

SEPTEMBER, 1980

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TwoWheelerS



If you thought motorcycling shaft drive meant:

- Down-on-power performance
- A substantial weight penalty
- Driveline freeplay and clunky gearbox blues

Forget it!

But if we told you a shafted 650 was:

- The lightest in its class
- The quickest of all but one up-to-750 bike
- Handled rewardingly well
- Offered state-of-the-art steering and nimbleness

You'd have to agree that shaft drive is the most significantly forgettable component of modern motorcycling.

This year, Yamaha made the roadster to match the futuristic concept:

BIKE OF THE YEAR!

A PART FROM the XS1100 heavyweight and SR500 single, Yamaha's new-release bikes (for street and dirt use) of the past couple of years have almost always been slightly revised version of existing models or pseudo chopper re-styles. The latest rendition of Yamaha's touring four-stroke triple, the XS850, is a case in point, being little more than an XS750 with larger pistons and new mufflers. Cosmetic revision of this type will rarely transform an ageing bike into a world-beater and TWO WHEELS has found it increasingly difficult to get excited about "new" Yamahas — be they E, F, G or H models — in the light of so many genuinely new machines from other factories.

It came as quite a relief then, to sample the new XJ650 at its Oran Park press debut and find a bike not only totally new from the ground up, but one of design philosophy distinct from that which gave birth to its brothers in the last decade. Perhaps the XJ model prefix, a change from the usual XS of Yamaha's street four-strokes, is intended to denote this change of tack. Certainly this four-

cylinder 650 is nothing like any of its predecessors — it is a bike for the '80s.

The machine

The name of the game in larger-than-commuter motorcycles is *performance* and there are two methods of bestowing healthy get up and go on a fledgling machine. One is to give it such a generous serve of horsepower all else is secondary (specifically its weight) and the other is to keep strict tabs on mass and make do with less brute power. Short of turbocharging, the first method usually involves lots of cm^3 and there are any number of megabikes on the road built to this theme, including Yamaha's own XS1100. Undoubtedly the Raw Power King is Kawasaki's awesome Z1300, which is not the fastest bike money can buy primarily because it's also the Raw Weight King.

Of late, forward-thinking bike builders have been trying the second route to performance with considerable success, Suzuki's GS1000 and GSX1100 and Honda's 900 Bol d'Or are obvious examples. The advantages of lighter performance bikes include greater manoeuvrability, better fuel economy and longer tyre life, but the main reason for the growing popularity of these models is their superior handling and steering. As weight falls it becomes disproportionately easier to make the motorcycle do the right things at the right time and since today's riders demand first-class dynamics as well as breathtaking acceleration, the heavyweights start with the dice loaded against them.

Yamaha, judging by its latest offering, has seen the writing on the wall and it's not before time — the three-cylinder XS750 was heavier than most fours and the XS1100 beat all-comers on the scales till Kawasaki king-hit it with their battle-cruiser six. The XJ650 weighs in at a petite 204 kg dry (454 lb), a full 15 kg lighter than Kawasaki's Z650 and only 4 kg more than Honda's CX500. Yamaha's efforts to keep the XJ as free of as much excess (XS?) weight as possible are not fully appreciated until it is realised that, in spite of its commendably low weight, the 650 is equipped with shaft-drive — a most civilised street bike accessory which, unfortunately, normally means a sizeable weight penalty over a chain rear drive. The similar-configuration chain-driven Z650 was hardly a heavy bike in any case. Even Suzuki, long a leader in weight moderation, has trouble with the mass of its shaft-driven machinery; although based on the lean GS750, the shaft-drive GS850 is downright portly by comparison, so much so that it outweighs the larger GS1000 and GSX1100 models. This points up all the more the

"The XJ is significantly lighter than Kawasaki's 650 and only a fraction heavier than Honda's CX500 — all this in spite of it being shaft drive, that civilised street accessory which normally means a sizeable weight penalty against chains".

"Suspension components seem ordinary on the surface — and indeed they are — but spring rates are near ideal (the rear springs are progressively wound) and the resulting ride is an acceptable compromise given the travel limitations of the suspension".

Bike Of The Year

outstanding job Yamaha has done keeping unwanted ballast off the XJ650.

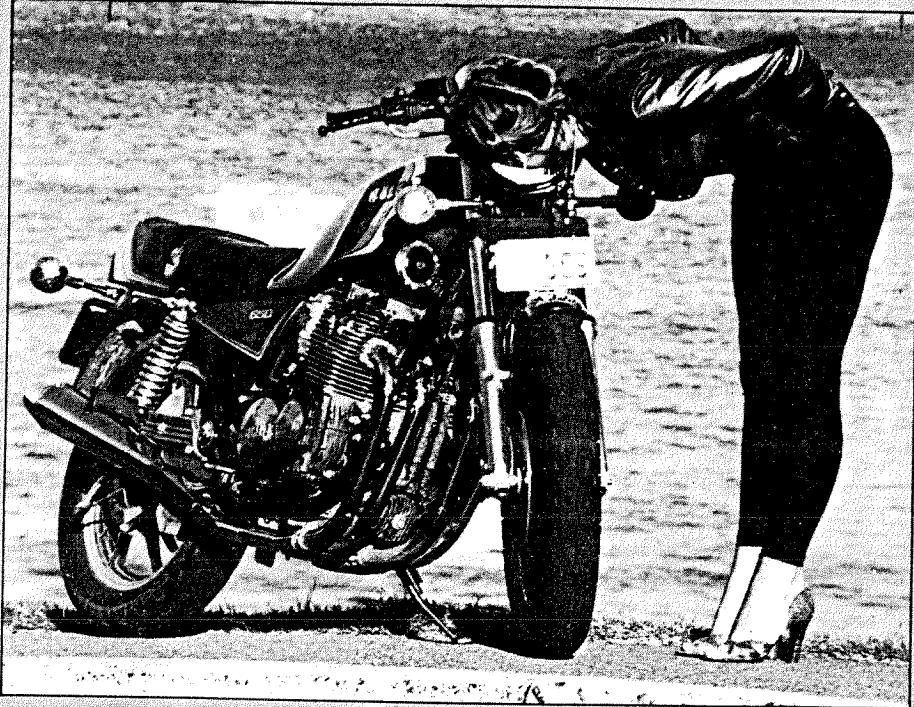
Having achieved a favourable starting weight, Yamaha followed through by building in a low centre of gravity (meaning the bike responds well to rider input) and seat height a Leprechaun could manage (sorry Lester). The result: A shaft-drive middleweight which is beautifully chuckable and a cinch to manoeuvre at all times.

The good news isn't over yet — the XJ comes with Yamaha's newest engine, a potent 653 cm³ four with enough steam to make the new bike, for all practical purposes, as fast as the quickest 750s — 16-valvers included! Electronic ignition and an oil-cooler are standard fittings and as the new powerplant is cast very much in the XS1100 mould, it should prove equally reliable. Backing up the engine are a slick gearbox and Yamaha's best-ever shaft-drive, so good in fact it ranks alongside Suzuki's as the sweetest shaft-drive TWO WHEELS has used to date.

Complementing the smooth short-stroke four and smooth shaft-drive are smooth looks — the XJ is certainly one of the most attractive new bikes to hit the streets in recent years. The slim yet handsome black engine, well proportioned fuel tank, TZ750-like front mudguard, futuristic wheels and Laverda-type double-bent silencers come together stylewise in a way which is all too rare in Japanese machinery.

Yamaha has fitted the 650 with good suspension (given that springing is not air-assisted), excellent brakes (in spite of a mere drum at the back) and top class steering geometry, so it is no surprise the model revels under hard riding conditions. Handling is first rate and cornering clearance extraordinary (our testbike was minus its centrestand, but this is well tucked away in any case) and an XJ shod with decent rubber in the hands of a competent rider can post astonishingly fast point-to-point times with a high level of safety.

The XJ650 scores a huge, 200 mm halogen headlight which does an absolutely superb job, and a sensibly loud pair of forward-facing horns. Both items have appeared on the latest versions of other Yamaha tourers. An original and thoughtful feature of the 650 is a small security chain and lock (using the ignition



key) which stows under the lefthand side-cover. Riders are advised by the owner's manual to ensure the chain is unlocked before moving off! Although only a light-weight chain, it is an added deterrent for deadshit bike thieves.

The powerplant

The XJ650 is hustled along by a sporty, double overhead cam, air-cooled, transverse four which puts out a claimed 54.5 kW (73 hp) at 9000 rpm (DIN) at the crank. Bore and stroke are well oversquare at 63.0 × 52.4 mm and compression ratio is 9.2:1. Induction is through a quartet of 32 mm constant vacuum Hitachis (these carbs are in regular use on Yamaha's four-strokes now), the exhaust system is a balanced two-into-one setup on each side and the tachometer redline is set at 9500 rpm, an engine speed our testbike was quite willing (if not actually keen) to exceed. Starting is electric or bump only and sparks come from Yamaha's usual magnetically-triggered battery/coil arrangement. For the XJ though, the old centrifugal advance was given the boot and spark lead is set electronically.

The engine runs two valves per cylinder each with two closing springs, opened directly by inverted-bucket cam

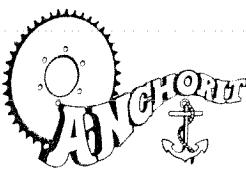
Pleasing overall appearance, low seat height, light steering and easy manoeuvrability — "A real gem" said our lady rider.

followers and valve clearance is adjusted by the old (now Suzuki's dohc TSCC heads with screw adjusters are here) and somewhat fiddly change-the-shims method. Camshaft drive is through a manually-adjusted (Honda-style) Morse-type silent chain running up the centre of the motor. The crankshaft is a forged, one-piece, plain bearing unit like those of the 1100 and 750 Yamahas and lubrication is wet sump aided by an oil cooler (as usual, without a thermostat and bypass oilway for cold weather).

In order to minimise crankcase width and thus be able to mount the engine

"Having achieved a favourable starting weight, Yamaha followed through with a low centre of gravity — meaning the bike responds well to rider input — and low seat height. The result: A shaft-driven middleweight which is beautifully 'chuckable' and a cinch to manoeuvre at all times".

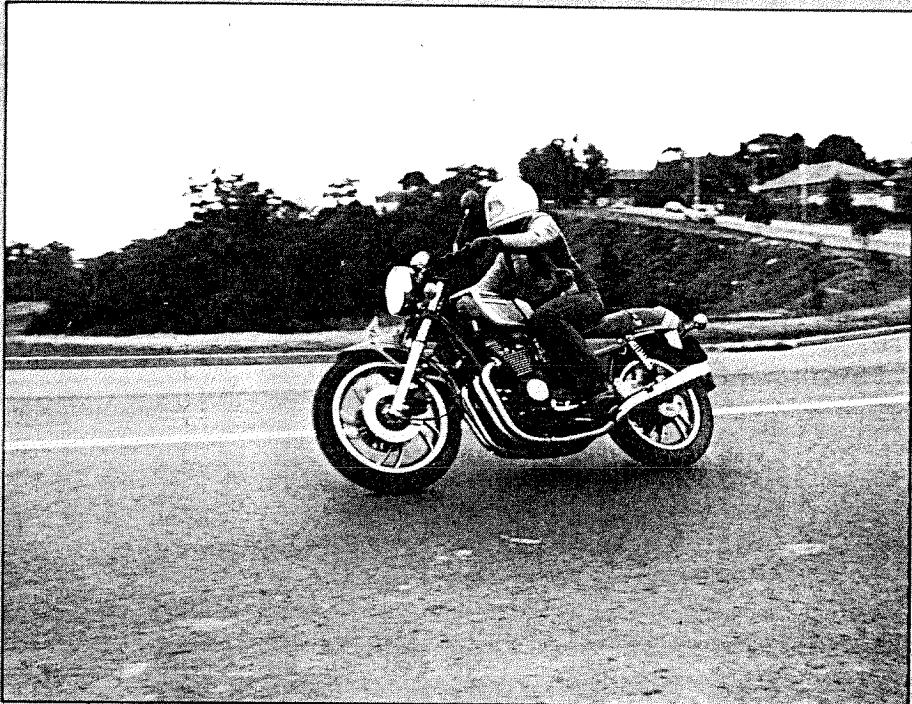
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lower, Yamaha put the XJ's alternator behind the cylinder block and moved the starter motor back over the gearbox. The starter now spins the crank through the alternator's Hy-Vo chain. There are no ill-effects from these re-arrangements and one glance at the delightfully compact powerplant confirms the success of Yamaha's efforts in this area.

In practice, the engine starts easily (the old-style choke up near the left thumb is a boon), warms up quickly (using the choke opens the throttles slightly so the bike will run unattended), is smooth, responsive, and very strong at high revs,

"The bike has good suspension (though not air-assisted), excellent brakes, and top-class steering geometry. Handling is equally first rate and cornering clearance extraordinary, and with good rubber the bike posts fast point-to-point times with a high level of safety".

returns reasonable fuel economy and generally is up to the high standard of the rest of the bike. For so free-revving a powerplant, the four provides unexpectedly strong engine braking. An oil level warning light is used in the dash instead of the more common low pressure warning and bearing in mind the frequency of oil pump failures, it's probably more useful — but why not have both, just in case? Our testbike's oil level never moved from full in spite of the dribbles that escaped from the tachometer drive connection on the head.

Fuel economy is not really a strong point of the 650 although we considered it fair in view of the performance of the bike. It ranged from a best of 19.7 km/l (56 mpg) touring solo, through 15.4 km/l (43.4 mpg) for city work and down to 13.8 km/l (39.2 mpg) when the bike was ridden with verve. Not bad for a highly-tuned engine, but hardly smell-of-an-oily-rag figures.

Performance

Performance is what this 650 claims to be all about and few would argue with acceleration being the most gut level, raw expression of performance. Without decent acceleration, the more esoteric aspects of performance are worth little.

Whoever heard anyone (other than Socket) rave over the handling and braking of a moped?

At Castlereagh, the XJ put its muscle to good use and became far and away the quickest 650 TWO WHEELS has ever tested. It sprinted over the standing 400m so fast only one 750 has been quicker, and then only by one-tenth of a second (Honda's 16-valve CB750KZ). The XJ smoked its back Pirelli Phantom — and good tyres they are — for at least 20 metres before clearing out to post a best time of 12.7 seconds and 168 km/h for the old "quarter". Zero to 100 km/h takes just 4.6 seconds and a further indication of the power inside those black crankcases comes from the top speed — a true 193 km/h (122 mph). As a contrast, Kawasaki's Z650 (far from new we'll admit) cut the SS400m in a casual 13.6 seconds and Suzuki's GS850 took 12.8 seconds. Clearly the XJ is an exceptionally fast 650.

Sub-13-second times are easy to turn once a rider is attuned to the bike, the easily controlled clutch and near perfect gearing make keeping the engine near its power peak a simple matter. We got our best times by running the bike to 10,000 rpm (indicated) before picking up the next gear, the power fall-off past the peak not really starting till after ten grand. Speedo error on our testbikes was a modest two percent (running Pirellis), the instrument exaggerating reality.

The dyno session at Stewarts confirmed the engine's strength at high revs (over 6500 rpm) and also highlighted its midrange and low-rev limits. As the chart shows, torque output climbs to about 4000 rpm then levels off until around 6000 rpm when it once again gets a spurt on. Torque stays above 40 Nm from 6500 rpm to 9500 rpm and this is the engine's zone of optimum performance. Power peaked at 9500 rpm with a healthy 38.1 kW available at the back wheel.

In street use, the XJ650 behaved just like its dyno results said it should, which is to say if one lugged the bike around in fifth, progress was leisurely for a 650 although 350s and 450s could still be hosed off. Knock the XJ down a gear or two and kick it in the guts however and an entirely different story unfolds — the Yamaha picks up its skirt and races off with a vengeance. The engine is a real Jekyll and Hyde special; almost re-

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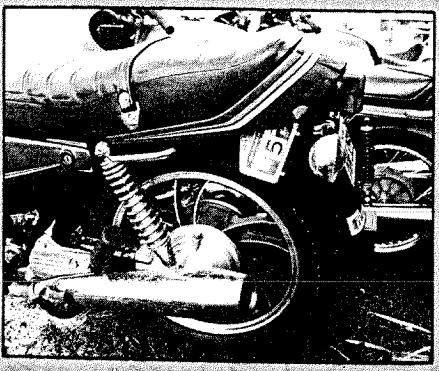
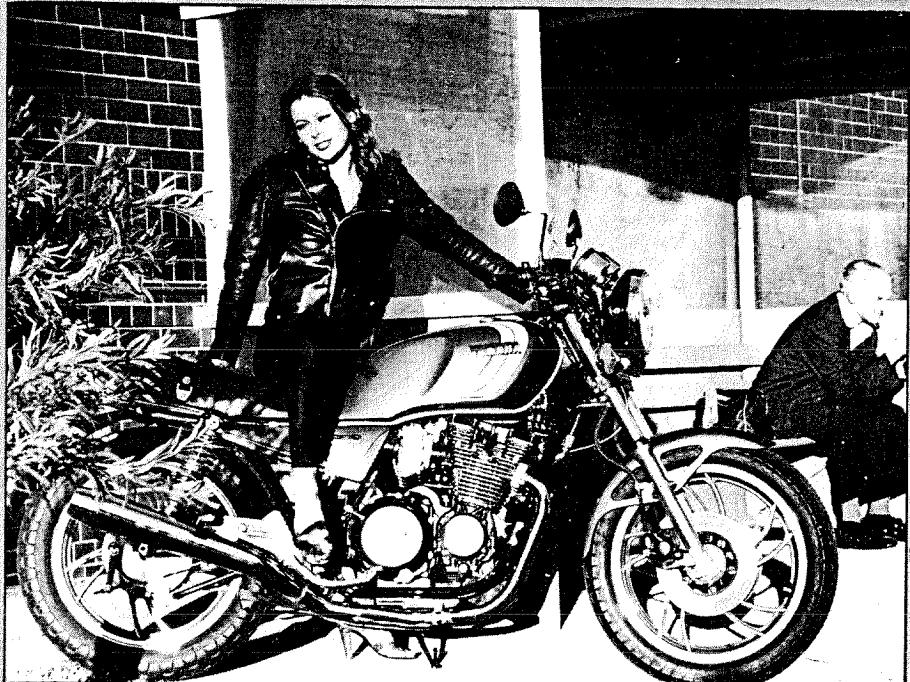
Bike Of The Year

calcitrant below 2500 rpm (though in no way unhappy), mild till 6500 rpm, and then a raging demon until it's spent at around 10,500 rpm. Most exhilarating after one learns to automatically choose the appropriate cog before screwing the throttle to the stop.

The 650 took its strip and dyno tests without batting an eyelid, there was no exhaust pipe blueing and certainly no overheating. The bike almost seemed specifically built for this sort of hard life.

Transmission

A gear primary drive takes engine power to a wet, multiplate clutch of superbike proportions (operated by a trailbike type rack-and-pinion linkage which gives excellent feel and a light lever) on the right hand end of the gearbox mainshaft. The box itself is a typical motorcycle constant-mesh unit of five speeds, but its action is superior. Engagement is light and positive and overall and internal reductions are well thought out.



The XJ650's gearbox gives the 850 Suzuki's box a run for its money as the best shaftdrive motorcycle gearbox TWO WHEELS has encountered. The Suzuki unit beat the 650's on a countback basically because it sounded nicer in use — the Yamaha box would "clack" ever

about. The slight raising of the rear of the bike as power is applied (which is universal on shaftdrive bikes) is present, caused by the swingarm wanting to drop as the shaft pinion tries to run up the crown gear.

The clutch on the 650 was progressive and controllable and well up to coping with a series of dragstrip starts in a couple of hours. It is operated by a Magura-style, kinked lever, well grommeted in the Yamaha tradition to keep the dirt out of the cable.

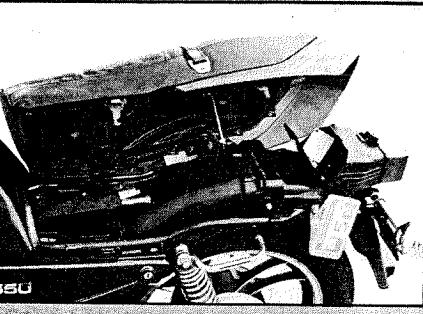
Handling

The XJ's frame is a heavily-braced, welded, double cradle affair with tapered roller steering head bearings and needle roller swingarm supports which, in addition to working very well, is obviously none too heavy. Suspension components seem ordinary on the surface, and indeed they are, but spring rates are near ideal (the rear springs at least are progressively wound) and the resulting ride is an acceptable compromise given the travel limitations of the suspension. It is not up to the standard of comfort provided by

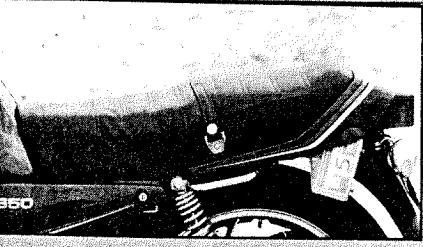
"Fuel economy is not the bike's strongest point, though it is certainly fair in view of the machine's performance. It ranged from a best of 19.7 km/l (56 mpg) to 13.8 km/l (39.2 mpg) when the bike was ridden with verve. Hardly smell-of-an-oily-rag stuff, but not bad for a highly tuned engine".

so slightly on changes when the oil was really hot. Both gearboxes are as good as any on chaindrive bikes.

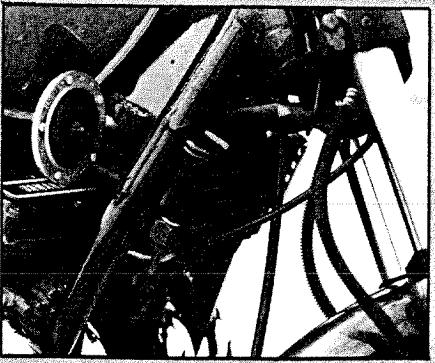
The same applies to the XJ's shaftdrive — it is as good in every way as the superb unit on the GS850, totally free of excess freeplay and a pleasure to forget



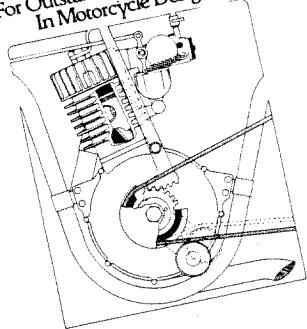
Forget the days of shaft-drives looking bulky; the XJ650, to use an old phrase, is "happening just standing still" (though the bus-stop brigade won't always agree). Seat is far better for pilot than for pillion and could use reshaping at the back.



Far left: Seat comparison shows up the BM in a better light, though the XJ shows signs of comparable touring capability and longevity with security chain, sturdy footpegs and tucked-in underpinnings. Electronic ignition and oil cooler (left) are standard fittings.



TWO WHEELS MAGAZINE
BIKE OF THE YEAR AWARD
For Outstanding Achievement
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the multi-adjustable, long-travel, air assisted suspension on the bigger (and pricier) road Suzukis.

To cut a long story short, the steering of the XJ is pure state-of-the-art, its handling is very good and its behaviour on all types of roads at all speeds is predictable and safe. A ride on the Yamaha was invariably rewarding. The bike put up with mid-corner braking, line changing and other abuse with aplomb and was equally secure one-up or doubling — at all times it was a most forgiving mount. The 650's nimbleness even took some of the pain out of city riding.

The only criticism we can make of the XJ's handling is a mild one and relates to its rear shock absorbers — it would be nice if they had a little more damping and retained that damping better as they became hot.

Braking

As with all recent Yamaha street bikes, we have no complaints about braking — the stoppers were powerful and relayed good feel to the rider. The twin-disc front brake did a reasonable job when wet (it was excellent, dry) and the rear single-leading-shoe drum was not noticeably weakened by fade when hot and acted as a reassuring backstop in heavy rain. The XJ remained stable under crash-stop conditions and never gave its rider any "moments" doing the braking tests at Castlereagh. Best stopping distance from 100 km/h was 35.1 m and from 60 km/h, 12.2 m; both results being commendably short.

Observations

We liked the standard security chain, the hinged dualseat, the rugged feel of



the bike and its sturdy footpegs, the well tucked in exhausts and underpinnings, the sporty modern styling and the way one sits *into* the XJ rather than on top of it. We were less enthused by the small tail-light, the inconvenient passing flasher, the lack of a second helmet lock, the slightly awkward sidestand (the end rests almost under the rider's footpeg) and the ease with which the parking lights can be inadvertently turned on while using the steering lock. The only negative evidence of the serious weight-paring Yamaha carried out on the XJ650 is a pair of thin-walled (but not small diameter) fork tubes which will flex forward and backwards occasionally, usually when the front end is light under hard acceleration and normally only on rough surfaces. While this trait of the forks can be observed, it is by no means common (it happened twice during our high mileage month with the bike) and it has absolutely no ill-effects on the bike's stability and security. It simply happens and nothing more.

The number one riding position on the XJ is a forward sloping (slightly), sporty one which we found extremely comfortable in practice. Footpegs are mildly rearset and the overall riding position is midway between that of Honda's supersports FZs and touring KZ. In many ways it offers the best of both extremes with, as far as we could ascertain, none of the disadvantages of either. The pillion's riding position though is likely to deter most passengers from going round Australia on the back — the footpegs are too high and the seat is not as good at the back as it is at the front. Which is not fantastic either, the older Yamaha roadies have better seats. A little more padding would be nice and the back half could do with some re-shaping as well. The seat is acceptably comfortable as far as the rider is concerned, however.

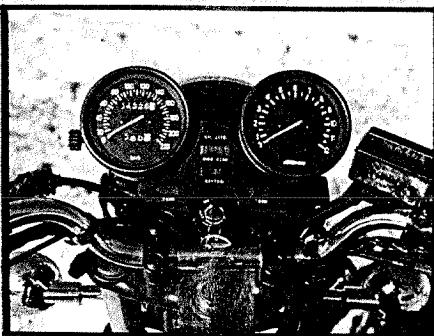
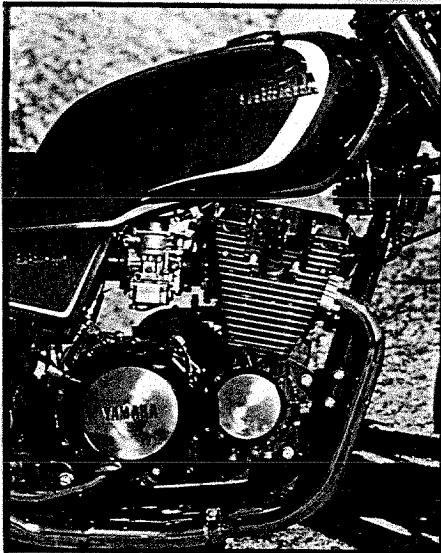
Touring range is reasonable with the 19.5-litre tank and reserve is a useful 3.8 litres. The XJ will tour well if the rider doesn't mind either being a bit patient

overtaking, or dropping a gear or two to bring the engine up on its cams for the manoeuvre — it is a particularly smooth bike to ride.

Conclusions

The XJ is one of those rare bikes able to make a decent fist of doing just about anything — it is a far more capable bike than its 850 cm³ brother, to say nothing of being a good deal faster. The two models are like chalk and cheese, they are so dissimilar it's hard to believe both are 1980 models from the same factory.

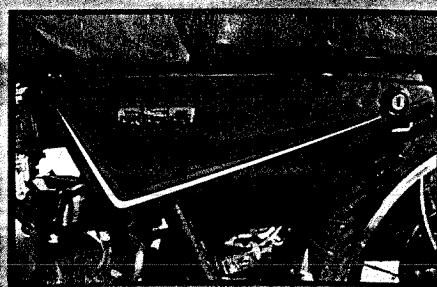
The XJ650 is a safe, well-balanced all-rounder which Yamaha can be justifiably proud of. If the 650 was "conceived as the forerunner of a new generation of sporting motorcycles", as Yamaha claims, we eagerly await the others. We thought the XJ650 so good the model is now TWO WHEELS 1980 Bike Of The Year. There is no higher commendation than that, and for \$2699 the Yamaha XJ650 is a top bike for a good price. *



From its TZ750-like front guard, black engine and well-proportioned fuel tank to the practicality of light weight combined with shaft drive, the XJ650 represents significant change of thought from Yamaha's Iwata headquarters.



The single front disc works okay and bike was stable in emergency stop conditions. Helmet lock resides under lockable left sidecover, bike could use two.



Bike Of The Year

Scratcher's view

MY LAST YAMAHA was a TX650A, on which I clocked 80,000 km. The comparison to the XJ650H was, to say the least, a vast change.

Yamaha's 650 twin was almost a classic, it had changed only slightly in eight years. People still say the twin was a pig; okay, the first couple of models was notorious for high speed wobbles and hopping round corners like a "roo on heat," but from the 650A onwards they improved. I suppose it's sentimentality, but my lime green 650A had character. I grew to like its looks, my bum formed calluses and could handle the seat on a long run. The bike pulled like a train and when the mufflers wore and tore, it started to sound like a motorcycle.

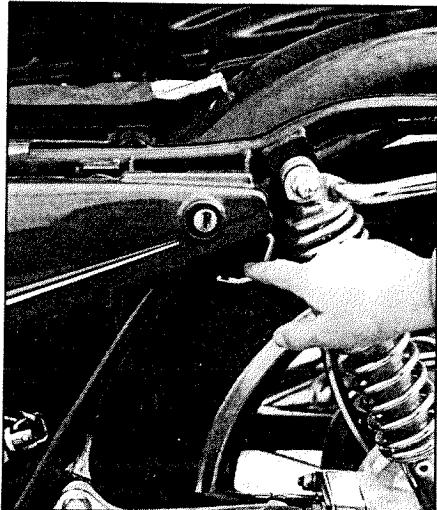
All this was in mind when I picked up the 650H for a couple of weeks' running round town and two one-day rides to Jambaroo (just past the 'Gong and south

of Sydney) and to the Zig-Zag Railway at Lithgow.

If someone had blindfolded me or put different decals on the tank I would have thought the XJ650 was a scaled-up version of Yamaha's RD350. One friend felt it reminded him of his RD400 Yamaha. Being a "newy" on the market, it created noticeable interest. Several guys in suits approached me at intersections for a quick rap and closer appraisal. Yes, they said, they did like its looks and were quite interested as they too had owned a 650 twin and this one seemed so different — and it is!

Its acceleration, top speed and handling are definitely superior to the old twin. The bike is very nimble, can change line with the slightest body move and huge the road oh so nicely one up and two up. Braking is fine, the headlight is great and nearly as big as your head. Pirelli Phantoms were on this test bike and proved a great combination for those who rode it on the racetrack and off.

The horn is loud, the blinkers flash brightly (don't they all?) and both stands tuck away nicely. I found the seat firm



Finish on test machine was impressive as was attention to detail. Frame too was neatly finished. Helmet lock action is shown here. Toolkit was "standard".

and comfortable but my pillion did not. Also, the pillion has nothing to grab on to (other than the rider!). Can you believe it?

The Yamaha XJ650 Engine

Japan's most thought-out mechanics

THOUGH IT breaks little new ground in terms of basic engine design the XJ650H power unit is technically interesting. At a hurried glance, it passes for a smaller version of the fire-breathing XS1100, which in turn was a logical follow-up to the factory's first foray into superbikes — the XS750 triple.

But the little 650 Four is only superficially similar to the XS models which spawned it, for the Yamaha engineers have drawn on hard-won experience and done their homework well, designing an engine which is at once sophisticated and yet simple in terms of normal servicing and ease of maintenance.

Current trends dictate chain-driven overhead camshafts with bucket-type followers and shim valve-clearance adjustment and semi-automatic adjustment for the centre-drive camchain. The norm also sees detachable-end connecting-rods with plain slipper big-end and main bearings, with well-oversquare bore × stroke dimensions.

But the XJ650 is radically different from its bigger brothers in several other areas, and the changes are all very much for the better.

The Hy-Vo primary chain has gone, and with it the jackshaft which drove most of the transmission components which could have just as easily been driven by a simple primary-drive gear. A set of gears and Hy-Vo chain are used in the new engine, but they simply drive the

alternator and in turn spin the engine through the starter-motor dog clutch which engages with a gear on the alternator when the electric starter button is pressed.

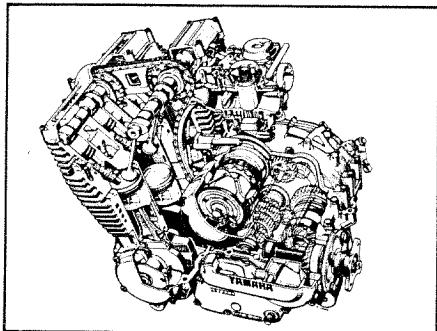
The chain is of course much lighter than the transmission chain used on the bigger Fours, because it is not transmitting power and is only hard-pressed when the starter motor turns the engine over when cold. When warm, the engine fires at the first touch of the button and the chain's work is done, its task from then on simply to drive a frictionless alternator.

Primary drive is by gear direct to the clutch assembly from between three and four cylinders, the alternator and cam-chain drives from between cylinders two and three. Cleverly, the alternator and starter motor are mounted behind the cylinder barrels, directly below the four constant-vacuum Hitachi carburetors, thereby overcoming the problems of a wide power unit with a heavy mass hung on the extreme end of a highly stressed crankshaft.

The results of this superior design are plain; better cornering angles because of the narrower crankcases, with better protection in the event of a spill, and longevity for the now more lightly-stressed bottom half of a high-revving engine.

Easy access

Certainly the main advantage of the



simpler gear-driven primary assembly lies in the ease with which the clutch and gearbox can be serviced — a vital point with ever-increasing service charges and hourly labour rates. Yamaha points with pride to an engine which can be serviced to a very great extent without removing it from the frame, and claims that overhead cam gear, heads and barrels can be removed with the rest of the engine and gear-train undisturbed.

The clutch can be reached by simply removing its outer case, and the whole assembly can be taken out for servicing or replacement without the need to disturb anything else. Even more remarkably for a shaft-drive motorcycle, the selector forks, drum and most of the gears, can be removed from the cases without taking any of the engine components apart — and with the engine still in the frame.

All this was made possible by the adoption of a primary gear drive and the elimination of the centre gear-case and jackshaft. Incidentally, the gearbox centre

No grab rail! That is unless your arms hang to your feet, then you can grab the blinker stems.

Overall styling is attractive and a breakaway from the later Japanese lines. Motor appearance is very similar to the XS1100. The mag wheels' appearance is stylish but how you feel about them is very much personal preference. I did not like them.

On a two-up ride to Jambaroo the Yamaha showed its lack of torque; sitting around 40-150 km/h, approaching a slight hill with plenty of throttle left it would not pull. It needed to be dropped two gears and revved much higher for any noticeable pull. But my old twin had heaps of pulling power...

The engine is smooth. In top gear at only 1000 rpm and powered to full throttle it pulled away smoothly. But it simply does not have a great deal of zap below 6000 rpm. From there on if powered too heavily the light front end feels even lighter — due to the fact that it's now airborne! I thought that around 4500-6000 the motor could be smoother although

it's far better than the twin...

On dirt the XJ650 was very nice and nimble and reminded me of the traditional shaft drive dirt holdings of the BMW R90S. I am awaiting the onset of race debuts with Yamaha's new baby!

Rear suspension is hard. Any bumps or corrugations are easily felt, even on the softest setting. I'd like to try a set of accessory shock absorbers to sort this baby out.

Front suspension feels a little mushy at speed, perhaps a steering damper to hold it steady instead of the rider having to do so would help.

The ignition key switch required a bit of fiddling to switch on. It also incorporates the steering lock, but check that the parking lights are also not locked on when you depart. I noticed the seat's lip is too tight and thin. With only 2500 km up it had already torn. With its high ridge any sort of rubbing cuts it.

Fuel consumption is not excitable. Around five to six litres to 100 km. Tank capacity is 19 litres with a range of about 300 km. The fuel petcock is tightly positioned and not as easy to work as some.

gear, with its cam-and-spring shock absorber (very British to look at!) can also be removed — along with the final drive assembly and bearing — without splitting the cases. This final-drive assembly is driven by the gearbox mainshaft and has a bevel gear to transfer the drive through a trim 90 degrees and thereby provide drive for the shaft assembly.

The gearbox mainshaft is the only component which cannot be removed when the clutch outer case is detached from the engine's right side, but very many kilometres will be covered before this chore is necessary.

The Hitachi constant-vacuum carburetors need to be adjusted, or at the very least checked, at initial servicing and are fairly sensitive to these adjustments, but Yamaha claims that further settings are rare and should not need to be attended to — more than routinely — until a first valve grind, when the shims in the bucket cam followers will also have to be checked and replaced.

A cover on the left crankcase end conceals the TCI (Transistor Controlled Ignition) system, which has no provision for mechanical or vacuum variation in ignition timing and is therefore maintenance-free.

The TCI system involves two pick-up coils mounted on the crankcases, triggered by a crankshaft-mounted governor, two ignition coils mounted to the frame under the fuel tank with current-controlling ballast resistors and a TCI unit under the seat. There are no contact points, but the system functions in precisely the same way as the coil-and-points systems still widely used. The

The portable lock-up chain is a top accessory, so long as a would-be thief notices the chain is there and does not jump on and try to ride off. I cannot remember any other bike having such a sensible item as standard equipment.

Ron Boulden and Garry Coleman staged a demonstration race of the 650's prowess on the press preview day. Boulden was astride the 650 and Coleman on the big 1100 Yamaha.

In the first 50 yards the 1100 was first away, into mid third gear Boulden had caught the 1100 and was just ahead, out of the curve at pit straight's end the lighter 650 was in the lead — and it stayed there. Keep in mind Coleman is no slow rider and he hammered the 1100 around Oran hot on Boulden's heels. Everyone was most impressed with the 650's nimbleness and beat acceleration.

Overall I think the 650 is a good mid-range mount. It's nimble, responsive, and lean for city riding and good on the open road. Probably more a racer than a tourer. A 750 class beater? Debatable, but I think not.

Graham Monro

magnetic pick-up coils and control box (TCI) are used in place of the mechanical points, while the governor works almost as a points cam. There are no wearing parts, and service is therefore eliminated.

A cover on the right end of the crankcase conceals ... nothing at all! The crankcase simply has a plug at the end, with the outer case merely a cosmetic device.

Four Allen screws hold the cover over the left end of the alternator, the latter's rotor held in place by a single through-bolt, the stator secured within the cover itself. The AC generator can be pulled apart almost to the drive chain in a matter of minutes. Not a job to be done every day, but simple (read low-cost!) when the need arises.

Though based, in essence, on the XS1100 and 750 electrical system, the XS650 includes a new feature which employs a safety switch that does not allow the engine to be fired up unless neutral gear is selected or the clutch lever is held in. In passing, the clutch withdrawal is effected by a neat rack-and-pinion assembly — gimmicky, but very effective and allowing one of the lightest clutch actions in our experience.

Lubrication

Of course wet sump lubrication is employed, with the one supply of oil circulating through engine and gearbox.

The lubricant is dredged up by trochoid pump and directed through the normal cartridge-type oil filter to the main gallery, where it is pumped through main and big-end bearings, through conrods to little-end bearings and through oil rings to

pistons and cylinder walls. A by-pass takes the high-pressure oil through hollow mounting bolts to dowels upon which the inlet and exhaust camshafts sit.

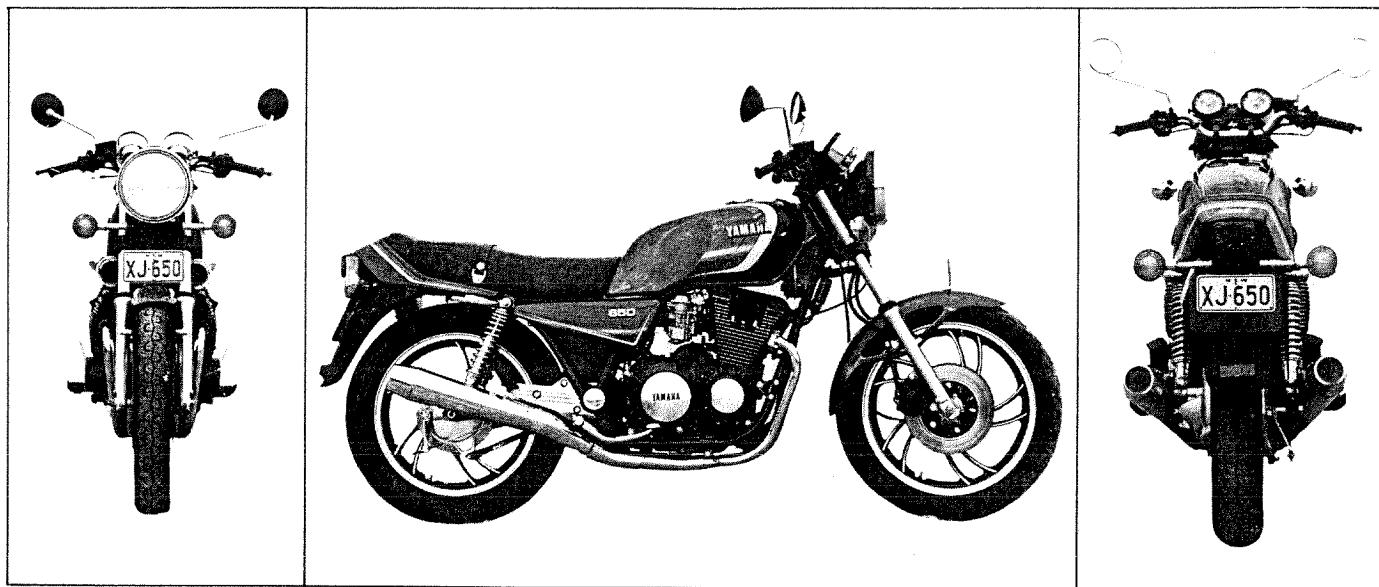
Camshafts are located by double-pillar blocks through which the oil passes, and the lubrication process is then completed. A further by-pass takes the lubricant through the shift-bar into the gearbox and through a special nozzle to spray directly on the inner run of the alternator drive-chain.

Most engines employ an oil pressure switch, but the new XJ650 adopts an oil level switch to warn of low oil levels, thereby keeping an eye on the quantity of oil rather than its pressure. Obviously, high pressure can still occur in a very small quantity of very hot oil, and this cunning device is intended to overcome the possibility of this occurring.

The machine comes complete with heavy rubber tubing and a large oil cooler, which would seem to point to poor thermal efficiency but is probably as fashionable as the double overhead cam-shaft layout, while the oiling system is completed by a crankcase emission control which routes gas blow-by from the crankcases, through a coverplate on the left crankcase into the base of the air-filter. The inlet charge picks up oil mist and carries it into the combustion chamber.

Though gimmick-free for the most part, the new Yamaha engine shows what can be done by a major manufacturer willing to learn by mistakes in earlier models, and to introduce to a competitive market-place an endearing machine with a great promise and a bright future. *

Yamaha XJ650H



ENGINE

Air-cooled, transverse, double overhead cam, four-cylinder four-stroke. Chain-driven cams, two valves per cylinder, plain bearing crankshaft, wet sump lubrication with oil cooler. Alternator mounted behind cylinder block. Maximum rear wheel power 38.1 kW
 Maximum torque 42.7 Nm at 8000 rpm
 Bore x stroke 63 x 52.4 mm
 Displacement 653 cm³
 Compression ratio 9.2:1
 Maximum engine speed 9500 rpm
 Carburetion 4 x 32 mm constant-vacuum Hitachis
 Air filtration Dry foam
 Starter system Electric only
 Ignition Electronically triggered battery/coil, electronic

TRANSMISSION

Gear primary drive to wet, multiplate clutch. Five-speed, constant mesh gearbox with one down, four up pattern. Final drive by sealed shaft in left hand swing fork.
 Ratios (overall:1)
 First 15.29
 Second 10.48
 Third 8.06
 Fourth 6.52
 Fifth 5.68
 Primary reduction: 1.672:1
 Secondary reduction: 1.437:1
 Final reduction: 2.090:1

FRAME AND BRAKES

Double-cradle frame with tapered-roller steering head bearings; needle-roller, swingarm bearings. Oil-damped, coil-spring forks and hydraulic rear damper units with five-position external spring preload. Hydraulic, double-disc front brake, and rod-operated, single leading shoe, drum rear brake. Front suspension travel 140 mm
 Rear suspension travel 75 mm
 Fork rake 27 deg 45 min
 Fork trail 115 mm
 Front brake diameter 2 x 270 mm
 Rear brake diameter 210 mm
 Front tyre Pirelli Phantom 3.50 V19 (Rear pattern)
 Rear tyre Pirelli Phantom 120/90 V18

DIMENSIONS

Dry weight 204 kg
 Seat height 790 mm
 Wheelbase 1440 mm

Ground clearance	140 mm
Fuel capacity (inc reserve)	19.5 litres
Fuel reserve	3.8 litres
Engine oil capacity	3.3 litres

CALCULATED DATA

Weight to power ratio (90 kg load)	7.72 kg/kW
Specific power output	58.4 kW/litre
Mean piston speed at redline revs	16.6 m/sec

PERFORMANCE

Acceleration

Standing 400 metres	12.7 secs at 168 km/h
Average of last three runs	12.8 secs
Zero to 100 km/h	4.6 secs
Maximum speed	193 km/h

Braking

From 100 km/h to zero	35.1 m
Average of last three stops	35.3 m
From 60 km/h to zero	12.2 m
Average of last three stops	12.3 m

Fuel consumption

Touring	19.7 km/l (56 mpg)
City	15.4 km/l (43.4 mpg)
Hard riding	13.8 km/l (39.2 mpg)
Average on test	15.9 km/l (45.1 mpg)

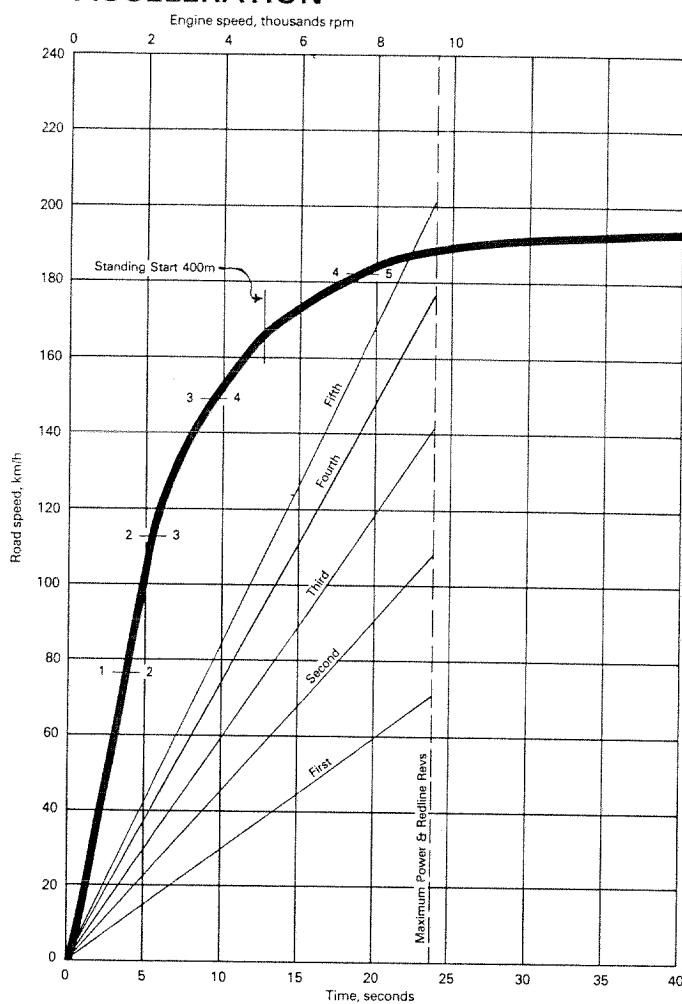
TEST MACHINE

Manufacturer	Yamaha Motor Co., Iwata, Japan
Test machine	McCulloch of Australia, Seven Hills, Sydney
Price	\$2699

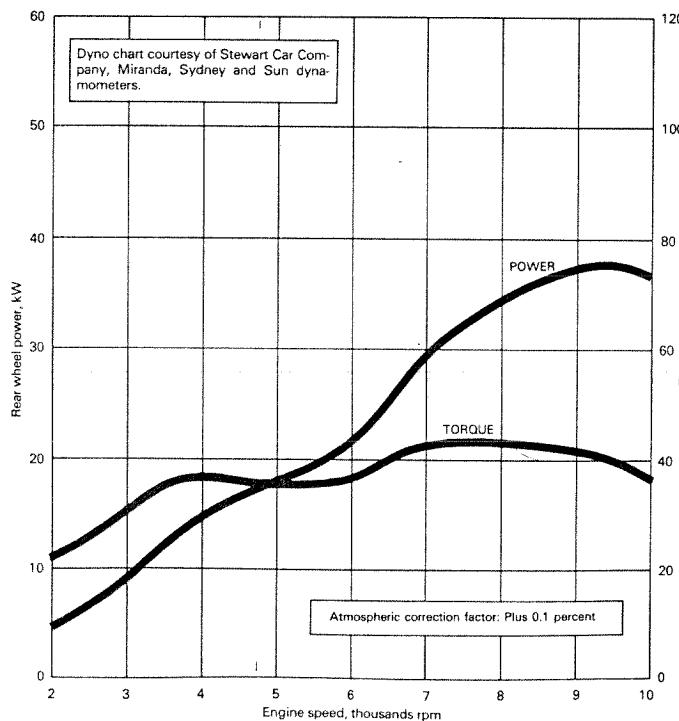
Best points: Bike is an extremely well balanced, handsome package able to blast and tour with aplomb. Steering and handling are superb, brakes excellent and suspension good. The shaftdrive is clunk and slop-free and gearchanging is slick. Engine is very strong at high revs yet unfussed at low revs and both weight and seat height are moderate. Headlight is superb, horns excellent. Bike is very forgiving, cornering clearance is exceptional and the lockup chain is a sensible fitting. The machine goes like a fast 750.

Worst points: Tail light is too small, seat could have a little more padding and economy is only average. Bike should have a second helmet lock. Power at low and midrange revs is a bit lower than most 650s put out.

ACCELERATION



CHASSIS DYNAMOMETER



SUMMARY

RATINGS

ENGINE

Responsiveness
Smoothness
Bottom end power
Mid range power
Top end power
Fuel economy
Starting
Ease of maintenance
Quietness

	Poor	Below Average	Average	Above Average	Outstanding
Responsiveness				●	
Smoothness		●	●		
Bottom end power		●	●		
Mid range power		●			
Top end power			●		
Fuel economy		●	●		
Starting		●	●		
Ease of maintenance		●			
Quietness		●			

TRANSMISSION

Clutch operation
Gearbox operation
Ratio suitability
Drivetrain freeplay

Clutch operation			●	
Gearbox operation			●	
Ratio suitability			●	
Drivetrain freeplay		●		

HANDLING

Steering
Cornering clearance
Ability to forgive rider error
High speed cornering
Medium speed cornering
Bumpy bends
Tossing side to side
Changing line in corners
Braking in corners
Manoeuvring
Top speed stability

Steering		●		
Cornering clearance			●	
Ability to forgive rider error			●	
High speed cornering				●
Medium speed cornering			●	
Bumpy bends		●		
Tossing side to side		●		
Changing line in corners		●		
Braking in corners		●		
Manoeuvring		●		
Top speed stability		●		

SUSPENSION

Front
Rear
Front/rear match

Front			●	
Rear		●		
Front/rear match		●		

BRAKES

Resistance to fading
Stopping power
Braking stability
Feel at controls

Resistance to fading			●	
Stopping power			●	
Braking stability			●	
Feel at controls			●	

CONTROLS

Location of major controls
Switches
Instruments

Location of major controls			●	
Switches		●		
Instruments		●		

TWO-UP SUITABILITY

Passenger comfort
Stability with pillion
Cornering clearance two-up

Passenger comfort		●		
Stability with pillion			●	
Cornering clearance two-up			●	

GENERAL

Quality of finish
Engine appearance
Overall styling
Seat comfort
Riding position
Touring range
Headlight
Instrument lighting
Other lights
Rearview mirrors
Horn
Toolkit

Quality of finish		●		
Engine appearance			●	
Overall styling			●	
Seat comfort			●	
Riding position			●	
Touring range				●
Headlight		●		
Instrument lighting		●		
Other lights		●		
Rearview mirrors		●		
Horn			●	
Toolkit		●		

VALUE FOR MONEY

Bike Of The Year

Viewpoint:
The female rider

APART FROM its overall appearance, the first pleasing thing I noticed about the XJ650 was the height of the seat. For a female with proportionately short legs, I found I could straddle the bike and place two feet simultaneously on earth without feeling like a dwarf astride an 18-gallon keg. Paddling backwards and forwards was almost as effortless, and later I found no difficulty at all manoeuvring the Yamaha into awkward parking spots.

It was a fair stretch to the handlebars over the narrow 19.5-litre tank and previously I have found this too much strain at my wrists. I know this seems of little consequence on short trips, it can be a problem over reasonable distance. However, the handlebar position is high relative to the seat, and that together with the light clutch and throttle, meant I never felt any strain during the time I was riding the XJ.

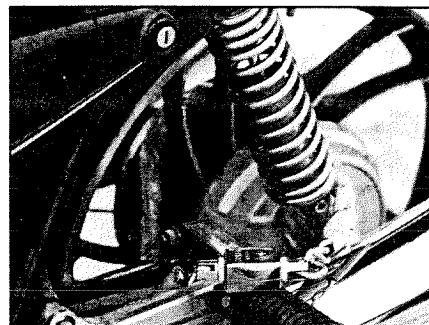
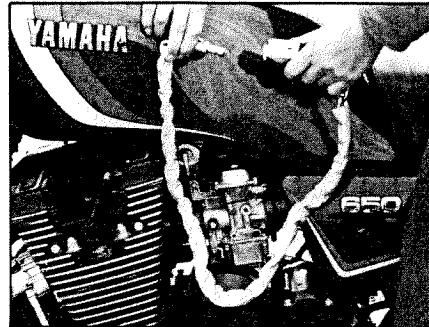
In fact, I found the riding position ideal for straightening my tired back, the rear-set footpegs working to complement this effect. The seat, although not luxuriously padded, was firm and comfortable.

As with most modern bikes, controls were adequate (easy to operate with a small thumb) with the exception of the passing flasher, which I couldn't use without releasing my grip from the handlebars. The self-cancelling blinkers worked like a charm and it was a welcome sight to see the choke on the handlebars.

Riding the XJ650 was the second pleasing experience I had with the bike. Changing gears was so smooth I didn't believe it was my doing — there was no doubt about which gear I had selected as each was found with faultless precision. The gearshift and foot brake levers were well-positioned and easy to use — they weren't so far inboard that I had to put my toes on the engine cases in a desperate search to find them.

The Yamaha steering is light and precise and provided effortless manoeuvrability zipping through traffic. Out on the open road, its handling was superb. Unlike some heavyweights which require brute force to recover the bike to a vertical position after tackling one bend and before considering another, the Yamaha middleweight was easy to throw from side to side, consuming curve after curve with a delightful, smooth vigour.

The bike was quite responsive in the rev range below 4000, seemed to do nothing more from 4-6000 and then practically launched itself into orbit above six grand. Highway cruising was relaxing at about five or five and a half but for quick



manoeuvres or for overtaking it's necessary to get over the 6000 rpm mark pronto.

One uncomfortable aspect of city riding for short people is caused by the squareness of the back of the petrol tank. Because they sit further forward than most riders (a consequence of short arms), the constant stopping, starting feet down, feet up at regularly spaced traffic lights causes the squarish corners of the tank to chafe the inside thighs after a while. Thankfully, it's not noticeable in other riding situations.

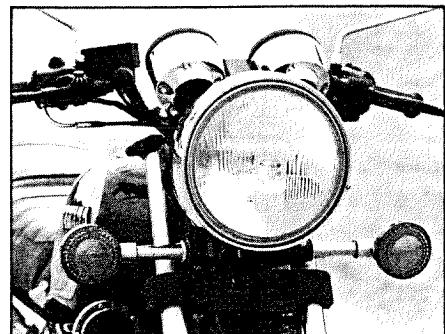
Pillion riding on the 650 is a completely different experience in terms of comfort. The footpegs are high and the seat less slippery than normal, but no natural back support is provided and it's a "hunch" position on the pillion. After an hour or so you get backache! Before Miller set the correct suspension adjustment for pillion riding I experienced everything from a jarring boneshaking to a perfectly elastic bounce. Somewhere in between I received a fairly satisfactory ride on a less than ideal back seat. Naturally, comfort was far better than riding pillion on a trail bike, but one tends to expect a bit more from a tourable 650.

There was no centrestand on our test bike so I could not test my strength that way. What I did try (not a usual test before considering the purchase of a bike) was to lift the bike after having someone lie it gently on its side. On my second attempt, with the correct knee-bend, it was not too difficult to stand the 205 kg machine upright again.

The sidestand proved rather annoying as it rested directly under the rider's footpeg. I could only hook it with my heel in such a way that my foot slipped off before I had the stand properly ex-

The XJ comes with headlight and horn performance we've come to expect exclusively from bigger machinery. Controls and instruments proved generally well-suited to the riding position.

The gimmickry is sensible: Chain storage offers easy access and use — it was described by one rider as "the best accessory he'd ever seen standard". With the touring capability offered by the essentially sporty XJ, perhaps a better toolkit would have been more appropriate.



tended. Often it took four or five attempts to put it right down, while on other occasions I dismounted and used my right foot.

At first glance the ignition switch steering lock seemed confusing but on reading the owner's manual, its operation became clear. Being the absent-minded type, however, I still had to be careful not to turn the key to park when I wanted the earlier lock position.

The XJ650 is a real gem. It has a charming personality — untemperamental and eager to please, undemanding yet responsive, forgiving, individualistic and dynamic. Its sporty appearance (marred slightly by the big headlight, but worth the penalty) matches its sporty nature. The XJ is a superbike particularly suitable for girls (as well as guys with short limbs) of at least moderate strength. It's easy to touch the ground, easy to push around and easy to ride.

This Yamaha has more than enough performance and appeal to justify buying it over more powerful, less manageable, heavyweight machines which might be only marginally (if any) faster and certainly will be more expensive. — A.C.

two wheels

Bike of the year 1980



(Y) YAMAHA

XJ·650·H

Runs rings around the other middleweights.

The XJ 650H is certain to regenerate excitement in the middleweight class. Yamaha recognises that sports enthusiasts no longer care to rely on brute power alone. This machine has been made to combine highway power with racetrack handling, city flexibility and genuine economy.

All the benefits of the bigger capacity superbikes are there, with none of the disadvantages. The speed is amazing and fuel consumption is meagre.

The XJ 650H features a very powerful

and tractable DOHC four cylinder motor; smooth, clean, adjustment-free shaft drive; superb styling and new 'Italic' alloy wheels; even such seemingly unimportant but vital safety features as self-cancelling blinkers and a brilliant long-throw Halogen headlight: even a tough lock-up chain that fits into its own compartment when not in use.

Spend a rewarding fifteen minutes walking around the new XJ 650H at your nearest Yamaha dealer. It won't take you long to see why this is the start of a new generation of sporting motorcycles.