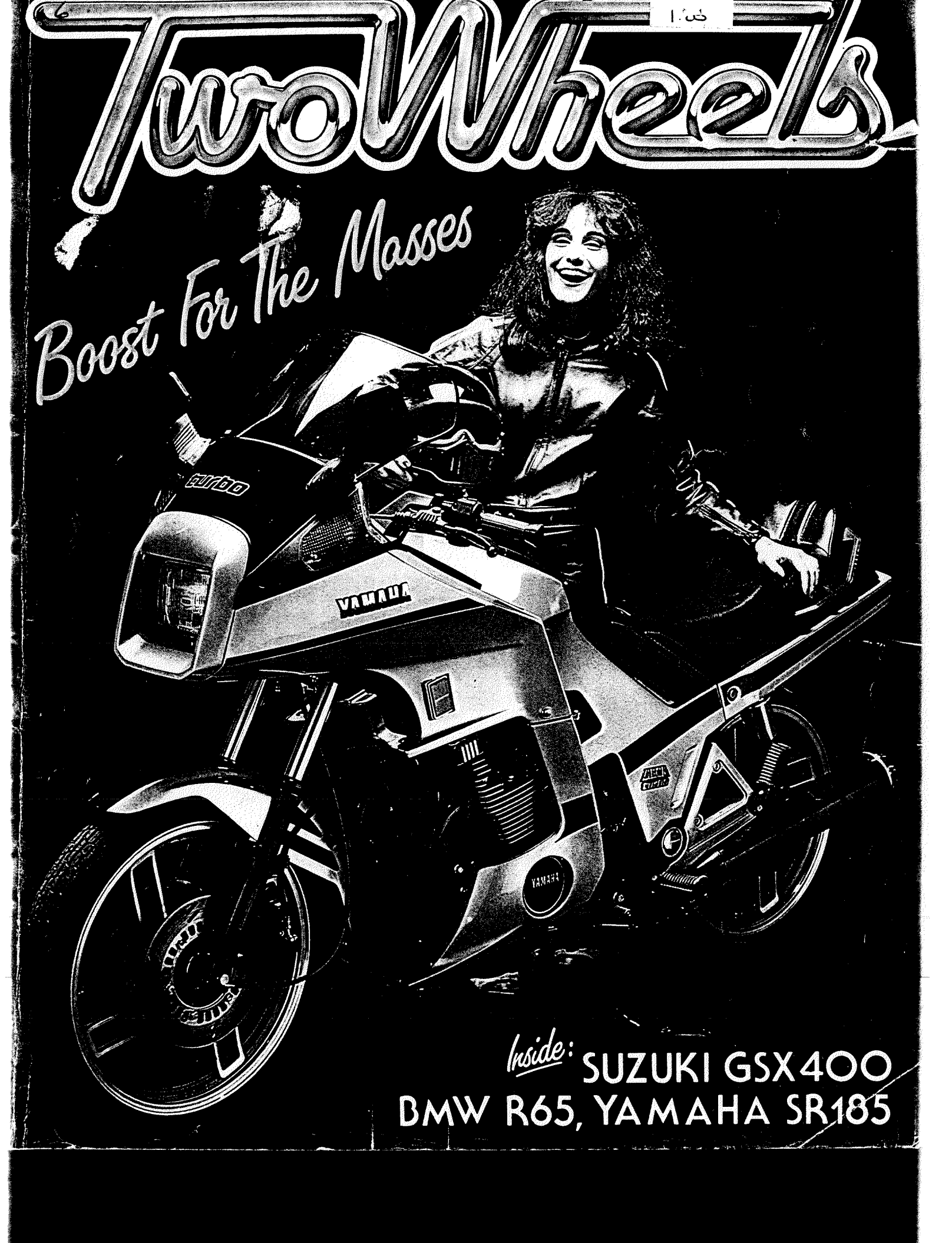
TwoWheels

Boost For The Masses



Inside: SUZUKI GSX400
BMW R65, YAMAHA SR185

agv
turbo

The Masses!

YAMAHA XJ650L

The rider's route to High Technology

Behind the bigger power, the computerised instruments and the snappy fairings, what – finally – does the New Technology offer? KEL WEARNE scraped bare the soul (and underside!) of the first Turbo model for the masses for these answers.

TUCKED in behind the full fairing with just enough helmet above the top line of the screen to give your eyes clear vision and peeling left off the end of the straight on Yamaha's test track, weaving slightly as you roll the throttle off a fraction, across to the outer edge of the track and downhill into the braking zone. Down two gears and the back gets all twitchy as the weight transfers to the front, even momentary rear wheel lock-up; still downhill as you line the bike up for the initial portion of the large, lip-shaped 180 which is really three distinct turns.

The first part is a fast entry (140) after braking from 225, with a large dip in the best line. It brings metal to asphalt and flicks the bike to the outside of the track. Body English straightens it and you try your braking hand (thankful for the wrist-strengthening exercises during the year); down another gear and a much sharper level turn with a change of camber half way through it as it gets tighter. Here you can be too slow. The choice is to stay in second and approach the final section; a blind, smooth, rising sweeper, leading directly to a right hander, with lots of revs, a fair amount of tyre slip and a drift verging on slide.

As you finish the exit and start the short straight leading to the pit esses your senses feed information which makes it hard for your brain to stay objective.

It is hard to think of the bike as a 650.

The power, the weight and feedback are those of a one-litre superbike. Yet the bike is the Yamaha XJ650T, the second of the Japanese mass-produced turbos we have ridden. A bike that will represent many things to many people.

It may herald the reality of how the internal combustion engine will be used in the afternoon of its life (following the projections that a large proportion of cars will have turbos by the late '80s); it may offer a sound engineering platform for development to some, it may provide unnecessary complexity to others; or then again it could be just the thing to own and pose with.

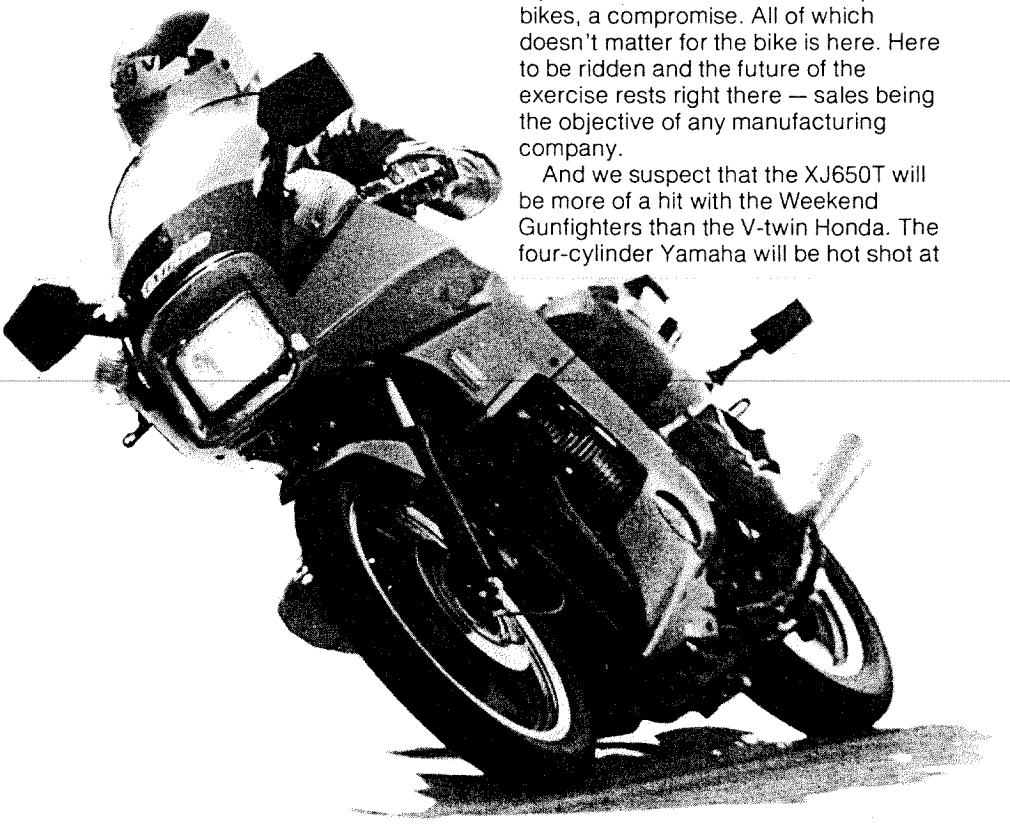
An undiscovered market?

The XJ650T adds new words to biker terminology; suave, egalitarian. It is the XJS of the bike scene and the suburban cafe cowboys will have to match its smart, upmarket presentation.

The XJ turbo is audacious, matching Yamaha's bid to knock Honda off the Number One spot. It's sharp in that it handles well and has been designed with some riding speed combinations in mind; it's snazzy with a complete integrated fairing and total design including paint scheme much like a full Cardin/Gucci outfit on a Young Blade. It's not totally practical in much the same way as an XJS is hardly the best approach in an energy-conscious world – the 650 Turbo will be as ruthless on fuel at high performance figures as any big bike when pushed, but it is still economical compared to four wheelers.

None of these things matter because the XJ turbo exists. Conceived in the hallowed, panelled conference rooms of top-level management; created by marketing departments, designed by artists and engineers and computers, and manufactured to production limits to a price, the bike is, as with all Japanese bikes, a compromise. All of which doesn't matter for the bike is here. Here to be ridden and the future of the exercise rests right there – sales being the objective of any manufacturing company.

And we suspect that the XJ650T will be more of a hit with the Weekend Gunfighters than the V-twin Honda. The four-cylinder Yamaha will be hot shot at



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the boulevard sessions around the land as well as riding shotgun to the discos. It will even be sound country company, but whether high distance riders go for such a sophisticated hybrid remains unknown right now.

Yamaha might have the right idea offering a mix of conventional with new. The age wave has created a large number of riders and ex-riders from the '60s who are now in their 30s and among the affluent. Neither gunfighters nor boulevard racers, this group is inclined to be more selective and more aware of its involvement with the bike as a solitary experience and an alternative to their regular (as in week-day) transport. Hence a number of companies are interested in making Image Machines in limited quantities (thus affecting all riders/readers) and selling to those who can pay.

Yamaha could not be pinned down into saying who it thought would buy the turbo; who it had been aimed at (apart from people who might be interested in the Honda turbo). Perhaps it falls into a new area to attract different types of people who, in the midst of more leisure time, find motorcycles have more entertainment/pleasure quotient as their complexity and pose value increases.

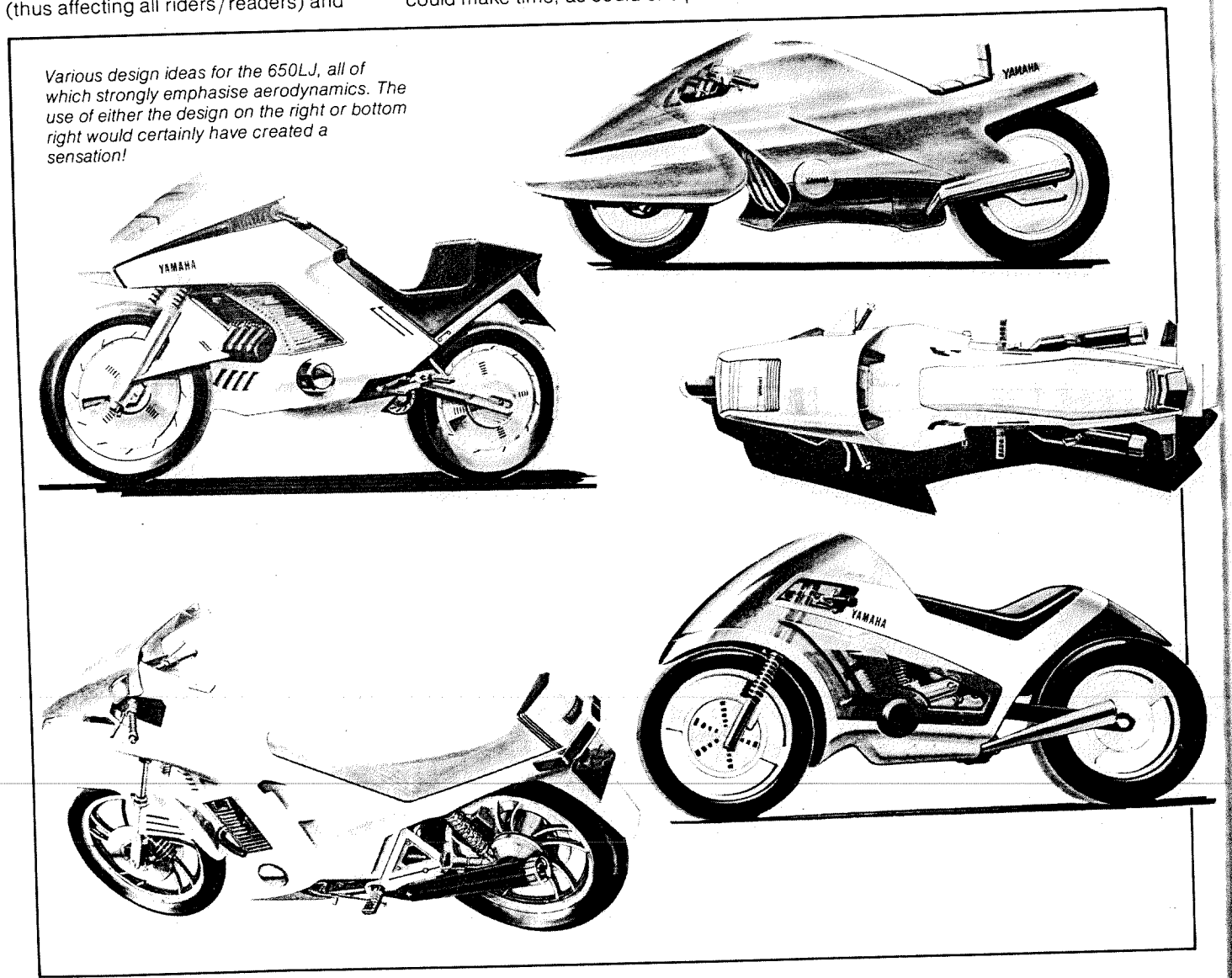
On the track

The tuck-in on the XJ was not just to get top end (it had no effect on the turbo); the zero temperatures of Japanese winter made everyone duck, most especially the warm-blooded Aussies. In the gaps between riding, the different national groups did their thing — the Italians invested in a radio-controlled Honda racer replica, but under the hard-riding times it crashed itself into waste.

On the track a couple of the Italians could make time, as could one particular German. The lads from Down Under were not disgraced and we gave the Turbo the greatest graunch testing, almost wearing through the header pipes, well into the pegs and removing most of the sidestand edge, as well as paint and fibreglass from the under-belly section of the fairing. This was on Bridgestone Mag Mopus tyres (3.25 x 19 front and 120/90 x 18 rear). Any Billy The Kids who buy the turbo and add Pirellis or similar alternative top tyres, will have a chance to repeat this on their own piece of racer's road. Mind you, the turbo was designed for the roads and not the racetrack.

And a race circuit cannot measure a bike's performance on the road; however it can provide some idea. The Turbo was ridden during two days and there was a chance to compare it with the other bikes on the track and also tackle on/off throttle changes and gearchanges in corners as well as checking torque by tackling the circuit in top gear. It was far superior an

Various design ideas for the 650LJ, all of which strongly emphasise aerodynamics. The use of either the design on the right or bottom right would certainly have created a sensation!



introduction to Honda's CX500 release — a couple of laps at suicide speed on their banked circuit.

The first day was the coldest and with strong winds. The track lies on the upper portion of a ridge with cuttings and sections that are both protected and exposed. There are socks to indicate wind severity and direction. The problem is real. We wondered what it would be like travelling at GP speeds on experimental racing models.

The transition from the lighter XZ550 to the XJ650T brought home the fact that the Yamaha turbo is not light. With the full fairing it suffers greater movement due to crosswinds than the XZ, but like always, the heavier weight meant the bike was also more stable once you "felt" it out through the wind buffeting. The turbo can be pushed in play race form until the front brakes get grabby and the rear drum becomes more of a hindrance than a plus factor. In fact during some fast laps the XJ was more stable under hard braking using only the front discs; if the rear was used either as a stabiliser or real brake the bike became twitchy forcing you deeper into the corner before initiating the turn.

The Yamaha turbo is an effective handler, even in corners with variations in attitude. There is little of the shaft drive tendency to lift or compress the rear end. With boost coming on at around 3000 rpm and becoming potent over 5000, we found the smoothest manner through any corner, particularly the tricky (as most of the track was) end-of-straight three-section one, was to keep the revs up near the redline of 9500. This kept the drift predictable; one never felt the bike would get away from you.

If you rode more sedately there was some tendency to get uneven power halfway through the turn, similar to what can happen on the CB900F and GSX.

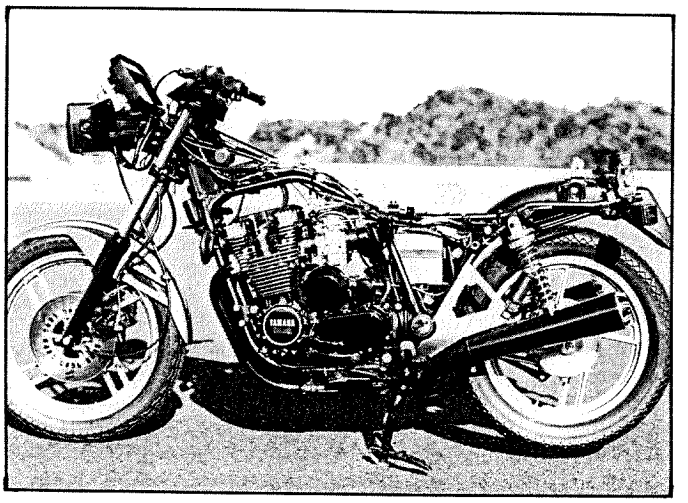
We tried all settings on the rear units; finishing with damping on four and preload on three.

The improved power of the turbo 650 over the standard 650 even with the additional weight, can be seen in the figure of 6000 rpm giving 160 km/h. It's interesting in view of the weight; the watercooled V-twin XZ550 weighs around 195 kg fuelled up, the XJ650T scales closer to 238 kg and the standard XJ650 weighs 210 kg.

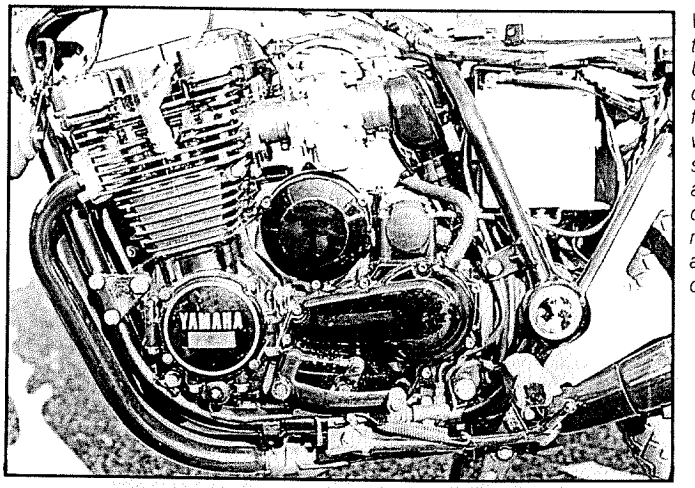
The internal story

The normal turbo-lag is not a significant factor on the track. The steps to overcome the problem (inherent with turbos) almost do the trick. There is still a slight delay in twistgrip reaction, but all riders found it easy to get used to.

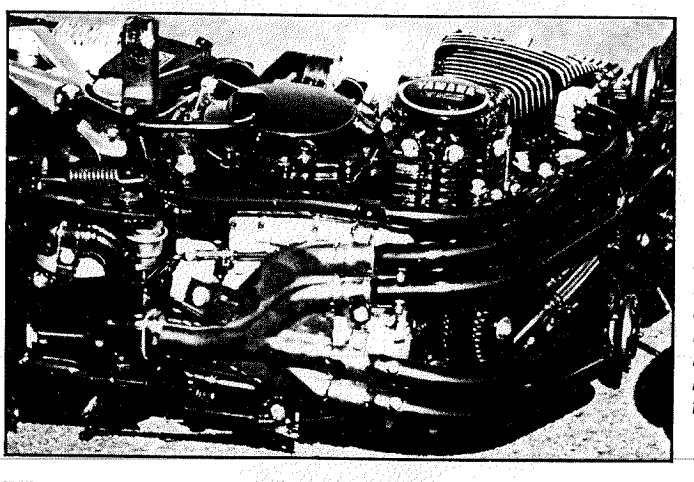
Yamaha worked in conjunction with



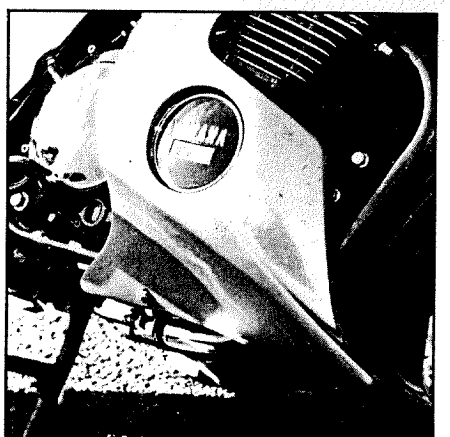
Naked and unashamed. The L gets same frame, uprated rear shocks with dampening adjustment, and new wheels. Battery has been moved from right side to left with the alterations to the breathing department. Engine gets YICS system as well, as does the normally-aspirated '82 650 (at last).

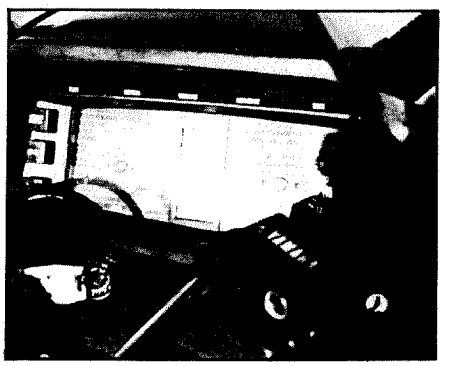


Where is that turbocharger? Unconventional choice of using the full quartet of carbs, which are completely sealed from the atmosphere. Yamaha claims that the choice means better mixing and supply to the cylinders.



Left: Turbo unit is hidden away behind crankcases, to shield rider and fuel system from enormous heat produced.
Below left: The 650 can be hung up fairly easily — and damagingly! Note severe scrapes on No. 4 pipe and nudges on fairing. Back to the drawing board?
Below: Pictographic trouble-shooter panel.





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XJ650L

Mitsubishi in developing the turbo unit. Mitsubishi is experienced with turbos and has just released the Turbo-Sigma in Australia. Yamaha, which makes a number of engines for Toyota, built its first turbo-charged engine (a five-litre V8!) in 1970.

The unit fitted to the XJ650 is a Mitsubishi TC03-06A and is currently the smallest available in the world (smaller than the IHI on the Honda). It has a turbine impeller diameter of 40 mm versus IHI's 50 mm. Turbine speed can exceed 200,000 rpm. The shaft linking the exhaust turbine to the intake impeller is pressure-lubricated from the crankshaft's main oil gallery.

The TC03 sits under the rear of the engine. The four headers have internal stainless steel pipes and a flat manifold which links pipe one and four and two and three before they merge to one and enter the turbo. This provides even exhaust pulses to drive the unit. A wastegate takes excess exhaust to the left side exhaust to prevent excessive boost. The right hand exhaust pipe/muffler handles the gases from the turbo unit.

If the position of the turbo unit is unusual, Yamaha also went against the current tide of fuel injection and uses a bank of four sealed 30 mm carbies. The bowls are vented to intake air pressure to provide normal flow. Each carb can be tuned to each cylinder, something not available on the other turbos. Fuel is supplied by a fuel pump which is cable-driven from the camshaft; a regulator returns excess fuel to the tank.

To beat the lag problem the XJ has a reed valve between the plenum chamber (from the air cleaner) through to the surge chamber, by-passing the route to the turbo until pressure (from the turbo) closes the valve. There is also a second back-up poppet valve to release pressure in case of excess boost. This allows the bike to function normally (ie aspirated) and smoothly until the turbo builds up pressure.

The Yamaha-patented YICS may also have an effect on reducing lag. This induction system on the turbo (it is on a number of models), is a secondary inlet port linked to the main manifold which moves incoming mixture away from those cylinders which have closed inlet valves and boost the fuel being introduced into the cylinders with valves open. It also provides a swirl effect, thoroughly mixing the fuel/air and improving both performance at low revs and fuel consumption.

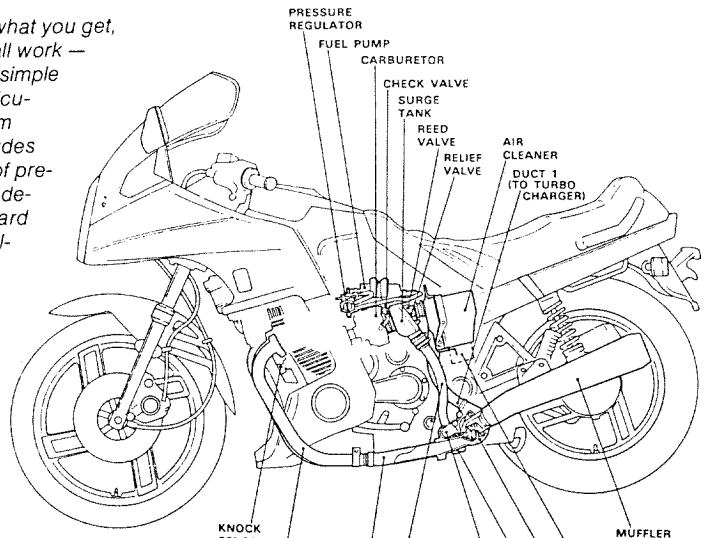
The Yamaha's boost pressure is moderate, even by bolt-on standards (I have seen 14 psi/95 kPa on one turbo test bike a couple of years back but most of the kitted bikes run only 40-68 kPa). The Honda CX500T provides a maximum of 130 kPa (19 psi) and this is pretty explosive considering Pommie Pete's monstrous champion drag Kawasaki, with heaps of work, ran 190 kPa (28 psi) of boost.

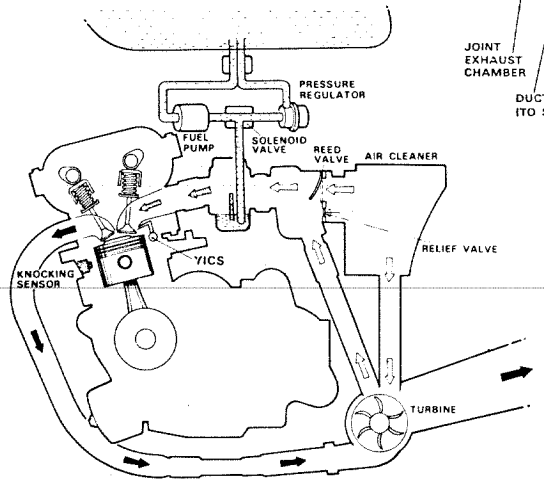
The XJ650T runs about 60 kPa (9 psi); this is reasonable for a well-designed engine and there is substantial internal strengthening supporting the neat grafting of the turbo unit to the four.

The 650 engine gets heavier clutch and transmission parts, the crankshaft main bearing journals have been cross-drilled and the connecting rods have another oil hole to allow extra oil to the bottom of the pistons (an oil cooler is standard on the machine). The pistons are strongly webbed and have 30 percent thicker crowns than standard. Overall compression ratio is down to 8.5:1.

In addition, the electronic ignition system has an electronic vacuum advance and a knock sensor. Boost pressure (or lack of) in the inlet manifold as well as engine speed are measured and the sophisticated ignition governor unit adjusts timing to ensure the engine produces maximum torque. The knock sensor monitors the special vibration within the cylinder which denotes knock or detonation and the ignition governor retards the timing in stages until the knock condition disappears. Neat and effective.

Externally what you get, to make it all work — a relatively simple but well calculated system which includes a number of precautionary devices to guard against malfunction and overload.





The guts of it all. Fuel pump is electric. Note reed valve between air cleaner and surge tank, to help eliminate lag at low road speeds when turbine needs time to build speed.

So what are we offered?

While the 650 would have been enough of a sports bike with the turbo, Yamaha created a full fairing which is claimed to reduce drag more than any other factory fairing available and also to reduce front wheel lift by 10 percent over an XJ650 *not* fitted with a fairing. One look at the bike and you know it was a total design with fairing fueltank and

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seat/sidecover panels all formed to merge as one.

The bike is well-designed to fit into and is one of the few sports bikes which still feel relatively compact, although it will take some practice to Gung-ho in play races; climbing around and hanging off the bike to ensure maximum cornering.

The exhaust whine is similar to the CX500T, and at high revs somewhat akin to the CBX six-cylinder of old, a low-pitched but dominating howl well within legal tolerances but certainly enough to let you know the bike is different and is working.

We found boost would begin around the 3000 rpm mark and rise to about half pressure (28 kPa) at 4000 rpm then climb steeply to maximum at a little past 5000 rpm. There is no burst of power as such, and those who want the exhilarating feel of a CBX coming onto power or a GSX1100 moving into action in third gear at eight grand will not find the Yamaha inputs to their fancy. But there is no mistaking the tacho and the speed and we suspect riders will be taken by surprise at the speed with which they arrive at corners. Deceptive is the word.

Although Yamaha announced a first, the *Cycom* instrument system during our time in Japan, the XJ650T does not get this device. Cycom is an on-board computer which arrived in great fanfare during 1978 but which proved a fizzle with the market. Some cars still have them standard.

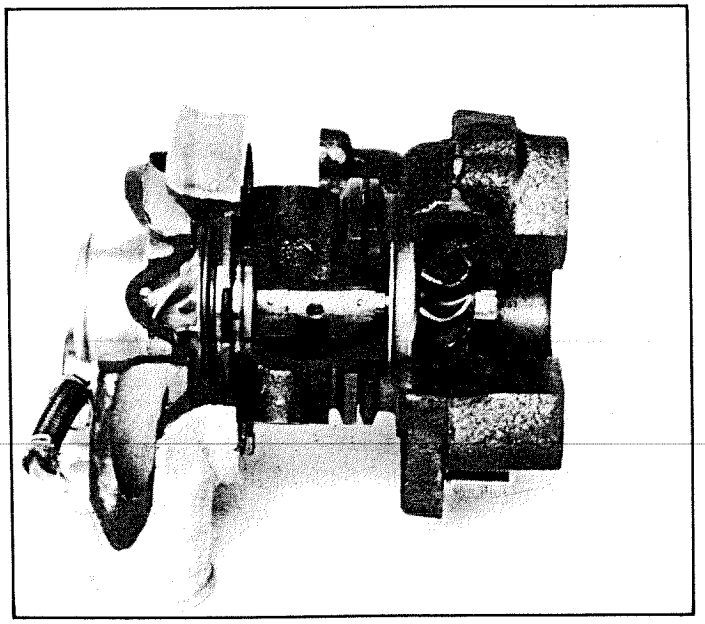
In short, the computer offers a digital display of 10 functions which we think will be more applicable and desirable on a bike than in a car. The functions include clock, distance travelled (can be reset) distance remaining (to destination — punched in prior to leaving), remaining fuel (nice), current fuel consumption rate, distance which can be covered with remaining fuel, total running time (total time with ignition key on), average running speed (saves calculating later), fuel consumption overall and average mileage.

It has to be a must for testers!

Anyway, turbo buyers don't get this system. The already large instrument display and the amount of wiring behind the rectangular headlight shows why it could not be fitted. Instead, the turbo gets a wide console with a strip of idiot lights across the top. Below are the speedo and tacho dials and between these is the small boost pressure gauge set above a square containing 10 coloured indicator squares.

This centred cluster is called a Pictographic Monitor System! Within each box is an LCD diagram in three colours showing the following: in red there are sidestand retraction warning, disc brake fluid level warning, engine oil warning and low fuel quantity; in blue (for electrics) the battery acid level, headlight high beam, and the stop/tail light malfunction; the green is for three fuel amount calibrations.

Gimmicky? You bet, but it matches the style and image of the XJ650T; a bike built for those that want the latest gadgetry, the latest wizard technology, not necessarily because it's the best but because it's there. Like the suburban cowboys — big hats and no cows! The show is the thing.



Cut-away of the tiny Mitsubishi turbo-charger showing the turbines on both sides. Unit is claimed to be able to run to a maximum 210,000 rpm. Temperature of exhaust gas entering unit can be around 800 degrees C. Lubrication for the shaft between the intake compressor and exhaust turbine is supplied from the crankshaft's main oil gallery, with a scavenging pump for return.

The turbos may be among the second generation models to polarise people who normally support Japanese bikes; ride them and live with them. The first generation were the CBX/CB1100Rs and the Katanas which sparked off emotion responses. What we have is not so much a failure to communicate (as in what we want) but a failure to understand that the Japanese manufacturers are evolving as well, and that they can offer us anything we want (eventually) and at some stage will put emotion in their products too.

The turbos are so obvious many people may forget the first batch which brought us not only the adrenalin speed rush but also the feelings which for so long only the Norton/Triumph/Harley/Ducati riders could lay positive claim to experiencing.

Like everything the blow jobs are there to be experienced . . .

FOOTNOTE: The XJ650T is now dead — it no longer exists. A sudden death for such a promising, if not downright exciting motorcycle.

But before you start tearing apart your precious Yamaha underdaks (or worse still, this very magazine), read on. We now have the XJ650L, or to be totally correct, the LJ.

Even while Kel was in Japan, the 650 Turbo had no suffix attached formally. The Yamaha Japan Service Guide (produced in December '81) referred to the bike purely as the XJ650 turbo. Some of the advance PR material, however, called it the T. That letter had been used at various times around the world to signify the difference between the Honda CX500 in normally aspirated and turbo forms (it's formally the CX500TC nowadays) and carried on as useful shorthand to denote Yamaha's turboed bike. It simply made things easier. Even Suzuki's turbo 650 has been christened the GS650T by some journalists (but if you read TW you know it's officially the XN35D). The Kawasaki Z750 turbo bike was officially given T as its suffix by that company.

Alright, but the Yamaha has finally been given a surname and that's L (and nobody seems to know exactly why). It has to be followed by J, because it's a 1982 model. Yamaha works its suffixes across the board (unlike some other manufacturers), which makes things nice 'n' handy for industry, consumer and press alike. We all know what year's model an SR500G was, or an XS1100E.

But then there was the original XJ650H, which was released in Australia in May 1980. In the Year of the G, it was an H. So we decided it stood for Harold.

Why?

Why bloody not?