



Honda S2000



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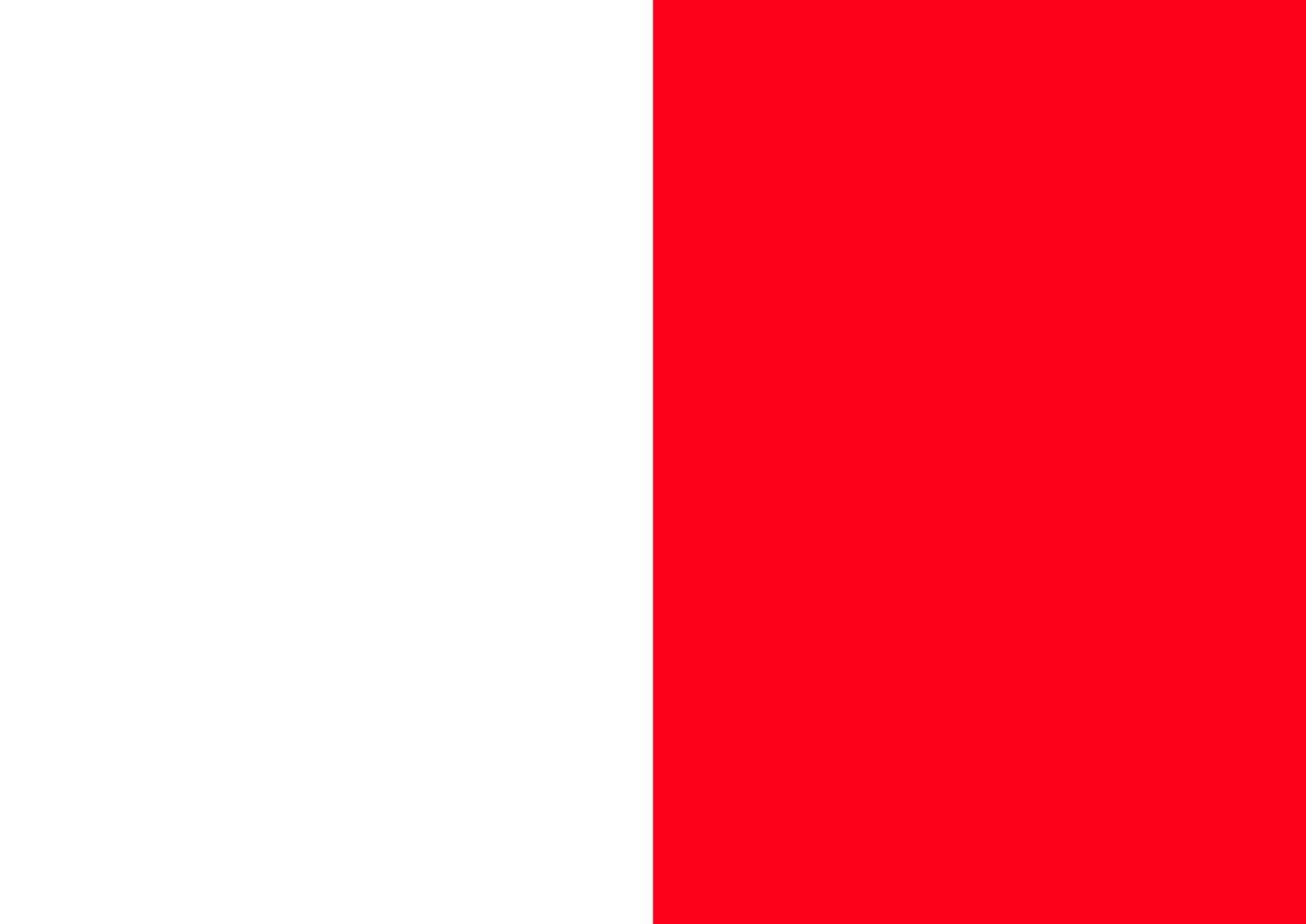
Printed on Recycled Paper

A division of Honda Motor Europe Ltd. No. 857969 Registered in England and Wales

Part No: CARM 0924
Issue Date: 12/02

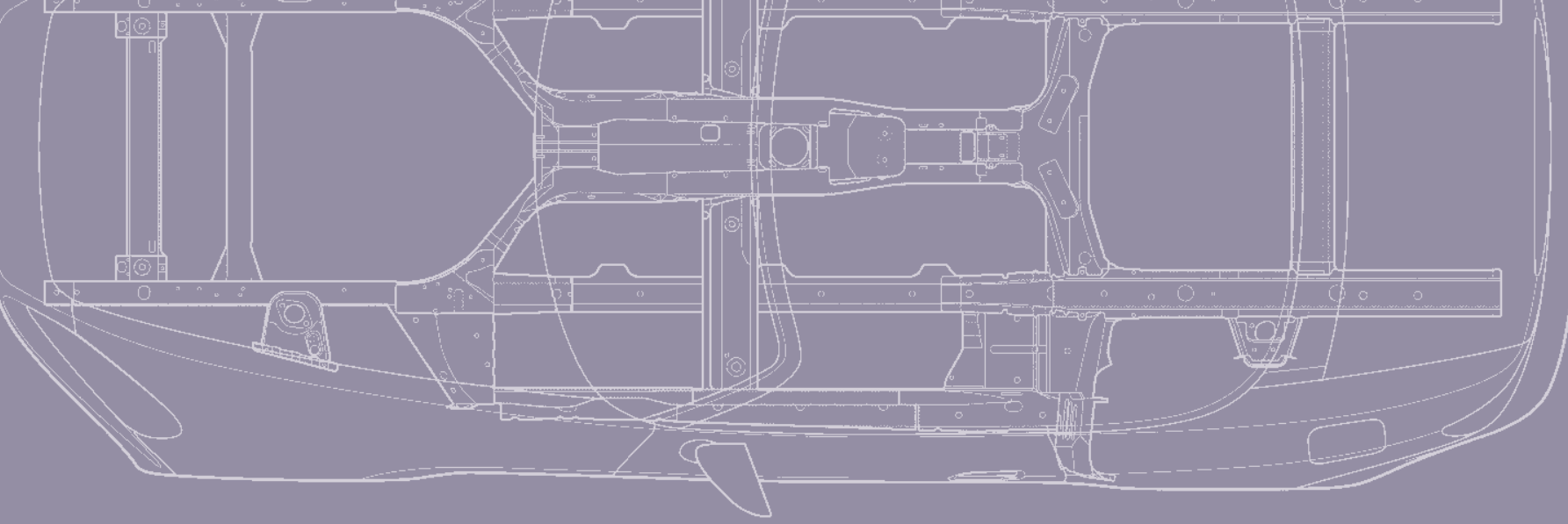








Introducing the Honda S2000



A racing heritage



The Honda S2000 has been born out of single-mindedness.

It is one of those rare cars that doesn't need to rely on image or advertising myth. A pure-bred roadster that's been forged by the challenge of racing discipline rather than roadside chic.

Reasonable assumption would say that the Honda S2000 project began with the unveiling of the SSM concept at the 1995 Tokyo Motor Show. In fact it finds its roots in Honda's first cars, the Sports 360 and 500. They too were unveiled at the Tokyo Show - some 33 years earlier. They were also compact rear-drive two-seater roadsters with very advanced specification engines: inclined four-cylinder units with roller-bearing crankshafts and twin overhead camshafts. This continued ability to produce engines with standards of reliability, efficiency and ecological sensitivity barely matched by rivals has been, and is still, the key to Honda's progress. It's a talent that leaves it the biggest manufacturer of internal combustion engines on the planet and the power behind 71 Grand Prix wins since 1965. It comes as no surprise therefore to discover that the chief engine designer for Honda S2000 was previously the Formula One powerplant project leader.

The Honda S2000's spiritual predecessor was the remarkable Honda Sports 800. Unveiled at the 1965 Tokyo Motor Show, the Honda Sports 800 was offered as a roadster and coupé. Like the Honda S2000 it had an advanced chassis and very advanced engine. In an era of unsophisticated, crude pushrod engines, rival roadsters produced just 50 bhp from 1,000 cc or more. The Honda Sports 800 powerplant delivered 70 bhp from just 791 cc - 88.5 bhp per litre - and the red-line was marked in at a staggering 11,000 rpm. Stunning then, and still unmatched today. When the time again came to produce a roadster, similar margins of technical and dynamic advantage were a necessity, not just a goal.

The purity of philosophy

Honda is a company which acts on a closely held philosophy - something developed and nurtured throughout its 50 year history - that includes the guidelines 'don't copy others ...seek the truth'. Honda is an organisation that exercises sharply fresh thinking, and which seeks originality and unique solutions. A company where its beliefs are its guidelines to the future, and where styling is never arrogant or exuberant, but a considered reflection of its unrivalled engineering. The Honda S2000 is a product of that philosophy.



" In a race competing for a split second, a tyre length on the finish line will decide whether you are a winner or a loser. If you understand that, you cannot disregard the smallest improvement "

Soichiro Honda - Founder of Honda Motor Company with the 1963 prototype F1 car.



Conceived by competitive spirit

Honda Sports 800 to Honda S2000 to F1

Race-track success drove founder Soichiro Honda from his days racing cars in the 1930s. 'Since I was a child, I have dreamed of building an automobile with my own hands and having it dominate world motor racing competition,' he said in 1954. Soichiro Honda believed that motor racing exercised the minds of engineers and boosted Honda factory morale. Within three years of the roll-out of Honda's first road cars, the company had won a Formula One race with the RA272 at the Mexican Grand Prix in October 1965. Between 1986 and 1991 Honda gained six consecutive World Constructors' Championships and five World Drivers' Championships. The Honda S2000 shows the experience of those years of Formula One success, but it also hints at the years to come.



The Mugen-Honda MF301HD

The 1998 FIA F1 World Championship saw Jordan running with Mugen-Honda engines for the first time

Honda's motorsport highlights

- 1964 First Formula One race, German Grand Prix
- 1965 First Formula One victory, Mexican Grand Prix
- 1983 Honda resumes Formula One racing
- 1984 Williams-Honda scores Formula One victory of new era, US Grand Prix
- 1985 Williams-Honda win four Grand Prix
- 1986 Williams-Honda win nine Grand Prix and first Constructors' Championship
- 1987 Lotus-Honda win two Grand Prix, Williams-Honda win nine Grand Prix and second Constructors' Championship
- 1988 McLaren-Honda win fifteen out of sixteen Grand Prix and third Constructors' Championship
- 1989 McLaren-Honda win fourth Constructors' Championship
- 1990 McLaren-Honda win fifth Constructors' Championship
- 1991 McLaren-Honda win sixth Constructors' Championship
- 1992 McLaren-Honda win five Grand Prix and retire from Formula One
- 1996 Honda wins American CART series driver's and manufacturer's titles
- 1997 Honda wins second American CART driver's title
- 1998 Jordan with the Mugen-Honda engine takes victory at the Belgian Formula One Grand Prix with first and second place
- 1998 Honda wins third American CART driver's title and second manufacturer's title
- 1999 Jordan with the Mugen-Honda engine takes victory at the French Formula One Grand Prix
- 1999 Honda is CART Manufacturer's Champion for the third time in four years
- 2000 Honda enter Formula One after an eight year absence with British American Racing
- 2000 Honda-powered driver Gil de Ferran wins the Cart Drivers Championship. This represents the fifth consecutive Cart Drivers Championship for Honda
- 2001 Honda becomes the only engine manufacturer to supply two teams with works engines when Jordan join BAR as a Honda team
- 2001 Honda achieve two rostrum finishes at the Spanish GP and German GP



The heart of the Honda S2000 *the engine*

Apart from being the world's largest producer of internal combustion engines, Honda also stakes a claim to making some of the world's most reliable, most environmentally friendly and most technically advanced engines on sale today.

With the launch of the Honda S2000, the company is setting another benchmark for a road car: the highest specific output ever produced in a naturally aspirated engine. The Honda S2000 engine delivers an incredible 120 PS per litre. What's more, its powerplant is so clean and efficient that it meets the strict Californian Low Emission Vehicle (LEV), EU2000 and German D3 emissions requirements.

Engine design

Like the rest of the car, this engine and transmission are a completely new design, something demanded by a project marked by its fanatical attention to detail. Producing the highest ever per-litre output in any non-turbo production engine meant that Honda's unrivalled experience in designing light, compact, efficient and high-tech engines was stretched to the limit. Engineers were forced to develop new materials, new methods of construction and components that could cope with a road-car engine developing its peak power at 8,300 rpm.

Honda also held the previous record of 108 PS per naturally aspirated litre - from the 195 PS 1.8 litre engine used in the Integra Type-R, so the leap to 120 PS is quite remarkable.

At the early-concept design stage, a number of alternatives to its established four cylinder VTEC layout were considered. In engineering terms, the simplest way to produce 240 PS would have been to turbo-charge an existing engine. Honda's commitment to engineering purity meant this forced-induction route was rejected.

This was primarily because even the most modern turbo-charged engines suffer inherently from lag - the time delay between pressing the throttle and the engine's response. Equally, Honda looked at a small capacity V6 engine but it felt that to give the Honda S2000 as ideal a weight distribution as possible, what was really needed was a very powerful, very compact and very light four cylinder engine. Which is why the design of the Honda S2000 powerplant, like the rest of the car, started as a clean-sheet project.

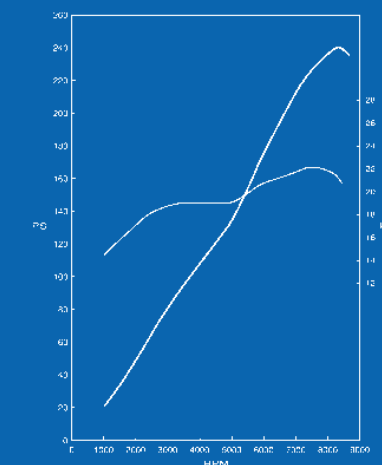
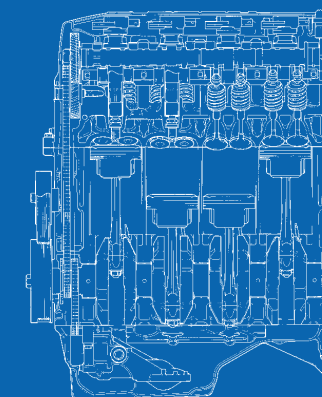
199901-GS014 DOHC-VTEC system



Such a specialist powerplant requires a highly specialist approach, starting with materials. The engine block is made from fibre-reinforced aluminium, a high-tech material more often seen in aerospace applications, adding essential stiffness to the lightness of aluminium alloy. It is, of course, an expensive way of building an engine, but exemplifies the company's dedicated approach with the Honda S2000 project. This also called for a very compact engine - dictated by the powerplant's location, tucked in behind the front wheels. The design team managed to come up with an engine that is both shorter and a remarkable 10% lighter than the 2.2 VTi unit used in the Prelude. It was also designed to sit angled to the left - when viewed from the car's nose - helping to allow for the steeply raked bonnet.

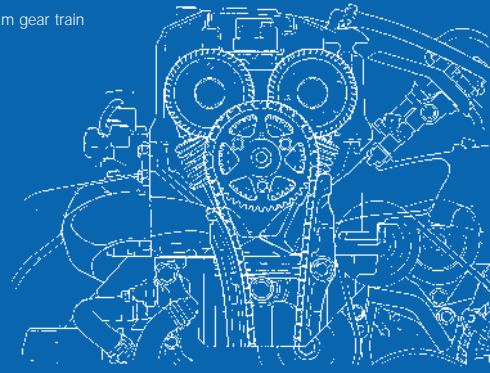
Honda has a reputation for smooth, high-revving engines both in road cars and after long years of experience with Formula One and CART ChampCar engines, and yet the Honda S2000's engine broke new boundaries even for a manufacturer with such experience. With its red-line at 9,000 rpm - unheard of in a contemporary road car - the added sophistication of the VTEC system was an unexplored area for production-car engineering. Such a high rev limit was required simply because the greater the revs, the greater the potential power output. So the way to extract very high power out of a capacity of just 2.0 litres is to achieve very high revs.

199901-GS012C
Engine cutaway / side view



The Honda DOHC VTEC engine combines low rev torque with high end power

199901-GS012D
Engine cutaway / cam gear train



The VTEC powerplant *the engine*

Building an engine that would reliably and regularly run to such high speeds meant that every component would have to be reconsidered because of the high demands placed on it. A focus was placed on precision-built, lightweight valve gear as well as reducing friction inside the engine. The engineers ruled out balancer shafts as part of the quest for minimal friction, because even the tiny drag and incremental power loss of turning the two shafts would be too great a compromise to place on such a precision-built engine. Although stiffness is aided hugely by the material used for the block, the engineers added an aluminium ladder frame to increase the rigidity of main bearings in the bottom end of the engine.

The key to the engine's extraordinary performance is the unique VTEC (Variable Valve Timing and Lift Electronic Control) system. Put simply, VTEC gives the engine a dual personality, changing the timing and lift of the valves to combine good torque characteristics at low revs with high power at high revs. For the Honda S2000, a new

method was developed to manufacture the rocker arms. Usually they are machined into complex shapes from a solid block, which is time consuming and expensive. With the new method, liquid metal is injected into a mould, creating the rocker arm in a simple, one-shot process. It is then heat treated for increased strength. To reduce friction in the valve gear, these new rockers are mounted on smooth-running roller bearings, which also allows the cylinder head lubrication system to be simplified. Certain engine components are also coated with a special low-friction plating, a technology taken straight from Honda's Formula One engine programme.

The massively high speeds sustained by a valve train designed for an engine running beyond 9,000 rpm led to the adoption of lightweight valve springs using materials derived from Honda's CART ChampCar racing programme. Other components that use competition materials and construction techniques include the pistons and connecting

rods. Forged pistons are seen for the first time in a Honda road engine, as are the specially heat-treated steel con rods. Another feature is the use of chain-driven (instead of belt-driven) camshafts for greater reliability at the higher potential speeds of the Honda S2000 engine.

As well as reducing the physical size of the engine, the engine's ancillaries - the alternator, water pump and air conditioning pump - have been cleverly packaged to reduce the bulk of the powerplant. These are all powered by what is known as a serpentine drive, a single belt driven by the camshaft. This belt does not drive a bulky and power-sapping (up to 5 PS) power steering pump, because Honda opted for EPS - electric power steering, similar to the system used on the NSX. The main advantage of this system is that it can be programmed to offer greater steering feel at all speeds, something much more difficult with conventional hydraulic power steering.

To optimise the weight distribution by mounting the engine as far back in the chassis as possible, a conventional distributor was dispensed with. In its place come individual coils sitting on top of each spark plug, a layout which also improves ignition performance at high revs.



Clear breathing - both inhaling and exhaling - is vital for a high-performance engine, especially one capable of such high speeds. To this end the Honda S2000 features both a low-restriction intake manifold and air filter system. The engine's intake manifold is a straight-through, large bore design as is the air filter set-up which is mounted in the nose ahead of the engine. Free-flowing exhaling is helped by a low back-pressure exhaust. This features an unusual metallic honeycomb catalyst, which is much less restrictive than conventional ceramic types. Emission performance is enhanced by an exhaust valve air pump which reduces emissions on start-up and an insulated exhaust manifold which shortens the time needed to get the catalyst up to operating temperature.

199901-GS012 Engine cutaway





Six-speed gate *the transmission*

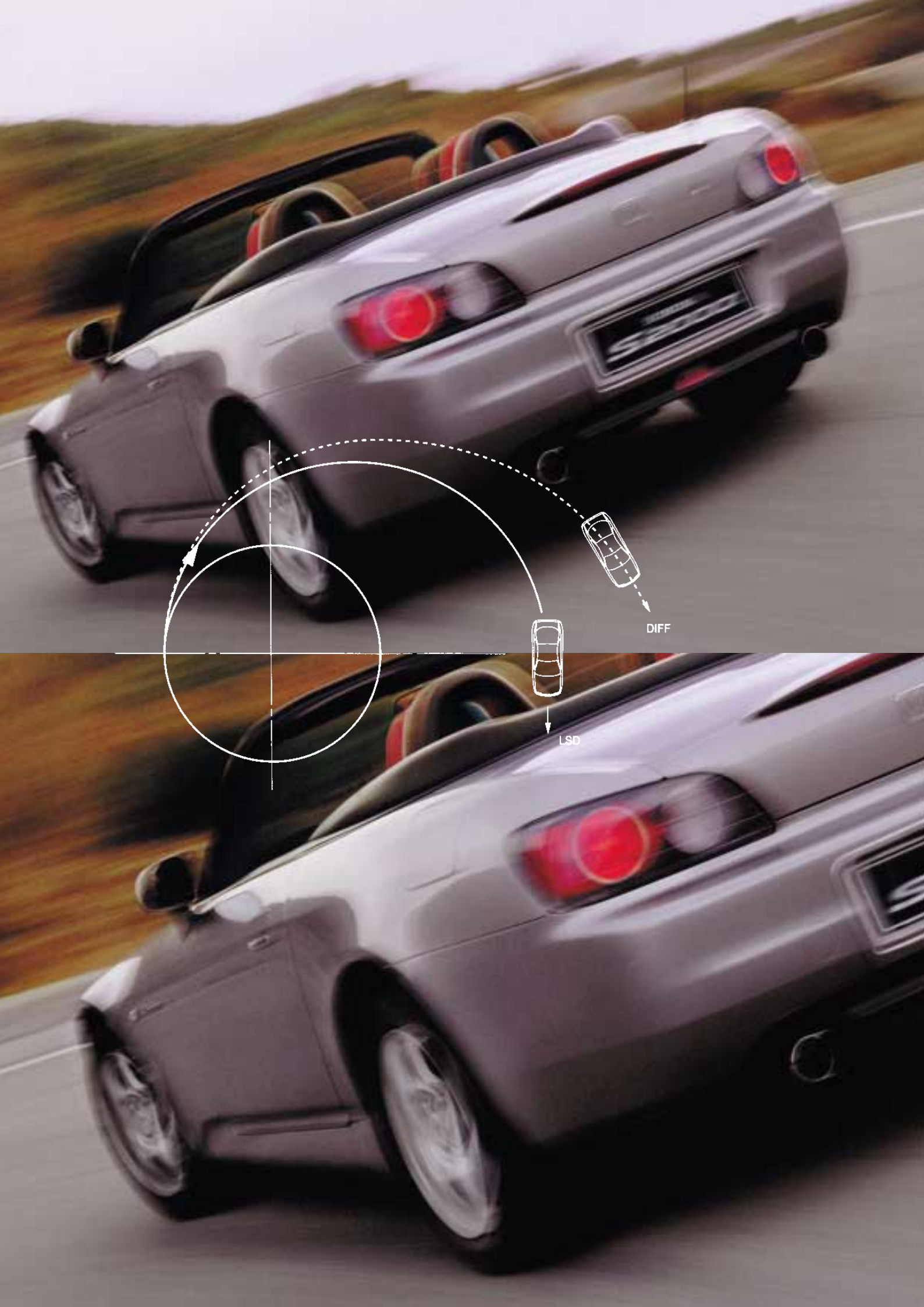


Like the engine, the six-speed transmission was another project with a clean sheet of paper, with the design objectives of being light and compact. The main aim of the engineers was to enable the driver to make very quick, smooth and low-effort shifts. To this end, the shift action is very short with movement of just 23 mm across the gate and 40 mm up and down it. The lightweight gears have double-cone synchronisation on first, third and fourth, whereas second has triple-cone synchronisation, to help smooth out the regular first-second shift pattern. To maintain full lubrication the box gets its own internal oil pump.

In front of the transmission is a lightweight, low-inertia flywheel which helps with smooth gear shifting by allowing the engine to pick up or lose revs quickly. Behind it is a very large diameter, and therefore very rigid, propshaft. A torque-sensing limited slip differential, similar to that used on the Honda Accord Type-R, Integra Type-R and NSX, is a standard fitment. This ensures that drive continues to both rear wheels even when one is spinning - in the wet for example.







Race car design *chassis and suspension*

Virtually every component in the Honda S2000 is unique to the model and the engineers set themselves the task of defining the ideal layout - in terms of chassis, suspension and the siting of the transmission - for a two-seater roadster. A solution that would excite the most demanding of drivers.

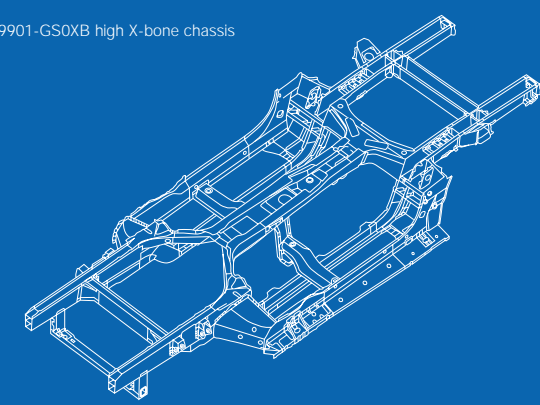
Chassis and suspension
Rigidity is a key element in the make-up of a world-class chassis. When the vehicle concerned is open top, achieving high levels of stiffness requires innovative engineering solutions. The conventional design route would be to add hefty reinforcement to an existing chassis, which was probably originally designed as a fixed-roof car. It is hard to imagine a more unsatisfactory or inelegant approach, adding weight, blunting performance and struggling with the resulting shortcomings.



The pursuit of rigidity is, of course, not just to prevent bodyshell shudder. A stiff platform allows the car's suspension and steering to operate correctly: twisting and flexing reduces the accuracy of the steering, unsettles the ride and can affect traction and, perhaps most importantly, handling precision.

The company's engineers, however, ensured that a radically new solution was developed for the age-old problem of building a rigid open-top car. The answer became known as the 'high X-bone frame'.

199901-GS0XB high X-bone chassis



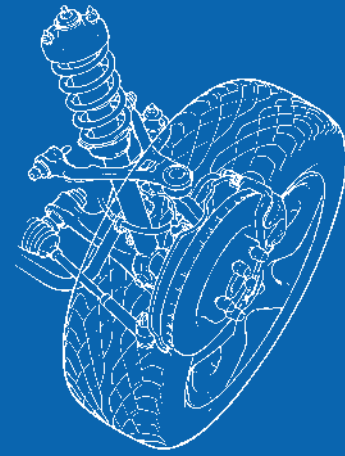
Responsive handling *chassis and suspension*

The Honda S2000's high X-bone chassis is based around three large, stiff box sections: the centre tunnel and the two sills. The latter are enormously strong, wide and tall - as tall as the centre tunnel, hence the 'high' in high X-bone. These sills are joined to the centre tunnel by four rigid cross members. Two run forward into the engine bay and two run from behind the cockpit: the 'X' of the X-bone. The result is a chassis that equals the stiffness of some of Honda's fixed-head cars.

Suspension solution

With a guarantee that the Honda S2000 drivetrain would be hooked up to a class-leading roadster structure, the company could confidently invest in a brand new and forward-thinking suspension system. It can be summed up in one word: precision.

Double wishbone suspension has long been a Honda signature and the basic principle is again exploited. It is a particularly pure engineering solution, being both compact and rigid. It also ensures the wheels move up and down at right angles to the road surface, keeping the maximum amount of tyre tread on the tarmac in all circumstances.



In-wheel double wishbone suspension

The engineers decided to design a new system - inspired by the NSX - that was even more compact and more rigid than existing set-ups. The result was the 'in-wheel' double wishbone which suspends the Honda S2000 from all four corners. By shrinking the whole wishbone layout and going to great lengths to specially shape the components, most of it is accommodated within the 16" alloy wheels.

Shorter wishbones mounted closer together provide a more rigid suspension set-up. The steering axis lying within the wheel also results in a quicker and more precise reaction to the driver's steering input.

The Honda S2000's dampers, which sit inside the coil springs, include a separate gas reservoir. This race-bred detail means that the damper can use a bigger piston, which in turn means that the car benefits from a much-improved ride quality.

Both the rear (255 / 50) and front (205 / 55) tyres have specially developed construction and compounds. Honda and tyre maker Bridgestone worked together to design the Potenza S02 especially for the Honda S2000.





Model shown is S2000 GT

A special place *the interior*

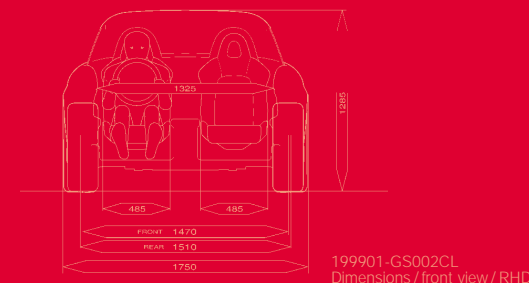
In keeping with the purity of approach in all other aspects of the design of the Honda S2000, the exterior styling and interior layout are a reflection of Honda's pursuit of the highest possible driving performance. The exterior has been stretched around the sophisticated underpinnings, which is why the shape is a reflection of the compact in-wheel suspension and set-back front engine layout. It is also vital that the interior design is governed by function and good ergonomic practice, especially when the vehicle in question is a serious driver's car. Which is why the Honda S2000 cockpit rejects gimmicky looks for forward-thinking function.

In a true performance car the seating position is extremely important. By placing the seats low, the driver has a proximity to the heart of the chassis that results in a feeling of 'oneness' when driving the Honda S2000. Feeling so closely connected to a car is what allows the driver to understand the chassis: input can be more accurately delivered and the chassis' reactions can be easily and quickly understood, especially when driving hard. The low-set seats and high-point sills and doors also engender a feeling of security and close connection with the car.



Honda's commitment to redefining the performance roadster was so focused that no existing components - switchgear or instrumentation - were considered. This completely fresh look at how a driver operates in a high-performance environment threw up such a fundamental reworking of the typical cabin, that the Honda S2000 stands out as an ergonomic benchmark.

Honda's inspiration comes from motorsports like Formula One, where the driver has to be able to assimilate information and operate all the controls instantly and preferably without taking their hands from the wheel. Figuring that the same applied to a serious and skilled driver, the designers decided to locate almost all of the switchgear within fingertip distance of the steering wheel, as well as improving the at-a-glance clarity of the instrumentation. The result is a marked departure in automotive cabin design with the bonus of a race car inspired starter button mounted by the steering wheel.





Pure sports feel *the interior*

At each side of the wheel are two pods, each topped with an air vent. On the left hand pod are the heating and air conditioning controls; on the right, the audio controls and the engine starter button. Between them is the digital instrument pack, semi-circular so it follows the shape of the wheel's rim. The operational logic is inspired. The direction and temperature of the heater is controlled by rotating knobs and the fan speed by a sequential rocker switch. Air conditioning and recirculation activation is by push-push switches.

Pressing the 'audio' knob switches between CD and radio, rocking from left to right scrolls up and down through stations or tracks. Another sequential rocker switch controls the volume. Under the audio knob is the large, red starter button. This is sheer theatre: twist the ignition key, then press the button. It's a race car ritual.

The switch to digital instruments is equally well thought out. The rev counter is rendered as an arc around the top edge of the binnacle. It retains one of the advantages of the conventional needle: being able to 'see' the car's acceleration as the indicator 'sweeps' towards the red-line.



Under the arc the speedo displays large digital numerals which are easier to read at a glance than a needle and tiny numbers. For all its functional simplicity, the Honda S2000 is not without its flourishes: an aluminium-leather combination gearlever, aluminium foot pedals, beautiful leather wheel, aluminium kick plates, sculpted leather sport seats, CD as standard and a heated glass rear screen.

The only switchgear not dash-mounted sits on the centre console. The hazard and heated window switches are by the gearlever as is the activation for the electric hood. Like everything about the Honda S2000, this is beautifully designed, raising itself in just six seconds.





0 mph
000044

0.0

SRS
AIRBAG

ENGINE
START

CH

MUTE

+

VOL

-

ALOID
CONTROL

MODE
PUSH

A/C

+

-



HONDA
S2000



High performance *active and passive safety*

Because the central section of the steel monocoque is very stiff, it allows the Honda S2000 crumple zones to deform in a more effective and controlled manner. The fact that the car's massive box-section sills and centre tunnel are joined by substantial load-bearing members is another crucial aspect of the car's passive safety performance. In the event of a side impact, not only is the occupant protected by the sheer physical size and strength of the sill section, but also its connection to the centre tunnel means the force of the impact is transferred from the sill and into the chassis' centre tunnel.

The result is that the crash forces are routed around the occupants and absorbed by the chassis, reducing the shock experienced by the passengers. The integration of the sill and centre tunnel structure has been dubbed the 'load dispersion frame layout'.

The engineers - aided by powerful computer simulations - also used the stringent European NCAP crash test regime as a guideline when addressing the crash protection offered by the Honda S2000.

Having exercised such detailed attention to front and side impact protection, Honda was not going to ignore the potential hazard of a roll-over. Like many other roadsters, the Honda S2000 has heavily reinforced windscreen surrounds, achieved by sandwiching a steel tube made from high-strength alloy steel in between the pressings. But unlike some other roadsters, the Honda S2000 also wears heavy duty roll bars behind each seat. These internally reinforced steel loops are fixed directly to the car's chassis members, making for very secure roll-over protection.

Driver and passenger airbags are standard on the Honda S2000, as are seatbelt pretensioners, which tighten to help secure the occupants more firmly into their seats in case of impact.

Of course it's to be hoped that the Honda S2000 braking system will stop the car before any impact can take place. Despite the complexity of 'in-wheel' suspension, the engineers have managed to install massive 300 mm ventilated disc brakes on the front wheels of the car and 282 mm discs on the rear. Naturally anti-lock brakes come as standard.





New Formula Red (Ascari Red)



Nurburgring Blue Metallic



Imola Orange Pearl*



Silverstone Metallic exterior with red dash and red leather

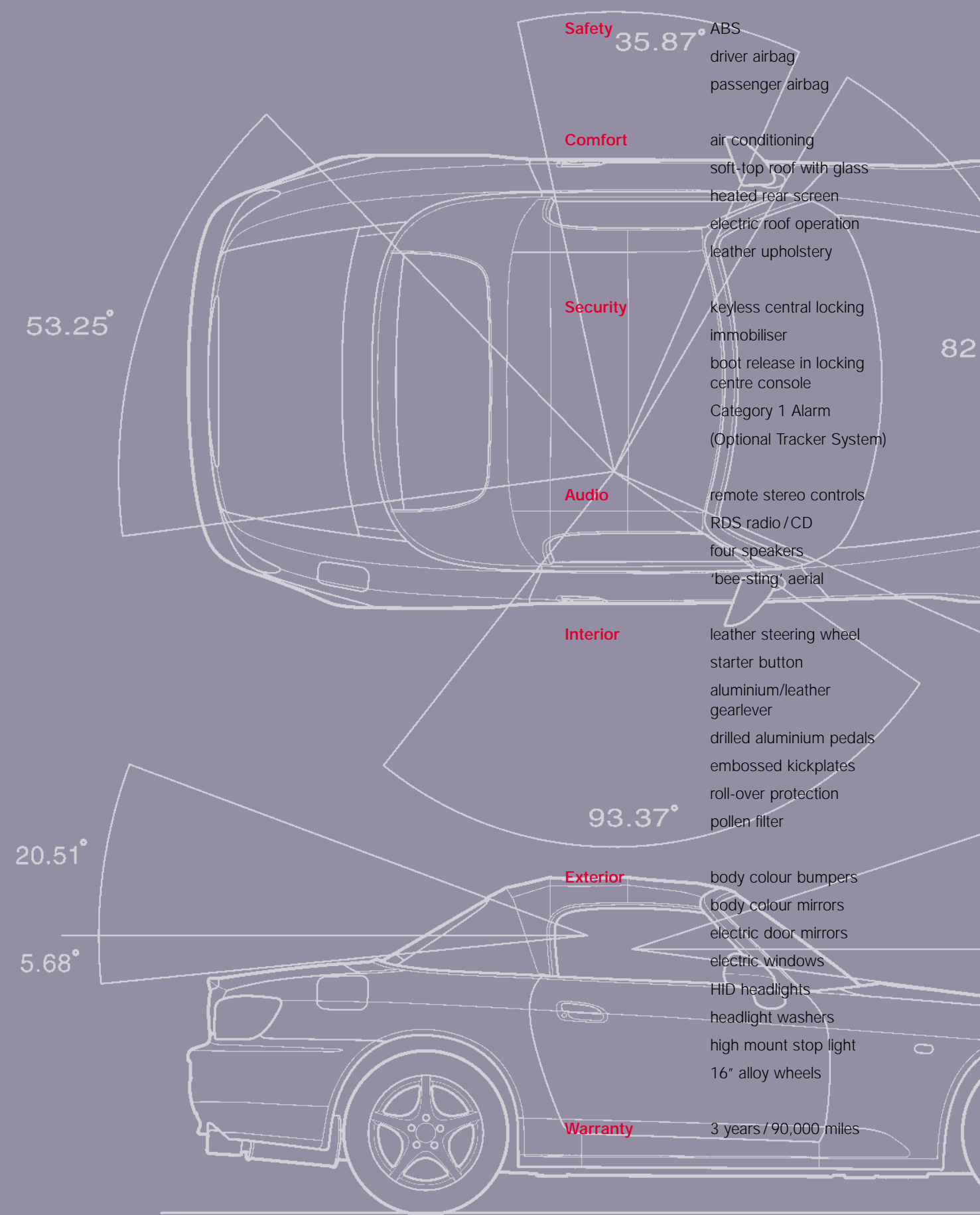


Nurburgring Blue Metallic exterior with blue dash and blue leather



Blue soft top cover

Standard features



Honda S2000

the options

The Honda S2000 - the most dynamic and stylish car in its class. Carefully selected options have been designed to personalise your vehicle and complement the already high standard of specification.



Side skirt



Rear boot spoiler



Wheel arch lower skirt



Full body cover



Front spoiler skirt



CD changer



Utility net



Floor carpets

ENGINE START

This is only the beginning

You don't want promises, policies or pieces of paper - you want results. When something goes wrong, you want it fixed. Better yet, you'd rather nothing went wrong in the first place. You need help, advice, reassurance - this is a big thing you're doing here.

These are not unreasonable demands in this day and age. Odd, then, that we seem to be the only people who think buying a car should be easy. Satisfying. Even, dare we say it, fun.

We start from a position of strength by building our cars to exceedingly high standards. But we take nothing for granted. Every new Honda is covered by a three-year, 90,000-mile mechanical warranty. One call to Hondacare Extended Warranty on 01992 653399, and you can make that up to six years.

Once you've chosen your new Honda, there's the small matter of paying for it. No problem - Honda Finance packages are tailor-made to suit your budget and circumstances. We can even do you a competitive insurance package.

Before it leaves the forecourt, your new Honda undergoes an 80-point pre-delivery inspection, and we don't let it out of our sight until all the paperwork's sorted, and you're happy with how everything works. Should anything stop working, whether you're on the road, at home or even in Europe, three-years' free Hondacare Assistance membership means you'll never be left stranded. If it's something more serious, the Honda Accident Helpline on 0800 521728 will have your vehicle recovered, and put you in touch with the nearest Honda Approved Bodyshop.

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Beyond expectations