

4 Road-going Four-strokes

For the first 15 years of their history Yamaha produced only two-stroke machines. Then the factory started to develop a full range of four-stroke motor cycles. There were several reasons for this seeming change of policy. Firstly, the ecology-minded Americans were bringing in stringent exhaust emission laws that favoured the four-stroke engine. These tend to burn more of the fuel they use compared to the two-stroke which wastes some as unburnt gas which escapes out of the exhaust system. Secondly, Yamaha wished to move up and to build larger capacity machines for which the four-stroke engine is more suitable. Thirdly, there is a sizeable proportion of motor cyclists who much prefer the four-stroke engine; and, finally, the fuel crisis of the 'seventies focussed everyone's attention on fuel economy, and horsepower for horsepower, the four-stroke engine does more miles per gallon than its two-stroke counterpart.

Now, as we approach the mid 'eighties, the choice is wide with no less than 18 models ranging from single cylinder, through vertical and vee-twins (with air- or water-cooling), to three-cylinders, and on to the classic across-the-frame four, pioneered by the Italians in racing and then adopted and improved so dramatically by the Japanese.

1000cc and Above

Top of the range is the impressive xs1100 Sport. A slimmed down and lightened version of the original xs1100, the Sport is powered by a double overhead-camshaft, air-cooled, four-cylinder (71.5 x 68.8mm) engine that produces a lusty 95bhp at 8500rpm – enough to give a top speed of 140mph with searing acceleration.

Transmission is by a five-speed gearbox via shaft-drive to the 17in. rear wheel which is shod with a fat 4.50 cover. The front wheel is 19in. and both front and back are cast aluminium with disc brakes – double on the front wheel and single at the rear. The machine is finished in black and standard equipment includes a small sports fairing with rev-counter.

Next in the Yamaha range, moving down the capacity scale, is the TR1. This is a very different machine from the ultra-sporty xs1100 Sport. For the TR1 is the super tourer of the range, powered by a 980cc vee-twin engine, which is a type of power unit famous for delivering loads of easy-going power without noise, revs or fuss.

With chain-driven single overhead-camshafts the 95 x 69.2mm bore and stroke engine delivers a healthy 70bhp at a lowly 6500rpm to give effortless 80mph cruising and a top speed of



The top of the range XS1100 Sport is impressive in black and chrome.

around 120mph. The gearbox is a five-speeder but, rather curiously, Yamaha have stuck to chain drive for this model; however, to ensure long life and the minimum of attention, it is fully enclosed.

The frame is of the latest type with Yamaha Monoshock rear suspension controlled by a single de Carbon unit mounted under the fuel tank and adjustable for both damping and spring

rate. The front fork has adjustable air springing, perfected on the Yamaha racers, with double disc brakes. A drum is fitted at the rear which is a set-up preferred by many riders who like the more progressive feel of a drum brake when riding in wet conditions.

The 900-850cc Range

New for 1983 is the XJ900. Beautifully styled, Yamaha claim that this machine has the best

power-to-weight ratio of any motor cycle in the popular 900cc class of 113.7bhp per litre.

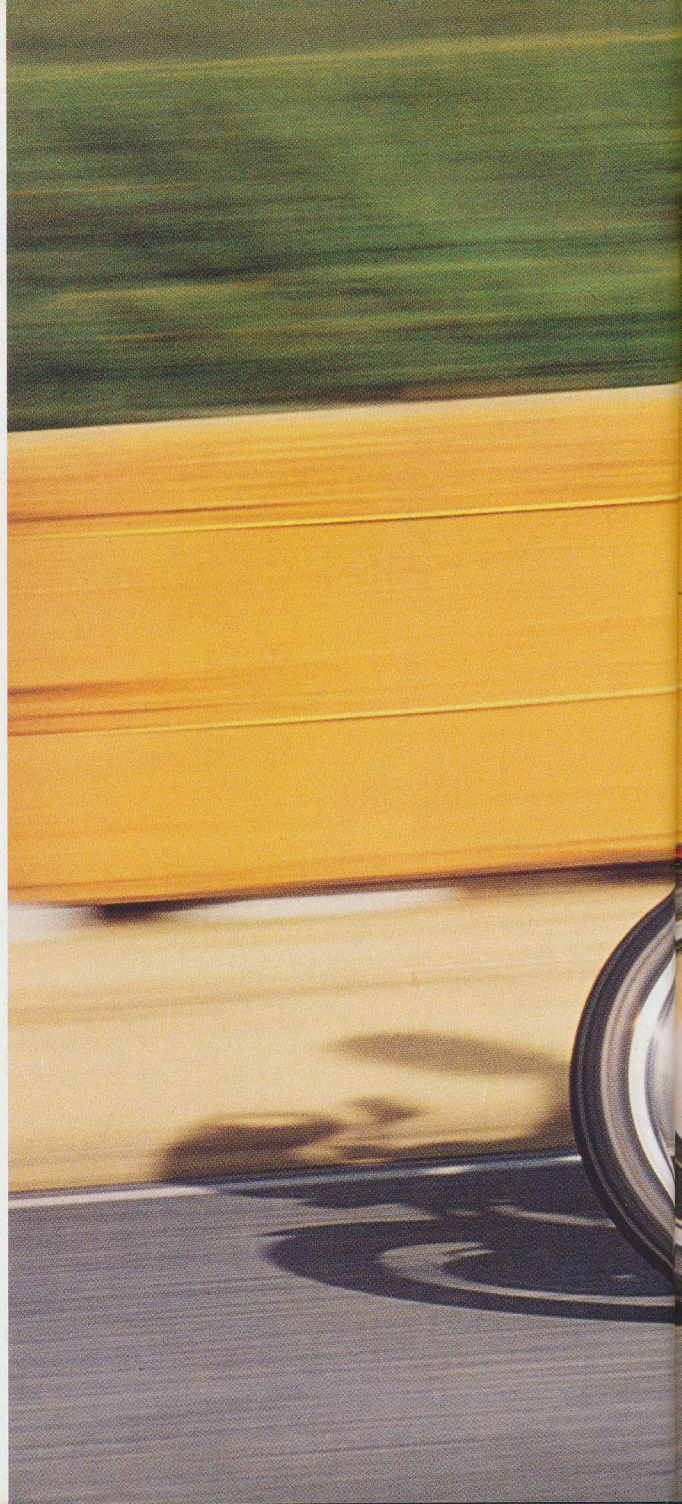
The engine is a double overhead-camshaft, across-the-frame, air-cooled, four-cylinder unit of 853cc (67 x 60.5mm bore and stroke) which puts out an impressive 100bhp at 9000rpm. This is more than the older xs1100 Sport and, coupled to considerably less weight and a narrower frontal area, means that the xj900 should be able to out-perform its bigger brother.

Surprisingly, Yamaha have stuck to conventional rear suspension with twin gas/oil shocks alongside the rear wheel, rather than the Monoshock system. The air-suspension front fork has a built-in anti-dive system and linking equaliser pipe to make certain that both legs work in unison. Three disc brakes, two on the 18in. front wheel and one on the rear, are fitted with sintered pads to give improved braking in wet conditions.

Special attention has been paid to styling with the 22-litre fuel tank blending into the seat and tail unit. Equipment includes a sporty head fairing which helps to protect the instrument console with speedometer, rev-counter, fuel gauge and digital clock.

The old-timer in the range is the three-cylinder xs850, the direct descendant of Yamaha's first real superbike, the xs750, introduced in 1976. Like the TR1 the xs850 is designed for the long-distance rider who wants no-trouble motor cycling allied to good value for money.

New for 1983, the XJ900's four-cylinder, double overhead-camshaft engine develops 100bhp to give a top speed of 140mph.







Yamaha's turbo-charged model, the XJ650 Turbo, comes complete with streamlined fairing.

The well-proven double overhead-camshaft, across-the-frame engine has a capacity of 826cc (71.5 x 68.6mm) and produces nearly 80 horsepower at 8500. There is a five-speed gearbox and a shaft drive is fitted. Like all the big Yamahas, an electric starter is standard.

The suspension is orthodox with telescopic front fork and twin shocks at the rear. There is a twin disc brake set-up at the front with a single disc at the rear.

The 750-650cc Range

The smaller of the vee-twins, the xv750 has an American-style custom specification with high swept-back handlebars, stepped seat, forward-mounted footrests, short megaphone exhaust system and a fat, 16in. rear tyre. Similar to the larger vee-twin engine the xv750 engine has bore and stroke of 83 x 69.2mm (748cc) and produces 61bhp at 7000rpm. The gearbox is a five-speeder and the final drive, unlike the TR1, is by shaft. But, in common with the larger vee-



This drawing shows how the turbo-charger, driven by the exhaust gases, is mounted on the XJ650 Turbo.

twin, the xv750 has a pressed steel spine frame with Monoshock rear suspension.

Fulfilling the need for a mid-range sportster is the xj750, powered by a double overhead-camshaft, across-the-frame, four-cylinder engine with bore and stroke of 65×56.4 mm to give an exact capacity of 748cc. Power output is 81bhp at 9000rpm to give a top speed of around 125mph.

The gearbox is a five-speeder and like all the new large capacity Yamahas, final drive is by shaft. A new feature is a computer monitor system with warning display lights which signal if there are problems with oil, brake fluid, battery, fuel, bulbs, or if the side-stand has been left down, which is potentially dangerous to the rider.

Next down the capacity scale comes one of the main prestige models of the range, the turbo-charged xj650 Turbo. Engine is a double overhead-camshaft, four-cylinder across-the-

frame unit, to which has been added a turbo-charger. Mounted low down behind the gearbox, this makes use of the flow of exhaust gases to drive a small turbine which forces the fresh fuel-air mix into the engine.

This supercharging effect greatly increases the power output of the engine, especially at high-revs. For the faster the engine runs, the faster the exhaust gases travel and the quicker the turbo turns. In fact, Yamaha claim an output of 85bhp for the xj650 Turbo, which is an increase of 12 over the standard xj650 machine which shares basically the same 653cc (63×52.4 mm) engine. The gearbox is a five-speeder and drive is via a shaft.

To assist the rider to take advantage of the high speeds of which the machine is capable, the xj650 Turbo is fitted with a comprehensive streamlining which protects the legs as well as the arms and body. Its top speed is about 130mph.

The 550cc Range

Of the Japanese manufacturers Yamaha were the first to realise the sales potential of the big-single – a machine widely popular in Europe in the immediate pre- and post-war years. To tap this market they launched the beefy xt500 trail bike in 1976, and for 1983 this was superseded by the xt550, a restyled version with a larger engine and a new frame.

With a bore and stroke of 92×84 mm (558cc) the xt550 produces 38bhp at 6500 – enough to give a top speed of 100mph. Special features of the engine are a four-valve head and a twin-

carburettor system in which only one carburettor actually operates at low engine speeds, the second one opening progressively as the revs rise.

The gearbox is a five-speeder and the final drive is by chain. The engine incorporates a counter-balance system to smooth out vibration and an easy starting device with a valve-lifter automatically linked to the kick start. It is the only one of the big Yamahas not to have an electric starter.

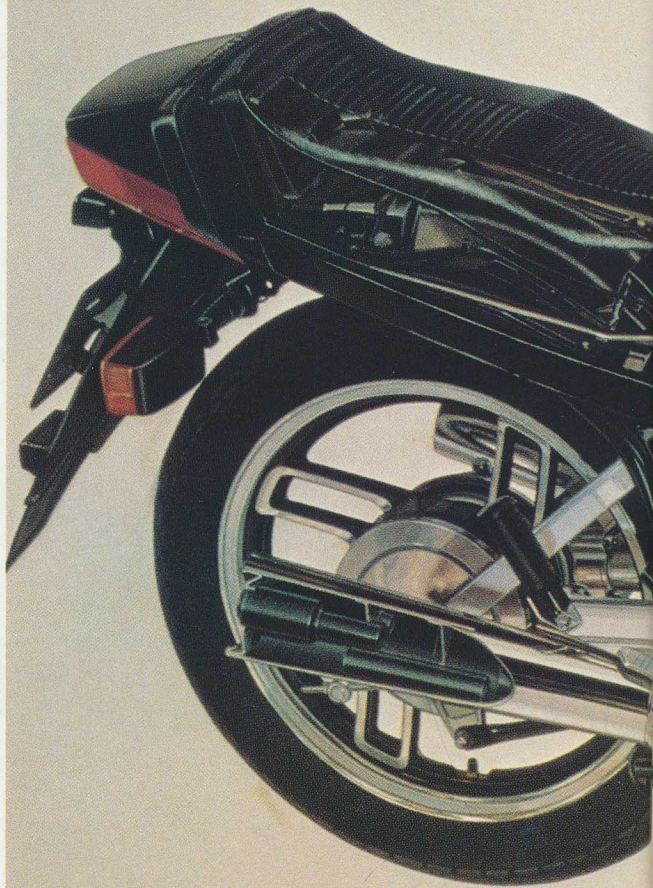
The new chassis has Monoshock rear suspension with 8in. of travel while the race-developed, air front fork has a similar amount of movement. To cope with the mud and water likely to be found when trail riding, drum brakes are fitted front and rear.

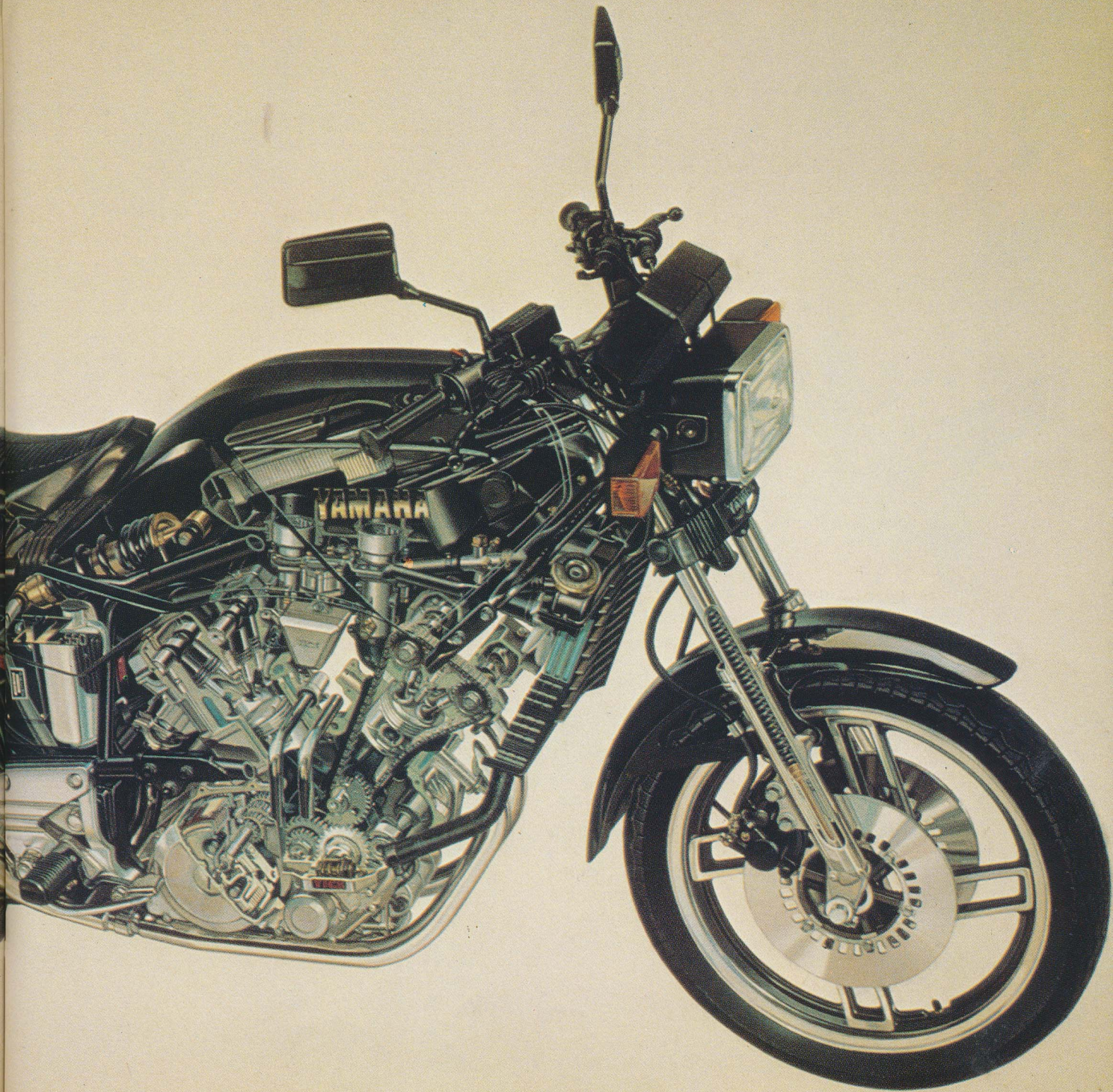
Of the same capacity to within a few cubic centimetres, but designed for a very different market, is the XZ550, a super-sports vee-twin which boasts a specification to make any enthusiast's mouth water. Unlike the larger vee-twins, aimed at the touring and custom markets, the XZ550 is water-cooled, has double overhead-camshafts and four-valves per cylinder.

Bore and stroke are well over-square at 80 x 55mm (552cc) and revving to 9500rpm, which is extremely high for a vee-twin, the engine punches out an impressive 65bhp to give a top speed of around the 120mph mark. A five-speed gearbox is standard and final drive is by shaft, the neat and very slim engine-gearbox unit mounted in a Monoshock frame.

The radiator is fitted with an electric fan which

A cut-away drawing of the technically interesting vee-twin XZ550 sports model with double overhead-camshafts and four valves per cylinder.





cuts in automatically when needed – usually when the machine is travelling slowly in heavy traffic. An unusual front fork with trailing axle is fitted. This helps to reduce the wheel-base, a problem with vee-twin engined machines because of the overall length of the power units.

Sharing the 550cc capacity bracket is the xj550, the smallest of the Yamaha across-the-frame, four-cylinder machines. This boasts all the advanced features of the larger fours except that it has chain final drive. Power output from the 528cc (57 × 51.8mm) engine is 56bhp at 9500rpm. To get the best out of this, a six-speed gearbox is fitted in place of the five-speeder of the larger models.

Following up the success of the big-single xt trail bikes, Yamaha launched a pure road version, the sr500, in 1978. This has continued with little change, the 499cc engine (87 × 84mm) producing a modest 33bhp at 6500rpm.

The 400cc Range

Largest of the four-stroke vertical twins in the current Yamaha range (time was when they marketed both 650 and 750cc Triumph-style vertical twins) is the xs400, a neatly styled sports model with a top speed of around 105mph.

Bore and stroke of the double overhead-camshaft engine are 69 × 53.4mm (399cc) and revving to 9500 it produces 46bhp. The weight has been kept down to a creditable 365lbs, helped by the Monoshock frame with the engine as a stressed member. The gearbox is a six-speeder and both wheels are 18in.

The popular bread-and-butter commuters, xs400se and xs250se vertical twins, with their simple single overhead-camshaft engines and six-speed gearboxes are retained in the range with changes aimed at making them more acceptable to the rider who wants an American-style custom look about his machine, i.e. high-rise handlebars and a deep, stepped seat with short, megaphone exhaust systems. With bore and stroke of 69 × 52.4mm the larger model has a capacity of 391cc while the smaller is 248cc (55 × 52.4mm). Both have chain final drive.

Smaller Capacity Four-Stroke

Three single-cylinder models complete the four-stroke range – the sr250se, the xt125 and the sr125se.

The sr250se is a town and country cruiser with custom styling. The engine is a single overhead-camshaft unit of 239cc (73.5 × 56.5mm) which produces 17bhp at 7500rpm. The gearbox is a five-speeder.

Designed for road and trail the xt125 shares a 57 × 48.8mm (124cc) power unit with the custom sr125se; both produce 12bhp at 8500rpm. But while the custom model has electric start, the xt has only a kick starter.

Like the xt550 the little xt has the latest type Monoshock frame together with long travel front fork. Special attention has been paid to weight saving with the machine tipping the scales at only 215lb, a far cry from the top of the range xs1100 Sport which weighs in at 554lb.



Mount Fuji forms an impressive backdrop to the lusty, single-cylinder XT550.