



ALFA ROMEO
CITIE SV



...Not for show

No big strike-between-your-eyes picture on the front cover?

No need. The new GTE 16V Vauxhall Astra is a serious car for the serious driver - and he will already know how the existing GTE looks. Give or take a couple of very decorous 16V decals, and a brace of orthogonal exhaust pipes, this new 2-litre looks no different. If it did - if we tacked on fancy extra panels, the way some manufacturers distinguish their high-performance variants - it would be wrong, for the existing shape is right. We put 1200 hours of wind-tunnel work into giving this body low drag, high stability and ample capacity; when something is as right as this, you do not spoil it.



Sunroof illustrated is optional at extra cost.



...But for go!

Many and inspiring are the differences beneath that familiar and slippery skin. Wherever change was appropriate to match the performance of the brilliant new 16-valve engine, changes were made. We shall come to them, in later pages: you shall see that the 16V has been engineered in fine detail so that in steering and stopping, in roadholding and reassurance, in all measures and not least in manners, it is a match for that otherwise matchless engine.



Actually, there is an engine which is almost a match for it. In a bare-wheeled, bare-boned, barefaced racing car - in the single seater designed for the new Vauxhall-Lotus Challenge, enlivening race meetings all over Europe - is an engine almost identical.

In the Lotus chassis, the engine is mounted lengthwise behind the driver. In the Vauxhall Astra, it sits sideways in front of him. Either way, it has the strength and stamina to take all the stresses of racing and roadwork in its stride. Revving furiously in a racetrack chicane or a hill-country hairpin, hauling hard up the pits straight or down the arterial road, it makes no difference.

Yet there is a difference. Regulations limit the racing engine to carburettors; the road car is free from such strictures, so the Astra engine benefits from the latest in electronic fuel injection.

Quite exceptional, this fuel injection system; it is part of an electronic control system so new, so elaborate, so sophisticated, that so far it has been seen only in two much bigger and more expensive saloons from the other side of the North Sea. It masterminds the precise injection of petrol in proper sequence and at the right moment to each inlet port, where other systems only inject simultaneously into all of them. The difference can be measured in higher efficiency, in power and economy; but it can also be felt.





It is not just a matter of an unusually broad rev-range, though broad is the word: the engine will pull at any speed from 1000 to 6800 rev/min, will pull at least 90% of its maximum torque anywhere between 3300 and 6000. That maximum is attained at 4800rpm - at which speed, thanks to the quickened reactions of the new sequential-injection system, the engine responds to your foot on the accelerator pedal in just 0.0625 seconds. **No lag, no sloth, no delay, no doubt: when you want it is when you get it.**

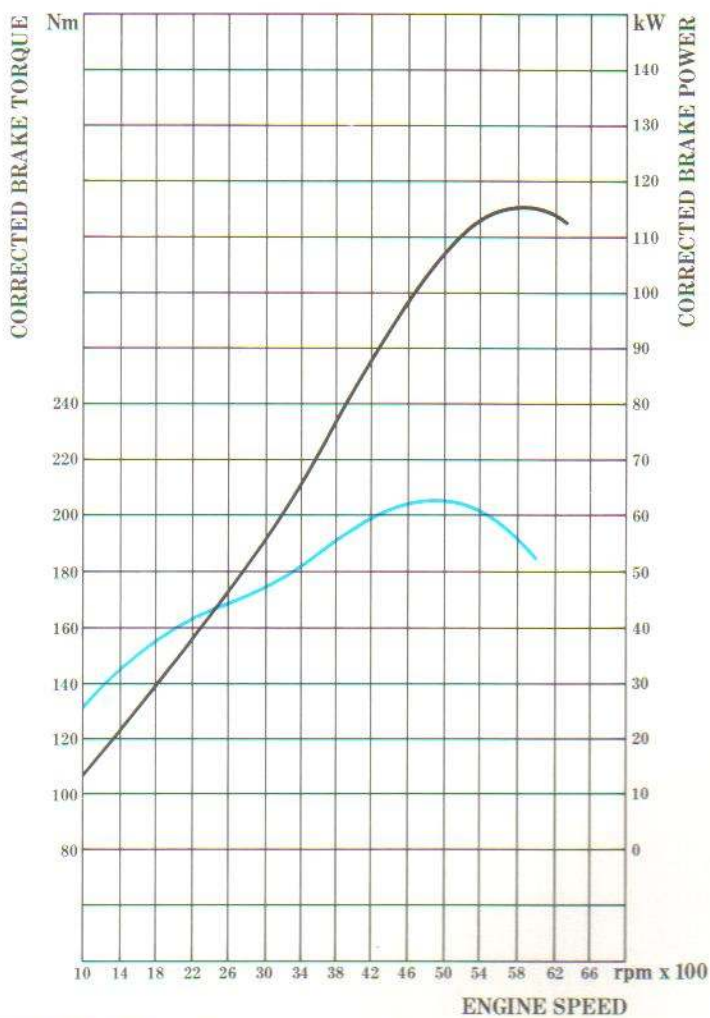
The same prodigious electronics manage the ignition system; so, when each cylinder should

have its spark, it gets it. Selective knock control is automatic, adapting to varying fuel quality (including 95 RON unleaded petrol) and atmospheric conditions, protecting the machinery and (not incidentally) improving exhaust emissions and fuel economy, while keeping performance right up to scratch.

It also gives you something normally found only in the best super-fi record-decks:

digitally stabilised idling. Take your foot off the accelerator pedal and the engine will promptly settle to 950 rev/min, whether stone-cold after the first start of the morning or sizzling hot at the end of a frantic journey. It is so stable that you can leave it ticking over like this with the clutch fully home and trickle along in bottom gear at a rock-steady 5.1mph. So extraordinarily flexible and responsive is the engine that it will actually pull from the same 950 rev/min in fifth gear: so you can be in top gear at 20mph if you choose.

At the other end of the speed range, the engine is no less brilliant. With its precisely forged pistons and utterly imperturbable valve-gear, it is safe right up to the automatic cut-off point at 6800 rev/min. Unlike rival engines, however, it does not have to spin so fast to achieve its maximum power: it breathes so clear and deep through its brand-new twin-camshaft cylinder head that at 6000 rev/min, when it generates 156 PS, its efficiency is a match for anything in its class; and at 4800 (maximum torque, remember?) **it has them all beaten.**



POWER (RON 97) —
 TORQUE (RON 97) —



Even an experienced eye will spot only some of the features which contribute to this performance. Hidden from view is the subtle shape of each combustion chamber, controlling the flow from its four ports to ensure optimum burning of the charge. More obvious is the light-alloy inlet manifold, its branches matched in length for resonance to ram air into the cylinders; concealed is the highly polished interior surface of each inlet port, easing airflow right down to the valve seats. The ports are so angled that the valve heads present the minimum obstruction when they are lifted; and the generously-dimensioned cams on their nitrided hollow shafts lift them unusually high. **There is no clatter, no bounce, no thrash:** the tappets are hydraulically modulated to eliminate clearances, and to eliminate the adjustments

that used to be the bane of multi-valve overhead-camshaft engines.

Almost as bad was the adjustment of camshaft gears – or the noise if you failed to do it! No problem here, both shafts being driven by the toothed belts that Vauxhall pioneered. Accurately and quietly in phase, the paired exhaust valves complement the fast action and vast area of the paired inlets, and in addition they are internally cooled by sodium which conducts heat away from head to stem – a feature once found only in racing and aero engines. The exhaust ports are polished too, reducing the loss of heat into the coolant and helping the gases on their way into the smooth tubular-steel exhaust manifold – which likewise has branches of tuned length for resonance to suck the gases

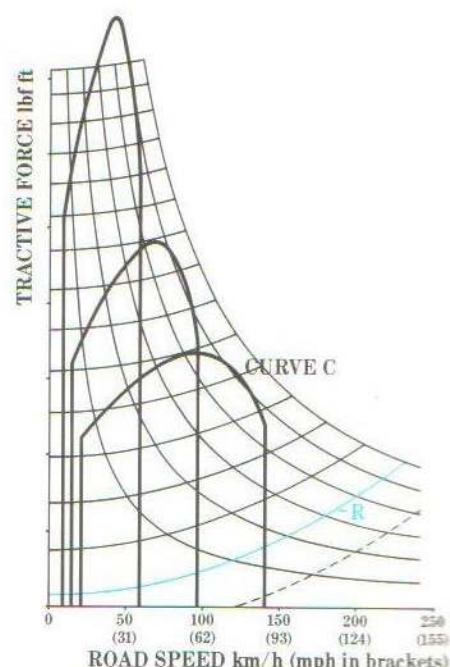
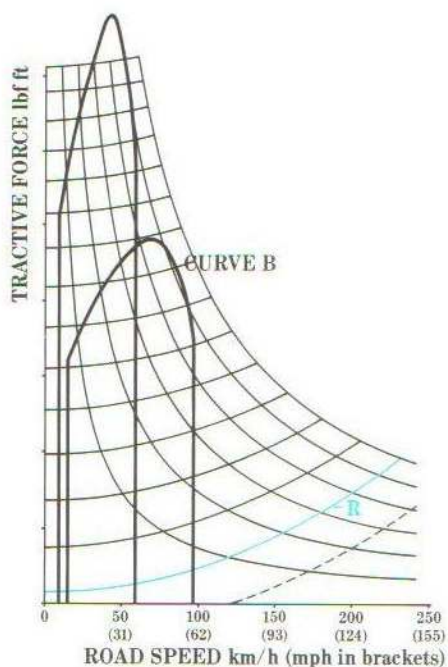
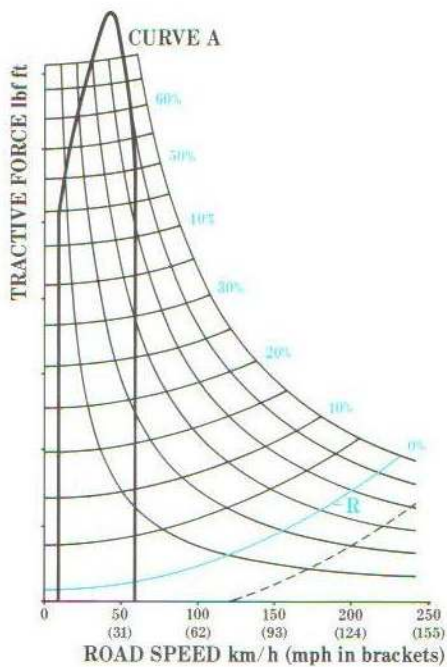
out of the cylinders.

Designed to work as hard as a racing engine must, the 16V Astra engine is also designed to work as long as a roadgoing engine should.

Stamina is there, as well as strength, with inbuilt capacity for enormous mechanical and thermal loads - literally from top to bottom, for a look underneath will reveal a new large-capacity oil sump, made from aluminium alloy and incorporating dynamic oil level monitoring to keep the driver informed via his dash-mounted check control panel.

Not that there is any fear of excessive oil consumption - nor of petrol consumption, despite the engine's race-track affinities. At a steady 75mph (just 3500 rev/min in fifth gear) the Astra 16V does 41.5mpg, and in fact it extracts the maximum energy from each molecule of fuel just 200 rev/min lower, when pulling fairly hard with the throttle almost fully open. But it maintains its efficiency far up and down the scale, in a most unracer-like way: thermal efficiency is still at least 82% of maximum with the throttle wide open at 5200 rev/min, or half-open at 2000.





This efficiency is reflected in a fuel-consumption curve that does not rise disproportionately with speed. At 124mph, it is only just twice as thirsty as at 77. It is not only the efficiency of the engine that is responsible: minimised frictional losses, carefully selected high-performance tyres, and the justly-famed low-drag aerodynamics ($C_d = 0.32$) of the Astra GTE body, all play their parts in ensuring that you get the utmost out of this car in return for what you put into it.

To show just what this remarkable car can do, we must introduce you to some graphs that most manufacturers keep locked up in their engineering departments. They are called 'cascades' - a nice word for the **cataracts of power that come tumbling from this 16V engine** - but before we see what the car has, let us look at what it needs.

Curve R shows the tractive effort needed at the front wheels to drive the car at any speed.

Where the curve originates at 0mph, the force needed is close to zero because the Astra's frictional resistance to movement is very slight. As the speed rises, more force is needed to overcome the sum of rolling and aerodynamic resistances; with inferior tyres or a less sleek body, the curve would rise much more steeply than it does.

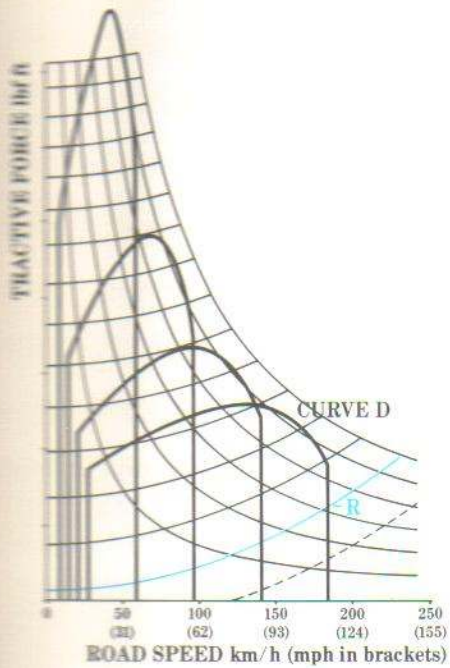
The tractive effort actually available is different in each gear; the lower the ratio, the greater is the multiplication of torque within the gearbox. Taking into account the gearbox ratio, the final drive ratio, and the radius of the tyres, the shape of the engine's full-throttle torque curve is heightened and compressed to appear as Curve A, representing what is available in bottom gear.

The vertical distance between curves A and R is a measure of how much surplus effort is available for acceleration or hill-climbing. It is, to put it very mildly, a lot; and you may be glad of the newly enlarged clutch and reinforced

differential which are vital links in the drive-line. But there comes a limit: at nearly 37mph the engine is at 6800 rev/min. No later you must shift into second gear. A new synchronizer system (also on bottom gear for easy downshifts) makes the change fast and effortless, and a new set of calculations produces Curve B representing second-gear tractive effort. There is so much area between this and curve R that a 37% gradient can be climbed at a rousing 50mph.

The acceleration is correspondingly vivid.

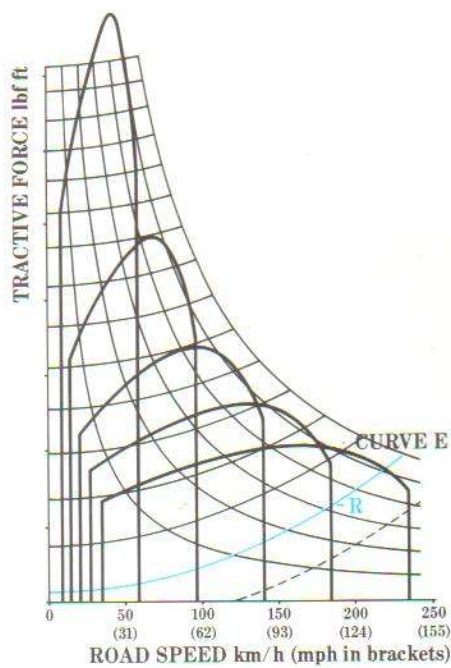




At 6565 rev/min, with your hand on the leather-covered gearlever knob ready to snatch third gear, the car has reached 60mph, and if you have done everything correctly it will have taken less than 7.7 seconds from standstill.



Go ahead and snatch; more powerful synchromesh has been fitted to 3rd, 4th and 5th gears, and they have all been reinforced. As you complete the shift, you meet Curve C representing 3rd gear, and already you should begin to appreciate the beauty of the new close-ratio gearbox that has been specially designed to accompany this 16V engine. Each time maximum speed is approached in any of the lower gears, engaging the next higher



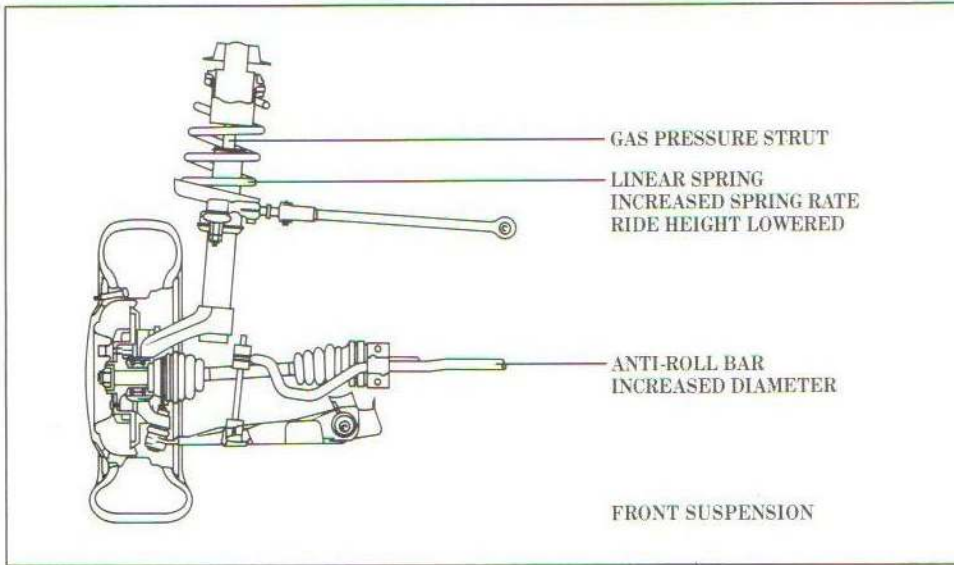
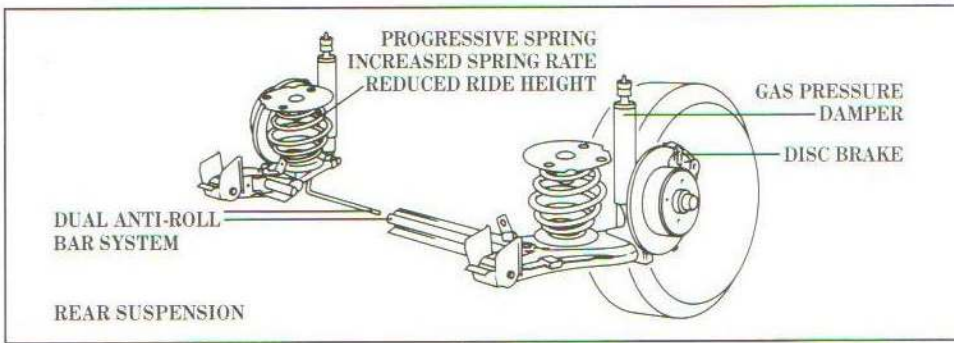
ratio returns the engine to the point at which it develops maximum torque, so that the strongest possible acceleration can be sustained.



To allow the driver a little leeway, the top three ratios are slightly closer, allowing each shift to be even slicker. Adding curves D and E for 4th and 5th gears shows that you should change up from 3rd at 85mph (6578 rev/min) where C and D intersect; and from 4th into top gear at 111.5mph (6581 rev/min) where D cuts curve E.

Where curves E and R intersect, there is no longer any surplus tractive effort to force the car along any faster. It has reached its maximum speed. In neutral conditions - no wind, no gradient - it is 137mph.

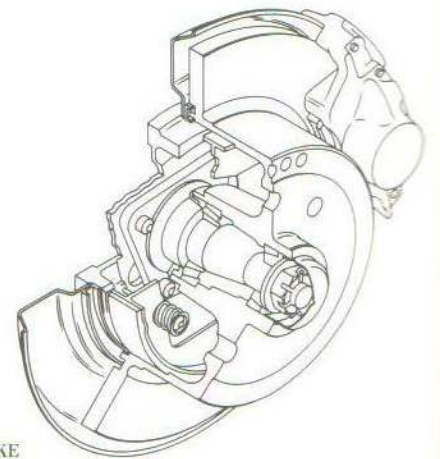
And still the steering is calm, positive, precise. Power assistance for the rack-and-pinion steering is standard, but in the 16V Astra the rack has revised mounts giving it more responsive and accurate feel.



The high performance of the GTE 16V has been matched by chassis modifications.

The car has been lowered by 10mm, and this reduction in ride height has been accompanied by an increase in negative camber at the rear wheels. The advantages include improved directional stability and surer handling on uneven road surfaces. Stiffer springs have been fitted all round, those at the rear being Vauxhall's ingenious 'mini-block' progressive-rate coils which maintain an almost constant spring frequency regardless of load. The anti-roll bar at the front has been upgraded, and for the first time in any Vauxhall the rear axle has been given twin anti-roll bars. In conjunction with gas-pressurised dampers at all four wheels, the result is roadholding and handling of a high order, without prejudice to a comfortable ride.

If the cornering ability of the car is on a par with its speed, so is its braking ability. In addition to the ventilated front discs already sported by the standard Astra GTE, the 16V has large solid rear discs, and an enlarged master cylinder. Nor have the ergonomics of control been forgotten; the pedals are located to suit the techniques of the skilled driver, without in any way confusing the beginner.



The most diverse of drivers can find a good and comfortable position at the controls of the 16V Astra. Adjustments for the copiously bolstered seat and the steering wheel, and the electrically-controlled external mirrors, all help to ensure that feet, hands, eyes, limbs and torso are ideally located and properly supported.



However much - or little - use is made of the demonic performance of this undemanding car, it is always evident, to driver and passengers alike, that no engineering effort has been spared to ensure that their security and serenity remain paramount. In a car of such colossal verve, anything less would require a colossal nerve. It is, as we said, built for go, not for show - though, if you would like it to appear distinctive, there is a gorgeous new two-coat pearlescent paint finish available.

Even then, it will not strike you between the eyes as much as it pushes you between the shoulder-blades...

Data for the launch of a rocket

Should you think that you have seen this Astra GTE before, take a closer look! There has never been an Astra with these specifications.

Astra GTE 16V

Engine

Four cylinders; 1998cc; 16 valves; hydraulic tappets; twin overhead camshafts; alloy cylinder head; polished ports; stainless steel exhaust manifold; Bosch M2.5 Motronic engine management system, incorporating computer-controlled sequential fuel injection and ignition; selective knock control and 'hot wire' air mass metering; dynamic oil-level monitoring; engine oil cooler; electric engine cooling fan. Maximum power 156PS (115kW) at 6000 rpm; maximum torque 149.7 lb ft (203Nm) at 4800 rpm.

Transmission

Front wheel drive, via mechanical single-plate (asbestos-free) clutch and 5-speed close-ratio synchromesh gearbox.

Gearbox ratios:	First	3.55:1
	Second	2.16:1
	Third	1.48:1
	Fourth	1.13:1
	Fifth	0.89:1
	Reverse	3.33:1

Final drive ratio 3.55:1

Suspension

Front: independent MacPherson struts with gas pressure cartridge dampers and helical coil springs; 22mm anti-roll torsion bar. Rear: compound crank with twin trailing arms; double-conical miniblock progressive-rate springs, gas-pressure telescopic dampers. Twin (18mm and 15mm) anti-roll torsion bars.

Steering

Power-assisted rack and pinion; energy-absorbing steering column. 3.4 turns lock-to-lock. Turning circle 32.2 ft (9.8 m).

Brakes

Diagonally split dual-circuit hydraulics with servo assistance; plastic-coated pipes and twin pressure-sensing rear control valves. Ventilated front discs, solid rear discs with integral drum-type parking brakes; all friction materials asbestos-free. Warning light for handbrake-on and low brake fluid.

Fuel

Tank capacity: 11.4 Imperial gallons (52 litres). Four-star or 95 RON unleaded petrol can be used without modification.

Electrics

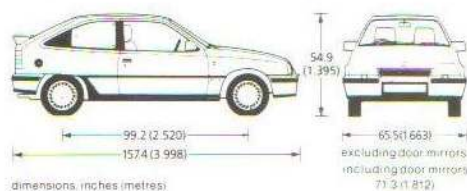
12V negative earth system: 65amp alternator; 55Ah maintenance-free battery.

Body

Cd-0.32. All-steel structure with extensive anti-corrosion treatment. Polycarbonate bumpers. Rigid passenger safety cell, safety crumple zones, front and rear; burst-proof door locks. Single-key operation of locks, ignition and fuel cap. Two tailgate assist struts. Usable load capacities (VDA): 35.3 cu.ft. with rear seat folded; 13.8 cu.ft. beneath hinged load cover with rear seat erect.

Wheels and tyres

Light-alloy 5½J x 14 wheels; Glacier White cars are fitted with alloy wheels in white. Radial-ply low-profile 185/65VR14 high-speed tyres.



Weights

Kerb weight 997 kg (2198 lb); Gross vehicle weight 1480 kg (3262 lb); maximum roof-rack load 100 kg (220 lb).

Fuel consumption

Test data officially certified by the United Kingdom Government as required by the Passenger Car Fuel Consumption Order 1983.

	mpg	l/100km
Simulated urban driving	28.0	10.1
Constant 56 mph (90 km/h)	51.4	5.5
Constant 75 mph (120 km/h)	41.5	6.8

Maximum speed

137 mph (manufacturer's figure).

Features

Exterior

○ 5-speed close-ratio gear box ○ power assisted steering ○ light-alloy road wheels ○ laminated windscreen with tinted shade band ○ green tinted glass ○ opening rear quarter windows ○ central door locking including tailgate

○ twin-tone horns ○ electric adjustment and heating of twin door mirrors ○ high-pressure headlamp washers ○ windscreen wiper airfoil (driver's side) ○ body side protection mouldings ○ body-colour bumpers and mirror housings ○ aerodynamic sill mouldings ○ front spoiler with concealed towing eye ○ NACA bonnet air ducts ○ rear airfoil ○ twin reversing lights ○ twin rear fog lamps ○ integral front fog lamps ○ halogen headlamps ○ locking fuel cap ○ tailgate push lock ○ intermittent tailgate wash/wipe ○ heated rear window ○ black finish on B-pillars and between tail-lamps ○ dual rectangular exhaust tailpipes ○ 16V decals on front spoiler and tailgate

Interior

○ Multi-function check-control system incorporating continuous monitoring of engine oil level while the engine is running; engine coolant level, screenwasher fluid level, brake fluid level, front brake pad wear, and bulb tests for head/tail/brake lamps ○ low fuel-level warning light ○ liquid crystal display instrumentation ○ rev-counter ○ oil pressure gauge ○ voltmeter ○ trip odometer ○ quartz clock ○ instrument panel light dimmer ○ lights-on warning buzzer ○ courtesy light with delayed cut-off ○ map-reading lights ○ leather-covered gearlever knob ○ leather-covered 3-spoke steering wheel ○ tiltable steering column ○ sports front seats, fully reclining ○ padded front seat head restraints ○ driver's seat height adjuster ○ 60/40 split-folding rear seat ○ full cloth door trim ○ front door pockets ○ under-facia tray and lidded glove box ○ twin sun visors with driver's ticket pocket ○ vanity mirror ○ cigar lighter ○ DC752 stereo radio/stereo cassette player ○ 4 speakers ○ cassette storage ○ air-blending heater with 3-speed fan ○ rear passenger compartment heater ducts ○ illuminated load area and glove box ○ underbonnet lamp

Factory-fitted options

○ sliding/tiltable glass sunroof with interior blind ○ electrically operated front windows ○ two-coat metallic paint (Steel Grey) ○ two-coat pearlescent paint (Aubergine)

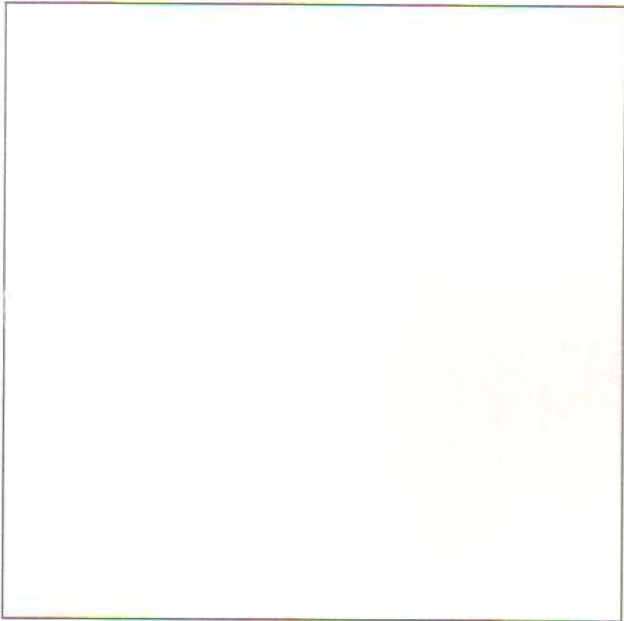
Colours and trim

Exterior colour choice: Glacier White, Carmine Red, 'Steel Grey, 'Aubergine. 'At extra cost.

All exterior colours come with grey Laser Velour seat trim.

A S T R A

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