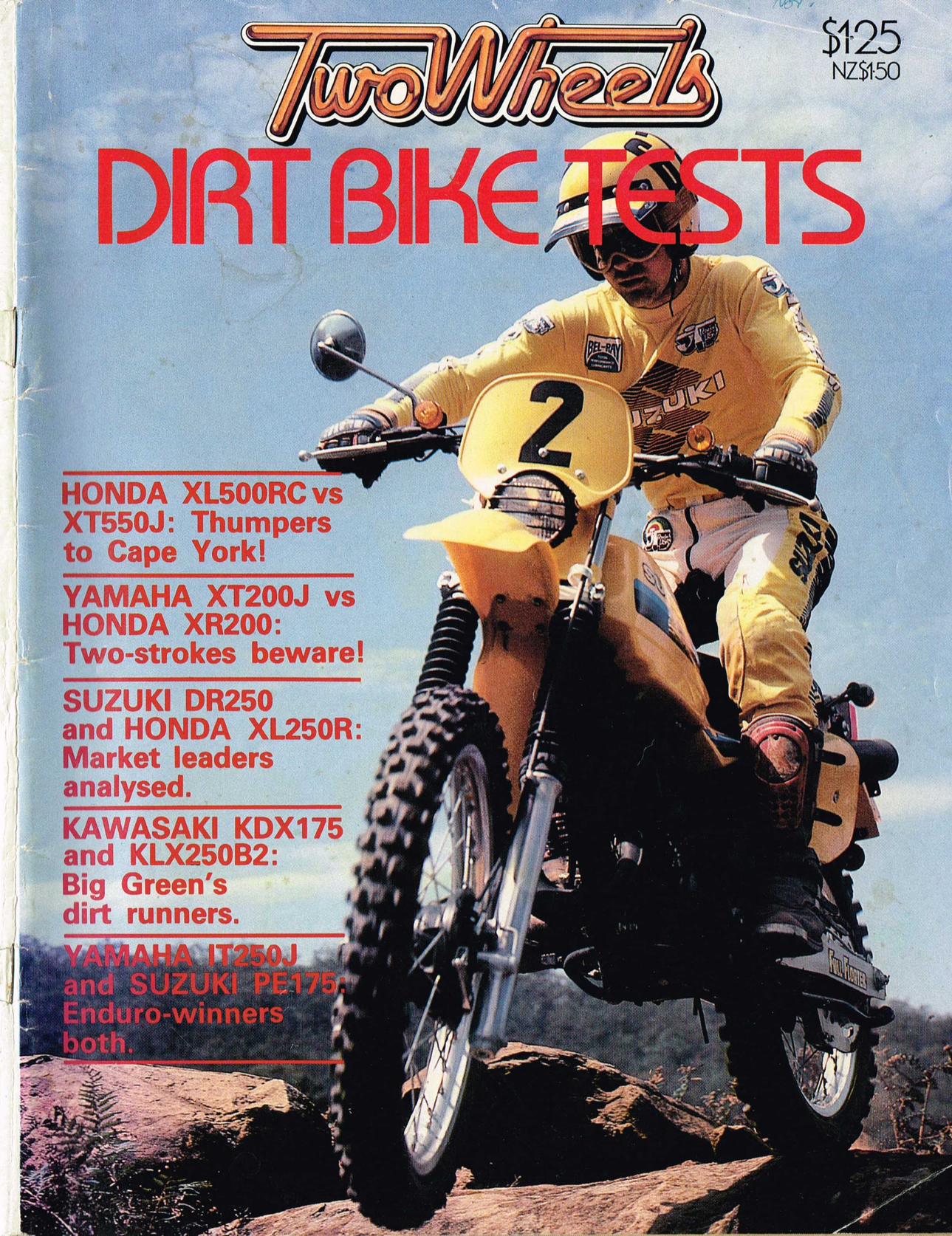
Two Wheels

$1.25
NZ$1.50

DIRT BIKE TESTS



HONDA XL500RC vs XT550J: Thumpers to Cape York!

YAMAHA XT200J vs HONDA XR200: Two-strokes beware!

SUZUKI DR250 and HONDA XL250R: Market leaders analysed.

KAWASAKI KDX175 and KLX250B2: Big Green's dirt runners.

YAMAHA IT250J and SUZUKI PE175: Enduro-winners both.

In Search Of A Quicker "J"

Getting to the point where you feel you can handle more herbs from your J-model YZ? Worried about the possibility of bullies with K-models kicking sand in your face? Then read on. Our Technical Wallah At Large, ANTHONY SEYMOUR, gives you the full details of the go-fast secrets used by Yamaha US riders, while STEVE ASHKENAZI, developer/tuner of the bikes used by the Toshiba Yamaha Dealer Team, passes on some of the tips learnt during the team's successful 1982 season.

THESE tips will help the competent owner/rider of a 1982 (J-model) YZ obtain more power at a higher engine speed, without — as long as the work is carried out carefully — an adverse effect on reliability. However, to fully take advantage of increased performance calls for a higher level of rider skill. If you find your stock-model YZ is as much as you can handle, it might be better to leave it as is!

Before getting on to engine mods on the various models, it is worthwhile to look at ways of obtaining the best from the bike's suspension. The problems faced by many riders can be traced, not to lack of power from the motor, but to poorly maintained or incorrectly set-up suspension. And if the performance is increased, the suspension-related problems are, if anything, magnified.

Because of the sophisticated nature of the suspension components in a modern motocrosser, they demand more regular and more meticulous attention. They also respond well to "blueprinting", in which the imperfections of the mass-production processes are tidied up.

Yamaha's Monocross rising rate suspension is shown in Figure 1. Each equal movement of the rear axle is matched by successively greater distances by which the spring/damper unit is compressed. In other words, each movement of the axle needs more and more force to overcome the spring's resistance. Figure 2 shows the seven points on the Monocross system which should gain regular attention. Since they carry forces some five and six times greater than axle loadings, the pivots need good lubrication to minimise wear. Another point to watch is when replacing the rear wheel. Do not overtighten the axle — it may distort the bushing in the rear backing plate and cause it to seize. For the YZ100J and 125J the correct torque is 83 Nm (8.5 kg.m) and for the 250J and 490J it is 98 Nm (10.0 kg.m).

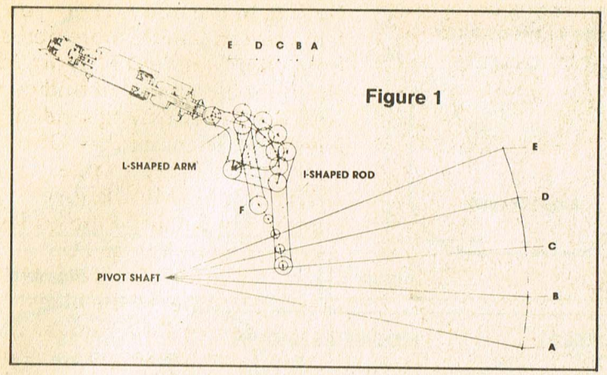


Figure 1

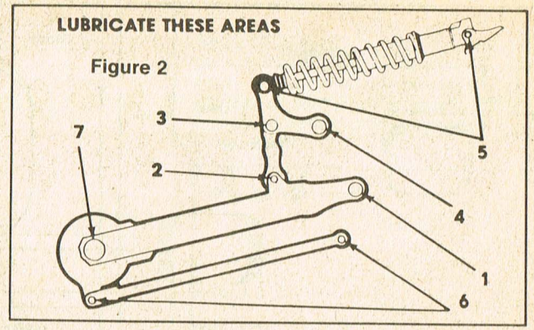


Figure 2

Left: ***Figure 1.*** Above: ***Figure 2.***

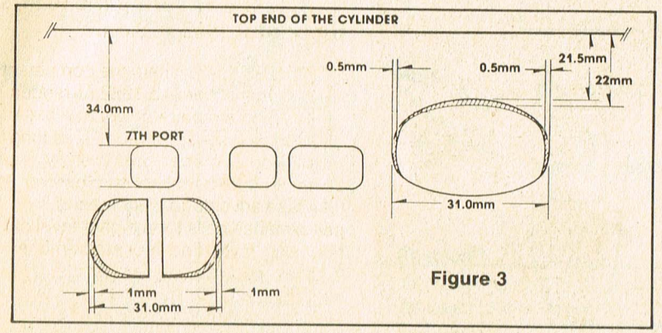


Figure 3

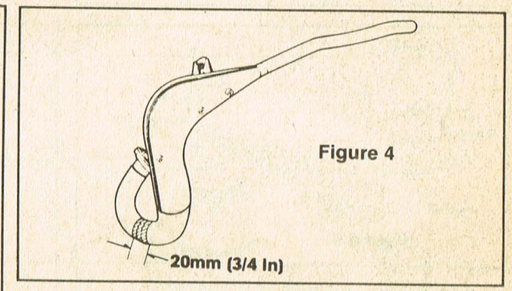


Figure 4

Left: ***Figure 3.*** Above: ***Figure 4.***

Optional suspension tuning components, such as springs, are described in the owners' manuals that come with each machine. Oil viscosities, amounts, monoshock nitrogen pressure and spring preload offer practically infinite adjustments and have to be decided according to prevailing conditions and rider weight. However, we are recommending that the front fork damper rods receive a high polish (accomplished best in the chuck of a lathe set at the highest speed with varying grades of paper — say, 180 and 400) outside and inside. The inside is a more difficult operation. I use a mandrel in the chuck of the drill press with 180-grit paper. All the oilways in the damper should then be deburred with a countersink cutter or a large drill bit. (A 45-degree countersink used carefully by hand is best.) The holes are stamped and the burrs on the inside of the large holes are pretty "knarly". You have to get in there with a curved file or appropriate grindstone or carbide cutting tool. Once completed the rods will not only look like pieces of art but will offer enhanced and more controlled damping.

Stiffening things up

The J-model YZs all tend to be slightly undersprung, and work better with the heavy-duty spring options both front and back. Particularly if the rider weighs over 60 kg, at least one step up is required.

Because the monoshock units are all the same size, the same range of springs fits all models. Thus, the average-sized 250 rider will find that replacing the standard 3.25 kg/mm spring with a standard 490 unit (3.50 kg/mm) will work just fine. Says Steve Ashkenazi: "If you've got a mate with a one-sized bigger bike, borrow his entire spring/damper unit, and try it out. That way, you don't have to fiddle around changing springs, and you can see if the stiffer spring improves things." As Steve points out, the problem with the too-soft standard springing is that the preload has to be wound right up to give decent ride height — only then the bike skips and hops over the small bumps.

You can save money on the front-end mod simply by shortening the standard springs, as the wire diameter and coil size is identical to the heavy-duty. Just measure the length of a heavy-duty spring and shorten the standard ones accordingly. For the doubters, the physics involved in this matter say that a spring is really a coiled torsion bar. In compressing a spring the wire is actually twisting. The shorter the coil or the larger the wire diameter the greater force is needed to compress it. The heavy-duty preload spacer is also needed, but is easily fabricated if otherwise unavailable.

Use 7½ to 10-weight oil in the forks, filled to 140 mm from the top of the stanchion tubes with the springs removed and the forks fully compressed. The Dealer Team has found that one of Castrol's hydraulic oils in this weight range (depending on the bike and rider) works well. Castrol is considering marketing this as a fork oil.

If the stiffest optional 490 monoshock spring is still not enough (it's rated at a very solid 4.00 kg/mm!), then the one from the IT175J is even stiffer (although a lighter bike, the IT has a different suspension rate, which means it can handle the stiffer spring).

Now for motor-related modifications to the various models in the range. It is assumed that the machines to receive attention are in good condition, and that they are otherwise unmodified from stock. Most of the alterations should be performed by a competent mechanic.

YZ60J

The cylinder should be modified with a die-grinder, removing the shaded areas illustrated in Figure 3 and carefully contouring (polishing as well if you wish) the exhaust port to the new shape. Whenever a cylinder is rebored the seventh port should be checked for specification.

Mill 0.025 mm from the cylinder head gasket surface. The exhaust pipe, reed valves and ignition timing should be left standard. Use a 12-tooth countershaft sprocket. For the kid who has everything, a YZ80H barrel will slip right into place!

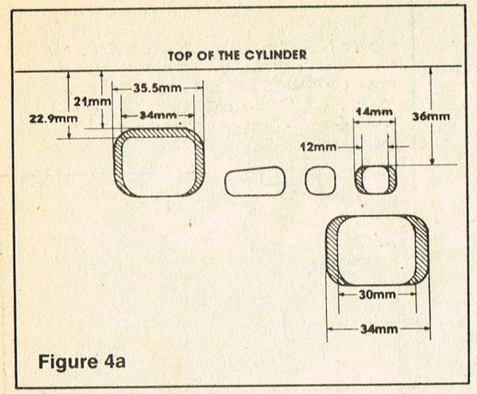


Figure 4a

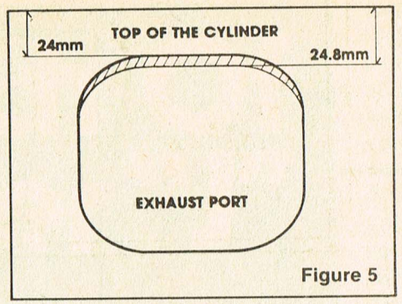


Figure 5

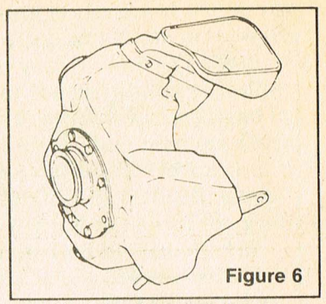


Figure 6

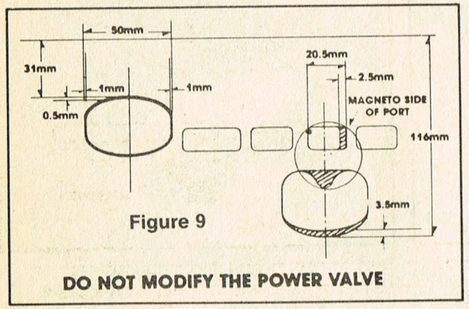


Figure 9

DO NOT MODIFY THE POWER VALVE

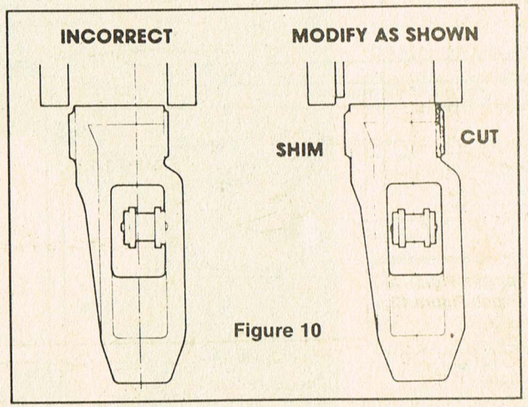


Figure 10

Top row, left to right: ***Figure 4a; Figure 5; Figure 6.*** *Bottom row:* ***Figure 9; Figure 10.***

YZ80J

To aid the intake a sock-type filter (Uni, K&N, etc) can be used after cutting a hole so that it can extend into the original airbox. Make the hole approximately 20 mm larger diameter than the filter.

Shorten the exhaust pipe as shown in Figure 4. It is essential that only a competent person performs this modification.

Remove material from the shaded areas as illustrated in Figure 4a. Place the piston at bottom dead centre and grind the transfer openings to match the piston contour. Machine 0.5 mm from the base gasket surface.

Cylinder head volume should be 7.5 cm^3, achieved by milling 0.38 mm from the cylinder head gasket surface. It is important to rematch the squish area of the combustion chamber to maintain a 0.75 mm piston-to-head clearance. Carburation will end up in the range of 250-260 main jet (standard, 210) and with the pilot jet down to 30 from 35 as an aid to crisper low-speed response.

YZ100J

Modify the exhaust port as shown in Figure 5. Drill 10 mm holes in the airbox as illustrated (Figure 6) and rivet some fine wire mesh to the inside. This improves breathing and jetting must be checked. For muddy conditions tape over the holes. Exhaust system, reed valve and timing are okay. Use a 52-tooth rear sprocket (standard is 50-tooth) if lower gearing is required.

YZ125J

The 125, along with the 250, has a power valve which mechanically varies the exhaust port area at different engine speeds. Its timing is very critical, and changes to it have the same effect as an alteration to port size.

The timing of this magic power valve can be altered by shimming the governor unit to alter the spring preload. In the case of the 125, place the shim (of 0.3 mm thickness) in position as shown in Figure 7. Yamaha part No. 648-45533-00-03 can be used if trimmed to an outside diameter of 31 mm. Adjustment of the power valve actuator is critical. My method is to manually push the actuator arm upwards as far as it will go and shine a light into the port to check the power valve. It should be blended into the port roof. Adjustment will invariably be required. Use Loctite on the nut and don't overtighten — the specs call for 5.4 Nm (0.55 kg.m).

It is necessary to double-check with the engine running. This is accomplished by marking the extent of actuator arm travel on the cylinder and revving the engine (short blips of the throttle only) to see if it actually goes that far. If not you will have to alter the previous adjustment.

The airbox should be modified as described for the YZ100, and the exhaust shortened as shown in Figure 8. Take 7.5 mm from either side of the joint.

Standard ignition timing is 1.88 mm BTDC but our dyno testing shows a preference for retarding the timing by 0.2 mm. This is in the interests of greater power output with as little cylinder head temperature rise as possible.

With all these modifications jetting will, of course, need attention. Note that retarding ignition timing can allow a leaner mixture to be used while the airbox mod — by allowing a larger volume of air to be pumped — will conversely require richer jetting to maintain the correct air/fuel ratio. As the YZs are often too rich out of the crate it's not uncommon for these factors to cancel each other out and you can still have the specified standard main jet.

The brake cable guide mounted on the lower triple clamp of the J-model YZs is prone to breakage. Replace it with its much stronger H-model counterpart (Yamaha part No. 3R4-23389-00). It will need a little bending to clear the clamp bolts on the 250. The part can also be used on the 490. Attaching a guide to both the top and bottom clamps (cut a slit in the number plate for the top one) allows you to replace the stock 490 front brake cable with one from a 250. The standard one runs across the front of the plate and kinks badly at full fork

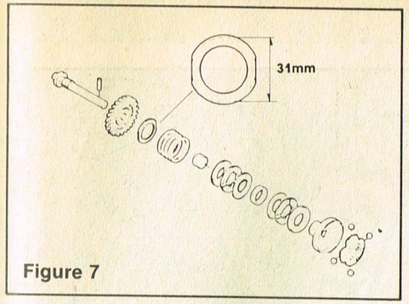


Figure 7

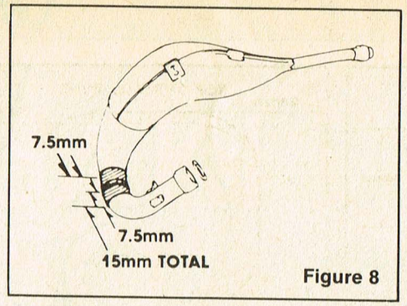


Figure 8

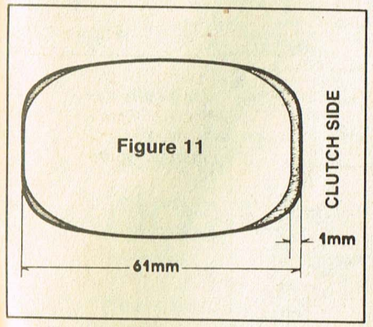


Figure 11

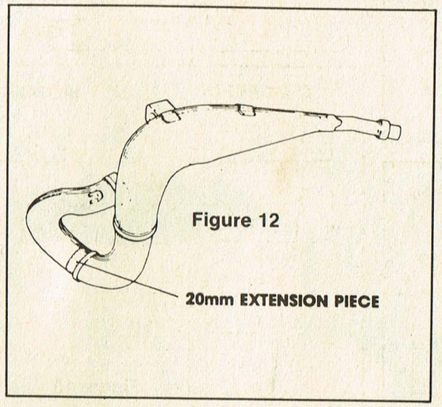


Figure 12

Top left: ***Figure 7.*** *Top right:* ***Figure 8.*** *Above:* ***Figure 11.*** *Right:* ***Figure 12.***

compression. It also has potential to snag behind the plate under these conditions. Using the two guides and the 250 cable gives a straight pull from the lever and a smooth curve.

YZ250J

Remove material from the areas shown shaded in Figure 9. Removal from the two areas ringed calls for the bottom piston ring to be removed as it will snag in the widened seventh port or catch in the top of the intake. However, the port modification improves mid-range power and justifies the extra wear which will result from using only the one ring. Steve Ashkenazi recommends a tear-down every three meetings when running this modification.

The cylinder head gasket surface should be milled by 0.5 mm. The modified chamber volume is 23.5 cm^3 and the squish area must be remachined to maintain a piston-to-head clearance of 0.75 mm. Airbox breathing is enhanced by drilling 10 mm holes as detailed for the smaller models. Adding a 0.5 mm shim to the power valve will give more top end but you must be a quick enough rider to be able to sacrifice some mid-range torque.

Rear sprocket bolts should be checked regularly at 31 Nm (3.0 kg.m) torque. Rear wheel alignment should also be carefully checked as the chain adjustment marks on the 250s are often inaccurate. Also check the alignment of the chain guide. If it is off centre modify as described in Figure 10.

YZ490J

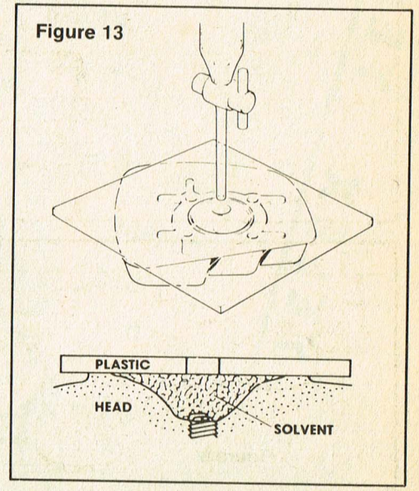
Modify the cylinder as shown in Figure 11, and *lengthen* the exhaust as per Figure 12. Modify the airbox by drilling the holes. Chain guide and rear wheel alignment should be checked. Make sure the YEIS hose is not kinked.

These YZ J-Model modifications have all been put to the test by us at International Motorcycles, Canosa Park, California. Mods other than factory recommended ones have been suggested by resident machinist, ace tuner and theoretician Michael Morse. To finish, here are some general tips for people performing tuning modifications.

Piston-to-head clearance is easily checked using resin-cored solder laid on the piston at TDC and torquing the head to specification. Combustion chamber volume is checked with a burette as shown in Figure 13, or an accurate graduated beaker. The standard spark plug should be installed.

Michael recommends the richest fuel/oil mix that the ignition will stand. Keeping accelerated piston wear (due to excessive heat build-up) in mind, it is unwise to exceed a ratio of 24:1. High-quality mineral-base oils only should be used. Never use outboard oil in motorcycles — it is formulated for different circumstances. Also avoid the claimed miracle worker synthetic oils.

Figure 13 *(below) demonstrates an accurate method of determining combustion chamber volume. Drill a 15 mm hole in the plastic, sit the head so that the gasket surface is level, and use a burette or graduated beaker to pour in the solvent.*



They burn dirty and don't lubricate as well as mineral oils. Vegetable based oils such as Castrol "R" should be avoided unless methanol is being used. Once mixed with petrol they have no appreciable shelf life.

It is essential when tuning these engines to be able to diagnose air/fuel mixture ratio from a spark plug reading. Accurate readings can only be obtained from the dyno or after a full-throttle run in a high gear. The motor must be killed while under load and coasted to a stop. A fresh plug should always be used for final analysis once the jetting is close and must, of course, be tightened correctly. (This is to aid heat transfer from the firing tip to the cylinder head as well as prevent harmful air leaks.)

As far as mixture goes, with the air-cooled motors we are aiming for a dark tan to light brown colour on the porcelain deep down in the area where it curves out to meet the body of the plug. This area is known as the mixture ring. Optimum colour for water-cooled models is slightly lighter. A magnified plug viewing light as sold by Champion is an essential tuner's tool for peering at plugs. Disregard "expert" plug reading with the naked eye. It simply can't be done adequately.