INTRODUCTION

The Vigor sports sedan is the fourth model in the Acura line of advanced performance automobiles. It offers personal sports sedan buyers the unique blend of performance, sophistication and advanced technology that is characteristic of all Acura automobiles.

The Vigor occupies a position between the Integra 3- and 4-door sedans and the Legend Sedan and Coupe. The Vigor is targeted to appeal to the kind of driver who wants a balance of performance and understated luxury.

CONCEPTS AND GOALS

The Vigor is designed to provide:

- Excellent performance in terms of acceleration, a flexible, responsive engine and crisp shifting.
- An excellent level of safety in terms of both active and passive safety systems.
- A subtle, understated luxury environment that complements the driving experience.
- Aggressive but refined cornering characteristics, stable and accurate response to steering input.
- Sporty but sophisticated styling, high levels of quality in fit and finish and a rigid structure for occupant protection and reduced interior noise.
- A low-stress driving environment.
OVERVIEW

The Vigor is equipped with a longitudinal drivetrain layout. By employing this configuration, the Vigor is able to achieve a 60/40 weight distribution, the ideal weight balance for a front-wheel-drive car.

The Vigor is powered by an inline 5-cylinder engine equipped with a single overhead camshaft, four valves per cylinder, Programmed Fuel Injection (PGM-FI), a two-stage intake manifold, electronic ignition and dual knock sensors. The engine produces 176 hp and 170 lbs-ft of torque. A newly developed hydraulic engine mount system helps to reduce noise and vibration. A 5-speed manual is standard. An electronically controlled 4-speed automatic with lockup torque converter and a low-hold feature is optional.

The Vigor features 4-wheel independent double-wishbone suspension. The Honda R&D-designed Anti-Lock Braking System (ABS) is standard. A driver's side Supplemental Restraint System (SRS) air bag is standard in the LS model, while the GS features a driver's and passenger's side air bag system. Also standard on both models is a direct clamping seat belt mechanism for both front seats.

Structurally, the Vigor body represents the latest developments in body design and construction. It features a front frame rail structure designed to impart optimal torsional rigidity and help dissipate impact loads in order to prevent them from intruding into the passenger compartment.

The Vigor is available in two trim levels — LS and GS. The LS model is fully equipped with air conditioning, wood trim and a leather-covered steering wheel. The more luxurious GS model adds leather-trimmed seats and door inserts, a power moonroof, a power driver's seat and the innovative DSP audio system.
OVERVIEW

The engine of the Vigor is a compact, all-aluminum inline 5-cylinder equipped with a single overhead camshaft, four valves per cylinder, Programmed Fuel Injection and a dual-stage intake manifold. It produces 176 hp at 6300 rpm and 170 lbs.-ft. of torque at a very low 3900 rpm.

The standard transmission is a 5-speed manual with a rod-activated shifter mechanism. An electronically controlled 4-speed automatic is optional.

The longitudinal arrangement of the powertrain achieves a number of desired goals. It creates an ideal 60/40 weight distribution for excellent handling and turn-in response. Also, it allows the use of softer engine mounts which reduce the level of noise and vibration reaching the cabin. By tilting the engine 35°, the engineers were also able to achieve a low hoodline for maximum visibility and a reduction of frontal area to reduce aerodynamic drag.

BENEFITS OF AN INLINE 5

Initial experiments with an inline 5 engine indicated tremendous potential. Since it is only slightly longer than an inline 4, it could easily be packaged in a longitudinal location and leave adequate space for a properly designed double-wishbone suspension. It provided ample low-end torque and direct, linear response at all levels of the power band. It is also lighter than an inline 6 or V-6 and in some cases more powerful.

VALVETRAIN

The Vigor engine features four valves per cylinder to optimize performance and improve breathing at all points in the power band. In order to achieve packaging efficiency and reduce weight, the valvetrain uses a single overhead camshaft design.

STAINLESS STEEL EXHAUST SYSTEM

To reduce weight and to improve durability the exhaust system is constructed of seamless stainless steel.
The Vigor inline 5 engine is tilted to the right, 35° from vertical. This has allowed the engineers to design a manifold with long, tuned intake runners to optimize engine breathing. Based on technology developed for the NSX and the 1991 Legend, the intake manifold is a dual-stage design to increase both low-end torque and high-end horsepower.

Below 5000 rpm, the cylinder is fed by the primary runner. Above 5000 rpm, however, the engine vacuum opens a butterfly valve, allowing the passage of air through a secondary runner. This increases the volume of air entering the combustion chamber and also produces an inertia ram-tuning effect for more complete cylinder filling, increasing both horsepower and torque.

**PROGRAMMED FUEL INJECTION (PGM-FI)**

The new Vigor engine is fueled by the Honda R&D-engineered PGM-FI sequential port fuel-injection system. The system, which is controlled by a microprocessor, meters fuel on the basis of continuous information gathered by the array of engine sensors. By making thousands of calculations per second the system constantly adjusts the air/fuel ratio to maintain it at the peak of driveability, power, fuel economy and within acceptable exhaust emissions.

**KNOCK SENSORS**

The Vigor engine is equipped with two knock sensors, located on the engine block below the intake manifold. If a sensor detects engine knocking, it sends a signal to the microprocessor which in turn adjusts the engine timing. This system allows the engine to operate safely with low octane fuel, but with a reduction in power. Premium unleaded fuel is recommended.
HYDRAULIC ENGINE MOUNTS

A total of six mounts support the powertrain: two at the forward edge of the engine, two on the forward edge of the transmission and two more located in the middle of the transmission. Of these six, the two on the engine are of a new hydraulic design.

The hydraulic mounts damp out engine vibration by transferring fluid through a restricted orifice in response to engine movement, much like a shock absorber. The fluid inside the chamber has been tested in extreme conditions and won't freeze in cold weather or deteriorate in a hot environment.

TRANSMISSIONS

The standard Vigor transmission is a rod-actuated, 5-speed manual fitted with a pull-type, hydraulic-operated clutch. To enhance reliability and durability, internal oiling of the manual transmission is provided by a built-in, forced lubrication oil pump.

An electronically controlled 4-speed automatic transmission is optional. To achieve the desired smoothness, all shift and torque converter lockup functions are electronically controlled by means of the transmission's 32K microprocessor. This computer is linked to the 48K engine-control computer. On the basis of various operating conditions such as throttle angle, coolant temperature, vehicle speed and engine speed, the microprocessor controls shift speed and torque converter lockup.

To help achieve smooth shifting, the ignition is programmed to retard momentarily during upshifts and downshifts in order to reduce engine torque on the transmission's shifting elements. By now retarding ignition timing on upshifts in addition to downshifts, shift smoothness is further improved. The transmission also features a low-hold clutch. This system will hold the transmission in first gear, something drivers will find useful for trailer towing and for steep uphill or downhill driving.

The housings of the manual transmission, the optional automatic transmission and the differential are all cast in aluminum, to help keep the weight of the powertrain to a minimum.
OVERVIEW

A double-wishbone suspension is employed for the Vigor, a system based on the design used in Formula One racing. The suspension system is similar to that used in all other Acura automobiles.

The Vigor uses relatively soft spring rates, fairly firm compression and rebound damping rates and long wheel travel. The conventional approach of using significantly higher spring rates produces a suspension which may subjectively feel aggressive and sporty, but in fact provides compromised road holding and produces a number of undesirable characteristics.

The suspension engineers were aided in their goals by the extremely favorable 60/40 front/rear weight distribution, a weight bias which, in testing, was determined to be the ideal for a front-wheel-drive car. This weight balance was made possible by the longitudinal drivetrain.

FRONT SUSPENSION

The front suspension comprises an upper and lower control arm, a single rate coil-over shock absorber mounted to the lower control arm, a radius rod and a tubular stabilizer bar.

The shock absorber is nitrogen gas-pressurized and is fitted with Honda’s patented HPV valving system. The HPV valve uses a specially tuned disc to control the fluid flow rather than a fixed orifice. By using this type of valve the suspension engineers were able to tune the damping force precisely to achieve a fine balance of handling and ride quality.

REAR SUSPENSION

The rear suspension features one upper and two lower control arms, a single rate coil-over shock absorber mounted to the rear hub carrier, a trailing link to provide longitudinal location and toe-control, and a tubular stabilizer bar.

Unlike the front shock absorber, the rear uses the Showa-designed NSV valve. This valve, with a specially calibrated orifice design, best accomplished the ride and handling goals the engineers had targeted.
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CHASSIS

SPEED-SENSITIVE VARIABLE POWER-ASSISTED STEERING

To achieve the best balance of feel and assist, the Vigor is equipped with a single ratio, speed-sensitive variable power-assisted steering system.

BRAKING SYSTEM

Braking is provided by a power-assisted four-wheel disc system equipped with a dual-diaphragm master cylinder. The front rotors are internally ventilated to aid in rapid heat dissipation. They are 282 mm in diameter (11.1 in.); the solid rear discs are 260 mm in diameter (10.4 in.).

ANTI-LOCK BRAKING SYSTEM (ABS)

The Anti-Lock Braking System (ABS) features four wheel-speed sensors and three channels. The system exercises independent control over each of the front wheels and controls the rear wheels as a single unit.

WHEELS AND TIRES

To reduce unsprung weight and enhance the handling, the Vigor is equipped with 6.0 JJ x 15-inch cast-alloy wheels.

The tire specification is 205/60R15 91H M+S All Season and will be supplied by both Bridgestone and Yokohama.
OVERVIEW

The Vigor unit body represents the latest developments in structural design and technology. The design of the chassis and exterior panels involved the use of NASA's NASTRAN Computer Aided Design process. The use of this system allowed the engineers to design a structure with the highest rigidity but at the same time control the overall weight of the vehicle. The construction of the body includes a number of innovations and technology features such as the honeycomb floorpan and headliner.

RADIUSED FRONT FRAME RAILS

The forward-wheel design afforded by the longitudinal engine placement has allowed the creation of a unique front frame rail design. The front frame rails are radiused as they meet the front bulkhead. This design imparts high torsional and bending rigidity to the body and also maximizes front impact protection by dissipating the loads over a wider area and by directing the load downward toward the floorpan.

HONEYCOMB FLOOR STRUCTURE

Instead of a conventional steel stamping for the floorpan, the Vigor floorpan uses an 18 mm thick honeycomb sandwich. It consists of a resin-impregnated honeycomb material trapped between two layers of zinc-coated steel. This structure imparts considerable strength to the floorpan. In addition to maximizing rigidity, the honeycomb material also serves to block out noise and vibration.

HONEYCOMB HEADLINER

The same concept was used for strength in the roof and to reduce the noise level in the cabin. The roof uses a similar impregnated resin material, and is sandwiched between two layers of resin felt. The honeycomb roof structure is only used on models that are not equipped with a sunroof.

PERIMETER ROOF RAIL

A new perimeter roof rail system was designed to maximize the structural rigidity of the roof. The rail securely ties together the six body pillars and serves to help resist torsional forces imposed on the body such as those encountered when only one wheel encounters a bump. This improves handling precision, as well as reducing the possibility of squeaks and rattles.
ANTI-CORROSION MEASURES

To ensure maximum corrosion protection, 90% of the Vigor panels are galvanized (zinc-coated). Most panels are galvanized on both sides. A special anti-chipping primer is applied in key lower areas of the body, where paint chipping is most likely to appear. Also, a plastic sheet is installed at the leading edge of these areas to further resist damage from stones or debris. To resist the possibility of rust forming in hollow body cavities, such as the rocker panels, a special anti-corrosion wax is injected during the assembly process.

PAINT AND FINISH

From bare metal body to the final inspection stage, the Vigor undergoes a careful 23-step, 3-coat, 3-bake painting process to help ensure a smooth, flawless finish.

SOUND INSULATION

In order to provide a quieter cabin environment, the Vigor has received a number of noise-reducing improvements. Additional sound-absorbing insulation material has been added to the rear floor area, wheel wells, parcel shelf, bulkhead and spare wheel well. Even the tires have been re-engineered to reduce road noise.
INTERIOR

The Vigor features a sporty, intimate cabin designed to enhance the car's performance potential. The designers achieved this by human-oriented design and by careful selection of appropriate materials. The interior is designed to provide high levels of luxury, low interior noise and vibration and excellent occupant protection.

MATERIALS

In LS models the upholstery material is a rich moquette fabric; the steering wheel is covered with leather. Leather trim for the seats, steering wheel and door inserts is standard in the GS model. Both LS and GS models have close-grained wood panels on the instrument panel and on the front and rear door inserts.

INSTRUMENTS AND CONTROLS

The proper design and the correct location of instruments and controls is extremely important in the creation of a driver-oriented cockpit. To minimize the amount of time a driver's eyes leave the road, all controls are carefully located, designed to be easy to reach and easy to activate.

The instrument cluster presents the driver with large, easily legible, white-on-black analog dials. Primary controls for lighting, wipers and washers are logically located on steering column stalks for quick access and activation.

AIR CONDITIONING AND HEATING

The standard air conditioning unit is powerful, efficient and extremely compact. It is 16% smaller and 6.5 db(A) quieter than units of comparable cooling capacity at maximum fan speed.

SEATS

The seats were designed to provide excellent fit and comfort, proper anatomical support and appropriate form fitting to keep the driver firmly in place during transient maneuvers. The construction methods and materials used help ensure that the seats won't sag over the life of the vehicle. In GS models, the driver's seat features a power adjustment for fore/aft and rake and an additional manual control for lumbar adjustment.
AUDI O SYSTEMS

The standard audio system in the Vigor LS is a 20-watts-per-channel 8-speaker arrangement. Speaker selection and location were determined on the basis of the best sound propagation and imaging. There are two 6x9-inch full-range speakers on the rear deck, one 6.5-inch full-range speaker mounted on each front door, two 1.5-inch tweeters on the dash top and two 2-inch midrange speakers located in the headliner.

The Vigor LS system features an electronically controlled AM/FM stereo/cassette. An anti-theft system renders the unit inoperative if it is removed from the car, until the proper five-digit security code is entered. A compact disc changer is available as a dealer-installed option.

DIGITAL SIGNAL PROCESSOR

An innovative Digital Signal Processor (DSP) audio system is standard equipment on GS models only. The DSP microprocessor conditions the signal by varying the amount of delay and level of reflection to re-create six different listening environments. The listener has a choice of six different aural environments: Club, Studio, Hall, Arena, Cathedral and Den.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) AIR BAG

All Vigor models feature a driver’s side air bag while the GS model also features a passenger’s side air bag as standard equipment. The Supplemental Restraint System (SRS) air bag is intended to supplement the seat belt in the event of a collision. To ensure durability and reliability, the electrical connectors for the system are gold-plated.

The seat belts of the Vigor use a direct clamping mechanism to grip the belt near its exit from the reel. With this system, the belts effectively stay tight on the occupants, helping to reduce forward movement in the event of an impact.