

# Doing It Yourself Is Easier Than You Think

By Walt Fulton

**Y**AMAHA'S DT400 IS as bullet-proof as they come. But it, just like any mechanical device, requires periodic maintenance, as well as an occasional major service. The amount of time spent on this service varies not only from bike to bike, but also has a great deal to do with the type of riding that the bike is called upon to do. It isn't unusual to find a bike like the 400 that never even dirties its tires with off-the-road muck; on the other hand, others will be thrashed constantly in the dirt and require a regular maintenance schedule.

Our test DT400 (March '75), now has more than 1000 miles on it. . . all of them off-road. And the majority of these were ticked off in one type of competition event or another, usually in the desert. Anyone who's been there knows what that means—plenty of dust! Consequently, it has been necessary for us to perform minor service on the bike every time it has been ridden.

This maintenance involves cleaning the air filter, changing the oil and adjusting the chain, clutch and brakes. But we won't bore you with these things; anyone who buys a bike like this and uses it regularly must have some idea of what is required from day to day to keep it in tiptop condition. What you don't know, the owner's manual should be able to tell you.

But these manuals don't get into the more serious things like removing the

top end to rebore the cylinder and replace the piston and rings. Some dealers will have a factory service



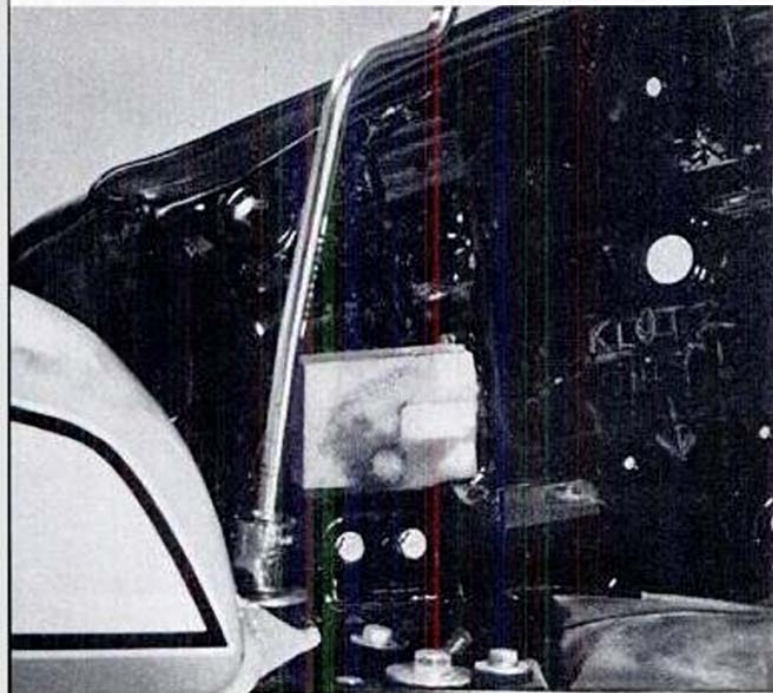
manual to describe such procedures—if you're lucky. But fear not, we're about to give you a step-by-step on the entire task.

If you are the type who has some mechanical aptitude, a few common hand tools and a desire to save money, then this do-it-yourself job is right up your alley. A top-end rebuild is an easy task, and one that can save you cash and time. The actual cylinder boring operation will have to be done at a machine shop. This will cost, on the average, 10 to 15 dollars. The price of the necessary replacement parts—piston, rings, pin and circlips, top-end bearing base and head gaskets—will also vary, but you can expect to pay up to \$35.

The tools you'll need include a handful of sockets, a ratchet and "B" extension, several open-end wrenches and screwdrivers, and, most important of all, a torque wrench. To hurry things along, a speed handle really helps.

If your engine has a knock or any other strange noise emanating from it, chances are that one of three things is wrong: a) there are broken or stuck rings, b) too much piston/cylinder clearance, or c) all of the above. In our particular instance, the bottom ring had managed to stick itself to the piston; piston clearance was within limits. Normally the cylinder could be honed, new rings fitted and the top end reassembled, but in our case there were indications of ring flutter in the bore, which grooved the cylinder at the rear near the intake port. To clean up the marks in the cylinder, it was necessary to bore it to the first oversize.





**1** Lift the seat to expose the 17mm nut that secures the tank to the frame. Turn the gas off, remove this bolt and the fuel line, and pull the tank away from its front mount.

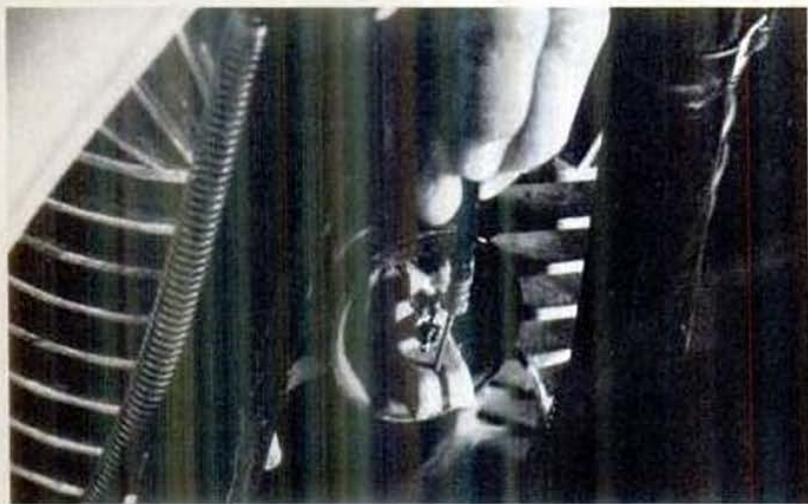
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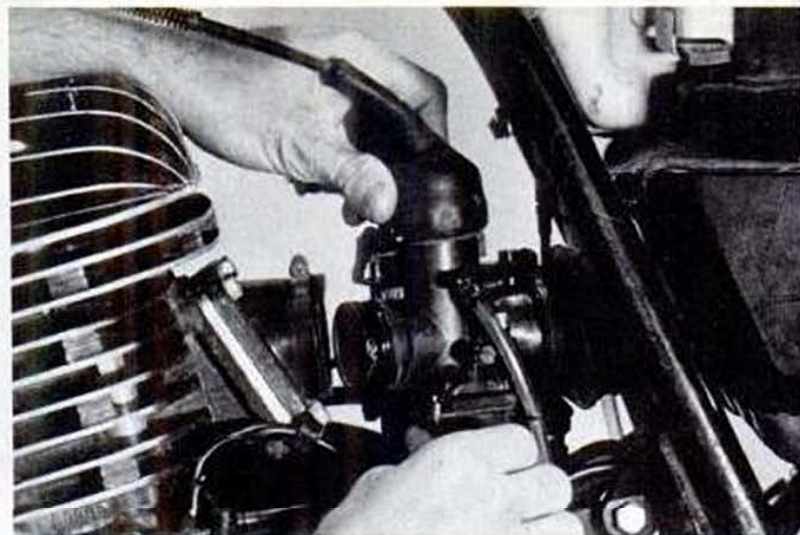
**2** Use a medium-sized Phillips driver to remove the heat shield from the pipe. These screws are sometimes very tight and may require an impact driver. If this doesn't do it, use channel locks and get new screws. A 13mm socket will remove the two nuts holding the pipe flange to the cylinder and the one bolt attaching it to the frame just behind the tank mount. Now work the pipe out.



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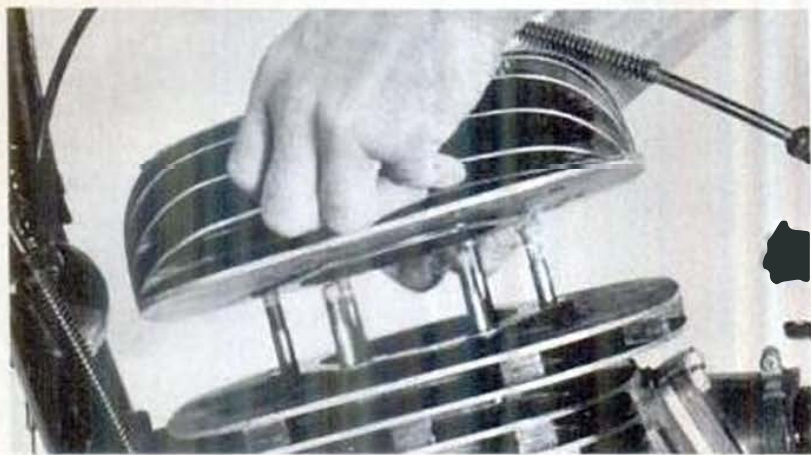


**3** Raise the rubber cover on the decompression release at the front of the cylinder. There will be enough free play in the cable to disconnect it without any effort. Tuck the cable out of the way.

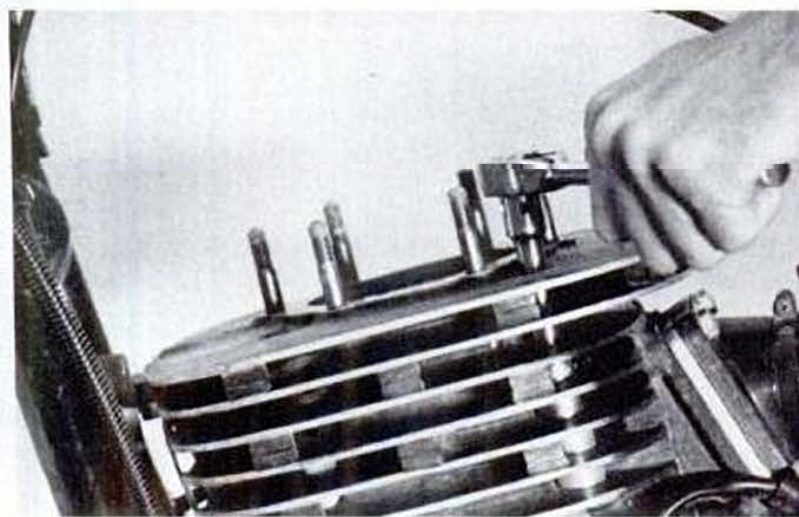


**4** Loosen the clamp that holds the carburetor to the reed-valve block by using a Phillips driver. Push the carb toward the rear and pull out on the front at the same time.

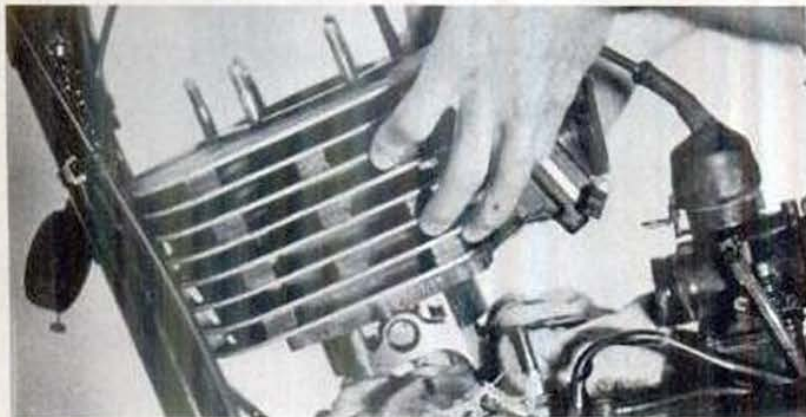
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**5** Remove the six 13mm hex-head nuts using a socket and ratchet with a 3-in. extension. It is best to use a magnet to remove the washers on the studs before the head is removed. It is also good practice to loosen the plug before lifting the head off.



**6** Again using the ratchet, extension and 13mm socket, loosen and remove the four nuts that attach the cylinder to the crankcase.

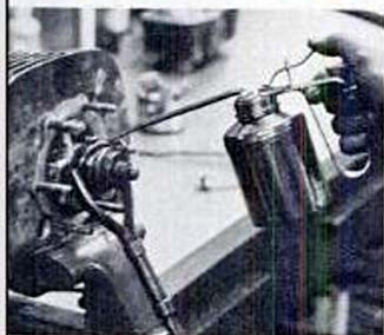


**7** Removal of the cylinder may require tapping the fins several times with a plastic hammer in order to separate it from the base gasket and crankcase. Before the cylinder is lifted off the piston, stuff a clean rag into the bottom end to prevent any dirt or pieces of broken ring from dropping in.



**8** Firmly grasp the circlip with a pair of needle-nose pliers. Twist to the inside and at the same time pull out; the clip will come right out. Using a pocket knife or similar tool, deburr the piston-pin hole (above steps not shown), and push the pin out from the opposite side.





Before boring the cylinder, remove the decompression release and reed-valve block. This requires a 17mm open-end wrench and 10mm socket, respectively. The machinist will use a set of micrometers to measure the cylinder bore and the new piston diameter.

The cylinder is bored slightly smaller than piston diameter plus specified clearance, then honed to the exact size. Several cuts are made before the final bore is achieved to assure a smooth and straight finish. We found the bore to be out of round by .003 in., a fact not too uncommon today, due to the speed with which all bikes are assembled. Yamaha specs allow for a maximum out-of-round of .004 in. Once the bore is straightened, it will maintain its shape.

In setting up a new engine, factory specs call for a maximum of .002 in. of piston clearance. Maximum allowable wear is .004 in. We prefer running a little looser than this, so we clearanced the cylinder to .0025 in. and honed for the best.

# 9

# 10

Before proceeding, clean any gasket material from the crankcase and cylinder. Also, use a scraper to remove any carbon buildup that has accumulated in the head. Thoroughly wash the cylinder in solvent to remove any particles left over from the bore job. Install the decompression release and the reed-valve block. Tighten the block down evenly.



Work the piston pin back and forth through the piston several times to assure a smooth slip fit. Lubricate the small-end bearing and place it in the connecting rod. Install one circlip in the piston with the open end facing the top or bottom of the piston. This way the forces acting on the clip won't have a tendency to close it and pop it out of its groove. Push the pin into the piston and install the other clip in the same manner. Make sure the arrow on the piston crown is facing forward.

# 12

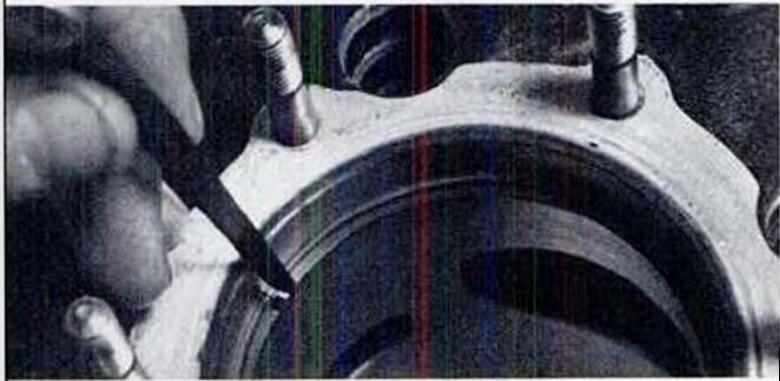
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# 9

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# 11

To check for proper ring gap, use the piston to push the rings an inch or so into the bore. Measure the end gap with a feeler gauge; both top and bottom should be .012 to .020 in. If the gap is too tight, use a small flat file to remove some material from the ring. Check the gap often to make sure the limit isn't exceeded. We set this one up at .015 in.

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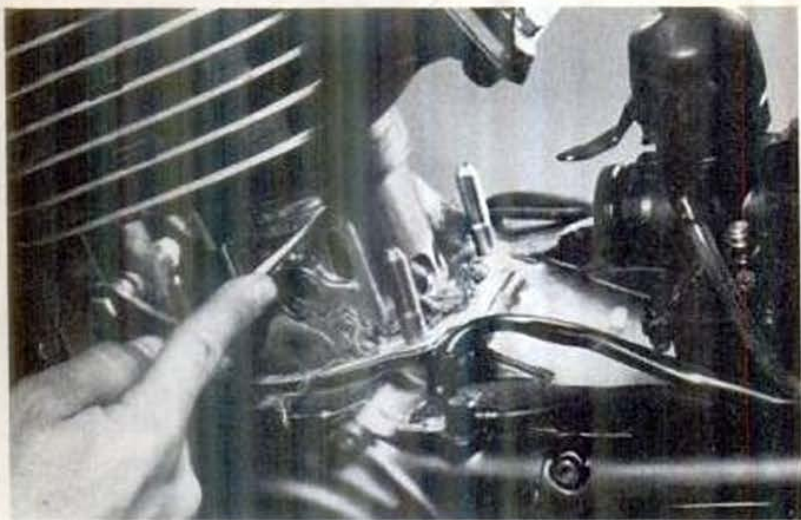


# 13

Once the piston is secured, install the piston rings in the grooves on the piston. The writing on the ring should be to the top. Before the bottom ring is fitted, place the ring expander in its groove. There are tools made for installing the rings, but if care is taken, it can be done with a good set of fingernails. Place the base gasket on the crankcase at this point.

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## 14

Lightly lubricate the cylinder, piston and rings with the oil used in the injection. Making sure the rings are properly positioned on the piston, place the cylinder on top of the piston and start to slide it over the rings. The bevel at the base of the cylinder helps to compress the rings, but it will be necessary to help it along with a small flatblade screwdriver. It is important to exercise caution at this point to prevent ring breakage.

## 15

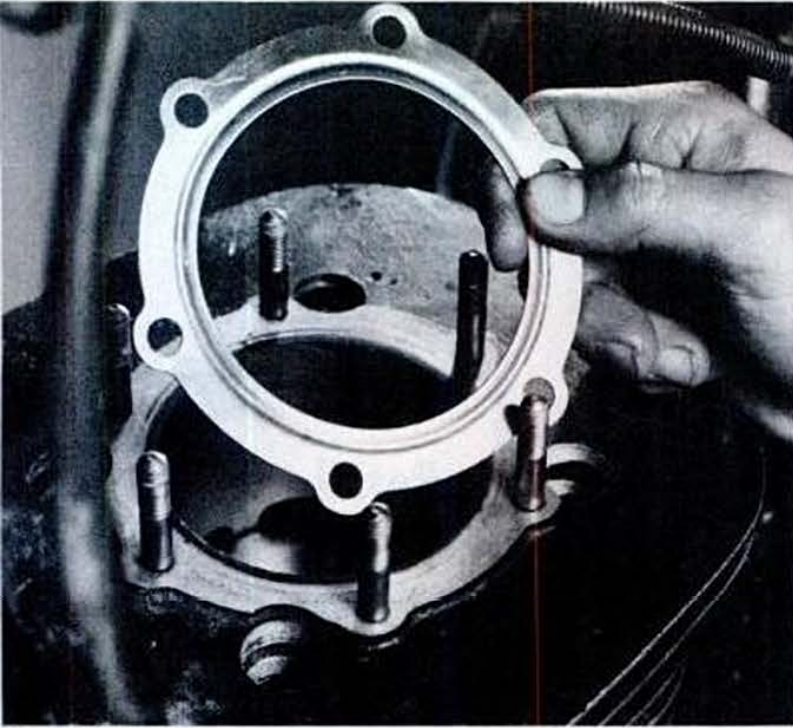
Push the carb into the spigot, making sure it is positioned correctly. Don't forget to tighten the clamp.



## 16

Using a criss-cross pattern, tighten the cylinder nuts to 32 ft.-lb. Start at 15 ft.-lb. and work up from there. This assures that the base will not be tightened unevenly and eventually warp from the heat.





**17**

The head gasket goes on next. Place the raised portion down against the cylinder. As with the cylinder, tighten the head nuts evenly and in steps until 18 ft.-lb. has been reached.



**18**

Connect the decompression cable to the valve and cover with the rubber cap. Carefully work the exhaust pipe into place and tighten the flange to the cylinder after the bracket behind the tank is in place. Fit the heat shield. Last but not least, the tank is remounted. A little lubricant on the tank rubbers will help with its installation. Connect the fuel line and its ready to roll. 