

Subaru Justy 1.2GLII ECVT



AS IF ITS CHEEKY LOOKS, FLICK-OF-A-switch four-wheel drive and lusty, three-cylinder, three valves-per-cylinder engine weren't novel and interesting enough. Subaru's mud-plugging supermini – the Justy – has now added automatic transmission to its inventory.

Not just any old automatic transmission, mind you. Far from it. Instead, the Justy uses Electronically-controlled Continuously Variable Transmission (ECVT for short), making it the world's first car to combine 4WD and continuously variable transmission.

Like the CVT automatic 'boxes available in the Ford Fiesta, Escort/Orion and Fiat Uno, the Justy's ECVT also relies on the steel drive belt and variable-width, split-pulleys arrangement, which gives CVT its stepless, spread of gear ratios. But, Subaru has taken the concept a stage further by adding an electromagnetic powder clutch for smooth drive take-up, and bringing the whole operation under microprocessor control.

Identical in all other respects to five-speed manual versions, the ECVT Justy, like them, comes as a three-door SII or, as tested, as this five-door GLII, with only very minor equipment differences between them.

Raring to go

Thanks to its impeccably behaved automatic choke, the Justy is soon ready for the off and, despite a lazy fast-idle on our test car and the feeling that immediate drive-off from cold might cause problems, it never once stalled on us. The engine is happier when given a few seconds to warm-up before pulling away, although even without it, the Justy is refreshingly free from the jerky 'creep' that afflicts many small automatics on a cold morning, and has a totally untemperamental warm-up.

It's an impressive little performer, too. The 1.2-litre motor pumps out a generous 67bhp which, combined with the uninterrupted flow of power during acceleration, gives it a lively willingness that confounds most people's expectations of a small-engined automatic, especially one equipped with four-wheel drive.

Smooth operator

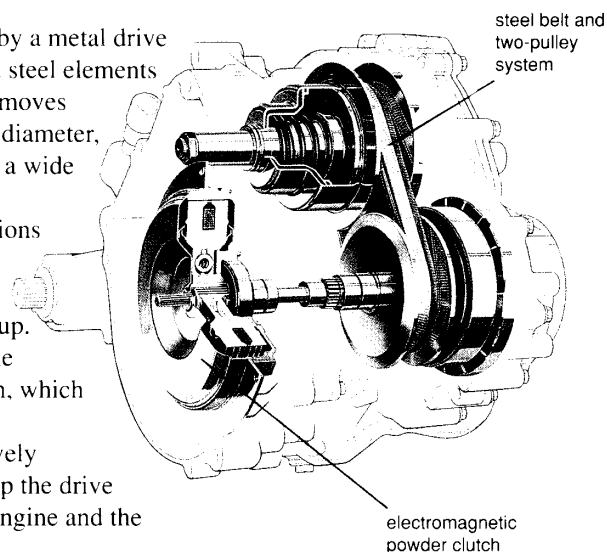
The unusual electromagnetic powder clutch, while perhaps not quite as silky in take-up as a torque convertor, nevertheless does a very good imitation of one, and the whole process of moving-off, accelerating away and coming to rest is performed significantly

ECVT - HOW IT WORKS

CVT relies on split drive and driven pulleys connected by a metal drive 'belt', which is formed from hundreds of wedge-shaped steel elements carried on two flexible steel bands. Half of each pulley moves axially, altering the pulley's groove width and effective diameter, so providing a continuous, stepless span of 'gears' over a wide ratio range.

The Justy's ECVT differs from the similar transmissions available on the Ford Fiesta and Fiat Uno in employing microprocessor control of the 'gearchanging' and in the use of an electromagnetic powder clutch for drive take-up.

Metal powder occupies the annular space between the outer (driving) and inner (driven) members of the clutch, which can rotate independently so long as the particles are unmagnetised. Electric current fed into a coil progressively magnetises the powder and causes it to harden, taking up the drive smoothly until there is a solid connection between the engine and the CVT input shaft.



more smoothly than with any other CVT we've yet sampled.

At the base of the large, chunky selector lever, well-illuminated shift positions are readily visible to the driver, with a repeater display helpfully set into the instrument panel.

Lacking a centre differential, the all-wheel drive is of the 'part-time', driver-selected type (unsuitable for dry-road use), but selection could hardly be simpler. The additional drive is engaged by means of a simple switch on the side of the selector lever, confirmation of which is provided by an idiot-proof facia symbol that lights up. Engagement can be a bit *too* easy at times, however – some of our longer-legged drivers found that they knocked the switch with their (redundant) left knee during cornering, for example.

The 'D' setting is used for most normal driving, while a 'Ds' position (s for sport, perhaps) selects intermediate gearing and generally higher rpm, for improved response (without resorting to full-throttle kickdown) and increased engine braking on hill descents.

Sounds right

The Justy's deep, distinctive three-cylinder howl (we love it!) is generally less apparent in this clutchless model under normal driving conditions, because the ECVT's search for efficiency maintains as high a gear (and as low an engine speed) as it can, consistent with throttle demand.

Full-throttle demands, naturally, produce more urgent underbonnet noises. Actually, full-bore CVT acceleration gives a sensation rather like an aircraft's take-off run, as road speed steadily climbs to meet a near-constant engine note, although the engine revs and urgency subside as soon as the 'pilot' throttles back.

Automatically efficient

While the 'auto' Justy doesn't quite have the legs of

the manual version in outright performance, the CVT's potential efficiency shows up in fuel economy – our test car delivering a very creditable 38mpg overall. This easily beats our selected rivals, notwithstanding their measurably superior performance, and all but matches the five-speeder's result. However, the Justy (unusually for a Japanese car) lacks a low-fuel warning lamp, and its meagre fuel tank capacity limits the realistic range between fill-ups to about 250 miles.

VERDICT

The 'lusty Justy' (as we affectionately refer to it) was already a clever little performer, combining small-car practicality, pretty looks, an endearing character and off-road agility with on-road refinement.

Now, with the additional appeal of an easy *and* efficient automatic gearbox, it adds a further feather to its cap. It's just the ticket for people who simply want to get from A to B with the minimum effort at the wheel, especially when the going is muddy or slippery.

Admittedly, the Justy's load space and back seat accommodation are limited, its seat comfort may be mediocre and, off-road, it ultimately lacks Land-Rover credentials (and ground clearance) if the going gets really sticky. On the other hand, it still packs valuable versatility into its pint-sized, supermini frame.

What's more, however hard you scan the price lists, you'll be hard-pressed to find more than a couple of small automatics that cost less – let alone one that provides CVT or four-wheel drive or, as in this case, both.

Until now, superminis for the 'gymkhana-set' or, as Subaru puts it, 'the folks who live on the hill', didn't offer any choice as to who did the gear-changing. Thanks to ECVT, the Justy now does!

PERFORMANCE

Acceleration time in seconds using manual hold (see text)

STANDING START	0-30mph	0-60mph	1/4 mile
	4.6	15.1	20.1

mph	30	40	50	60	70
THROUGH THE GEARS		2.5	5.8	10.5	17.8

20 mph	30	40	50	60	70
SPEED RANGE		4.4	8.1		
RANGE TIMES		5.9			11.8

Maximum speeds

using accelerator kickdown

REVS PER MINUTE	1st/2nd	3rd	4th	mph
	5640			
				88
				Low

FUEL CONSUMPTION

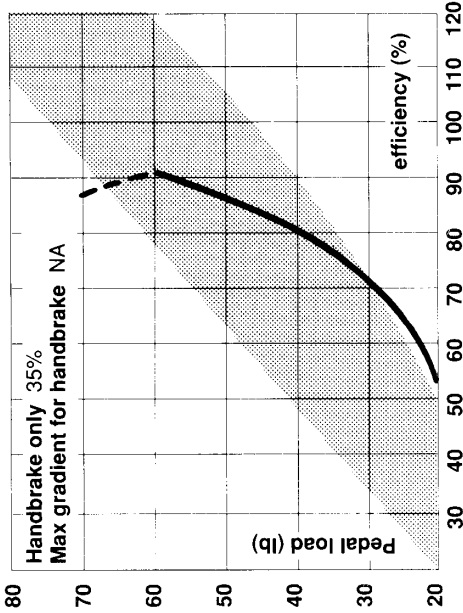
Fuel grade for tests: 95 octane, unleaded

Normal range	mpg
Hard driving, heavy traffic	30 1/2
Short journeys in the suburbs	35
Motorway – 70mph cruising	36
Brisk driving, mixed roads	38
Gentle driving – rural roads	46
Typical mpg overall	38
Realistic tank range*	30 litres/250 miles

* based on gauge/warning lamp and filling station experience

SAFETY

Brakes How pedal loads affect braking



Braking efficiency shown as a percentage of gravity (ie 100% = 1.0g). Ideally the braking curve should fall within the shaded zone of this graph. If it's above, the brakes are too heavy; if it's below, they are too light. When the curve becomes broken, the wheels are skidding.

Fade test

How hard use or water affects braking. (Ideal brakes show no change.)

Pedal load needed for 75% stop (lb)

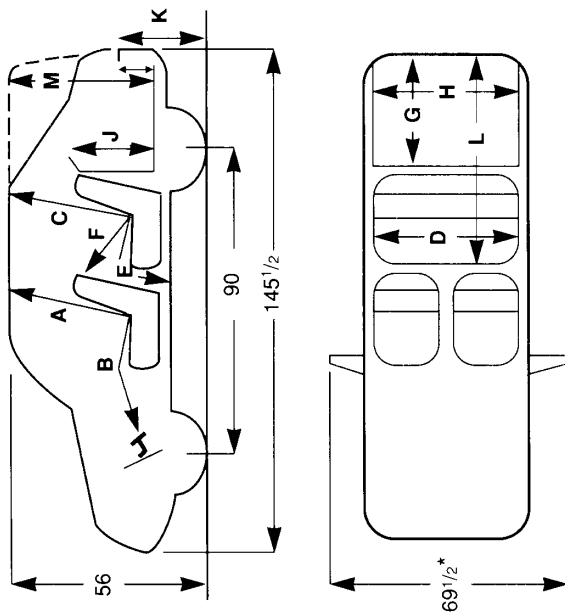
32	At start of test
28	After constant use
32	After severe use
NA	After watersplash
NA	Number of stops to recover

Safety check list

Steering	true 'feel' of the road?	☒
Brakes	powerful? sensible effort? fade resistant?	☒ ☒ ☒
Seatbelts	front – effective? convenient? rears – effective? convenient?	☒ ☒ ☒ ☒
Head restraints	front – effective? rear – effective?	☒ ☒
Interior	thoroughly padded?	☒
Fuel	shielded filler? protected tank?	☒ ☒

MEASUREMENTS

Dimensions (inches)



* 60 1/2 with mirrors folded

Inside (inches)

Kerb weight in lb (full of fuel)

A Front headroom (with sunroof)	37 3/4	G Load length	21
B Front legroom (min - max)	35-41 3/4	H Load floor width (min - max)	35 1/2-51
C Rear headroom	35 1/4	J Load height	12 1/2
D Back seat width (between armrests)	51	K Sill height (inner/outer)	1 1/2/25
E Typical rear * legroom	35 3/4	L Load length	43 1/2
F Typical rear * kneeroom	25 1/4	M Load height (to tailgate hinge)	28 3/4

* 'Typical' represents the mean measurement behind the driver's seat set at 39in legroom and the passenger's seat set at 41in

HOW IT COMPARES

	Engine cap/power (cc/bhp)	Max speed (mph)	30-70mph through gears (sec)	30-70mph in 5th/4th gears (sec)	Fuel overall (mpg)	Brakes best stop (%g/lb)	Maximum legroom – front (in)	Typical leg/kneerom – rear (in)	Steering turns/circle (ft)	Overall length (in)
Subaru Justy 1.2GLII ECVT (5 door)	1189/67	88	17.8	NA	38	92/60	41 ³ / ₄	35 ³ / ₄ /25 ¹ / ₄	4.4/30	145 ¹ / ₂
Ford Fiesta 1.4 CTX Ghia (5 door)	1392/75	98	13.0	NA	36	97/40	41	37 ¹ / ₂ /27 ¹ / ₂	4.3/33	147 ¹ / ₂
Peugeot 205 1.6 Automatic (5 door)	1580/80	95	15.1	NA	33	88/37	41	36 ¹ / ₂ /27	3/33 (p)	146
Renault 5 1.4 Automatic (5 door)	1397/68	95	16.5	NA	36	95/45	39 ³ / ₄	37 ³ / ₄ /25 ¹ / ₂	4/33	144
Subaru Justy 1.2GLII (5 speed manual)	1189/67	90	16.7	32.7/24.4	38 ¹ / ₂	91/55	41 ³ / ₄	35 ³ / ₄ /25 ¹ / ₄	4.4/30	145 ¹ / ₂

(p) with optional power steering

TECHNICAL SPECIFICATION

ENGINE

Type and size front-mounted, transverse 3 in line; water-cooled. 78.0mm bore x 83.0mm stroke = 1189cc. Aluminium alloy head and iron block; 4 main bearings

Compression ratio 9.1:1

Valve gear single belt-driven overhead camshaft actuating 3 valves per cylinder via rockers

Fuel system one twin-venturi Hitachi carburettor (with automatic choke) fed by electric pump from 35-litre (7.7-gallon) tank; no low-level warning lamp. Fuel required: 90 octane minimum, leaded or unleaded

Ignition system electronic, breakerless via coil and distributor

Maximum power (DIN-net) 67bhp at 5600rpm

Maximum torque (DIN-net) 72 lb ft at 3600rpm

TRANSMISSION

Type continuously variable by steel-element belt and split pulleys with electromagnetic

powder clutch, and 'on-demand' four-wheel drive. Gearbox ratio range: 2.503 (low) to 0.497 (high), reverse 2.472:1

Final drive 5.905:1 to front wheels, or all four wheels

Mph per 1000rpm range from 4.19 to 21.09 (theoretical)

Rpm at 70mph 3450 in D, 4440 in Ds (observed) at constant speed on level road

CHASSIS

Suspension front: independent, MacPherson damper/struts, coil springs and anti-roll bar. Rear: independent, damper struts, separate coil springs, wishbones and anti-roll bar. Dampers: telescopic all round

Steering unassisted rack and pinion with 4.4 turns between full locks. Turning circles average 30ft between kerbs with 59¹/₂ft for one turn of the wheel

Wheels 5.00B steel with 165/65R13 76S tyres (Semperit Hi-Life on test car)

Brakes front: 9.4in ventilated discs. Rear: 7.1in drums; vacuum servo

