

# ICP TECH TEST

# MORE FROM VOLVO



Volvo's luxury sedan—the four-door 164—remains at the top of their product line for 1975. While exterior styling is essentially the same, many engineering refinements have been made including redesigned rear suspension, new electronic ignition and redesigned seats. Below, Volvo's new 240 Series cars for 1975 are easily identified by the new front end shape, designed to provide greater crash protection and not simply as a styling change.



**With a new front end, some different model designations and a couple of other tricks, the '75 Volvos are here**

BY ALEX WALORDY



**V**OLVO'S '75 PREVIEW got its kick-off at Bob Bondurant's Driving School, up at the Sears Point racecourse, near San Rafael, California. It was as good a place as any to demonstrate that Volvo is more than just another deluxe family sedan. It did well on the twisty, hilly course, and later proved that it could also handle all the wet mountain roads from Frisco to Carson City, Nevada, up one side of the mountains and down the other. It is certainly a car where handling far exceeds the availability of power, so that it would be difficult, if not impossible to



A catalytic converter is used on all California cars, but not in the other forty-nine states. Three bolt flanges allow quick replacement. Cavernous 240 trunk has standup room for the spare and can gobble up suitcases, briefcases and camera gear with room to spare.

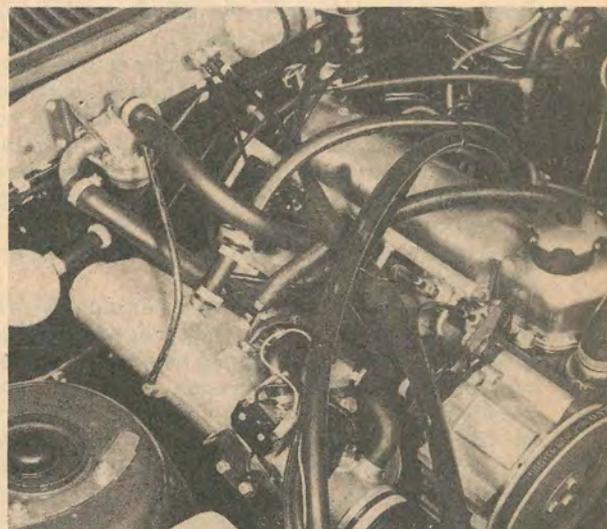
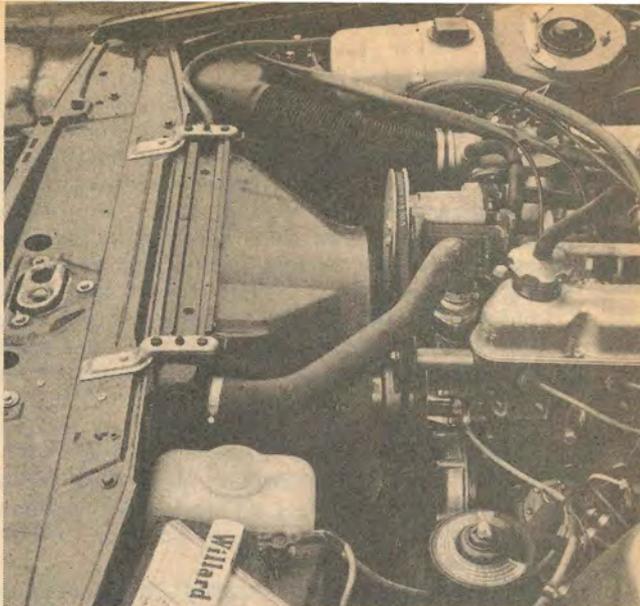
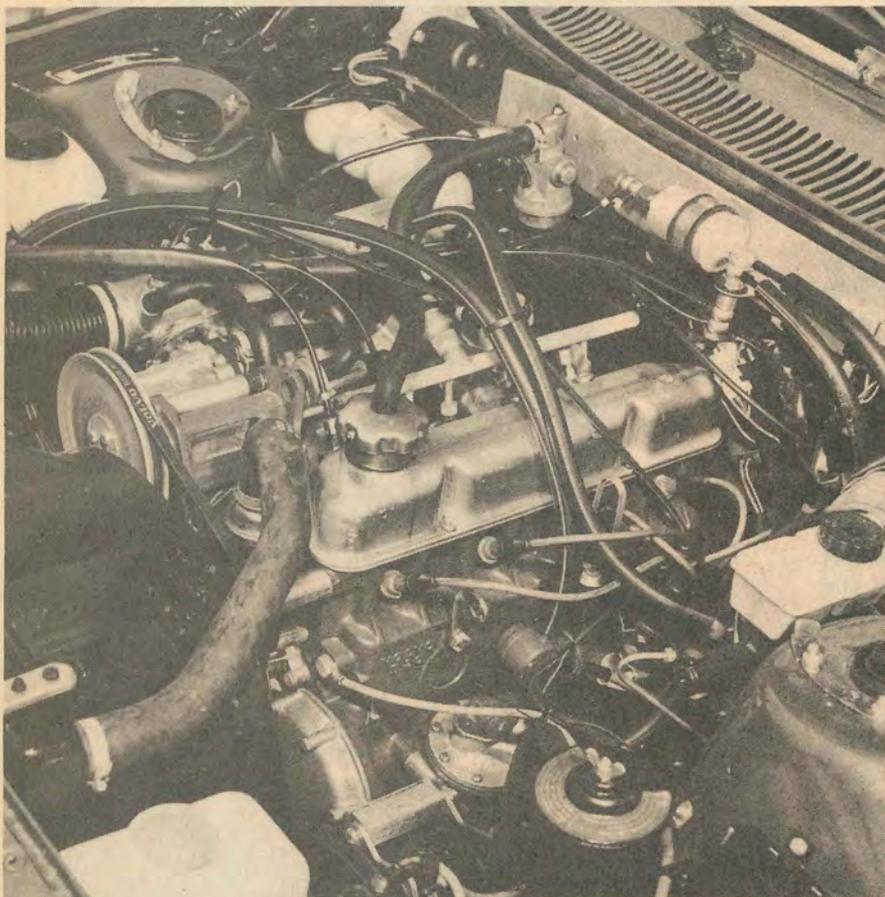


get yourself in trouble without really trying.

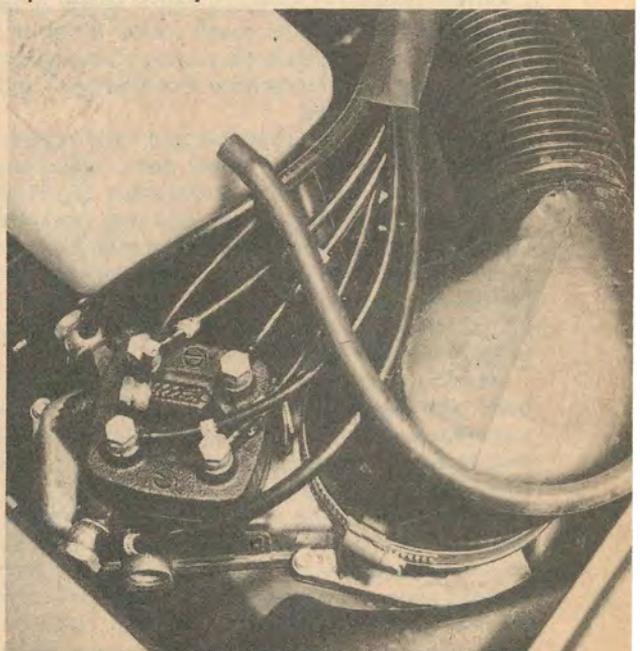
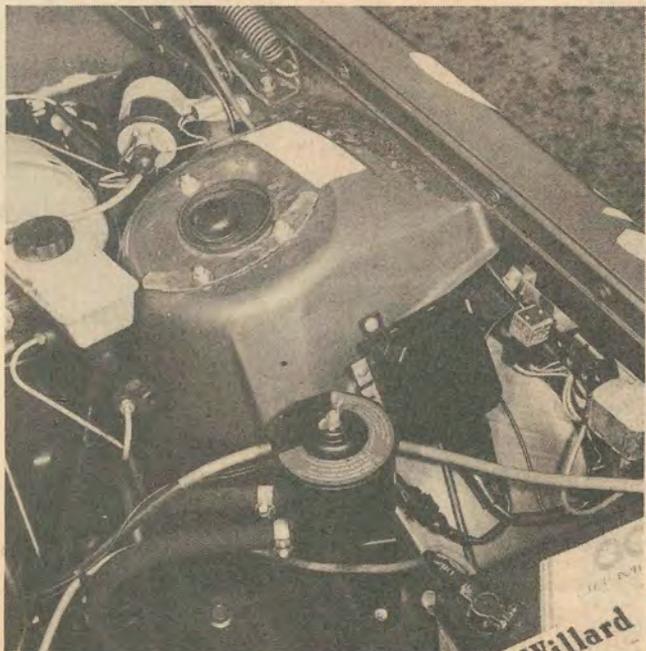
The new 240 Series supersedes the previous 140's, but retains the same general numbering system, with the last digit indicating the number of doors and the middle one the amount of cylinders. In addition, the Volvo array is subdivided into DL's which is the standard version and the GL that includes a very useful overdrive as well as a tach and other amenities such as special wheels and metallic colors and a sun roof.

The current crop of do-good car legislation reaches most machinery in ways it wasn't intended to, and the current rage for armor plated ram-them-and-sink-them bumpers has done styling little good, if any. Volvo fared

The new 240 Series includes a 242 GL two-door as well as a 244 GL four-door and straight DL 242's in two-, four-, and five-doors (wagons). Drainage grills under the headlights keep snow from accumulating. Comfortable seats have side wings to hold you in place, and a lombar adjustment for the small of your back, as well as the tilt and swings. The sturdy two liter push rod engine is available for North American consumption, and Volvo Western stocks an ample amount of performance goodies for it. At the bottom of this page you can see that all of the electrical components are grouped next to the battery for easy service, and the coil is mounted in a cool corner back of the shock tower.



From top, note the large flex hose leading from the fuel injection metering body to the ram intake manifold. The throttle is mounted at the inlet of the intake manifold (center), and you can see a small bypass arrangement with a knurled knob that serves as the engine idle speed setting. Below, the metering unit senses air flow going to the engine and proportions a corresponding amount of fuel to the injectors. An individual pressure regulator for each cylinder equalizes fuel delivery.



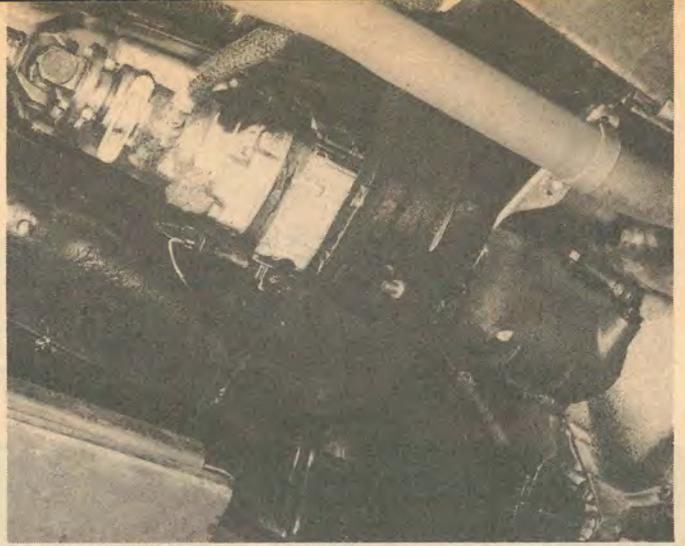
relatively unscathed in this respect, though length, weight and cost grew all out of proportion with the returns. Overall styling is clean with an emphasis on comfort. This leads to a tall roof line with head room for full sized Vikings and to a trunk with a reasonably flat floor that measures a full five feet across, not to speak of a 43 inch depth. Two small wheel wells, one built into each of the rear fenders, is all it took to get the spare out of the way, which is more than we can say for many of the domestics. Other functional features include full frames for the door glass, doors that close solidly, and recessed door handles. Up front, the thoughtful Volvo stylists have added little grills under the head lights so that snow and ice will not block them off. In Europe, incidentally, Volvo uses a rectangular head light with a built-in wiper and a covering glass. They throw more light and are safer, but we are too busy concentrating on catalytic converters to pay attention to little things like that.

The interior is just as detailed. For instance, we went through a series of skid school demonstrations at the Bondurant School, using the Volvos, and those seats hold you in a remarkable fashion. You sort of sink in the middle and get enveloped. The sides are firm enough to hold you in almost any toss and turn situation and they stayed just as comfortable after five and six hours of straight driving. Seating room is ample, front and rear. For some reason Volvo picked a very wide center console which takes away from wiggle room but then they made up for it by adding quite a collection of control buttons, warning lights and a superb AM-FM and tape deck radio.

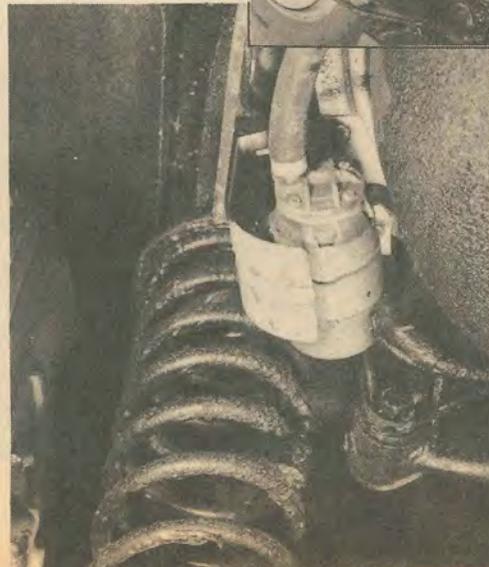
Last year, bumper height regulations caught Volvo on the end of a model run and they proceeded to meet the problem by working with spring heights, since there was no rational lead time to redesign a complete body. The tall springs made for a comfortable ride, but added lots of roll in the corners. For '75 the bumpers wound up at the right height and the springs returned to their handling function. As a result, there is much less roll. Also, the steering response improves considerably. The new power steering, which is supplied to Volvo by TRW has remarkable centering characteristics. You can drive on a freeway barely making any corrections at all, and yet you can take precise evasive maneuvers with full road feel. The power steering gives you 3.5 turns lock-to-lock as opposed to 4.3 on the manual, and also provides a certain amount of damping action which is very welcome when traveling on rough roads. A pair of universals on the steering post, plus a sound absorbing rubber coupling connect the forward mounted rack and pinion to the steering wheel.

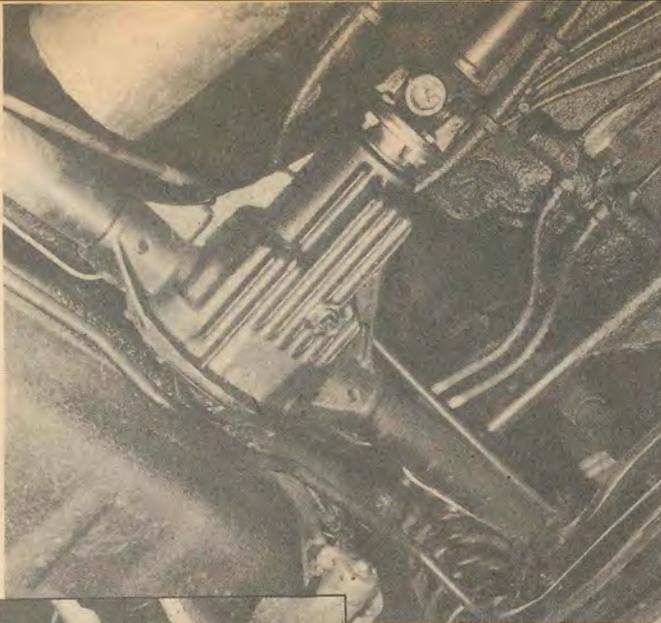
Contributing to the road feel and handling were a set of 185-14 Michelins with steel belts. Volvo engineers tell us that no less than 96 individual tire brands are used, all of them steel belted, and that the belts insure better uniformity, apart from any of their other benefits. Under normal road conditions they are kept at around 28 pounds, but for tooling around Bondurant's road course, the pressures were up to 36 pounds without noticeably detracting from the ride.

Handling really begins with a sturdy, shake-free unit body with many galvanized cross members and reinforcements built into the structure. The result is a shake free body car which provides a good tie in for the suspension pieces. This is complimented by a big bolt-on crossmember for the front suspension and the engine mounts. Normally, the engine mounts at the side of the engine allow it to rock, but don't restrain it from going forward except in extremes. Here, they are designed to cushion both in roll and fore and aft. There is even a hard rubber mount fastened to the cross member which

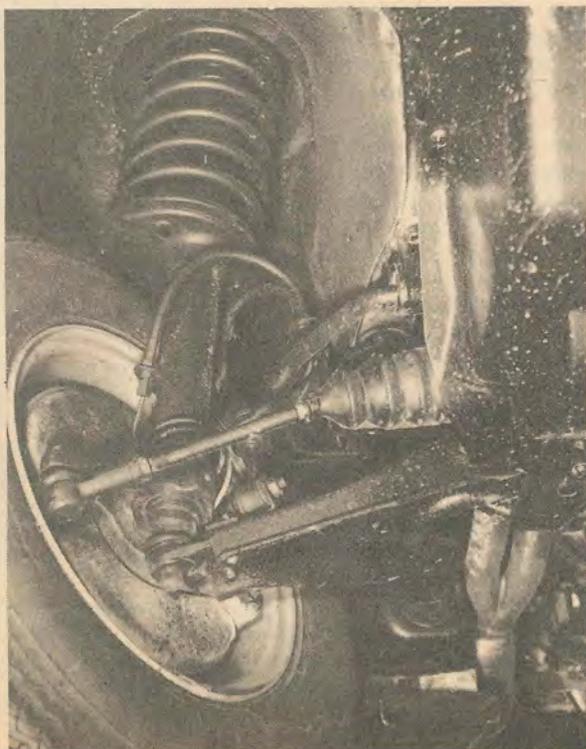


Above, the GL's are all fitted with a Laycock de Normanville overdrive which is operated by a switch on the stick shift when the transmission is in fourth. Large sheetmetal shield under the front of the engine keeps out dirt and big rocks, apart from stiffening up the front end and improving the cooling. Below, a hefty Panhard rod controls the rear axle side motions and prevents any overshoot on turns. Bottom, the small electric fuel pump picks up at the rear of the tank and feeds the fuel injection system. Two rubber mounts provide the sound insulation.





Top, individual pressure limiting valves are used, one for each rear brake. Each section of Volvo's fail-safe dual brake system controls both front brakes and one rear brake. Left, Volvo's power steering on the GL gave an impeccable on-center feel. It's an easy steering for long freeway stretches and yet is precise for mountain road use. Bottom center, upper and lower control arms form a four bar linkage that provides a neutral action on take off and braking. Note the rear stabilizer bar. Bottom right, the bottom of the spring is offset with respect to the strut, and aimed at the center of the tire. This helps equalize loads on the strut bushings and improves their life.



serves as a final stop for the engine, if it were to move forward, but normally doesn't contact. The result of all this isolation and tuning is that the Volvo feels like a much heavier car than it actually is. In effect, it's making the best use of the engine and transmission assembly as the largest single mass in the car to tune the Volvo for that big car feel.

The suspension includes large diameter coil springs at each corner of the car. Up front, the coil springs are mounted on the suspension strut, sort of a modified MacPherson with a complete lower control arm to guide it. The supports that hold the bottom of the springs are offset quite a bit from the strut, so as to aim the spring toward the tire patch—where the tire contacts the ground. This in turn reduces some of the side loading on the strut bushings and makes them live longer. The distribution of the roll forces during turns is handled by front and rear anti roll bars. This costs more but gives the car a better balance. You'll find that the small amount of built-in understeer doesn't vary appreciably whether you go into the turn slowly or fast. This is what gives the Volvo that smooth consistent feel; as their engineers put it, a "friendly car".

The general design of the rear suspension is essentially a carry-over of the previous model. There are upper and lower control arms on each side that handle brake and torque reactions and are pivoted at each end. The control arms are angled so that the car remains reasonably neutral on take off or hard braking and at no time is there any trace of wheel hop. Side forces are handled by a Panhard rod which ties the rear axle to the body so that there is never any overshoot as you go through a corner. By mounting both the springs and the shocks so that they are nearly vertical, and by having them tie in to the side rails of the floor pan instead of using a conventional sea-leg shock mounting, Volvo gained more trunk room as well as a more rigid design.

The 240 Series begins its career with a push rod type 2 liter carry-over engine. This is not to mean that Volvo's engine designers are asleep at the switch. They do have a larger overhead cam four in Europe. There is also a V-6 which was developed in cooperation with Peugeot in France. Neither of those two engines will be brought to the North American Continent, as you have probably guessed it, for emission reasons, or at least that is our guess.

The push rod engine is very smooth, quite driveable, and gives good gas mileage. It is however, somewhat anemic in the power department unless you are willing to row the gear shift lever a little. The other alternative, of course, is to invest into some of those good off road performance parts from Volvo Western, or to move up to the six cylinder version when it becomes available in the 240 series. A long radiator shroud which eats up some of the unused space in the engine compartment certainly makes provisions for the bigger engine. Here again, it is safe to assume that uncertainties about emission regulations have deterred Volvo from entering new engines into the US and Canadian markets.

The Bosch fuel injection system for the Volvo is remarkable for its driveability and smoothness. You just can't slip the engine into any stumbles or misbehavior, in spite of a full compliment of emission gadgetry, ranging from Thermactor pump and EGR to a catalytic converter for California. One advantage of the fuel injection is that it allows the use of a ram-type intake manifold that delivers lots of mid range torque. The metering portion of the fuel injection unit is located right above the air cleaner at the right front of the engine compartment with full access to cool air. The air stream impacts against a square edged disc that acts just like a weighing scale. The disc then moves it, tending to open up a



Volvo has a new station wagon for 1975, one of the new 240 Series. Carpeted cargo area measures 70 cubic feet, room enough for a sofa and two chairs.

MORE FROM VOLVO

funnel-shaped area. The larger the air flow, the higher the air valve moves up in its tapered housing. Fuel pressure counter balances the force exerted by the incoming air stream and acts just like a return spring.

However, it's able to accomplish many more things than a simple spring. For instance, it damps out unwanted air valve motions and smooths out air valve motions. Also, several specialized controls are used to modulate the fuel pressure acting against the air valve and this in turn richens or leans the mixture as needed.

When the air valve rises, it causes a small plunger to move up and uncover part or all of a series of metering slots. This in turn proportions the fuel flow to the amount of air coming into the engine. Since flow depends not only on the size of the orifice but also on the pressure across it, four individual evenly balanced pressure regulators have been built into the unit, one for each slot. This insures that the cylinders all get an equal fuel flow and naturally helps not only emissions but also engine smoothness. A ribbed flex tube connects the metering unit to the throttle at the inlet of the ram intake manifold.

Fortunately, the exhaust side of the system is a lot less complicated. A dual exhaust merges into a single pipe in time to reach the catalytic converter. From there it travels to a resonator, just ahead of the rear axle, and then to a transverse rear muffler. The engine compartment is very well organized for service and accessibility. For instance, all the electrical components are grouped near the battery. There is even a full width belly pan under the front of the engine, which keeps the compartment remarkably clean regardless of how much mud or water you have encountered during the day. Among the little niceties are items such as a slip clutch

fan and a windshield washer bottle which is as tall as the radiator.

The transmission and overdrive combination is flawless. In fact, given any sort of choice you really ought to look into the GL and the overdrive if you plan any amount of cross country driving. Dropping down into overdrive makes a 700 RPM difference at normal highway speed and not only quiets down the engine but saves gas as well. When you come up a steep enough grade, or run into traffic, a small slide switch at the top of the stick shift lets you flick out of it. The shifts are automatic, and the small green OD light up on the dash lets you know where you are at. On flat roads you can easily stay in overdrive down to 3000 RPM, but in hilly country, you not only get out of overdrive but also into third to maintain that same 3000 RPM if you have any intention of accelerating. Just to put things in their proper perspective, you could probably travel the freeways from New York to Chicago without taking it out of overdrive except for stops.

Volvo seems to have gone further than most car makers in designing a set of superb brakes. For one thing, they don't rely on engine vacuum alone to feed the booster. Instead, there is a separate vacuum pump driven off the engine camshaft which connects to a vacuum tank and then to the booster itself. Point is that a modern engine with full emission controls doesn't pull enough vacuum at the intake manifold and Volvo isn't leaving anything to chance.

Dual brake systems are generally divided front to rear for convenience. If the rear brakes go, the front ones can easily stop the car. However, when the front brakes let go, it's hard to achieve a quick stop. Things

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## IMPORT NEWS

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of additional gasoline taxes of up to 10¢ a gallon. All the people favoring this move seem to have forgotten that nearly everything we consume in the US is trucked vast distances, and any jump in gas prices just gives inflation another healthy goose. (An old Time-Life book called *Wheels* traces the truck mileage behind the ingredients in a lowly burger and malted served on the New Jersey Turnpike and found over 30 separate truck trips totalling 7141 miles!)

**Better ideas:** Participating Peugeot dealers are now offering a 24-hour test drive instead of the traditional 15 minutes with a hard-selling salesman in the other seat. And Subaru is testing what they call "the longest test ride in history." Subaru buyers in Rhode Island, St. Louis, and Springfield/Decatur, Ill., can get their purchase price back, with no questions asked, for up to 30 days after delivery of their new Subarus!

**Wrong again, Ralph:** The NHTSA has slapped down a charge by Ralph Nader that 1000 Plymouth and Dodge cars had a built-in steering defect due to hasty parts substitution on the assembly line. NHTSA's investigation showed that, if the assembly line workers had done what Ralph charged they had done, the cars couldn't have been driven out of the plant!

"The world's safest thief" says Allstate Insurance, has stolen their airbag-equipped Olds demo car from Allstate's Washington PR man. We hope he keeps it!

**Big wheel:** Most manufacturers buy their wheels from outside suppliers. But Volkswagen does it themselves, and since 1954 they have turned out 100-million of the skinny devils. Laid flat, they would reach around the world. . .and some nut in a VW would try to pass them!

## NEW FROM VOLVO

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become even touchier on a slick road since locking up the rear brakes will send the car into a spin. As a result, Volvo uses a system where the front brakes always come on together with one rear brake. Actually, each front

caliper has four pucks that work in pairs. When both circuits operate all four are applied. If either of the circuits fails, one pair of front pucks is still applied on each of the front calipers, so that you always retain no less than half the front braking. Each of the rear brakes has its own individual pressure limiting valve designed so that you can't lock up a rear brake before a front one.

To go with this sophisticated system, Volvo also designed a new type of master cylinder. Conventional practice is to use a straight through bore with two pistons. Here, there are two separate bore sizes. An annular or ring shaped area formed by the difference between the big and small pistons is equal in area to that of the small piston. The two pistons move together. If either circuit fails, the brake pedal retains virtually the same travel as before. Also, the brake force is now resisted by half the total area, so a given pedal pressure doubles the line pressure and you still can bring your car to a safe stop. Just so that you don't get complacent about it, a warning light comes on the dashboard. Even without going into all these engineering plus-points, the driver gets the benefit of very short controlled stops and excellent proportioning to the pedal pressure.

The new 240 series succeeds in conveying a feeling of superb smoothness in a practical package. It's the kind of a car that lends itself to a long trip and still lets you arrive at ease and ready to go some more. The new Volvo also delivers twenty-five miles to a gallon without even trying, and well over thirty miles to a gallon as your reward for observing the speed limits. 

## NEW VOLKSWAGENS

(Continued from page 56)

warning light comes on telling you its time to redo the points and the distributor. Then, at 30,000 you get another light telling you to get some cash ready for a replacement catalytic converter.

The other 49 states get off scot-free. Some things are just too hot to keep under a security blanket. The Beetle's heating system has been revised so that all of the exhaust now goes through the heater boxes. This adds twenty percent to the heat capacity, enough to make it toasty warm in a New England storm.

The fuel injection system on the Beetle begins with a flat air cleaner element housed at the left of the engine compartment. From there, ducting leads to an air metering valve that consists of a double vane. The more air the engine accepts, the further the metering vane moves against spring pressure. A potentiometer, which is a fancy