# From jet lag to turbo lag

# MASTHEAD

## Turbofan airplane engines have their own kind of lag problems

As long as motorcycles are largely made in Japan and Europe, then much of the effort involved in publishing Cycle Canada will include the task of connecting man, motorcycle and appropriate riding conditions at the same time and place. It's not always easy. The manufacturers have their problems shipping new motorcycles in time for us to meet deadlines, the weather doesn't always co-operate for our photo sessions, and as associate editor Jean-Pierre Belmonte discovered, airplane travel has its own troubles.

The first leg of Jean-Pierre's last flight was from Montreal to Toronto, where assistant editor Damian James was waiting to join him. Jean-Pierre is a licensed pilot and takes a greater interest in airplanes than do most people. After landing at Toronto, he watched carefully from his window seat over the wing as the plane taxied up to the terminal. The plane, an L1011, stopped with a turbofan engine just short of a baggage truck covered with a large tarpaulin. When the pilot shut down the engine a sudden, powerful draft tore the tarpaulin from the truck and sucked it into the engine. Jean-Pierre sat and watched the scene in disbelief. No one else seemed to have noticed the mishap.

Jean-Pierre hailed a stewardess and told her of the problem while she listened indulgently, nodding and smiling and not believing a word. She at least brought back the pilot to hear the story, and he decided to go outside to take a look. As the pilot talked to the groundcrew, Jean-Pierre watched them shake their heads and deny that anything out of the ordinary had happened. The pilot decided to see for himself, and when he peered into the engine he could see part of the tarpaulin jammed in the engine's internals.

Consequently, the passengers were hauled off the plane and forced to endure a five-hour delay while a spare plane was prepared for the rest of the flight.

Obtaining motorcycles for the tests in this issue of Cycle Canada was a cliff-hanger until the last minute.

The Yamaha Seca Turbo tested in this issue was the first one released in North America, and made quite a hit wherever it went. We were on boost ourselves just waiting for it to be airfreighted in. Then it was delayed in clearing customs because of a weekend and a holiday, and it had to be uncrated and given a final checkup. It wasn't your pot-luck, fresh-off-the-assembly-line item, either. The odometer, tires and footpeg rubbers bore witness to a heavy day on Yamaha's Iwata test circuit.

The Yamaha DT125 whose test comes up next month is another that just rolled out of the airplane. There isn't another on the roads on this continent, and you'll read about it first in Cycle Canada. □

**Our test riders waited impatiently for the first Yamaha Turbo production machine to clear customs and come out of the crate before they could start riding.**


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**Cycle Canada** is published monthly for and about motorcycling in Canada by Brave Beaver Pressworks Ltd., 290 Jarvis St., Toronto, Ont., M5B 2C5. Second-class mail registration number 2573. Printed in Canada. Brave Beaver Pressworks also publishes Moto Journal in French, and for the trade, Motorcycle Dealer & Trade.

**Advertising**: Rate cards are available from Brave Beaver Pressworks at 290 Jarvis St, Toronto, Ont., M5B 2C5. Telephone (416) 977-6318. Refer also to Canadian Advertising Rates and Data.

**Subscriptions**: Rates for Cycle Canada are $14.95 for one year. Subscriptions to the U.S. are $16.95 payable in U.S. funds. First-class and air-mail rates available on request. For change of address, allow at least five weeks and send new address with the label from a recent issue.

**Contributions**: Editorial contributions are welcomed if they are offered exclusively to Cycle Canada. We assume no responsibility for the return or safety of unsolicited artwork, photographs and manuscripts.

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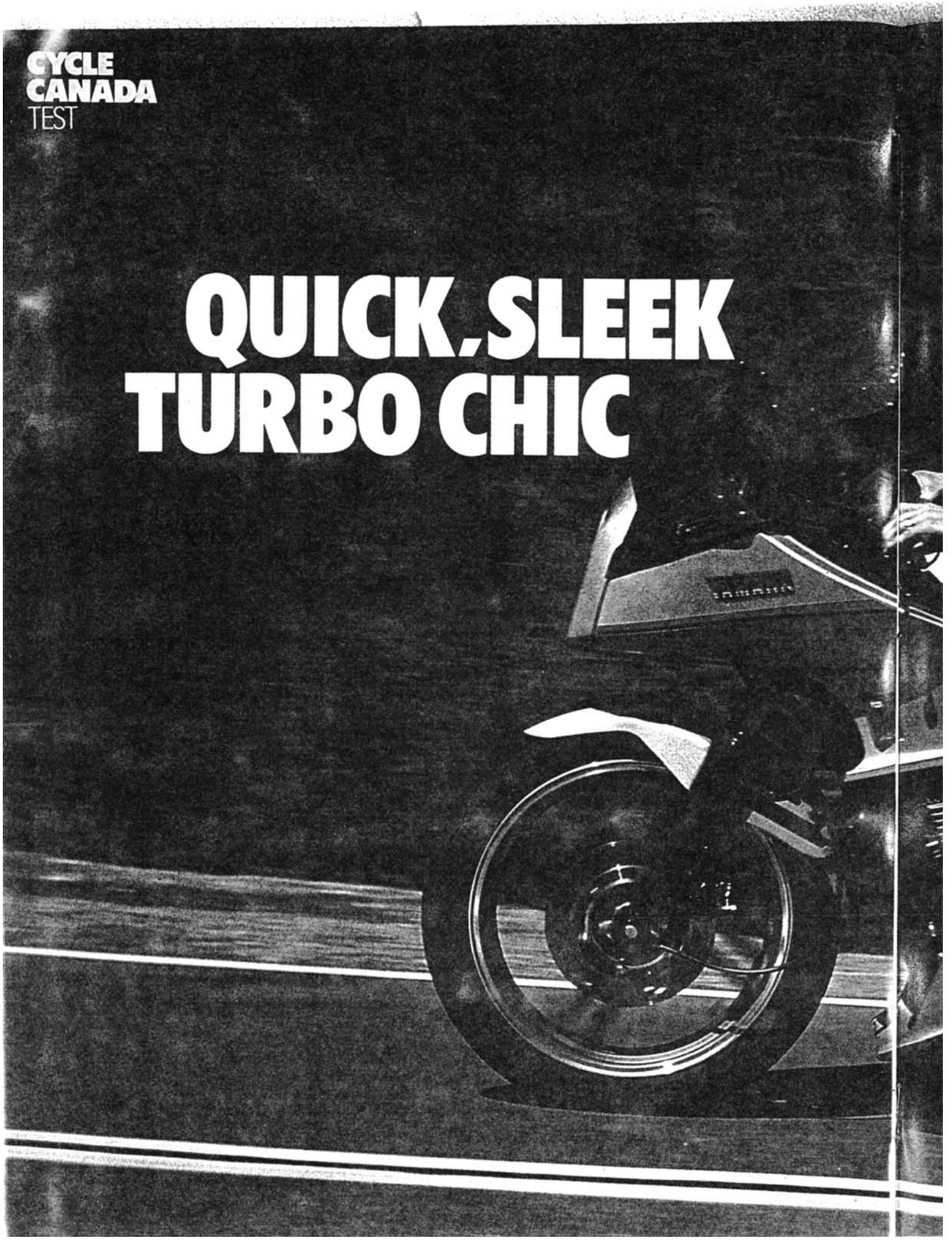
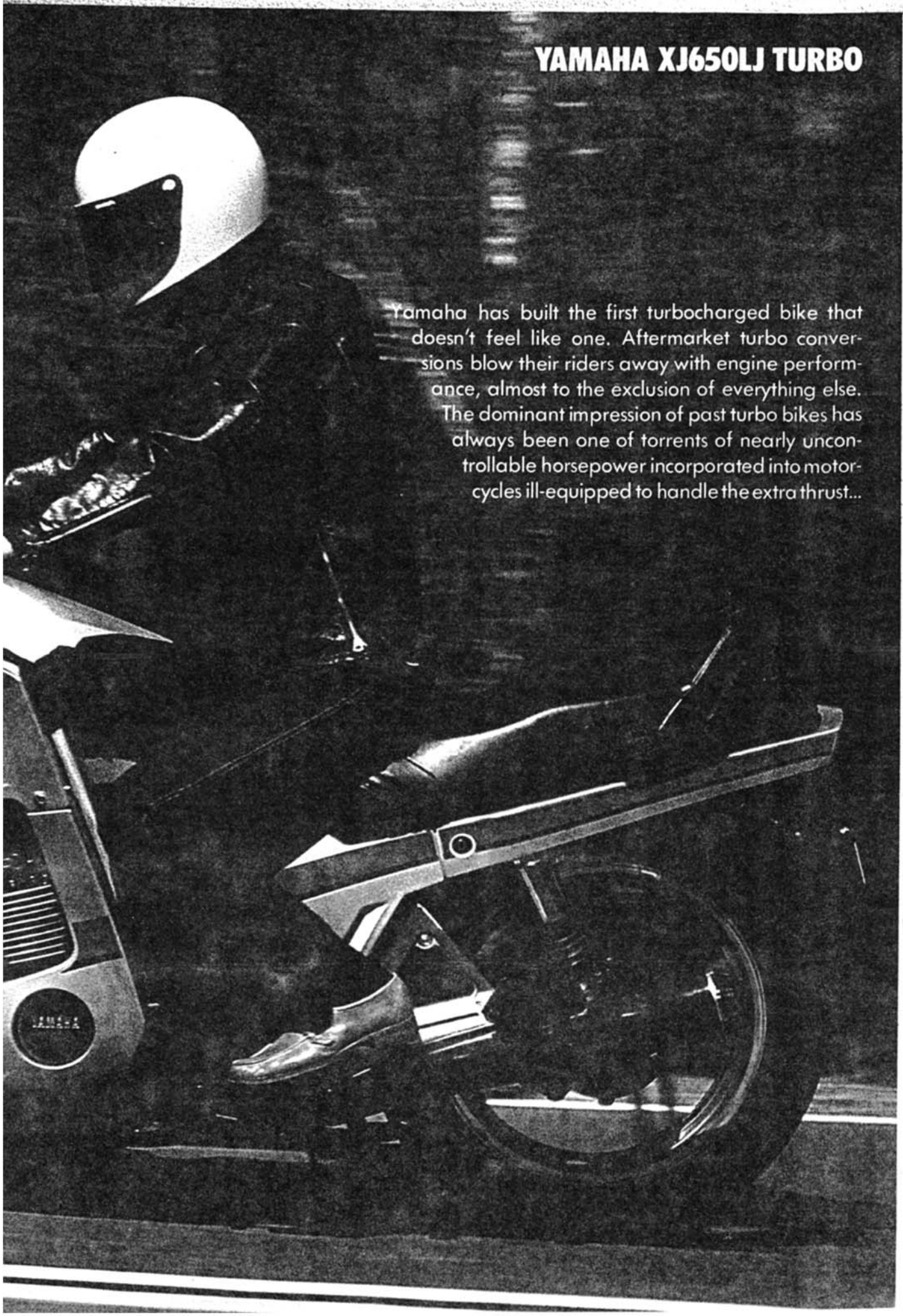
**ISSN 0319-2822**

# QUICK, SLEEK TURBO CHIC




YAMAHA XJ650LJ TURBO
Yamaha has built the first turbocharged bike that doesn't feel like one. Aftermarket turbo conversions blow their riders away with engine performance, almost to the exclusion of everything else. The dominant impression of past turbo bikes has always been one of torrents of nearly uncontrollable horsepower incorporated into motorcycles ill-equipped to handle the extra thrust...

# SECA TURBO

Instead, the Yamaha leaves its rider with strong impressions of the chassis, handling and civilized, unobtrusive performance. That's not to say it's slow; our test bike turned a 12.33-second quarter mile in the hands of a professional racer, and it'll happily pull redline in top gear.

For the first time, a turbo bike doesn't overwhelm a rider with trepidation. The Yamaha turbo can be ridden and enjoyed in the real world. It works with its rider to provide satisfying motorcycling experience, a move in the right direction for turbo development.

First impressions of the motorcycle focus on its appearance. We lost track of the number of Battlestar Galactica/Star Wars/Space Invaders jokes and comments we received from bystanders while we had the bike. There's no doubt that it looks sleek and spectacular in a high-tech, the-future-is-now manner. The fairing, which includes a gas-tank cover, the side panels and the strip of material visible below the seat, benefits from Yamaha's marine experience with the construction and the materials used.

The fairing is made from a fibre-reinforced plastic that Yamaha says is lighter and easier to work than fibreglass, yet stronger and more flexible than plastic alone. Yamaha's wind-tunnel work determined the shape; it provides protection for the rider and also reduces front-wheel aerodynamic lift by a claimed 10 per cent compared with a standard, unfaired XJ650. Rear-wheel lift increases at speed, giving the net effect of a slight increase in total lift, with increased front-wheel traction at high speeds. The steering is noticeably heavier than a standard XJ650 at most speeds, and the fairing may well account for it, both because of the aerodynamic effect and because of the extra static weight on the front end of the motorcycle.

The fairing's shape flows air to the oil cooler, across the cylinder head and around the cylinder block. Additionally, the scoop-like bottom section directs air toward the bottom of the crankcase. The air-cooled engine demands the extra cooling because of the higher compression and heat from turbocharging. The engine never overheated while we had the bike, despite some riding that included long flat-out bursts in over 25°C weather, so it appears the fairing is doing its job.

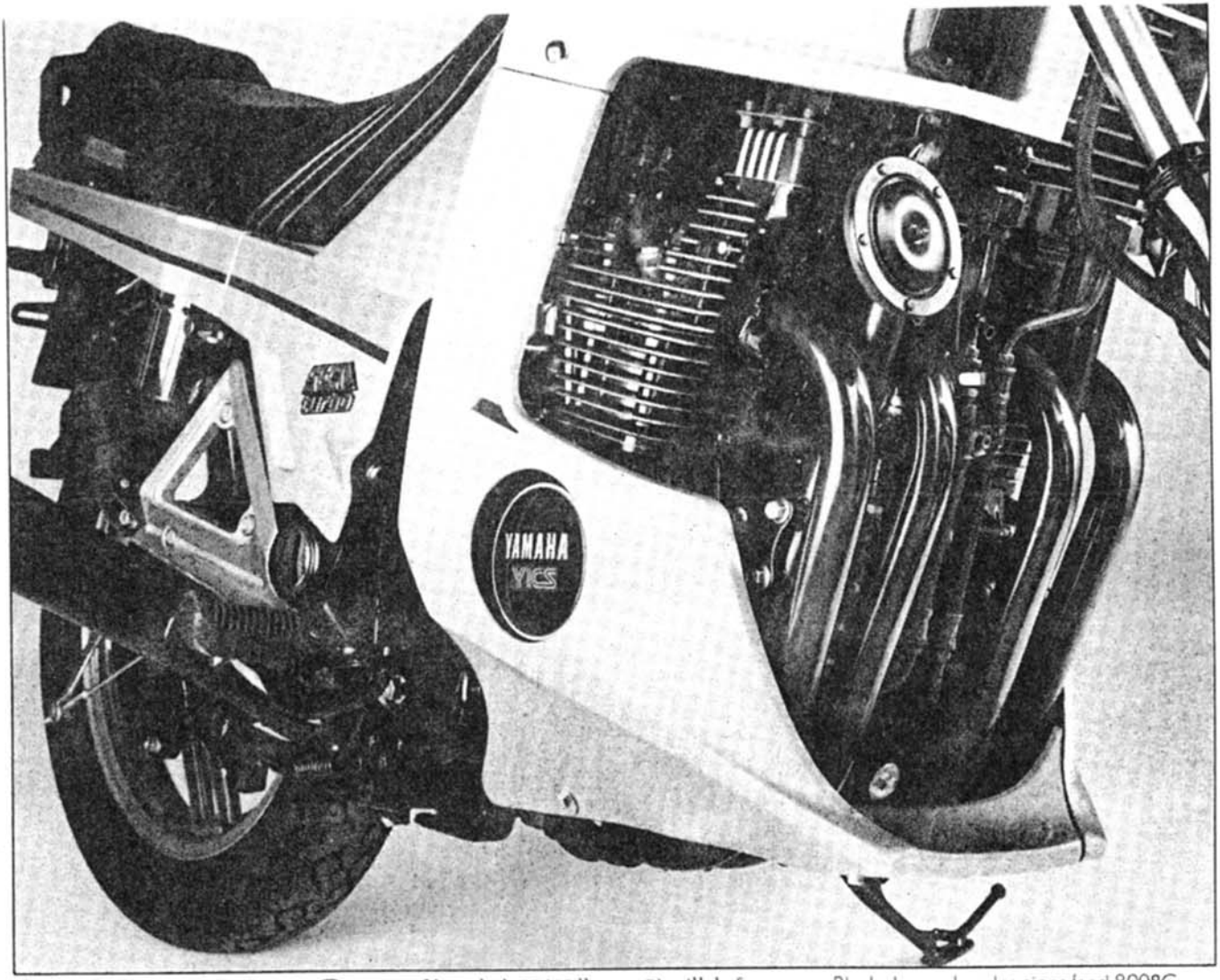
For its other task, rider protection, it works almost as well. The rider feels some buffeting around the head and live air hits the hands directly, but it isn't severe. We were spared the task of testing the bike in the rain so we can't comment on how soon hands would get soaked, but they'd be the first parts of the rider to suffer.

Fairing gives ample weather protection; visibility through windscreen is good.

Protection from mid-helmet to ankle is excellent. The rear portion of the fairing includes a flat section that perfectly protects the legs from the knees down. It keeps them out of the air stream and helps immeasurably in maintaining body warmth while riding in cold temperatures. As well, the fairing provides an area to brace the knees when braking very hard.

The fairing contains two small, locking storage compartments, unlike the fairing fitted to the Honda Turbo. The comfort and convenience of the fairing establish the Yamaha's persona of a gentleman's express, a civilized, well-behaved sport-touring machine.

The mild-mannered behavior of the turbo adds to the Yamaha's urbane manner. Boost starts building as low as 3,500 rpm, and reaches its maximum at 6,500 rpm, according to Yamaha. Riding impressions don't bear this out, nor does the story told by the boost gauge on the dash panel. There's little extra power below 7,000 rpm, nor does the gauge indicate any boost. From that point the bike accelerates extremely hard to 9,500 rpm. Below the 7,000 rpm level, the engine feels like a soft version of the standard XJ650, although comparative horsepower and torque curves show that the turbo engine makes more of both at every level above 3,000 rpm.




Black chrome header pipes feed 800°C exhaust into turbo below the gearbox.

# SECA TURBO

The biggest increase comes in torque, which is more useful in the real world than peak horsepower. Maximum torque of 7.5 kg-m is 2.1 kg-m higher than the XJ650, and although it peaks at a high 7,500 rpm, it makes more torque than the XJ's maximum all the way from 4,500. The effect is a meaty, strong mid-range with a muscle-straining rush at the top of the rev band. Since the torque curve is so fat from 4,000 rpm on up, it gives a deceptively slow feel without abrupt increases in acceleration rate. The Seca moves along smartly on its torque curve, but for maximum turbo effect and acceleration you really have to twist the engine.

Roll-ons against a Honda CX Turbo confirmed the pipey nature of the Yamaha's horsepower. We were flabbergasted by how quickly the Honda would leave the Yamaha behind. It's necessary to knock the Yamaha down to third to stay with the Honda in fifth, and once the Yamaha shifts into fourth the Honda disappears again.

That's what 130 kPa of boost versus the Yamaha's 55 (19 lbs vs. 8) will do for you. Yamaha's 55 (19 lbs. vs. 8) will do for you. The Honda and Yamaha engines produce similar maximums in horsepower and torque, but the Honda pushes much harder in the midrange, where roll-on power counts. Curiously, the times in the quarter mile are within a few hundredths of a second, with both bikes running in the 12.3 second bracket. Considering the numbers, it's surprising how much faster the Honda is when rolling on.

Looking at the bikes and reading about this apparent power discrepancy, you'd probably never believe how much more pleasant the Yamaha is to ride. Yamaha's engineers have done a good job of minimizing the lag inherent in a turbo system. When the throttle opens, a turbo doesn't start boosting until the exhaust gases from the revving engine accelerate the turbocharger. On the Honda, there's a perceptible pause, almost a hiccup, before the bike turns into a land-bound cruise missile. The Yamaha has less hesitation before the engine winds up; the Honda delivers maximum boost sooner, but the Yamaha is easier to control.

A reed valve in the airbox reduces throttle lag. When engine vacuum is greater than turbo boost, the reed valve opens, allowing the carburetors to bypass the turbo and draw air directly from the air cleaner. As boost in the intake increases, the reed gradually shuts. In theory the reed lets the engine draw the air it needs at all times, and it works well in practice. Although some lag remains it's the least of any turbo we've tried.

The use of carburetors is unique to Yamaha in the factory turbo game. Honda uses fuel injectors, as do the yet-to-be-released Suzuki and Kawasaki turbos. We see no disadvantage to Yamaha's carburetion. The carburetors are sealed, since the turbo blows through them, and the float bowls are pressurized by a fuel pump driven by a cable from one of the camshafts. An ignition-system sensor monitors detonation and rpm, backing off the ignition advance should either become excessive.

Advanced technology as an end in itself is no substitute for solid engineering. When designing the chassis of the Yamaha Turbo, the engineers decided to stick to a fairly conventional layout and use quality components to get the job done, rather than explore exotic new avenues. The result is a superb chassis

# SECA TURBO

with excellent suspension components, a combination that routinely permits the rider to perform feats of derring-do that would have most bikes wallowing.

The 650 Turbo chassis is little different from that of the standard XJ650, in our books one of the best around. Other than the different brackets for the fairing and turbo bits and the parallelogram-spoke cast wheels, in fact, they're almost identical.

To the strong, rigid frame Yamaha has attached forks with linked air assist but no anti-dive or damping adjustment. At the rear, conventionally placed twin air-shock absorbers are linked and have a common filler tube to simplify adjustment. Damping on the shocks is easily adjusted through four positions by means of a large collar at the top of the shock body. No tools are required to turn the collar.

Twin-slotted discs up front and a drum at the rear supply the braking force. Shaft drive simplifies the owner's life by re-adjusting and changing the drivechain. As with the standard XJ and the new 550 Vision, the shaft drive is well controlled, and doesn't intrude on the bike's behavior while cornering. It's possible to make the rear end drop by deliberately chopping the throttle in the middle of a corner, but you're unlikely ever to notice any handling effects caused by the shaft.

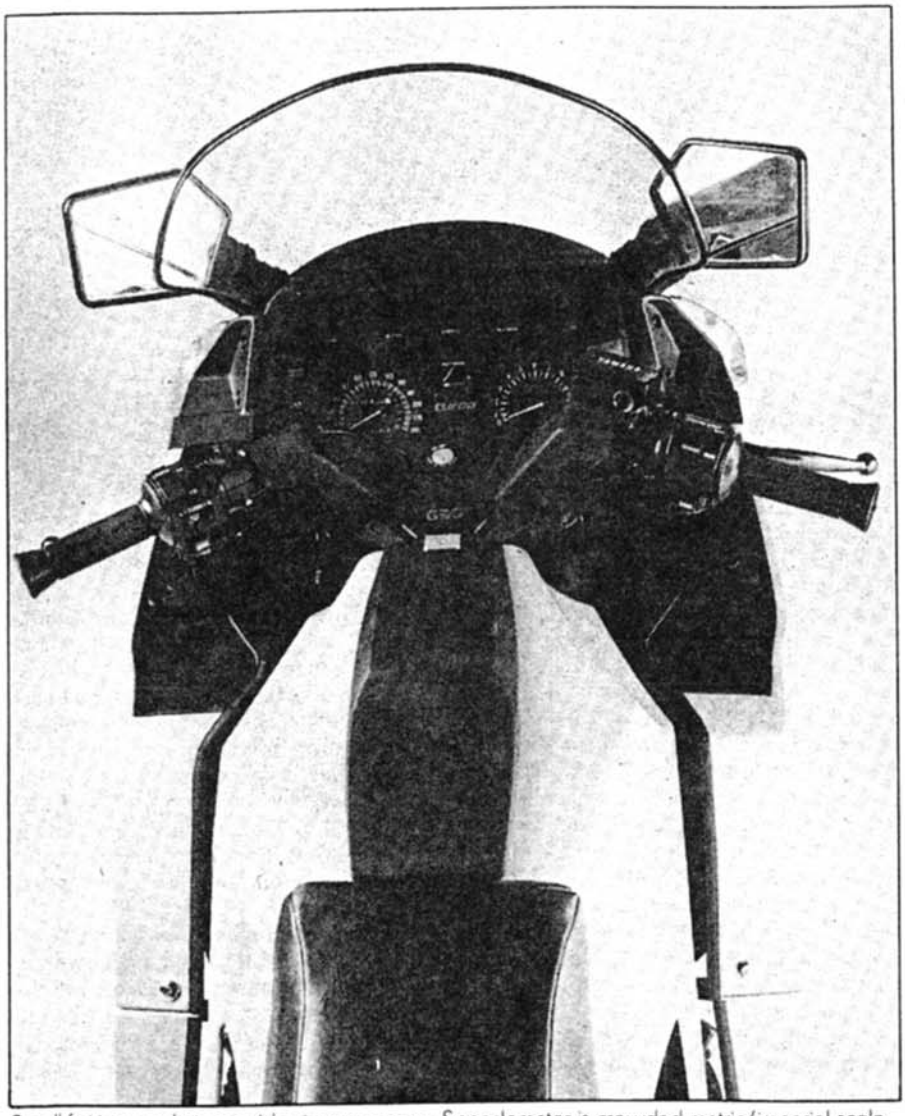
An excellent conventional rear system like this points out the weaknesses of monoshock street suspensions. Monoshocks are heavy, complex, expensive to build and replace and aftermarket suppliers don't build replacements. The claimed benefit of more progressive action depends on the shock design (the Vision is no more progressive than the Turbo, for example), and for that matter there's no reason linkages for twin shocks can't be built to provide progressive action.

At any rate, Yamaha has stayed with the conventional system on the Turbo; it works well and we're happy with it.

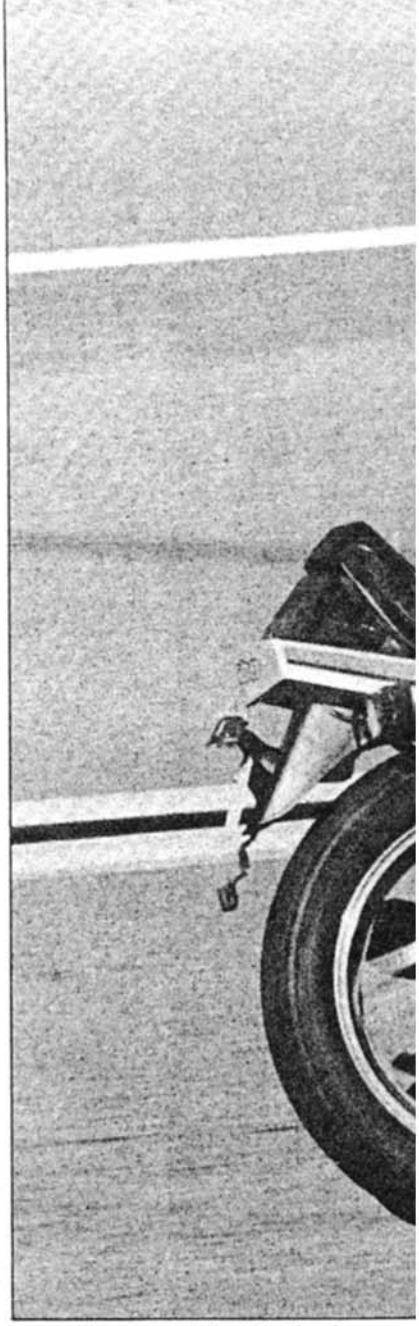
The air shocks, by the way, are a change from the prototype we rode in Japan (Cycle Canada, Feb. 1982), which used coil springs with preload and damping adjustment. The air shocks are a improvement; the damping rates are be ter and there's less of a tendency for th bike to weave in high-speed corners.

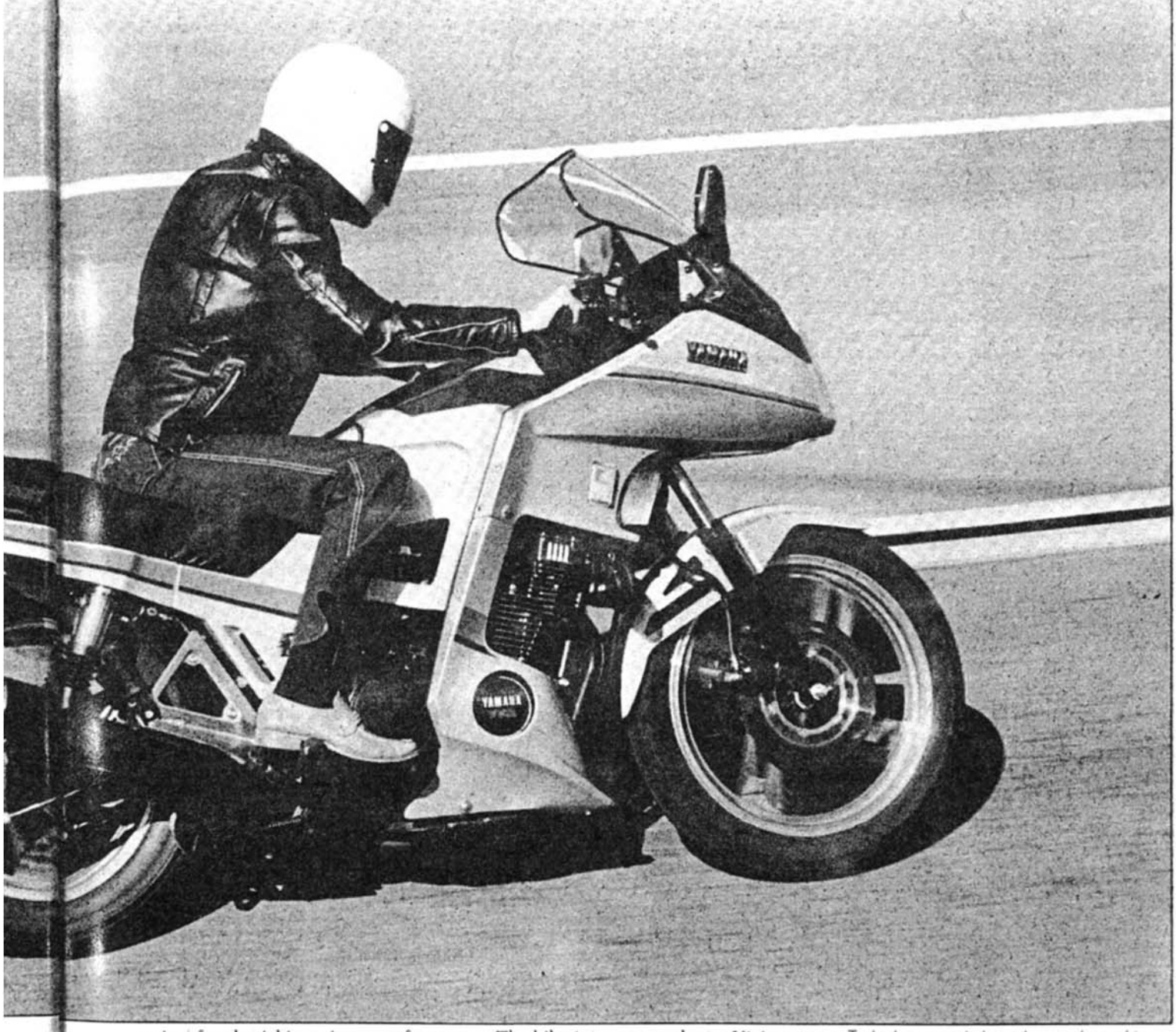
The air-assisted fork does an admirab job of directing the bike's forward pr gress. Steering is precise; heavy, but n nearly as heavy as the Honda. Despite th lack of anti-dive as on the 750 Sec thanks to the air assist there's no exce sive fork dive under braking. The air pre sure cushions and slows fork compre sion as travel increases.

The brakes are excellent, and have good feel, better than on Yamaha's oth new bike, the Vision. Braking power strong, thanks in part to the Bridgesto Mag Mopus tires. Like the Vision's tir these set new standards for Japanese ori inal-equipment rubber. The tires stick li glue right over to the last tread block. T



Small fairing pockets provide storage space. Speedometer is crowded metric/imperial scale.






Turbo's paint is lighter silver and graphics are bolder than on prototype.

price of such stickiness is wear, of course, and the rear tire was already looking tired around the edges at the end of our test, at which point there were 2,400 km on the bike. The tire certainly wasn't worn out, but don't expect Michelin-like wear. It seems like a good trade-off to us; for years we've said premium bikes need premium tires, and it's good to see that someone's been listening.

Even when the suspension is set up fairly stiffly for high-speed touring, the bike delivers a comfortable ride that's more than acceptable to all our test riders. The one drawback surfaces when traversing a series of small, sharp bumps such as those present on concrete slab freeways. In such situations the rear end delivers a maddening series of kicks. Backing off on the air pressure and softening the damping on the rear would help. The bike is no worse than a Vision or a Kawasaki 1100 in such conditions, though, so we don't think it's a serious problem.

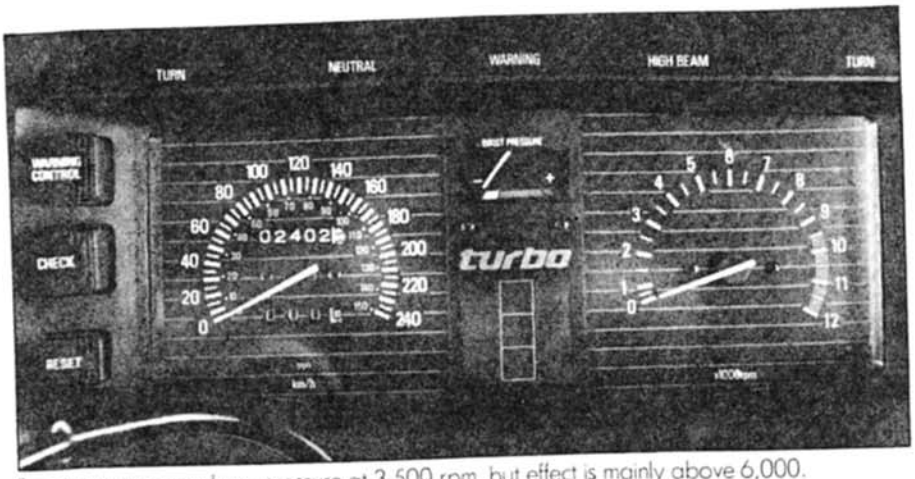
An excellent seating position and a seat that's much more receptive to the human form than it looks aids riding comfort. Despite the banana-like appearance, the rider's section proves comfortable for long stints of riding. There's room to move around and the foam provides enough support for hundreds of kilometres of sitting.

The narrow, low-rise bar, slants the rider's torso comfortably and the footpegs are ideally located for riders of average to tall stature. One of our testers has a bad knee that tends to lock up after riding with rearsets for any length of time, and even he found that after six hours on the turbo he had no problems.

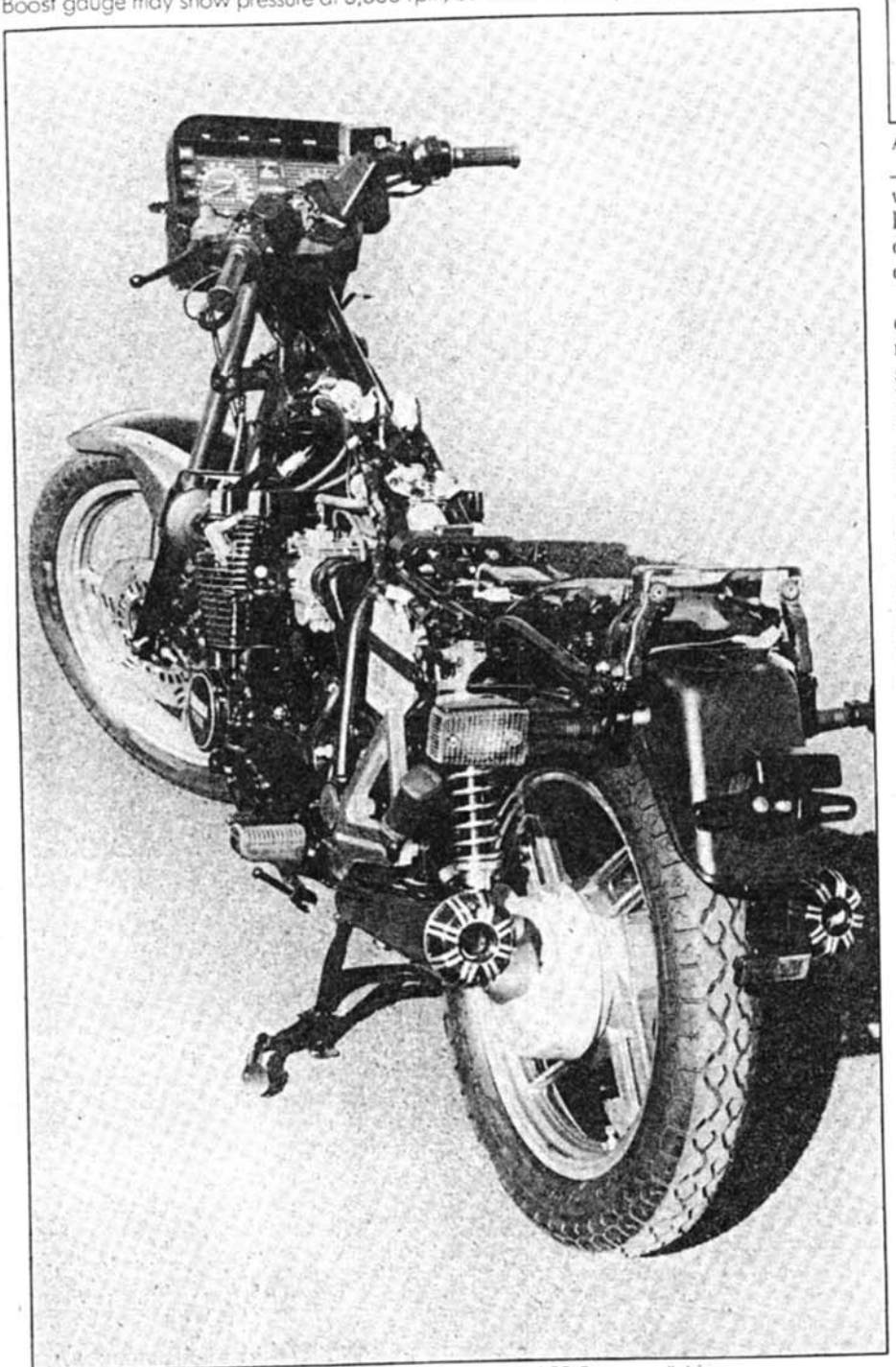
Passengers find themselves similarly happy. The seat foam seems to be the same at the back of the seat, and the kick-up serves as a mini-backrest to help hold passengers in place. Thick, comfortably padded grab rails mounted at the rear sides of the seat provide a good location for holding on. The passenger pegs, while higher than the rider's, aren't so high that legs get cramped.

By and large, accommodation for two people is excellent for a bike with a wheelbase of only 1,435 mm. That's actually 10 mm shorter than the Vision, which has nowhere near the same comfort level for two.

The seating position and the fairing provide a comfortable, quiet platform from




Boost gauge may show pressure at 3,500 rpm, but effect is mainly above 6,000.



Under the fibreglass is no awesome complexity. Basic 650 Seca is still there.

Air-shock filler valve is upper right.

which to direct the motorcycle. For tho long stretches when there's not much do, the instrument console provides diverting source of entertainment.

In addition to the tachometer and spee ometer, a boost gauge is fitted. It has numerical markings, but just a needle th swings from a minus to a plus sign boost climbs. It's not as much fun as t Honda's horizontally expanding LED d play, but then it's not as distracti either.

Yamaha's electronic check panel mo tors such things as sidestand positi headlight-bulb failure, fuel level, oil pr sure, brake-fluid level and battery con tion. A small ideogram representing ea item lights up in sequence after the eng is started; if there's a problem the id gram stays lit and a red warning li starts flashing. Punching a button c verts the flashing to a steady gl another punch turns it off, but the id gram stays lit. Punching a check but any time while riding will cycle the plays for your viewing pleasure.

The fuel level gauge has four green tangles that presumably represent quarter of a tank each. They progressiv turn themselves off as the fuel level dr To say that it's an inexact indicatio fuel level is an understatement. We despised it, and even ended up runn out of gas at one point.

When the last rectangle lights up, red warning light starts flashing on panel. It happened during a mountain-r photo session, so we made a mental n turned the flasher off and continued ing, expecting to have the bike g reserve. Wrong. When it ran out of ga was really out of gas. We discov there's no reserve petcock position. flashing instrument lights are the warning you get.

The system isn't a bad idea — seeing a red light is better than groping for reserve in the middle of a busy freeway — but it could be better executed. Dropping the rectangle gauge for a simple, accurate sweep needle device would be an improvement.

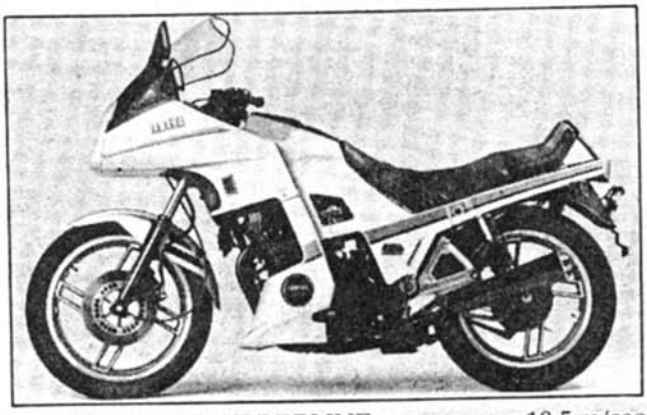
Yamaha's turbo package adds up to a smooth, quiet, fast and civilized bike. The Yamaha Turbo's at home in the open spaces, devouring vast stretches of country as fast as road conditions, rider ability and Big Brother surveillance will allow.

The one improvement that two of our three testers recommended may come as a surprise — get rid of the turbocharger and install a normally aspirated 750 cc or 850 cc engine. It would lower the price, reduce the complexity, improve the throttle response and not even slightly affect the lovely combination of handling, comfort and civility that make the bike such an enjoyable motorcycle.

mind turbos on cars, because it's a quick way to help engines that are in dire need of performance boosts. On bikes, the turbo goes unused 90 per cent of the time, and if you want more performance a bigger engine costs a lot less money than a turbo conversion.

Turbos however, are *de rigeur* these days, as performance and technological showpieces for their manufacturers. As such, they're probably here to stay, at least for a while. If that's the case, we hope more of them are like Yamaha's effort. In every way except for sheer roll-on power, those of us who have ridden the factory turbos find the Yamaha the best so far. It's an excellent motorcycle, with or without its turbo hype and complexity. □

# SPECIFICATIONS
# Yamaha Seca Turbo



MODEL ..... 1982 Yamaha XJ650 Turbo
TEST DISTANCE ..... 1,497 km
PRICE ..... $5,799

**ENGINE**
TYPE ..... Air-cooled four-cylinder four-stroke, chain-driven DOHC, two valves per cylinder, turbocharged, YICS
DISPLACEMENT ..... 653 cc
BORE AND STROKE ..... 63 x 52.4 mm
COMPRESSION RATIO ..... 8.2:1
HORSEPOWER ..... 85 at 9,000 rpm
TORQUE ..... 7.5 kg-m at 7,500 rpm
CARBURETION ..... Four Mikuni BS30 (sealed)
STARTER ..... Electric only
OIL CAPACITY ..... 3.5 litres, wet sump

**ELECTRICAL**
IGNITION TYPE ..... Transistorized breakerless
GENERATOR OUTPUT ..... 266 watts at 5,000 rpm
BATTERY CAPACITY ..... 12 volt, 14 amp-hours
HEADLIGHT ..... 65/55 watts

**TRANSMISSION**
TYPE ..... Five-speed constant mesh, wet clutch
PRIMARY DRIVE ..... Gear, 1.672:1
INTERNAL RATIOS ..... (1) 2.187, (2) 1.5, (3) 1.153, (4) 0.933, (5) 0.812
FINAL DRIVE ..... Shaft, 4.179

**CALCULATED DATA**
WEIGHT/POWER RATIO ..... 2.6 kg/hp
SPECIFIC OUTPUT ..... 130 hp/L
PISTON SPEED AT REDLINE ..... 16.5 m/sec at 9,500 rpm
RPM AT 100 KM/H ..... 4,605
SPEEDS IN GEARS AT REDLINE ..... (1) 79, (2) 111, (3) 145, (4) 179, (5) 206 km/h

**FUEL**
CAPACITY ..... 18 litres including reserve
RESERVE CAPACITY ..... 2.2 litres
CONSUMPTION ..... 5.68 L/100 km (49.6 mpg)
RANGE ..... 316 km total, 39 km reserve

**PERFORMANCE**
QUARTER MILE ..... 12.33 seconds at 170.2 km/h

**CHASSIS**
WHEELBASE ..... 1,435 mm
RAKE/TRAIL ..... 27.75 degrees/115 mm
SUSPENSION ..... Telescopic front fork with linked air assist, 140 mm travel; rear swingarm with dual shocks with linked air assist and four-position damping adjustment, 90 mm travel
BRAKES ..... Dual front slotted discs, rear drum
TIRES ..... Bridgestone Mag Mopus, 3.25V19 front, 120/90V18 rear
DRY WEIGHT ..... 225 kg
LOAD CAPACITY ..... 191 kg
HANDLEBAR WIDTH ..... 680 mm
SEAT HEIGHT ..... 750 mm with 61 kg rider
GROUND CLEARANCE ..... 130 mm with 61 kg rider

Distributed by Yamaha Motor Canada Ltd., 480 Gordon Baker Rd., Willowdale, Ont., M2H 3B4, (416) 498-1911.

PHOTOGRAPHY BY PATRICK BEHAR, JOHN COOPER AND JOHN WILD