

For success in "Schoolboy Sport" YAMAHA'S MINI-MOTOCROSSERS

Schoolboy motocross is something more these days than a bunch of kids having fun in a field on old cut-down bikes. The fun's still there but the whole business is a lot more competitive. It's a section of motorcycle sport that breeds champions like 1979 World 500cc title winner Graham Noyce and top 250cc contender, Neil Hudson. Just like any other form of racing, a competitive machine is essential and Yamaha provide a range of machines that will allow any young hopeful to develop his racing skills to fine

pitch before moving on to the Senior ranks. The Yamaha YZ80 and YZ100 are, in fact, accepted even by their rivals as two of the finest Junior class motocrossers ever produced.

Not that Yamaha have forgotten the fun aspect. The PW50 and YZ50 will give any child countless hours of enjoyment while providing a solid groundwork of motorcycling knowledge into the bargain. In addition, the Yamaha YZ50 can provide a first-class introduction to the world of motorcycle sport.



YAMAHA YZ50

Thanks to riders who were in the "schoolboy" ranks just a few years ago, Britain now has several honest-to-goodness World Championship contenders in the toughest classes of motocross. Indeed, former schoolboy star, Graham Noyce, brought Britain its first World title in over 15 years when he won the 1979 500cc Championship.

Starting early in motocross racing is almost

imperative if you are going to make the top these days and a good place to start is with Yamaha's YZ50.

Featuring the same monoshock suspension as its GP-winning bigger brothers, the YZ50 is a true mini-motocrosser **not** simply a disguised minibike. However, the easy-to-handle power of its 50cc engine makes it a simple proposition even for the complete novice. For any aspiring motocross racer, the YZ50 is the ideal start to a competition career.

YAMAHA YZ100

One of the most consistently successful racers in its particular class of "schoolboy" racing, the Yamaha YZ100 continues into 1981 with only detail modifications ... testimony to the continued winning potential of the model.

Only modifications are to the chassis, where a new shock absorber rear wheel travel from 198mm to 200mm and a changed spring and damper combination in the front forks gives even more stability at the front end.

New design alloy rims are stronger than previous models ... and lighter as well! Front and rear wheels are shod with new pattern tyres for better all-round traction.

Chain tension for 1981 is controlled by a new plastic-block tensioner as used on the YZ250 and YZ465 big-class racers.

YZ100 Technical Report:

The little YZ100 powerhouse puts out a staggering 22hp (16.2Kw) at a howling 11,500rpm ... a figure which would have comfortably powered a 125cc Grand Prix winner just a few seasons ago! Torque is an impressive 1.40 Kg-M (13.7Nm) and evidence of the wide power band of the YZ100 is that this torque figure is developed a full 2,000rpm down the rev-range, at 9,500rpm.

Torque Induction spreads the usable power even further while a six-speed gearbox makes the rider's task simple ... always a correct gear for the situation encountered. A multi-plate oilbath clutch completes the transmission department, picking up drive from the crankshaft via a train of gears.

Engine dimensions are "square", with a 50 x 50mm bore and stroke giving an actual capacity of 98cc. Compression ratio is 8.4:1 with the engine breathing through a 30mm competition Mikuni carburetor and fired by CDI ignition.



YZ100 Dimensions:

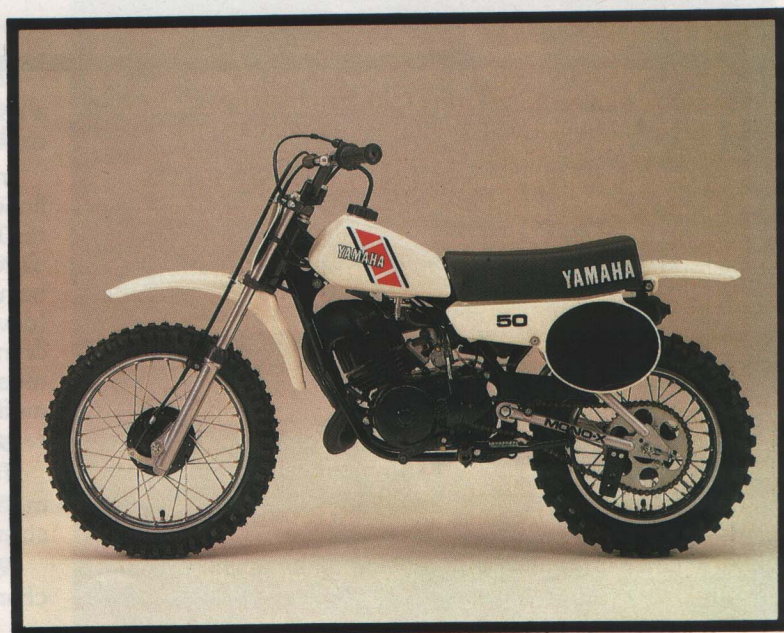
The YZ100 is very definitely a full-sized motorcycle ... very little smaller than the GP-replica YZ125. Weight is kept down to 84kg despite superb ground clearance of 310mm and a wheelbase of 1375mm. Seat height is kept as low as possible, bearing in mind that YZ100 riders will still be growing boys or girls! It checks out at 860mm with handlebar to ground height of 1165mm. Bars are 890mm wide and the bike is 2060mm in length. Wheel sizes are 3.00 x 21 front and 4.10 x 18 rear ... both shod with four-ply tyres.

YZ50 Technical Report:

The 49cc YZ50 engine shares the same Torque Induction, single cylinder basis as its bigger brother, the full-race YZ80. Being designed for a milder form of riding, however, the little power unit puts out a manageable 9bhp. Bore and stroke are almost "square" at 40mm x 39.7mm. Even though the YZ50 is not such a firebreather as the YZ80, there are no compromises in the suspension department. It features a competition monoshock chassis with rear travel of 100mm allied to front fork movement of 110mm.

YZ50 Dimensions:

A 2.50 x 14 front wheel, along with a 3.00 x 12 at the rear, keeps the YZ50 low to the ground ... an important feature for its younger riders. Seat height is kept down to 625mm while still allowing 195mm of ground clearance. Wheelbase is 1030mm within a compact 1510mm overall length. Height to the handlebars is 845mm and the bars themselves are 740mm wide for plenty of control. Weight is a completely manageable 52kg.





YAMAHA YZ80

Yamaha's YZ80 mini-motocrosser is one of the most updated bikes in the 1981 off-road competition range. Which must surely make it a potential champion on the "schoolboy" circuits, as the previous model had already established itself as one of the toughest little racers in the class.

For 1981 there are major changes in both engine and chassis departments ... all with better performance or handling in mind. Gone are the days when "minibikes" were simply kids' playthings. Now under-100cc bikes are fully-fledged racers in their own right, with performance enough to impress more than just the occasional grown-up!

The performance is combined with topline braking and handling that make the Yamaha mini-motocrossers

a safe proposition for the schoolboy racer as well as an exciting one!

In the engine department, the YZ80 features a radial-finned cylinder head instead of the old vertical fins. This results in much better cylinder head cooling due to better airflow and the reduced likelihood of cooling fin area being restricted by clogging mud. A shorter cylinder skirt (down from 22mm to 9mm) plus a re-designed piston and crankshaft allows new engine porting that produces a much wider spread of power. There's a new, compact muffler and a bigger-capacity air cleaner that features an easy-to-remove element for maintenance purposes.

Transmission is improved by a new, slicker change mechanism for the six-speed gearbox, plus a strengthened clutch release mechanism.

Moving on to the chassis department we find radical changes that make the YZ80 without doubt one of the

best handling off-road motorcycles regardless of class!

The old cradle frame has gone and in its place we find the full-loop replaced by a lighter, but just as rigid, semi-cradle layout that is a scaled-down replica of the chassis used on Yamaha's Grand Prix winners in the bigger classes.

A sturdy, large-diameter single front downtube parts into a double cradle under the engine. The double cradle carries on to provide a rigid sub-frame pivot and then on up to the single top tube. Rear engine-mounting bolt and sub-frame pivot are one and the same, which means more constant chain tension thanks to the reduction in distance between drive sprocket and sub-frame pivot point. Suspension is, of course, by Yamaha's famous and highly-successful monoshock system. Featured for 1981 is a new shock absorber unit with separate gas cell (again a development from the big GP racers) plus a longer rear sub-frame. This extension from 384mm to 430mm means two things. First of all it helps increase rear wheel travel from 180 to 215mm and secondly it results in slower suspension movement under such conditions as a closely-spaced series of bumps and dips. Front wheel travel is also increased, from 170mm to 205mm.

New pattern tyres are fitted on aluminium rims, with rear tyre size going up from 3.60 x 14 to 4.10 x 14 to cope with the little powerhouse's 17bhp!

Finally, riders will appreciate the new combination of shorter gas tank and longer seat which allows more freedom to change body weight position as the conditions dictate. The young rider can now slide right up over the engine unit in tight turns or get his weight way back over the rear wheel spindle while flying down the straights.

YZ80 Technical Report:

The single cylinder YZ80 two-stroke motor actually displaces 79cc by virtue of its 49 x 42mm bore and stroke. Compression ratio is 7.1:1 which assists in the little bike's amazing 17bhp (12.5Kw) at a screaming 11,500rpm. Maximum torque is developed only 500rpm down the rev range and is quoted at 1.06Kg-m (10.4Nm). Even with the maximum torque being developed at so high an rpm figure, the YZ80 is no narrow-power-band, difficult-to-ride freak. The same reed valve Torque Induction which spreads the power band of all Yamaha two-stroke competition bikes means that the YZ80 has plenty of low-down pulling power as well as top-end performance.

Keeping the YZ80 on its power band is aided by the six speed gearbox while capacitor discharge transistor ignition (CDI) delivers a precisely-timed hot spark even at the optimum end of the five-figure rev range.

YZ80 Dimensions:

Overall length of the YZ80 is 1770mm with a wheelbase of 1205mm. Seat height is a comfortable 760mm with overall height (at the handlebars) being 1010mm. The bars are 765mm wide. Ground clearance is 255mm with a 2.75 x 17 front tyre and a 4.10 x 14 rear. Both wheels are shod with tough four-ply competition tyres.

The compact little YZ80 weighs in at 60kg, presenting no problems in this regard for the youthful racer.

YAMAHA PW50

a "mini-mini" to develop a youngster's skills



What better introduction to off-road motorcycling for the cute kid in your family than the (dare we say it?) possibly even-cuter Yamaha PW50! Styled like no other "mini-mini" on the market, the PW50's looks alone are enough to make even the most apprehensive mother say "yes" to her fond offspring's pleas for a "motorbike".

Not that mother need be apprehensive about the PW50. Its 50cc engine puts out only 2 1/2 bhp and this, combined with a fully automatic transmission, means easy riding at bicycle-type speeds.

More and more parents are realising that allowing a child to start motorcycling at a young age means that he, or she, will be a much safer, more capable and responsible rider later on.

The PW50 is designed to introduce a child to motorcycling in as much safety as possible. It only weighs 36.5kg and, with its little 2.50 x 10 inch wheels, is slung low to the ground. Seat height, in fact, is a mere 480mm. Drum brakes are well-matched to the size and speed capabilities of the little bike. A miniature enclosed drive shaft rather than exposed chain is another important safety feature.

On the engine aspect, parents will note that it is a reassuringly low-revving unit ... developing its maximum 2.7bhp at only 5500rpm. Dad will also appreciate the Autolube automatic oiling system ... no messy pre-mixing of petrol and oil.

All things considered, the PW50 is the perfect way to instil some riding skills and responsibilities into your child. Statistics prove that riding instruction prior to taking to the roads cuts down the motorcycle accident rate. Developing skills at an early age is a definite safety factor if you feel that your child may want to turn to more serious motorcycling in the future.



**YAMAHA YZ125 -
A GRAND PRIX REPLIC!**

Biggest news for motocross fans in Yamaha's 1981 range is the advent of a liquid-cooled version of the already highly-successful YZ125. This gives the private rider what is virtually a carbon-copy of the machine which has been winning Grand Prix events for Yamaha in the 125cc class for the past three seasons. All of that Grand Prix development has gone into the new production YZ125 to make it an odds-on winner in the right privateer's hands. It's a bike capable of making an average rider into a potential winner as well as moving the above-average private rider further up the Championship ladder.

Liquid-cooling is only one of the changes that have been made to the YZ125 for 1981. There are numerous other updates of both engine and chassis components, all made as the result of experience on the toughest test-bench of them all... the World Championship racetracks.



The new liquid-cooled cylinder has altered port shapes and timing. These take advantage of the better cooling to give an appreciable increase in performance. The volume and shape of the exhaust system is also changed for added power. The new YZ125 (22.1Kw) at 10,500rpm from its 123cc power unit with the single cylinder two-stroke having a bore and stroke of 56mm and 50mm and a compression ratio of 8.1:1.

The YZ motor has quite a narrow power band, with its maximum torque of 2.07 Kg-m (20.3Nm) being developed at 10,250rpm. This, however, doesn't make it a difficult beast to ride, thanks to the smooth low-down carburation provided by Yamaha's reed valve Torque Induction and the precise ignition timing of the CDI unit. Additionally, the rider can match rpm to ground speed through a choice of six close-spaced gearbox ratios. A bigger clutch handles the extra horsepower of the new YZ125. Also made stronger to cope with the added power for 1981 is the crankshaft assembly.

There's plenty of toughening up in the chassis department as well. Starting at the front end, there is an increase in the diameter of the front fork tubes ... from 36mm to 38mm.

Front brake is now operated by the same eccentric cam system used on the YZ250 models and a new design of handlebar is fitted.

The frame is entirely new and is cunningly utilised as part of the liquid-cooling system (see accompanying feature).

Rear sub-frame is lengthened by 25mm to better handle the rearward weight transfer under acceleration and the YZ125 now uses the same remote gas cell shock absorber fitted to the heftier YZ250 and YZ465 racers. Rear wheel travel is increased to 300mm as a result of these changes. This will give the rider freedom to hit bumps at much greater speed so the Yamaha engineers have toughened up the rear wheel by means of a strengthened hub flange and larger spokes.

Yamaha YZ125 Dimensions:

The 1981 YZ125 is almost equal in physical size to its bigger brothers ... though, of course, it still weighs appreciably less. Total dry weight is 89kg as compared to the 99kg of the YZ250 and 104kg of the YZ465.

However, in such important areas as ground clearance the YZ125 has even more room to spare than the 320mm of the big bikes. On the YZ125, the clearance is an amazing 345mm!

Tyre sizes are 3.00 x 21 inch at the front and 4.00 x 18 rear, contributing towards an overall height of 1250mm. Seat height is still a sensible 945mm despite the massive ground clearance. Handlebar width is 880mm with overall length checking out at 2140mm and wheelbase at 1450mm.

The fuel tank holds 6.5 litres of the 16:1 petrol mix ... more than enough for even a 45-minute Grand Prix moto.

LIQUID COOLING THE YAMAHA

Maintaining high power output from a high-revving, small capacity racing engine is made much easier if the engine can be kept as cool as possible when it is being used at racing speeds.

Road racing has proved that liquid-cooling is the answer and, for some years, Yamaha has also been using this system on their small-class factory team motocross racers.

Now Yamaha's customers can reap the benefit of racing development. The production version of the YZ125 motocrosser is now liquid cooledjust like its Grand Prix-winning factory-team counterpart.

A special water jacket surrounds the cylinder and the head and the coolant is circulated by a pump on the lefthand side of the crankcase. Geared down from the crankshaft to run about two-thirds engine speed, this pump draws coolant from a radiator that is mounted ahead of the front fork triple clamps. A special cowling around the radiator facilitates mounting of the front racing number plate and also allows air across the front of the radiator.

Mounting the radiator in this position allows it the maximum amount of cooling air and also protects it from flying stones and other hazards of the motocross track such as a thick coating of mud.

Yamaha's engineers have connected radiator and engine in an incredibly inventive and effective manner. They have utilised the front fork clamps, the frame's steering head and its front downtube as actual carriers of the cooling liquid.

Cool liquid from the radiator runs down into the lower triple clamp, then via short hose into the steering head and down through the front frame tube. Another short hose then carries it from the bottom of the down tube to the coolant pump.

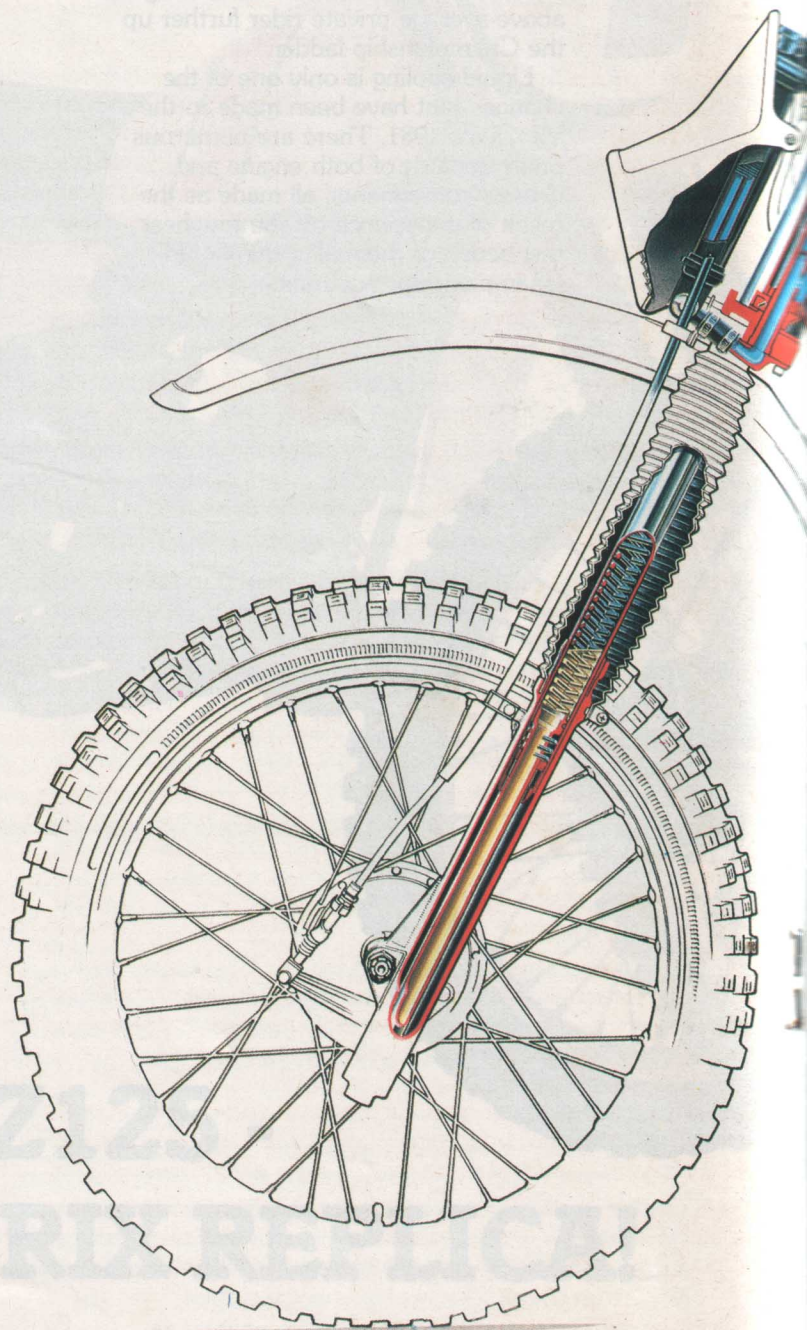
The coolant is then circulated around the engine and, as it heats up, is returned to the cooling radiator via a rubber hose that connects the cylinder head with the steering stem of the front forks. From the stem it runs through the top triple clamp and into the top of the radiator!

The heated coolant then runs down through the radiator, is cooled in the process and the whole cycle begins again.

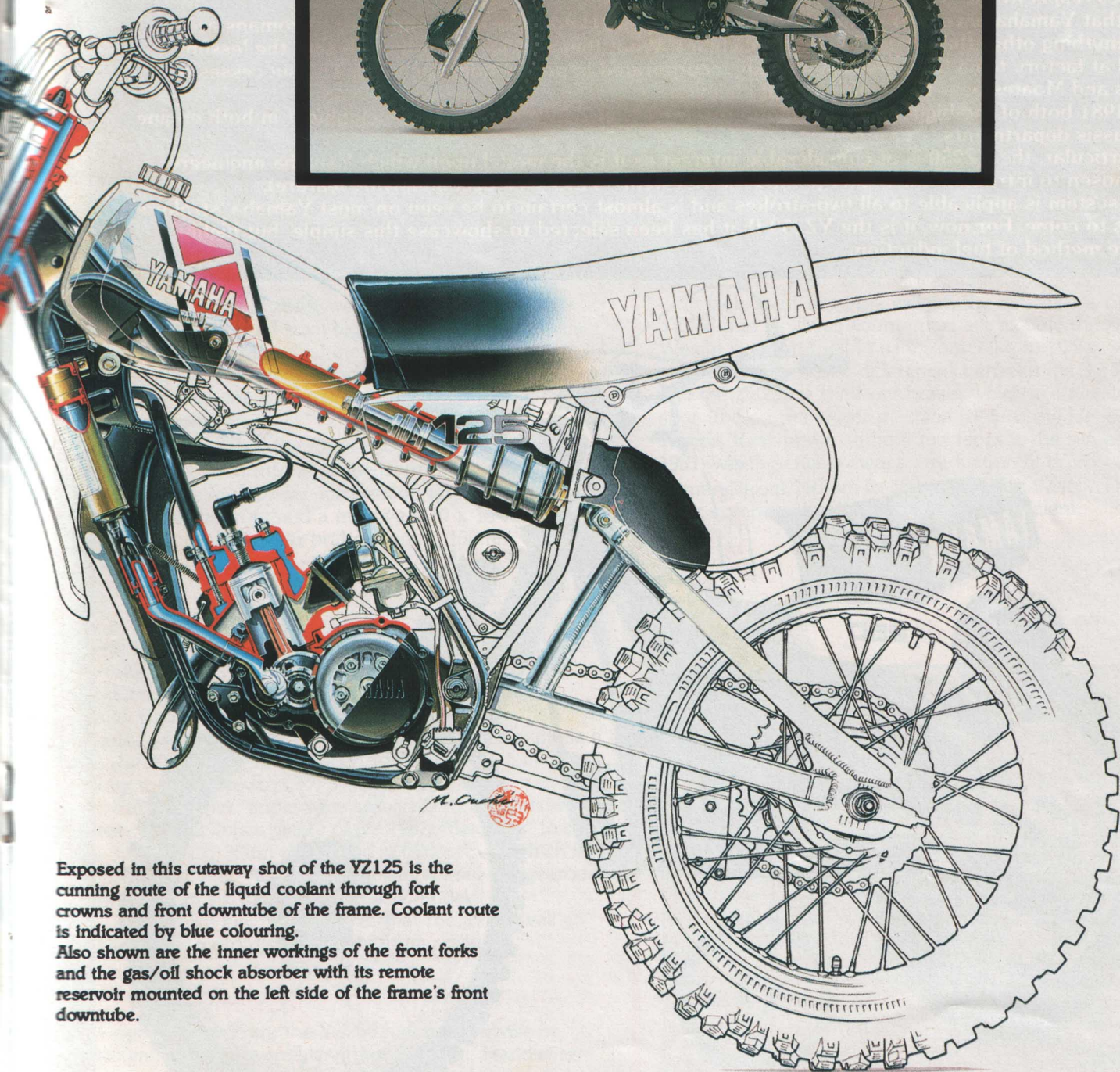
By this clever piece of engineering, Yamaha have reduced the number of bulky external parts, saved weight by doing so and also reduced the chances of breakdown due to such things as split hoses and the like. All of the hoses in the Yamaha system are short and flexible and are less likely to split or become detached than the lengthy exterior piping used by other manufacturers.

The advantages of liquid cooling for racing engines have long been obvious but actually incorporating the usually-bulky systems on to a lightweight motocrosser has slowed development somewhat in this area.

Yamaha's solution to the problem has delivered the advantages of liquid cooling while keeping the YZ125 as compact as any air-cooled racer.



YZ125



Exposed in this cutaway shot of the YZ125 is the cunning route of the liquid coolant through fork crowns and front downtube of the frame. Coolant route is indicated by blue colouring.

Also shown are the inner workings of the front forks and the gas/oil shock absorber with its remote reservoir mounted on the left side of the frame's front downtube.

- you too, can own a Grand Prix winner

YAMAHA YZ250 & YZ465

Despite many claims to the contrary, there is all-too-often a big, big difference between production "replicas" of Grand Prix machines and the actual factory racers themselves. The only way any factory can legitimately claim that their 'over-the-counter' machines are truly on a par with the works bikes is to actually score Grand Prix successes with customer-owned bikes.

During 1980, Yamaha did just that in both 250 and 500cc Championship categories with Belgian, Jean-Paul Mingels and American, Marty Moates scoring Grand Prix wins with production YZ250 and YZ465 machines respectively.

Not that Yamaha have ever claimed that superstars like Hakan Carlqvist and Andre Vromans are riding anything other than special factory machines. What they do claim, however, is that the lessons learned at factory team level are very quickly incorporated in production machines. The successes of Mingels and Moates bear testimony to that claim.

For 1981 both of the bigger Yamaha motocross racers evidence continued development in both engine and chassis departments.

In particular, the YZ250 is of considerable interest as it is the model upon which Yamaha engineers have chosen to introduce their Energy Induction System - YEIS (See accompanying feature).

This system is applicable to all two-strokes and is almost certain to be seen on most Yamaha 'stokers' in years to come. For now, it is the YZ250 that has been selected to showcase this simple, but highly effective method of fuel induction.



YAMAHA YZ250

Although the YZ250 does not differ visibly in any radical way from its 1980 predecessor, the new machine does, in fact, have a number of very significant changes to both engine and chassis.

Dealing first with the power unit, the obvious important item is the YEIS system or "Power Box" as the engineers have nicknamed it. It derives this title from the fact that a separate fuel reservoir (box) is mounted above the carburetor and linked direct to the inlet port. Operation of the YEIS is described in the accompanying feature.

A new design air cleaner gives more capacity and easier maintenance while there is a new exhaust system to complement changes in scavenge port timing designed at spreading the power band.

In fact, the new YZ250 has such a wide, useable spread of power that Yamaha have been able to simplify the rider's job by dispensing with one of the speeds in the gearbox. The new YZ250 has a five-speed box instead of six. And, because horsepower is up, the clutch has been strengthened by the addition of an extra friction disc and another pressure plate. Finally, there's a new design of shift lever copied from the factory machines.

Turning to the chassis, we find a new lightweight frame unit fabricated from high tensile steel plate, plus a longer rear sub-frame that increases rear wheel travel from 300mm to 310mm. A new shock absorber allows 30 stages of damping adjustment ... eight more than the 1980 version!

At the front end, the forks have been strengthened by the increase in fork tube diameter from 38mm to 43mm.

New pattern, four-ply competition tyres are fitted ... 3.0 x 21 at the front and a massive 5.10 x 18 rear. Up in size, also, goes the rear brake drum ... 150mm instead of 130mm.

YZ250 Technical Report:

The 1981 version of the 246cc single cylinder YZ250 two-stroke puts out 41hp (30.2Kw) at 8,000rpm. Torque Induction reed valves and the new Yamaha Energy Induction system feed the 16:1 petrol mix into the motor where an 8.1:1 compression ratio helps explode it in the 70mm x 64mm cylinder. Ignition of the fuel charge is by the well-proven CDI system.

Pulling power, and a wide spread of it, is something that the YZ250 has plenty of for 1981. Maximum torque is 3.8Kg-m (37.3Nm) developed at 7000rpm ... which is one reason why Yamaha have been able to cut gearbox speeds from six to five for the new model.

A nine litre fuel tank ensures that the YZ250 will go the full GP moto distance without any qualms.

YZ250 Dimensions:

Weighing in at 99kg, the YZ250 has a wheelbase of 1480mm and an overall length of 2175mm. Handlebar width is 880mm and distance from ground to handlebar tips is 1220mm. Seat height is 950mm with no less than 320mm of ground clearance.

YAMAHA YZ465

The only non-factory machine to win a Grand Prix motocross this year was the production YZ465 which Marty Moates took to victory in the United States 500cc Grand Prix, before his hometown crowd at Carlsbad Raceway, near San Diego, California.

Proof that the YZ465 is the most competitive bike that a privateer can buy ... and for 1981 it will be even more competitive!

There aren't many changes to the YZ465 engine but a combination of new, large-capacity air cleaner, revised scavenge port outline and new design exhaust system have meant even more torque for the lusty 85 x 82mm two-stroke.

While horsepower remains the same as 1980 at a more-than-adequate 52hp (38.2Kw), torque is increased from 5.65Kg-m (55.4Nm) to 5.75Kg-m (56.5Nm). Maximum power is developed at 7000rpm and maximum torque a full 1000rpm lower!

As with its smaller brother, the YZ250, a new lightweight frame from high tensile steel plate houses the YZ465 motor. The same remote-cell gas/spring damper as on the 250 is fitted to the 465 - again offering 30 adjustment points! Also common to both bikes are the new, tougher front forks with 43mm stanchions.

In fact, apart from the weight, the dimensions of the YZ465 and its 250cc counterpart are exactly the same. Weight is up on the big bike from 99kg to 104kg.

Only other chassis differences between the YZ465 and the YZ250 is the front brake, which is a twin-leading shoe unit on the bigger machine to curb the higher speeds. Rear brake on both machines is the same for 1981, which actually means a reduction of drum diameter from 160mm to 150mm for the YZ465. The more compact unit is, however, more efficient.

