the cylinder.

Porting of any two-stroke cylinder is a tedious and time-consuming task. In addition to a good selection of rotary files and small grinding-wheels, polishing equipment is helpful. If you don't have the necessary equipment, time, patience, and steady nerves, I suggest you have the job done by someone with experience. F&M will reed port a Hodaka cylinder for $30, which is very reasonable. Many bike shops will do this kind of work, but unless you're sure they've had plenty of experience working with two strokes, you are taking a chance.

If you are determined to do the job yourself, begin by covering with bluing all areas to be worked on. Machinists' bluing is available in spray cans, which work very well. Carefully measure and scribe out the material to be removed. When removing metal, go slowly and check your progress often, to avoid grinding away too much material. Do not leave square-edged ports, as they invite fractures. Use a small round file to get a minimum radius of 1/8 inch. Bevel the horizontal edges of ports, where they open out into the cylinder, to a 15° angle (fig. no. 7). This will prevent the piston ring from hooking the edge of the port.

Carburetor: The 32mm Amal concentric carburetor is a good choice in view of price, performance, and availability of parts. Drill out the pilot air jet to .027 inch. Use a 107 needle jet with the needle in the center position, and a main jet between 320 and 370. Don't use a sparkplug hotter than Autolite 603 or equivalent.

SPLITTING THE CASES

If you're going all out for the last bit of performance, there are several modifications to make inside the engine cases. A Hodaka workshop manual gives all the information you'll need for the teardown and reassembly of the engine; we'll cover only the modifications to the components. The only special tool you will need is a flywheel puller.

Once the engine is apart, the crankshaft should be balanced to 55%, to eliminate the vibration present at the higher rpm you'll be using. Balancing any engine is a fairly technical chore, and unless you know someone with the ability to do this job, I recommend sending the flywheel assembly to F&M, who will replace any worn parts and balance the assembly for $25, plus parts. At this point you should check all bearings in the engine, including the rod bearing, and replace as necessary. Hodaka recommends "blading" and polishing the rod, which helps the balance and eliminates possible fractures. Make sure that the rod has a minimum of .010 inch of side play. The flywheels should be trued up to a tolerance of .001 inch.

The kickstarter mechanism is meshed with the transmission, and one of the kickstarter gears is turned whenever the engine is running. Removal of the kickstarter gears cuts drag and saves a couple of pounds. The hole in the case left by the removal of the kickstarter shaft must be plugged; you can make a plug of your own, or F&M will supply their plug for $2.

To reduce friction still further, replace the two gearbox bushings in the cases with needle roller bearings. The bearings can be obtained through your local bearing supply house by ordering Fafnir part numbers HK1210 and NK1816H. The cases should be line bored for the bearings by a machine shop, to provide a .001 inch interference fit. F&M can also handle this job and supply the bearings.

At this point you can decide which gearbox to use. Hodaka supplies a close ratio gearbox which is stronger than standard and sells for $61. For high speed use (on tracks with straightaway speeds of 60 mph or over), the close ratio is more desirable.

The standard Hodaka clutch (part no. 924000) is 4-1/2 inches in diameter; has four lined plates; engages smoothly; and is suitable for motocross or TT. The earlier version (part no. 914000R) is a 3-3/4 inch diameter unit and gives less flywheel effect, for maximum efforts on TT tracks. With the additional power now on hand, a set of Barnett clutch plates ($7) will help the clutch operation.

Total-Loss Ignition: A total-loss ignition system (battery powered, with no charging system on the motorcycle) should be used in place of the standard magneto. The total-loss system gives a hotter spark, and robs no horsepower in producing the spark. Hodaka supplies a points cam for battery ignition (no. 913007R) for $3, and a battery ignition-coil (no. 913009R) for $9. The battery points cam eliminates the need for the heavy magneto flywheel. Without the flywheel, acceleration improves considerably.

The standard battery can be used in the total-loss system, but it must be charged before every race. Do not charge at a rate above one amp. The battery must be mounted in a way that isolates it from vibration. You can fabricate your own mount between the fork legs, behind the front number-plate for example, or purchase a racing battery box from Hodaka for $7.

You have probably reached the conclusion that a lot of time, money and effort can be put into a Hodaka in pursuit of making it into a race-winning machine. Correct; but don't forget that after investing this time and money you'll have a machine that *will* win races. A Hodaka equipped with all the modifications I've outlined will run with (or outrun) any machine of similar size. To top it off, the modified Hodaka is still reliable and rideable. □