

# fact sheet

United States  
Department of Transportation

Office of Public Affairs

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The information contained in this fact sheet has been checked for accuracy and corrected as of the date shown below. The Office of Public Affairs should be contacted if further information is required.

Subject: Calspan Research Safety Vehicle/Turbocharged Engine

Date: October 1980

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A research vehicle designed and built by the Advanced Technology Center, Calspan Corporation under contract to the U.S. Department of Transportation National Highway Traffic Safety Administration. Chrysler Corporation was a major subcontractor for automotive design work and Volkswagenwerk, AG was responsible for the advanced engine and transmission.

**Purpose:** The Research Safety Vehicle Program is designed to demonstrate that substantially improved safety, good fuel economy and low exhaust emissions can all be achieved in an attractive, comfortable and affordable family passenger car. Technological data developed in building the car will support automotive standards for safety and fuel economy for the mid-1980's.

**Design Approach:** Develop a vehicle suitable for family transportation with emphasis on improved crash safety and anticipated production technology to meet the need for mid-80's regulations. The design reflects an evolution of a Simca introduced in Europe in 1976 and an advanced turbocharged engine.

**Safety Features:** Crashworthiness -- The vehicle structure, restraint systems and interior padding are designed to protect occupants at crash speeds of over 40 mph in front collisions, and over 45 mph in side and rear collisions. The front structure also is designed to reduce impact forces on smaller, lighter cars. There is an air bag on the driver's side and an automatic air belt for the front seat passenger.

Collision Avoidance -- High mounted rear lights, new lightweight single beam plastic headlights, with automatic load level adjustment, and flat-proof tires that eliminate need for a spare tire and hazardous roadside tire charges will help avoid accidents. An anti-skid braking system improves stopping distance on wet pavement over 25 percent and provides capability to steer the vehicle under maximum braking.

Pedestrian Protection -- A plastic foam front end replaces all conventional front end components in front of the radiator and, in combination with an aluminum hood, significantly reduces impact injury to pedestrians at speeds up to 20 mph.

**Damageability:** The front and rear bumpers are made of resilient foam and are designed to protect the RSV against damage in 5 mph barrier impacts. These soft bumpers also significantly reduce damage to other cars in low speed collisions.

**RSV Fuel Economy Design:** Good fuel economy performance is dependent on the car's weight and aerodynamics, as well as on engine and driveline design. The Calspan RSV utilizes lightweight materials, including high strength steels, aluminum and plastics to attain a curb weight of only 2675 lbs (1213 kg). Full scale wind tunnel tests were used to design the car for low aerodynamic drag and tests at Volkswagen's tunnel indicated a drag coefficient ( $C_D$ ) of 0.36. Fuel economy with the VW turbocharged engine and 5-speed transmission measured in the EPA tests was 26 (city)/43 (highway)/32 (combined).

**Engine Emissions:** An advanced emission control system using a feedback controlled Weber carburetor and a three-way catalyst (Pt/Rh = 5/1) was developed by VW for this engine. Low mileage research tests of the installed engine for U.S. EPA emissions resulted in .13/3.0/0.6 gms/mi for HC/CO/NO<sub>x</sub> indicating that production goals of .41/3.4/1.0 are attainable. All tests were run at 3000 lbs. inertia test weight with Goodyear flatproof tires.

**Highway Performance:** With this engine/transmission in combination with the emission controls the RSV provides the following performance:

Safe passing (25 - 60 mph): 8.7 sec. (2nd gear)  
Gradeability: 41.7%  
Acceleration (0 - 60 mph): 12 secs.

### General Specifications

Body Type: 4-door hatchback with fold down rear seat  
 Wheelbase: 105.7 inches/2685 mm  
 Overall length: 177.8 inches/4516 mm  
 Overall width: 67.0 inches/1702 mm  
 Overall height: 53.1 inches/1349 mm  
 Curb weight: 2,675 pounds/1213 kg  
 (58% F, 42% R)  
 Tires: 185/70-13 Goodyear flat-proof (No spare required)  
 Brakes: Diagonal split disc/drum or optional Bendix Anti-skid  
 Brake System.  
 EPA Interior Space: 95 cubic feet  
 EPA Cargo Space: 19 cubic feet  
 (Rear seat up, cargo well)  
 Suspension: Front: Unequal length upper and lower control arms  
 with torsion bar springing and front sway bar.  
 Rear: Trailing link coil spring with sway bar.  
 Aero Drag:  $C_D = 0.36$

### Engine/Driveline Specifications

Displacement: 1.6L, 4-cylinder  
 Gear Ratios: 1 2 3 4 5  
 3.45 1.94 1.37 0.97 0.76  
 Axle: 3.476  
 Power: 78 kw (105 HP)  
 Torque: 139 Nm  
 Emission Control: Feedback Weber carburetor, second stage controlled  
 Catalyst: Three-way catalyst, Pt/Rh = 5/1  
 Maximum Boost Pressure: 1.6 bar  
 Air Injection: None

### Adaptive Braking System Specifications

Speed Sensors: Reluctance pickup for toothed gear rotating with each  
 wheel.  
 Brake Fluid Pump: Electric motor driven single piston pump.  
 Pressure Modulators: One pressure modulator each front brake; two  
 simultaneously controlled rear wheel modulators,  
 one for each diagonal system.  
 Control: Electric Control Unit (EVC) controls each front wheel  
 brake and both rear wheel brakes based on lowest rear  
 wheel speed.



CALSPAN RSV