VOLVO

Engineering Features of 1972 Models

Volvo 164E

Volvo 144

Volvo 1800ES

Volvos have been selling in Canada for more than fourteen years now, long enough to have established some evolutionary trends. The major trend (aside from a continual growth in consumer demand) has shown a steady increase in the quality and durability of the car itself — in terms of engineering, mechanical efficiency and passenger safety and comfort. More recently a second trend has developed: Volvo buyers are being offered more and more choice — choice of basic models, choice of body styles, choice of transmissions and choice of powerplants.

This year the two trends continue to unfold in a number of significant ways. Volvo buyers will be getting more quality and better performance in a whole variety of features. At the same time, they will have more choice than ever before. This does *not* mean that they can merely elect to pay for a few more "extras", but that there is now a greater range of basics at the customer's — and the salesman's — disposal.

Certainly the most impressive of these engineering features is electronic fuel injection. After its initial introduction two years ago in the 1800E sports coupe, fuel injection is also available in – the two-door 142E (Electronic) sedan, the four-door 164E sedan and the 145E station wagon.

The fuel injected models have been equipped with a compact electronic computer and an array of devices which sense and monitor the engine's intake and performance; the computer also controls the injection of fuel into each cylinder. The result is a smoother and more effective engine performance and, since these new fuel injected Volvos can use low lead-low octane fuel, a cleaner exhaust.

Another new fuel injected model for 1972 is the six-cylinder 164E which retains all the features of the earlier carburetted 164, like leather upholstery and power steering, and all 1972 innovations, like recessed door handles and improved brakes. It also has an extra-large clutch and a specially adapted automatic transmission or four-speed manual transmission with overdrive.

A more visible innovation is another new model — the 1800ES. It has all the basic features of the highly successful 1800E — including a four-cylinder fuel injection engine — plus entirely new rear styling which features a larger luggage compartment and an oversize rear window that swings up for loading.

All of these models, except the 145E, are available with either four-speed manual or modified automatic transmission. There also are a great many other improvements and refinements which are available very nearly across the board: new seats, improved brakes and tires, new colors, new shift controls, a new instrument console, new dashboard controls, a redesigned steering wheel and many more.

The basic "selling points" of the Volvo, of whatever model or engine configuration, are still unchanged, however — and that fact itself is going to bring a lot of people into your showroom. The car is still of the same rugged, no-nonsense construction, conceived by engineers rather than "stylists", and built to run smoothly and safely for a *long* time. This book will remind you of these basics as well as filling you in on the details of the latest innovations.

EXTERIOR

Making styling changes each year merely for the sake of change is not part of Volvo's approach to building cars, so it should be no surprise that there are no dramatic innovations on the outside of this year's models. A close look *will* reveal the new grille on the 1800E/ES and there are recessed exterior door handles on all models of the 140 Series and the 164. There is no question but that these relatively minor improvements enhance the exterior styling and make the cars more appealing.

But what is really noteworthy this year is what *hasn't* been changed. In spite of all the pressures of inflation and spiralling costs, along with increasingly stiffer competition from Detroit, Volvo is still putting its cars together in the same proven way. The frame and the body are still being welded up as a single unit, and it still takes about 10,000 spot welds to do the job properly. The rocker panels, headlight surrounds and front end panels — the parts most prone to rust — are still made of hot-dipped galvanized steel. The finishing process, an operation that takes about eight hours time, hasn't been downgraded either; the car is first completely immersed in a solution which lightly etches the entire body so that it will take paint more readily. It is then dipped in a primer bath. An undercoat and a sealer coat then follow, and they are in turn followed by three color coats. From the primer coat out, each coat of paint is rubbed down, washed and inspected by eye and by hand for rough spots before the next coat is applied. After the final coat, the car gets a layer of protective wax before shipping. This process puts about 33 pounds of paint on a Volvo, paint so thick that a weighted magnet that will cling to the door of a typical Detroit-made car, will slide down the side of a Volvo. The underside, incidentally, is equally well protected with two thick coatings of protective sealer designed to protect the car from the ravages of the salt used on Swedish roads during the long winter. This undercoating, a combination of a tough sealing wax and the familiar black "glop", is applied during the car's final assembly. It is one of the reasons Volvos are durable and last so long.

Needless to say, this whole process of protecting the body is not getting any cheaper. But it still works and Volvos will continue to be made this way.

There is, however, something new and different in the classic Volvo paint job this year — the colors. There are now five new ones available: Light Blue, Yellow, Light Green, Dark Green, and a Metallic Blue. The Light Green is an addition to the product line; the other colors are lighter replacements for those available in the past. All have been selected to appeal to the North American preference.

Some other traditional Volvo features include doors which open to an 80 degree angle with an additional stop position for easy exit in crowded parking lots and patented safety latches designed to keep the doors closed even under severe impact. Then too there are Volvo's strong and lightweight wraparound bumpers, which are made of rust-proof anodized aluminum, with the added protection of hard rubber inserts to help prevent dents and scrapes. And all the glass on a Volvo is slightly tinted, – but still light enough not to detract from night driving visibility.

The curious thing is that this old-fashioned quality workmanship and attention to detail means that Volvo is still very much sought after in this automated age. There is no question that the trend is away from "full-size" cars and very much in the direction of smaller, less bulky models. Canadian car buyers are now passing up the larger, higher priced cars and demanding instead more real value for their dollars. In Canada we call this phenomenom "Consumerism," but in Sweden, where planned obsolesence never became a business practice, demanding honest value is considered a natural law. Whether Canadians will get this value is a good question. In any case, car buyers are becoming more interested in function and performance than in styling gimmicks. In *Car and Driver* magazine's annual Reader's Choice Poll, Volvos were pitted against Detroit's *Intermediate* and *Full-Size* sedans for the first time, rather than the *Compacts*. Volvo won in both categories. "This is what happens", noted *Car and Driver* "when you take away the traditional barriers that supposedly separate our domestic models from the imports." The Volvo 142/144 took the *Intermediate* category — six percentage points ahead of its closest competitor, Chevrolet's Chevelle. The Volvo 164 won the *Full-Size* sedan category, running about *eight* percentage points ahead of its nearest domestic competitor, Pontiac's Catalina/Bonneville/Grand Ville.

It would appear that Volvo's solid construction and honest engineering will find a receptive public again this year.

145 and 145E station wagon's rear door, equipped with a safety latch, uses a gas-cylinder spring to assist lift. Floor of the 70-cubic foot cargo area is covered with a new hard-wearing textile material in three colors; brown, red and blue.

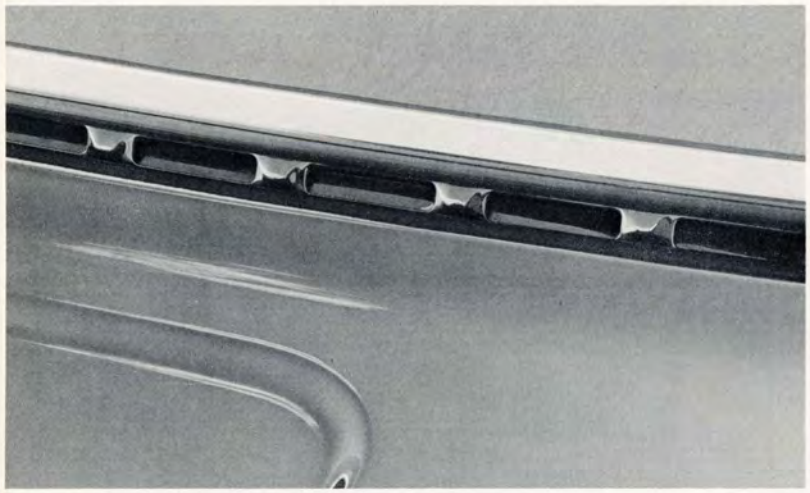
Rubber-faced aluminum bumpers, side marker lights, and wraparound turn signals, shown here on the 140 Series, are similar features found also on the 164.

145 Station Wagon is the same length as a 142 or 144 sedan. Special features include a rear window wiper and washer.

Wraparound aluminum bumpers also are fitted on the rear of the 140 Series and 164.

New 1800ES sports car has a hinged rear window that opens to the luggage area. Tail lights are new as are the bumper underriders.

Air extractor vents in the grille below sedan's rear window provide for fast distribution of fresh air throughout the car by permitting stale air to exit.



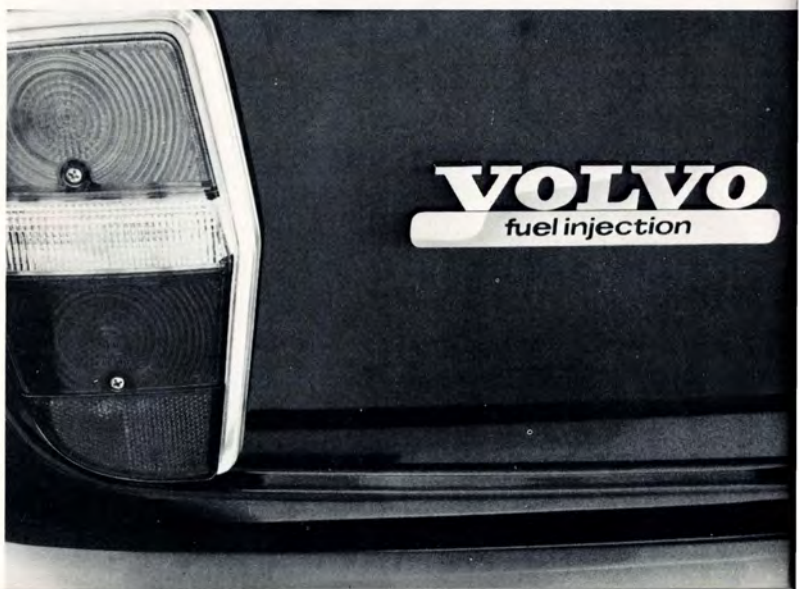
Rear emblem marks Volvo's new 182-cubic inch six-cylinder 164E with Electronic fuel injection.

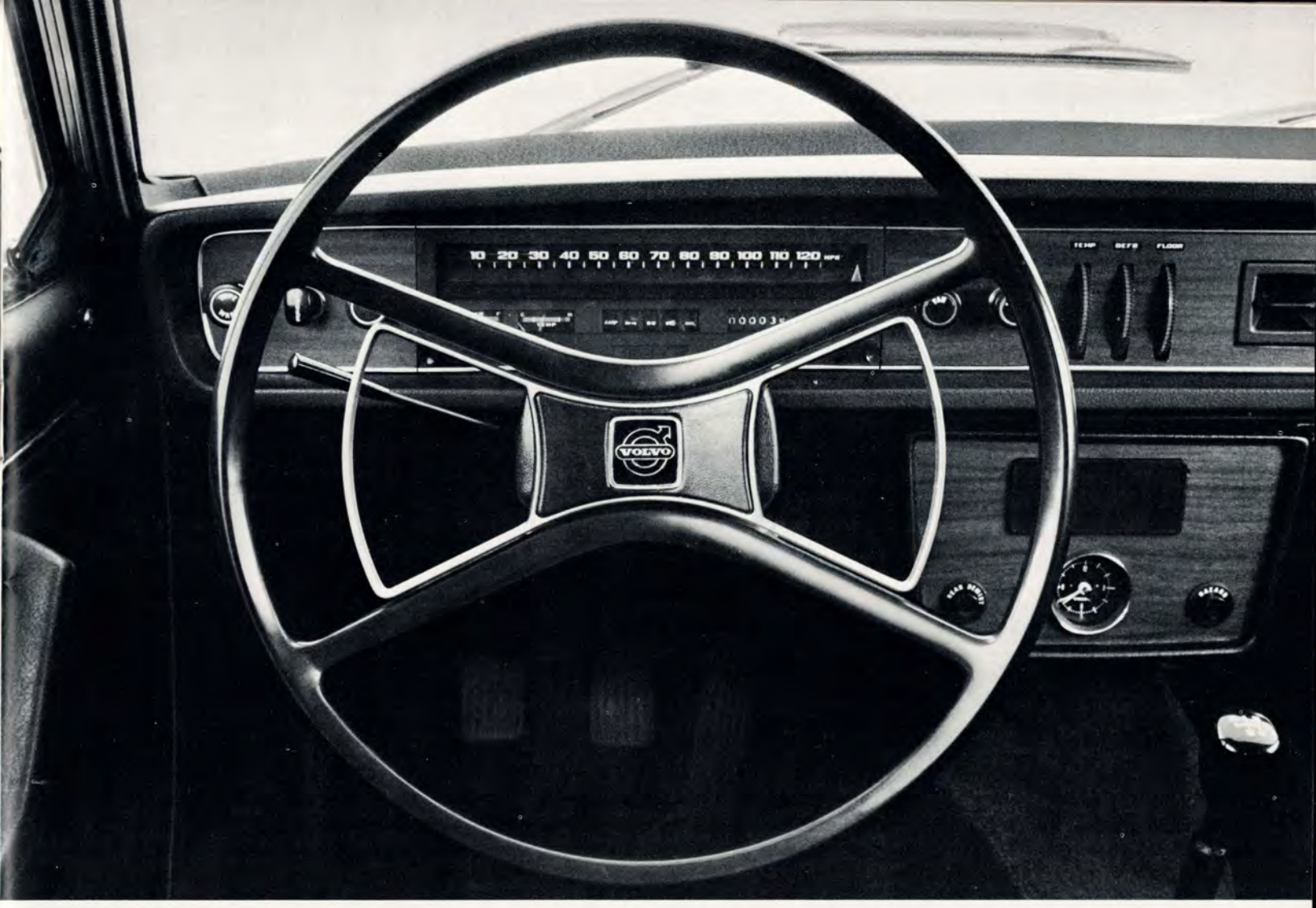
164 wheels are 5½" wide. Tires are long wearing radials with a thin whitewall stripe. Trim rings are stainless steel.

Exterior door handles on the 164 are now recessed to enhance the car's style and appearance. The 140 Series models also feature these new handles.

1800E/ES wipers are extremely well articulated to provide a full, even sweep across the curved windshield.

For 1972 the Volvo 145E, in addition to the 142E, will be seen with rear fuel injection emblems.





New, glare-free, four-spoke steering wheel, now standard for the 140 Series and the 164, allows for better forward vision.

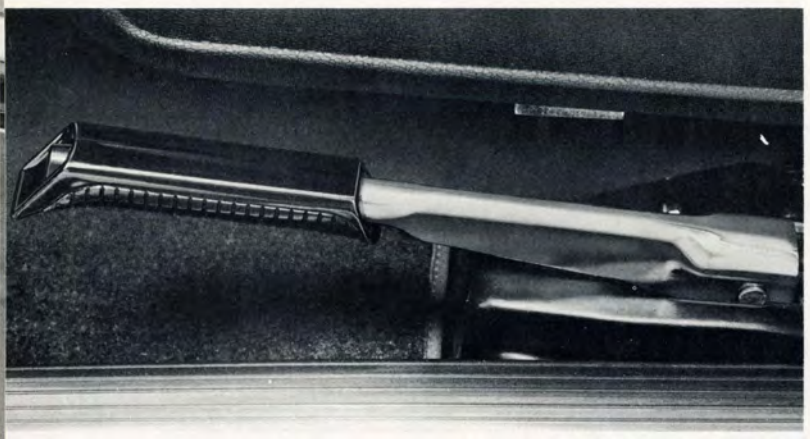
INTERIOR

In 1959 Volvo pioneered the automobile safety shoulder/lap belt as standard equipment. Since that time, Volvo has continued to set the pace for the automobile industry by introducing, also as standard equipment, such safety features as padded dashboards and sun visors, a collapsible, energy absorbing steering column, safety door latches, three-point inertia reel shoulder/lap belts and collapsible seatbacks for front seat passenger protection. These features have been supplemented by such refinements as recessed door handles, an interior hood latch, a two-speed electric washer-wiper and electric rear window demisting/defrosting.

Many of these safety features have been widely imitated. More and more of them are now required by law. What is not so easily copied, however, is the Volvo standard of construction. Volvos are built to surround the passengers with extra-strength box-member side posts and windshield pillars, concealed transverse roof bracing, and by putting in energy absorbing front and rear sections to take the initial impact of a car collision. The inherent strength of the side posts, six per car, means that a Volvo can support the weight of at least six other cars stacked on top of it . . . a fact that has been demonstrated in Volvo advertising, television commercials and films.

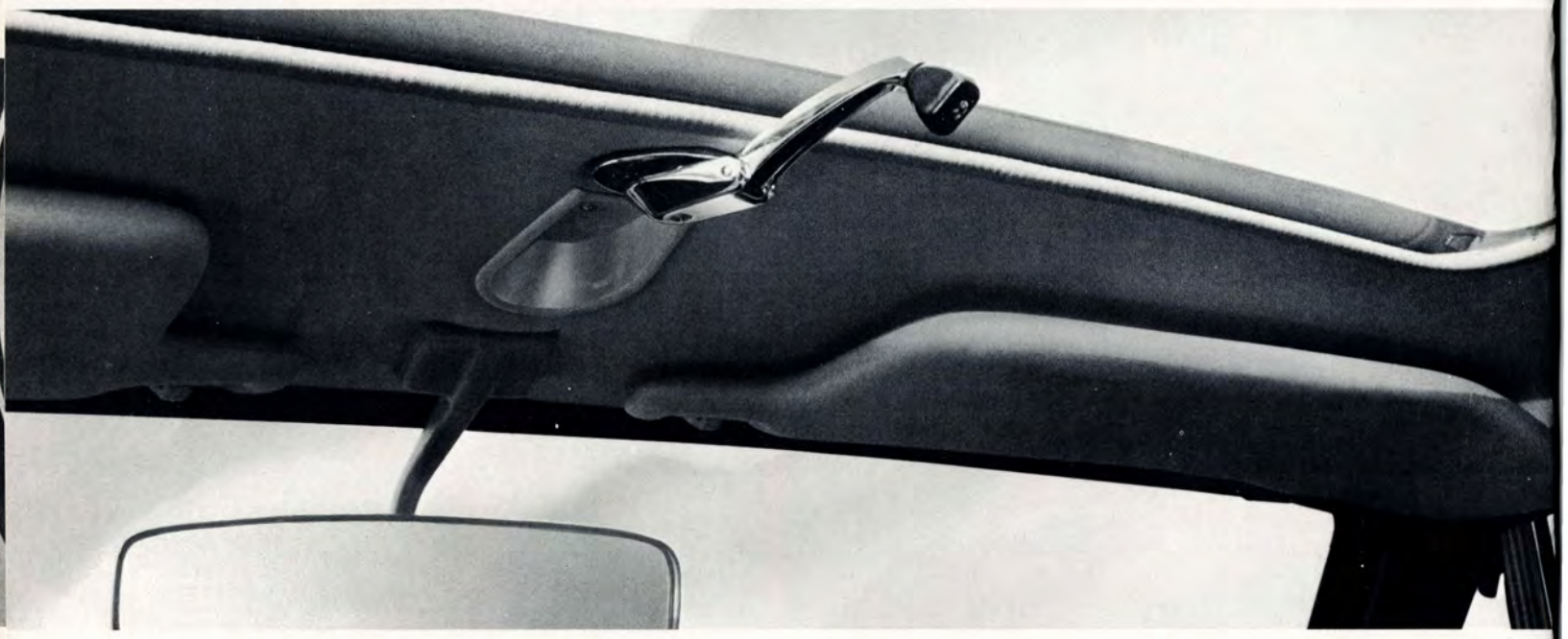
Safety considerations are followed by those of comfort. This year there have been notable improvements to the seats and further refinements to the dashboard controls. These are all intended to make the passengers a little more comfortable and to make driving more of a pleasure. So the headrests are narrower for improved visibility; they have also been redesigned for easier adjustment. The front doors on all

Handbrake operates a drum-type brake system on the rear wheels. It has a dashboard warning light which also alerts drivers to a failure of one of the dual brake circuits.

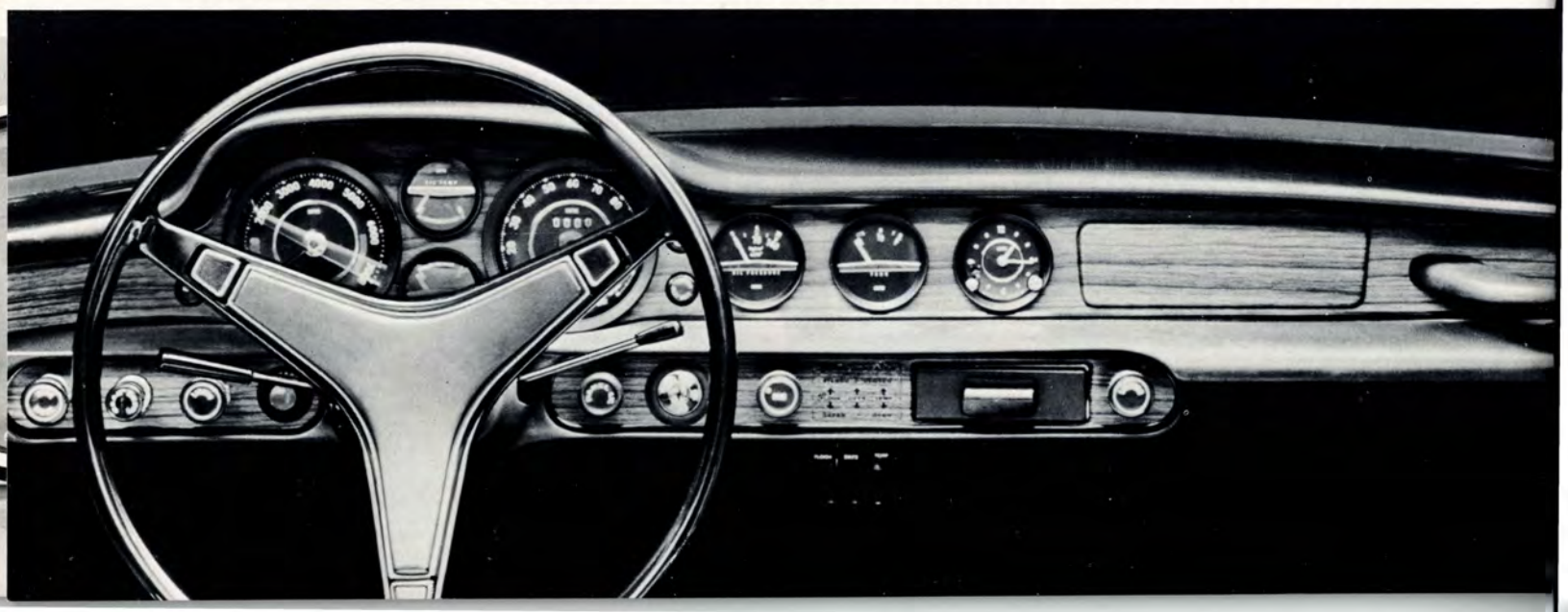


Oversize glove compartment is found under the right side dashboard. It is lockable and illuminated.

An optional flush-fitting metal sunroof, available on the Volvo 164E, provides draft-free ventilation because of a wind spoiler on the leading edge. Fast-winding handle folds up when not in use.



The fully instrumented 1800E/ES dashboard includes a tachometer among its six recessed, white-on-black, non-glare gauges.



models are now equipped with smarter looking trim pads and expandible map pockets. The 145 station wagon's cargo area has a new floor mat made of a hard-wearing textile material. The 164 also has new floor mats of a shorter, pile, form-pressed material called Volvolon. The 1800E/ES have completely redesigned seats with built-in headrests. These models now also have Volvo's automatically adjustable inertia-reel safety belts as well.

Up front, the Volvo driver is confronted with a number of improvements this year. The most noticeable, perhaps, is the new four-spoke steering wheel, which is now standard on the 140 Series and the 164. This new wheel is glare-free and it allows for better instrument viewing. It is designed to absorb more stress than the three-spoke design it replaces.

The dashboard has been modified, on the 140 Series, by the addition of the same simulated wood veneer that is standard for the 164. At the same time, the dashboard control knobs on both models have been reshaped for easier gripping. (They now have milled edges, like coins) and they are now made of a softer plastic. The picture symbols have been replaced by English language designations which explain their functions. As a further concession to North American driving habits, a choke warning light has now been added to all carburetted models. This light goes on when the choke is pulled out for cold-starting. It serves to remind the driver to push the choke back in once the motor has reached operating temperature.

On the left side of the steering column the directional signal indicator lever has been modified to include a "lane changing" mode. For turnpike driving, the lever can now be pushed *halfway* into the turn position and held to indicate the driver's intention to switch lanes; when the lane change is completed, finger pressure is removed and the lever returns to the center position of its own accord. To indicate a turn, push the lever all the way up or down. This same lever, incidentally, controls the highbeams by being pulled back toward the driver and released.

Aside from these two refinements, hand controls are essentially unchanged. On the 140 Series and the 164, knobs for the two-speed electric windshield wiper and washer and for the lights are still to the left of the instrument panel, while the controls for the fan and heater are to the right; the ribbon-type speedometer and odometer, along with the warning lights, are centered over the steering column.

A major addition to both the 140 Series and the 164, however, is the new instrument console centered just below the dashboard. This unit provides space for an optional air-conditioning center outlet and controls, and for the push buttons for the emergency warning lights and rear window demister/defroster. The rear window demister/defroster is part of Volvo's specially designed heating/ventilating system.

This system features air extractor vents in the rear to provide for fast distribution of fresh air and heat through the car, and for better defroster action on the side windows. This supply of warm air could, in fact, also serve to defrost the rear window as well, but by being electrically heated by fine wires bonded on the glass itself, the rear window does not steal heat from the rear seat passengers. Another example of the lengths Volvo's engineers will go to assure passenger comfort.

The 1800E/ES dashboard is also basically unchanged this year. There are six white-on-black, non-glare gauges and an electric clock arranged from left to right along the slim, wood grained recessed dashboard. Flanking the water and oil temperature gauges are a large tachometer and a speedometer with a six-digit odometer and a separate trip odometer. The oil temperature gauge takes its reading from the oil pan. To the right of the steering wheel there is a fuel gauge, an oil pressure gauge with a warning light and the electric clock with a micrometer adjustment for perfect setting.

A warning light indicates handbrake application or brake circuit failure. Another light shows whether the electrically-operated overdrive is engaged. There is also a seat belt warning light which is extinguished when the seat belts are in use. On the lower dashboard there are control knobs for the three-position electric washer-wiper, two-speed electric fan, parking and headlights, four-way warning flashers, rheostat adjustable instrument lighting and the electric rear window demister/defroster. Also on the lower dashboard: the center ashtray and cigarette lighter.

Dashboard knobs on all models have been redesigned. Milled rims and softer plastic make gripping easier.

Volvo's automatic transmission now features a floor-mounted shift quadrant with a newly designed push button selector lever. The push-button eliminates incorrect shifting from any of the six positions on the quadrant. The "2" position is new this year. It is a mode designed for city driving and engine braking on steep hills and curves.

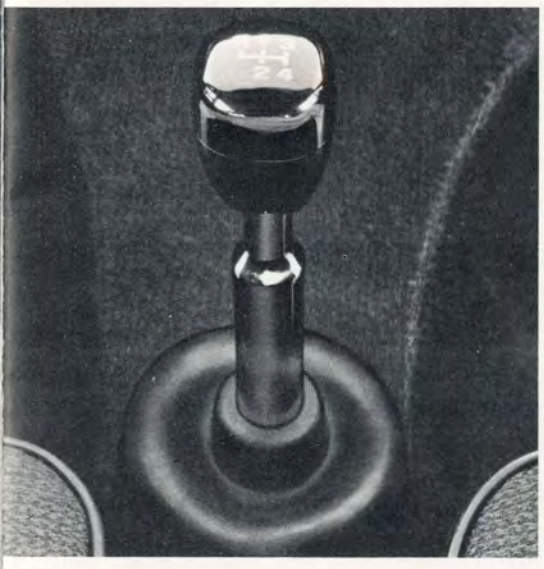
Centered just below the dashboard, a new instrument console provides space for emergency warning light and rear window demister/defroster controls. It also provides for the central air conditioning outlet.

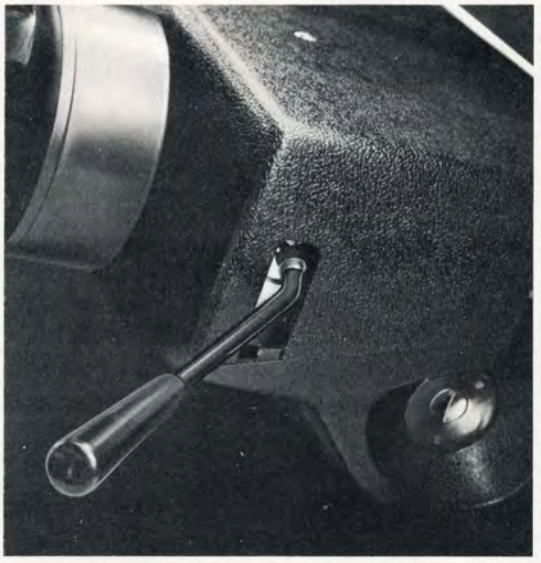
NO NEED TO DEPRESS BUTTON	DEPRESS BUTTON HALFWAY	DEPRESS BUTTON ALL THE WAY
P	P	P
R	R	R
N	N	N
D	D	D
2	2	2
1	1	1

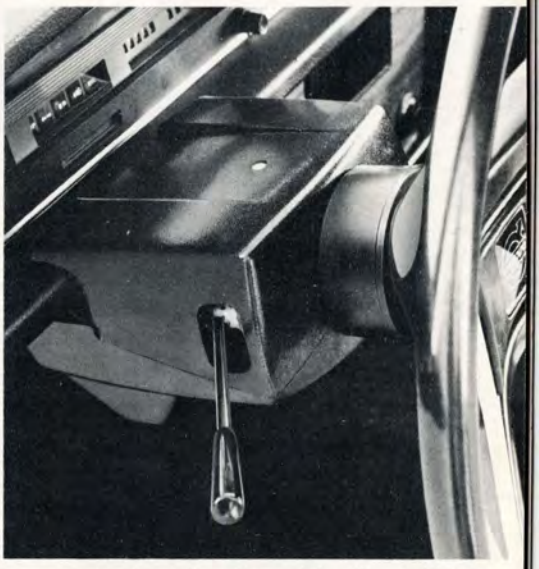
Front doors on all models have smarter looking trim pads and expandible map pockets. Shown are the 140 Series and 1800E/ES.

140 Series models are now equipped with a remote-control shift linkage like that used on the 164 and 1800E/ES. The shorter shift lever can be reached more easily and requires less movement. A lever on the right side of the steering column operates the overdrive.

Directional signal lever on the left side of the steering column, which also serves to raise or dim high beams, now includes a "lane changing" mode.

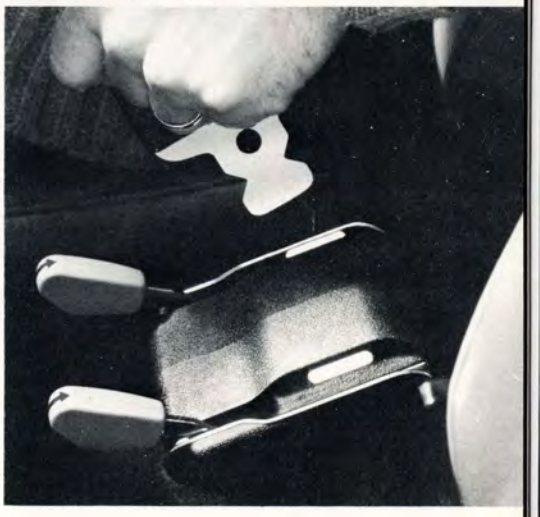






Easy-to-use rear seat belts have convenient hangers. Shown here is the Volvo 142.

Retracting, three-point inertia-reel safety belts are now standard for all models. The belt unwinds automatically when pulled down from the door post and locks into the center mount between the front seats. When released, it retracts into the door post again. Shown here is the 1800E/ES installation, which also includes an illuminated center mount.



Cutaway of 140 Series front seat shows details common to all models. Seats are orthopedically designed, with three layers of polyurethane foam over a new steel wire support called Pullmaflex. By turning the lumbar support knob, the backrest tension can be adjusted from "firm" to "soft".

SEATING

The improvements in seating construction in this year's models offer a striking example of how Volvo's freedom from the artificial pressures of yearly model changes encourages real development and innovation. Volvos have long been distinguished for their superior seating: this feature's orthopedically-designed bucket seats in front with a wide range of adjustments for maximum comfort. Real leather, seldom available these days even as an option, is standard equipment for the 142E, 164E and the 1800E/ES. The front seat's superior design begins with the frame and the fittings which secure it to the floor. These provide for ample fore and aft/up and down seat adjustments quickly and easily. On the 164 two separate adjustments that permit 10.9" fore-and-aft travel provide more front legroom than *any* other car on the road. The first adjustment is made by raising the lever at the right front corner below the seat cushion. This adjustment permits a fore-and-aft movement of 7.9" along the track.

For extra short or tall drivers, an adjacent lever can be raised to move the entire seat assembly forward and back or up or down. Three stops allow 1.6" of height adjustment and an additional three inches of fore-and-aft travel.

The front seats are designed to be not only comfortable, but orthopedically correct for driving. The padding of the seat cushion is made up of three layers of polyurethane foam, a plastic which has exceptionally good damping qualities, along with being fire and mildew-proof. At the sides the material is higher and firmer in order to provide good lateral support. The seat's front edge is also higher and it is filled with a softer foam to support the thighs without exerting too much pressure.

An exclusive feature of Volvo's front seats is their adjustable back support. The backrest is designed so that by turning the lumbar support knob on the side of the backrest, the passenger can make the backrest firmer or softer. (The same principle is used on some 747 jet liners' first-class compartment seats.) As a further assist to passenger comfort, the angle of the front seat backrest is continuously variable from a vertical all the way back to a reclining position. This adjustment can be made by means of a lever on the outboard side of each seat. The adjusting mechanism has another feature which provides additional protection against the possibility of whiplash: if the car is subjected to a rear-end collision with an impact of more than 10 mph, the backrests will automatically recline at a controlled rate, thereby minimizing the effects of whiplash, and the possibility of neck and spine injuries.

This year, Volvo's already superior seating is provided with an additional margin of quality. These improvements are basic: beginning with the seat construction, the elasticised webbing in the seat bottom and backrest has been replaced by an entirely new system called *Pullmaflex*. This consists of a number of highly flex-

ible parallel steel wires fastened to a flexible steel frame. When either from the pressure of the passenger's body movements or from the action of the lumbar support knob, these steel wires flex and respond in a manner similar to the rubber straps they replace, causing the backrest to become noticeably fuller and firmer as more tension is applied. Unlike the webbing, however, Pullmaflex will never fatigue with use.

The reclining backrest adjustment has also been modified in the interests of further ease of operation by the addition of a more powerful return spring. This means that when the lever on the outboard side of the backrest is loosened, the backrest will now tend to push slightly forward against the passenger's weight, rather than simply moving backwards in response to it. The effect of this is to provide the passenger with a kind of counterbalance to his movements, and thereby to make the raising of the backrest a one-hand operation. Seat backrests on two-door models also now have a new helper spring which eases the backrest up and forward when the safety catch is depressed. This makes the action of folding the backrest forward (in order to gain access to the rear seats) a one-hand operation too.

Volvo 142 and 144 models are upholstered with a woven synthetic fabric which is easy to clean and extremely resistant to stains. This year the transverse quilting on the seat cushions has been replaced by *longitudinal* quilting; a small detail, though anything but capricious — it is now easier to brush off cookie crumbs, beach sand and other debris. The 145, with its anticipated loadings of small children, dogs, camping supplies, etc., is entirely upholstered in easy-to-clean vinyl. Rear seats on all sedans, incidentally, have center armrests which can be raised to accommodate a third passenger. Safety belts for rear seat passengers are also standard equipment on all models including the 1800E/ES.

The 142E, 164E and 1800E/ES seats are upholstered in leather. This is not an option but standard equipment. Leather upholstery is rightly considered a luxury, so much so that it is rarely available even as an option. Its use in Volvos, however, is very much a practical matter. Leather has the advantage of aging without appearing worn. In view of the long lifespan of the Volvo, it makes particularly good sense to provide it with a long wearing upholstery like leather.

An equally practical feature of the 1800E and the 1800ES is the fold-down rear seat, which provides both models with additional storage space in the rear for luggage. The front seats of these models, incidentally, are completely redesigned this year, with the anti-backlash head restraints being built into the backrests. These seats also embody the improvements found this year on the 140 Series and the 164: Pullmaflex and more powerful springs.

Shortened lever on the outboard side of the front seat adjusts the backrest to any position. A more powerful return spring makes this a one-hand operation. Two-door models have the spring-loaded safety catch (located above the adjustment lever) to permit the seat back to be folded forward.

Foam padded adjustable head restraints are narrower this year for better foreward and rearward visibility. The adjustment knobs have been redesigned for easier operation.

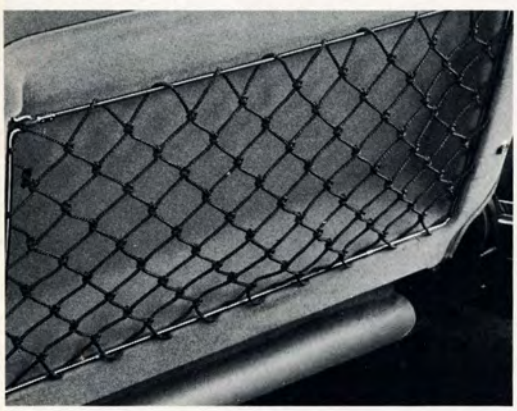
A distinctive feature of the 142E, 164E and the 1800E/ES are seats upholstered in leather. Like all Volvo front seats, backrests will recline at a controlled rate in the event of a rear-end collision at more than 10 mph to minimize whiplash injuries.

Redesigned 1800E/ES rear seat can be folded down to allow additional luggage room which includes space on the seat cushion.

Rear seat on all Volvo sedans has a fold-down center armrest.

For the convenience of rear seat passengers, the 164 bucket seats have expandible net storage pockets.

1800E/ES front seats with built-in headrests are upholstered in leather and equipped with all the adjustment features found in other Volvo seats. There's a locking console and tray along the transmission tunnel.



164 driver's seat adjustments are made by raising the top lever for fore-and-aft movements. The lower lever moves the seat up and forward or back and down.

HEATING AND VENTILATION

Since the southernmost part of Sweden is farther north than James Bay, a Volvo's heating system has to be extremely powerful. And to cope with Canadian summers, proper ventilation and removal of stale inside air must be provided for. That's why Volvos have far better than average fresh air heating and ventilation systems.

The thermostatically controlled heating system is so effective that its full capacity is needed only in extremely cold weather. On 164E and 140 Series models this system is controlled by three vertically-mounted illuminated discs recessed into the center of the dashboard.

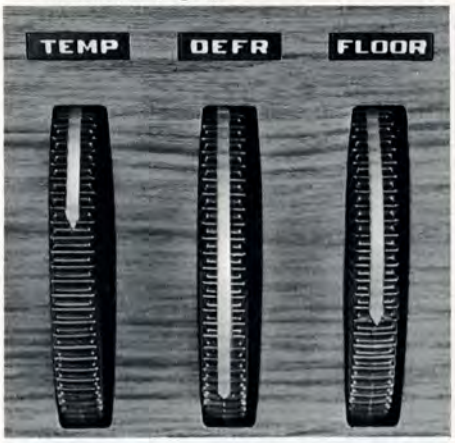
Three vents across the top of the dashboard supply the windshield with air for defrosting. Any adjustment from full force to a partial air flow can be made. Air can be directed to either the floor or windshield or both by dialing the floor and defroster discs.

A third disc, for temperature adjustment, is connected to a thermostat in the air stream. The temperature selected is automatically maintained regardless of changes in speed, or outside temperature.

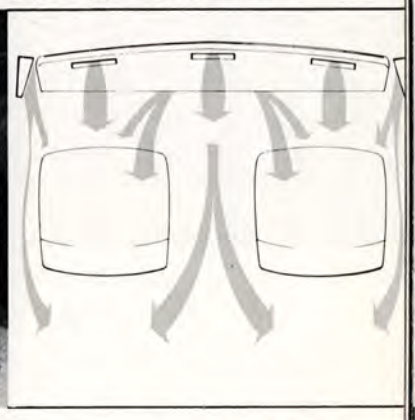
To get maximum benefit from this heating system the fan must be used. Moving 182-cubic feet of air per minute, the 100-watt, two-speed blower evenly distributes heated air to warm the entire car quickly. And because the rear floor is the last part of the car to get warm, two additional outlets have been placed atop the transmission tunnel to warm the feet of rear seat passengers.

Additionally, fresh air is drawn in at the base of the windshield, above the exhaust pipes of other cars, and enters the car through side outlets under the dashboard. The two vents, located on the left and right side walls of the cowl, have foot operated levers and two positions for partial or full force intake. An additional feature of this ventilation system is rust prevention. A constant flow passes through the sill plates in the rocker panels to avoid moisture accumulation.

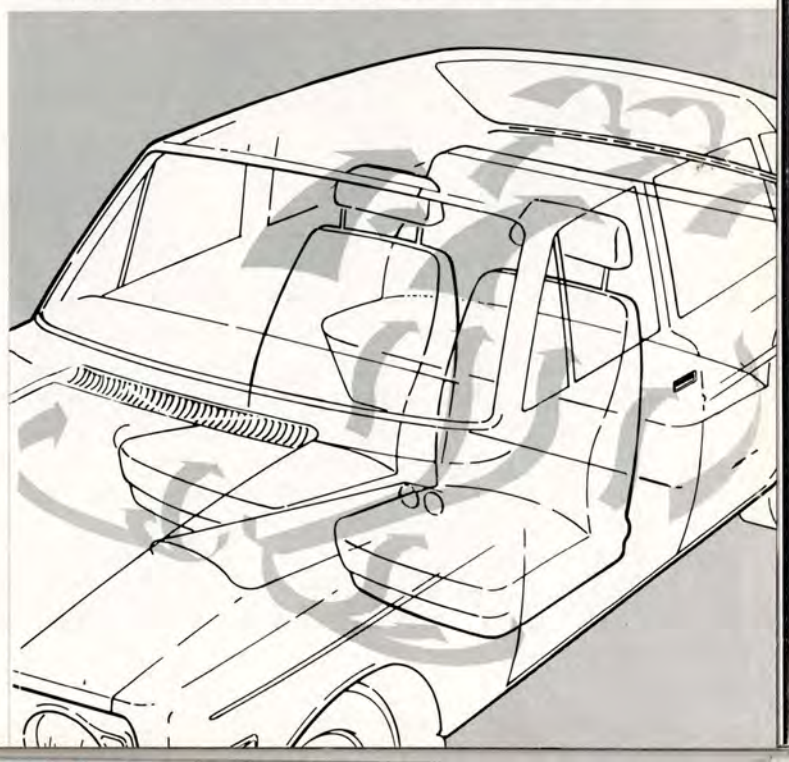
Fresh air heating system controls are centered on the dashboard. Dialing the illuminated temperature, defroster, and floor discs provides selected distribution of heated air. There's a fresh air intake under the dash on either side of the car (right).

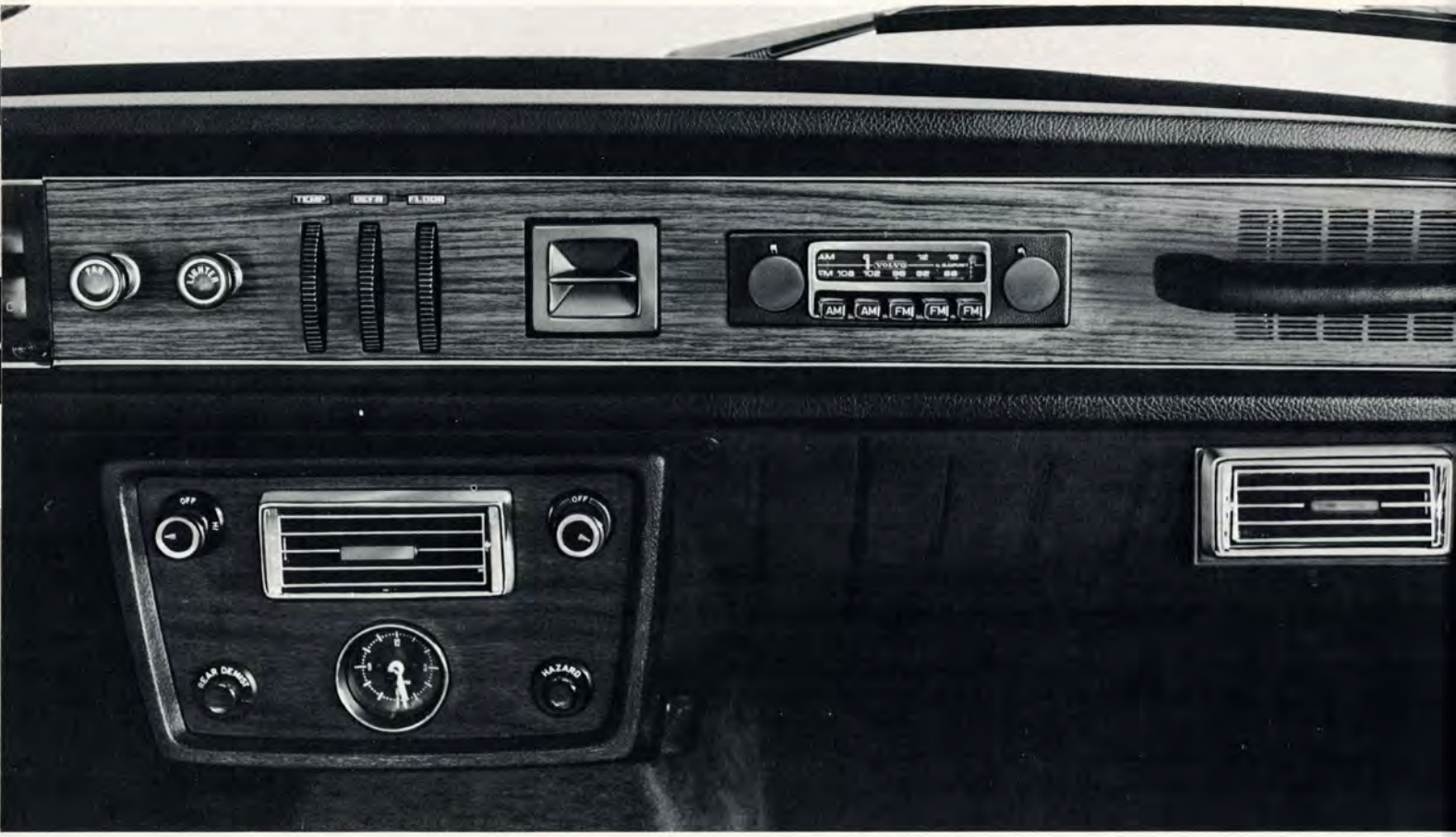


Rear passengers are warmed with air distributed through ducts atop the transmission tunnel. Drawing (right) shows how fresh air is distributed in the passenger compartment.



Fresh air for the ventilation and heating system is drawn in at the base of the windshield. Air flow passes over, under, and around the front seats and exits through a grille located below the rear window on sedans. On the 1800E the air exits behind the rear quarter windows and, on the 145, from behind the right rear quarter panel.





Controls for the 140 Series and 164 optional air conditioning are on the console. Control knobs adjust temperature and blower speed. Additional outlets are located at each end of the dashboard panel. Also shown is the optional AM-FM Volvo radio.

The 1800E sports coupe and the new 1800ES have a thermostatically controlled fresh air heating system so effective that the two-speed fan normally isn't needed. The operating controls, with the same functions as those of other Volvos, are located below the dashboard.

Standard equipment on all Volvo models is electric rear window defrosting. Special heat-conductive wires applied onto the tinted glass defog or defrost the rear window. The wires, placed 1⅛" apart, are so small in diameter that they are almost invisible. Ice that has formed on the outside of the glass can be easily removed after a few minutes because the system produces a maximum of 200 watts to raise the temperature of the glass above freezing. Defogging of the inside glass begins to take place within seconds. When left on for a long period the glass will get warm, but never hot to the touch.

Volvo's flow-through air ventilation system pulls stale air out through exhaust vents. These vents are located at the rear window on the sedans and 1800ES and in the rear quarter panels of the 1800E and 145. By merely opening the floor or heating vents, enough positive pressure is created inside the car to open a one-way rubber flap in the exhaust vent. Since Volvo's optional air conditioning system creates negative pressure, this flap remains closed to prevent any loss of cooling.

The air conditioning system, designed expressly for Volvo, has separately adjustable cold air direction, force, distribution, and temperature. Maximum dispersion of cool air in the 164E and 140 Series models is provided by three adjustable outlets installed in underdash panels. Temperature and blower controls are conveniently located in the center console. The two end ducts have a shut-off feature.

On the 1800E/ES the controls and dual outlets are installed under the dashboard in the center of the car. This unit also has additional outlets for cool air flow to the driver and passenger floors.

Volvo's air conditioners have a drive belt that runs free when turned off and, when operating, there is only a negligible horsepower loss although the system produces a maximum of 12,000 B.T.U.'s, more than twice as much as a single room home air conditioner unit.

LUGGAGE COMPARTMENT AND STATION WAGON

Despite modest exterior dimensions, Volvo engineers have designed exceptional storage space into their cars. The sedan's luggage compartment has more usable space than can be found in any compact, intermediate or standard-sized car. What accounts for this 23.6 cubic feet capacity is the box-like structure of the trunk, which even permits storing luggage vertically. Storing luggage upright also means that you can easily get at each suitcase without disturbing any other pieces.

The trunk lid, with a latch that can be left securely closed, but unlocked if desired, opens easily with gas operated springs that do the lifting. Inside, a spare tire is stored in a well where it is readily accessible but out of the way. Another well, hidden by the floor mat on the left side, is a "secret" storage area or a place to carry a specially fitted accessory gas can.

If even greater carrying capacity is needed, Volvo's station wagon fits the bill. Efficient planning of its interior space results in 70-cubic feet of cargo area with the rear seat folded. The Volvo wagon has a low loading height and a fully upholstered flat floor. The rear seat backrest and the bottom of the cushion, which folds vertically, also are upholstered as are the wheel arches. The rear compartment is as long as a double bed mattress, just two inches narrower (at the wheel arches) and 27 inches higher.

Opening the 145 rear door either from the inside or outside is easy because a powerful gas cylinder assists the lifting. A lever located near the latch deactivates the inside handle to prevent accidental opening. An extra roof lamp will light automatically when the storage compartment rear door is opened. Integral construction, especially in a station wagon, is superior to a frame design because body panels are welded not bolted in place. In addition to greater strength, a welded body also eliminates the possibility of annoying rattles.

The new 1800ES will appeal to those sports car buyers who want more luggage space than the 1800E sports coupe provides. The frameless rear window of this additional model also serves as the rear door. Supported by gas cylinders, the window, which is hinged at the top, opens to a 35 cubic foot cargo area with a fully carpeted floor. Maximum interior width of the 1800ES cargo area is four feet and the maximum length is just shy of five feet. The floor is completely flat even with the rear seat folded because of special hinges that allow the backrest to be raised as it is folded forward.

Volvo sedans have an unusually large box-like trunk with 23.6 cubic feet of storage space for upright luggage storage. The vertically mounted spare tire assures maximum lateral clearance. A durable rubber mat covers the floor.

Electric washer/wiper aids safe driving on the 145 by providing all-weather visibility through the rear window.

Underfloor compartment in the rear of the 145 has 3½ cubic feet of storage space.

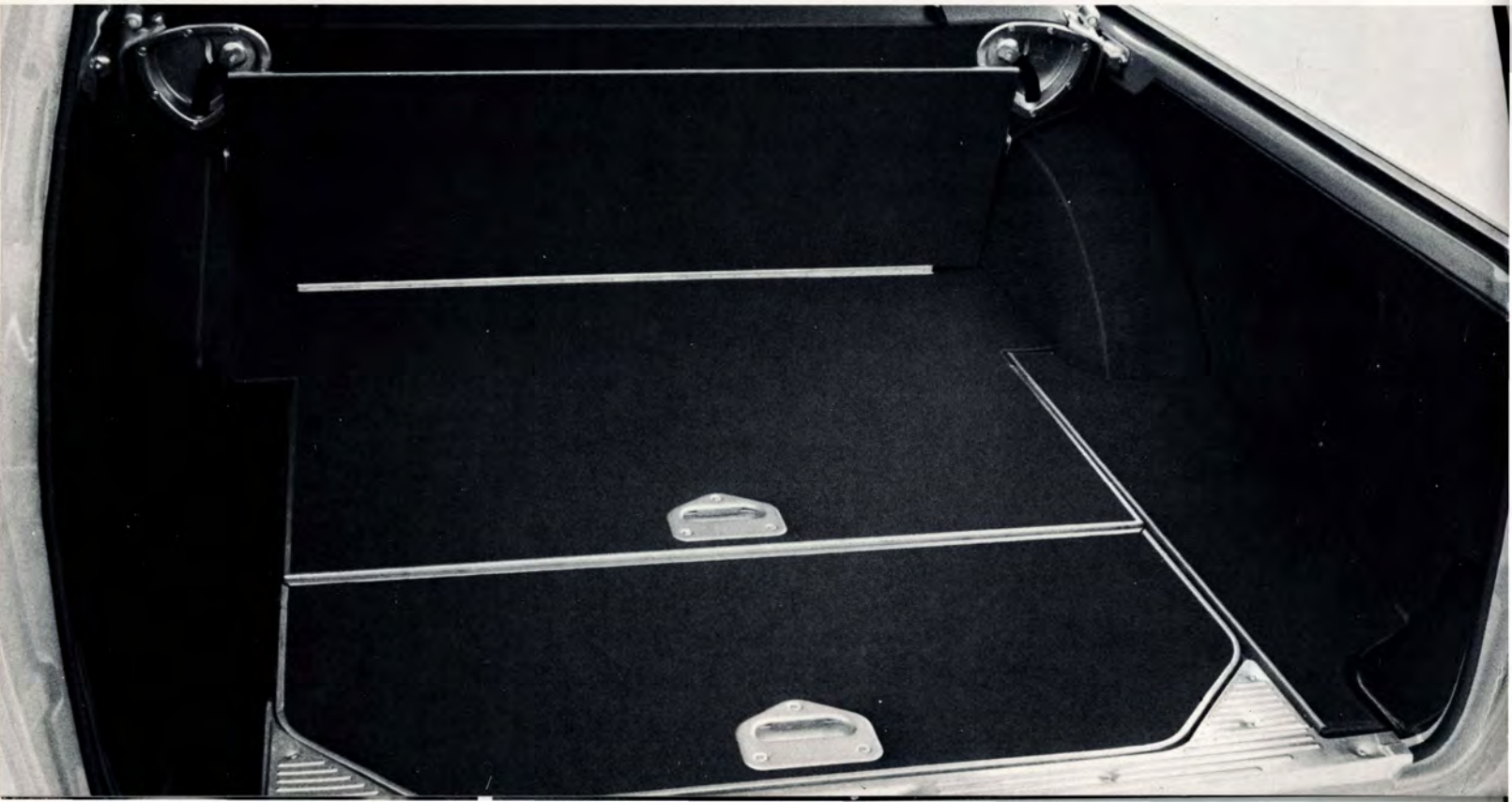
Spare tire is conveniently located in the station wagon's left rear quarter behind an easily removeable cover.

Recessed handles on either side of the car turn to fold the 145's rear seatback flush with the floor. Cushion itself folds against the back of the front seat.

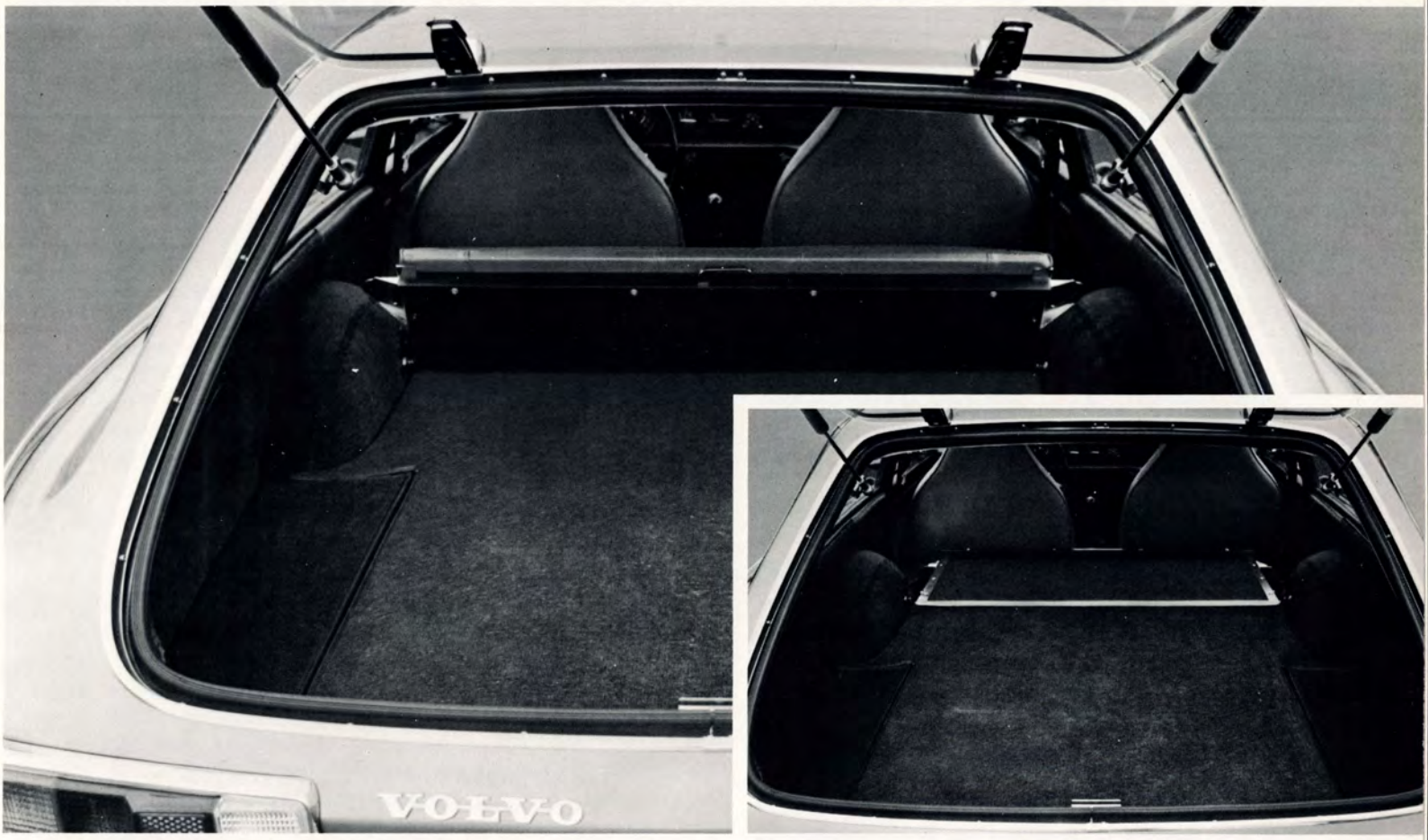
1.2 imperial quarts reservoir for the rear window electric washer is located to the right in an underfloor compartment.

1800E luggage compartment is fitted with a vinyl spare wheel cover and a protective rubber mat covers the floor.

145 rear compartment holds up to 70 cubic feet of cargo, 54 cubic feet with the rear seat in place. Maximum length of the completely flat floor is 74 inches and the maximum width is 55.9 inches. Height of the tailgate opening is 30.7 inches.



Unusually large cargo capacity of the 1800ES is 35 cubic feet, twelve more than the sedans. Even with the rear seat in place there's ample room for a family's luggage. The insert shows the 1800ES with the rear seat folded.



The 1800ES also has three underfloor compartments. The large center compartment houses the spare tire, those on either side provide hidden storage space for the odds and ends most people accumulate in the trunk.

ENGINES

In their fourth year of production, the evolution of the B20 and B30 engines continues. Both share many design features in the way of strength and durability with the rugged and reliable B18 engine which powered the Volvo in the years from 1961 through 1968. In addition, the two engines are both virtually identical internally, using the same pistons, connecting rods and valve gear.

The additional torque and horsepower of the six-cylinder, 3-litre B30 over the four-cylinder, 2-litre B20, however, calls for additional strength in some components — the clutches and flywheels, for example, have been redesigned. In the same way, the B30's two additional cylinders dictate somewhat different cooling and lubricating systems.

The B20 crankshaft has five main bearings; the B30 has seven; journals for both engines are induction hardened for protection against wear, and lead/bronze bearings are used for both main and connecting rods and for the camshaft bearings. A rigid inspection program assures that individual bearings and each crankshaft journal conforms to tolerance standards. Each crankshaft is also dynamically balanced to contribute to vibration-free performance even at the highest speeds. Another Volvo engine feature: fully machined combustion chambers to discourage carbon build-up and to produce a more even burning of the fuel/air mixture.

The basic B20 engine was modified in 1971 by the introduction of a new cooling system and new carburetors. Both systems are designed for North America's climate and drivers. The new cross-flow radiator, with a 25% larger cooling area, can cope with even the hottest desert temperatures; in addition to holding 18% more coolant, the horizontal design permits a lot more air to pass through the radiator's core. A new asymmetrically spaced six-blade metal fan with a clutch device to limit its rpms at highway speeds (for less fan noise and for a gain in engine horsepower) was also introduced at the same time.

This new system was not designed to make the engine run cooler; it did further stabilize engine temperatures to avoid damaging expansion and contraction of engine components — a significant factor in engine life.

The B20 (now designated the B20B) was also equipped with the new S.U. carburetors, a design similar to the Zenith carburetors used on the B30. These dual carburetors were designed to keep the fuel/air mixture independent of variations in temperature. This was made possible by the use in the carburetor of a special bi-metal lever — sensitive to temperature variances — to control the moveable main fuel jet. As a result, both hot and cold starting was noticeably improved, and, in conjunction with Volvo's thermostatically-controlled air preheating system, the B20's exhaust was made cleaner.

The air preheating system (also a feature of the B30A engine) is designed to supply the carburetors with air heated to a constant temperature (about 85° F.) for maximum performance. Additional benefits are a faster engine warmup and quieter operation.

To achieve this, cool air from the grille and warm air from the region around the exhaust pipe is drawn to the carburetors via two flexible tubes: the air mix and flow is regulated by a thermostatic-controlled flap valve where the tubes meet at the air cleaner housing. Depending on the temperature in the housing, cool air is either drawn through the grille and/or warm air from around the exhaust.

Since the temperature of the air taken in through the pre-heating system rises so rapidly, the choke is needed only for the first few minutes or so of operation even on the coldest days.

With the implementation of this carburetor air preheating system, a fuel injection system was a logical next step. Fuel injection was introduced in 1970 on the 1800E sports car with the B20E engine.

The fuel injection system was developed for Volvo by the Robert Bosch Company in Germany. Its basic feature is electronic computer monitoring and control of the flow of the air/fuel mixture into the engine's combustion cham-

bers. This means that information on air temperature, air pressure, water temperature, throttle position and engine speed is picked up by electronic sensors and relayed to the computer on a continuous basis. Here it is integrated and transformed into a series of operating signals for the electric fuel pump, the fuel injectors — one for each cylinder — and for the air intake system. The impulses sent to and from the computer, and the resulting actions of valves and sensors, can be summarized into one feature: the right air/fuel mix for any given operating condition, with none of the time lag and subsequent overreaction that carburetor systems are subject to. This means, of course, that there are no more carburetors. Other advantages include additional horsepower, improved warmup and a cleaner exhaust. At the same time, there is automatic compensation for changes in altitude, air temperature and coolant temperature.

A simple way to show how fuel injection can improve gas mileage is to watch what happens when a driver floors the accelerator pedal: when the throttle is suddenly opened on a carburetted car, large amounts of fuel are sucked into the combustion chambers of the engine — considerably more than can be used effectively. As a result, quantities of unburned gases pass directly into the exhaust — without, obviously, having done anything useful.

With a fuel injection system, this simply cannot happen. Instead, the engine's computer instantly senses the increased pressure on the accelerator and acts to limit or prohibit altogether the entrance of additional fuel into the engine until it senses that the engine speed has been sufficiently increased: the fuel, in effect, cannot run ahead of the engine's needs at the moment.

Another important feature of the fuel injection system is a "cold start" valve triggered by the ignition key. When the starter is initially operated at an engine temperature below 95° F., an injector sprays a thin stream of gasoline into the air intake duct to enrich the fuel air mixture.

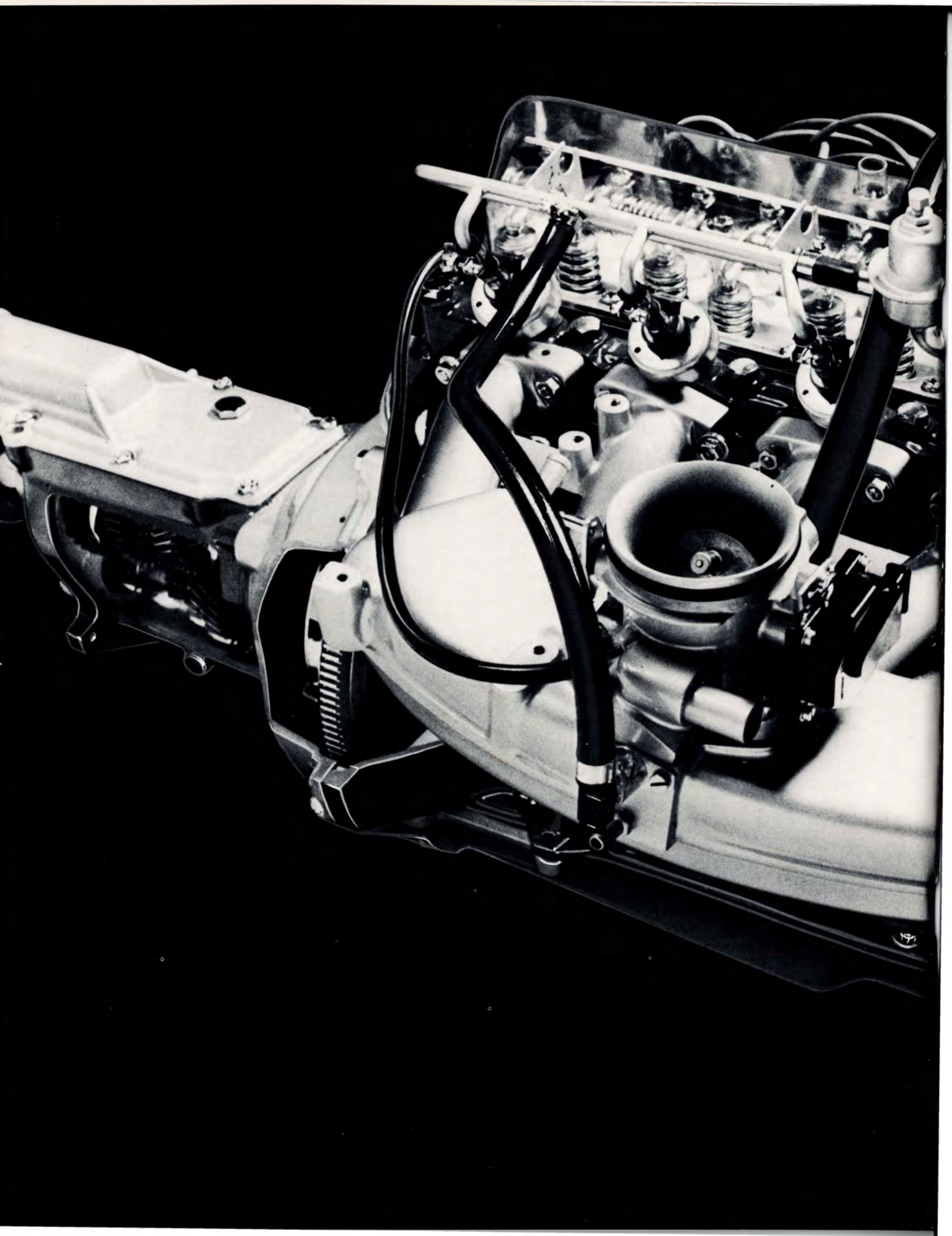
The air intake system itself is equally subject to this kind of precision control. As engine speed is increased, an additional amount of air is permitted to mix with the increased injections of fuel; when the engine is idling, or when the car is coasting, the air is directed to a by-pass and the computer is signaled to adjust the injections accordingly. Under cold running conditions, a varying amount of air enters the intake duct — bypassing the throttle valve — through the auxiliary air regulator.

The result of all this is an engine which literally "knows what it is doing" at all times. With this kind of "awareness" it is possible for the engine to react almost instantaneously and for it to make precise and minute adjustments in operation. The length of time a fuel injection valve stays open, for example, can be varied from two to twelve thousandths of a second to enhance engine performance.

This year the further development and refinement of these remarkable engines continues to emphasize cleaner exhausts. This has long been a concern of Volvo engineers; the introduction (and anticipation) of increasingly stringent Federal and Provincial controls on automobile air pollution must inevitably make the improvement of exhaust emission values a major factor in engine design and performance. With this very much in mind, Volvo now introduces the electronic fuel injection B20F and B30F engines for the North American market.

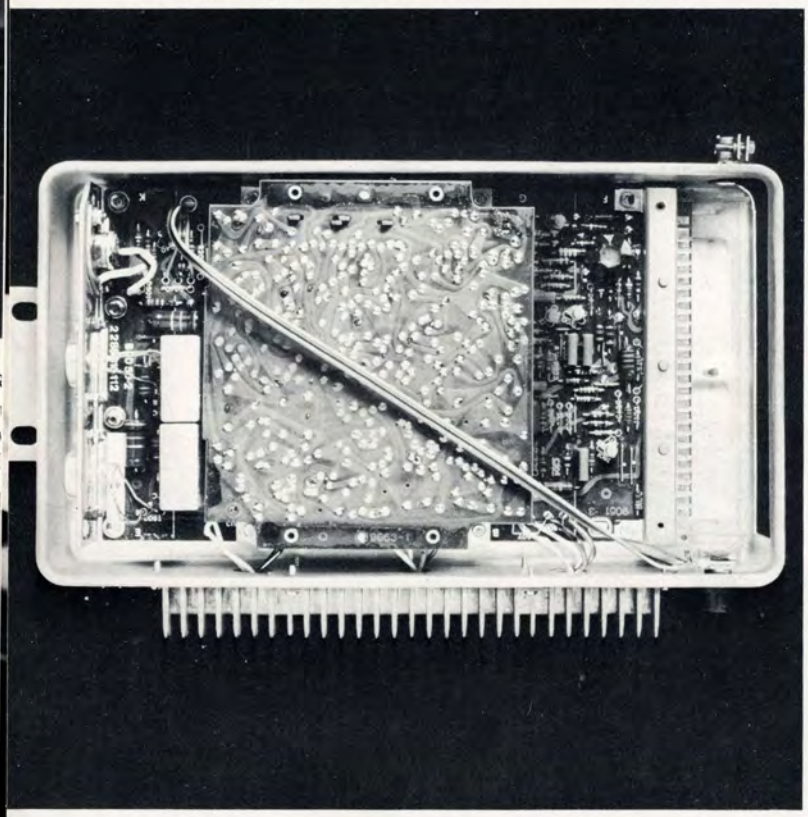
The B20F is a modified version of the reliable B20E, and it has been modified to use low-octane, low-lead "regular" grade fuel in place of the higher octane "premium" grade. The B20F's improved emission values, have been achieved by reducing its compression ratio from 10.5:1 to 8.7:1. This means that the B20F now produces 125 SAE horsepower at 6000 rpm, and 123 foot pounds of torque at 3500 rpm.

The six-cylinder B30F — now standard on the new model 164E — is the result of a develop-

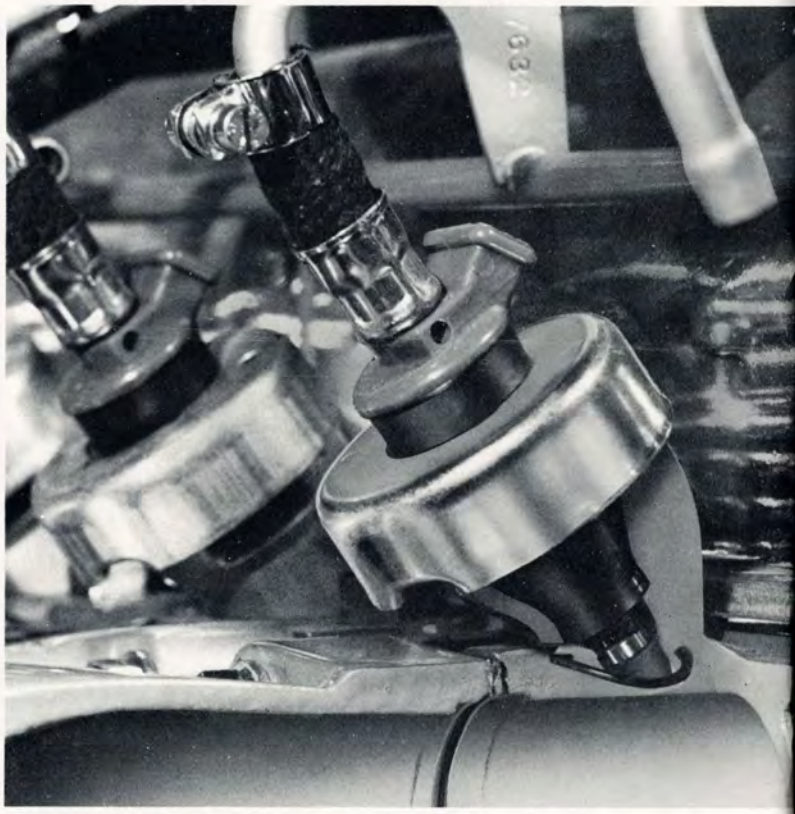


Cutaway of the fuel injected six-cylinder engine shows the fuel and air intake systems and internal components.

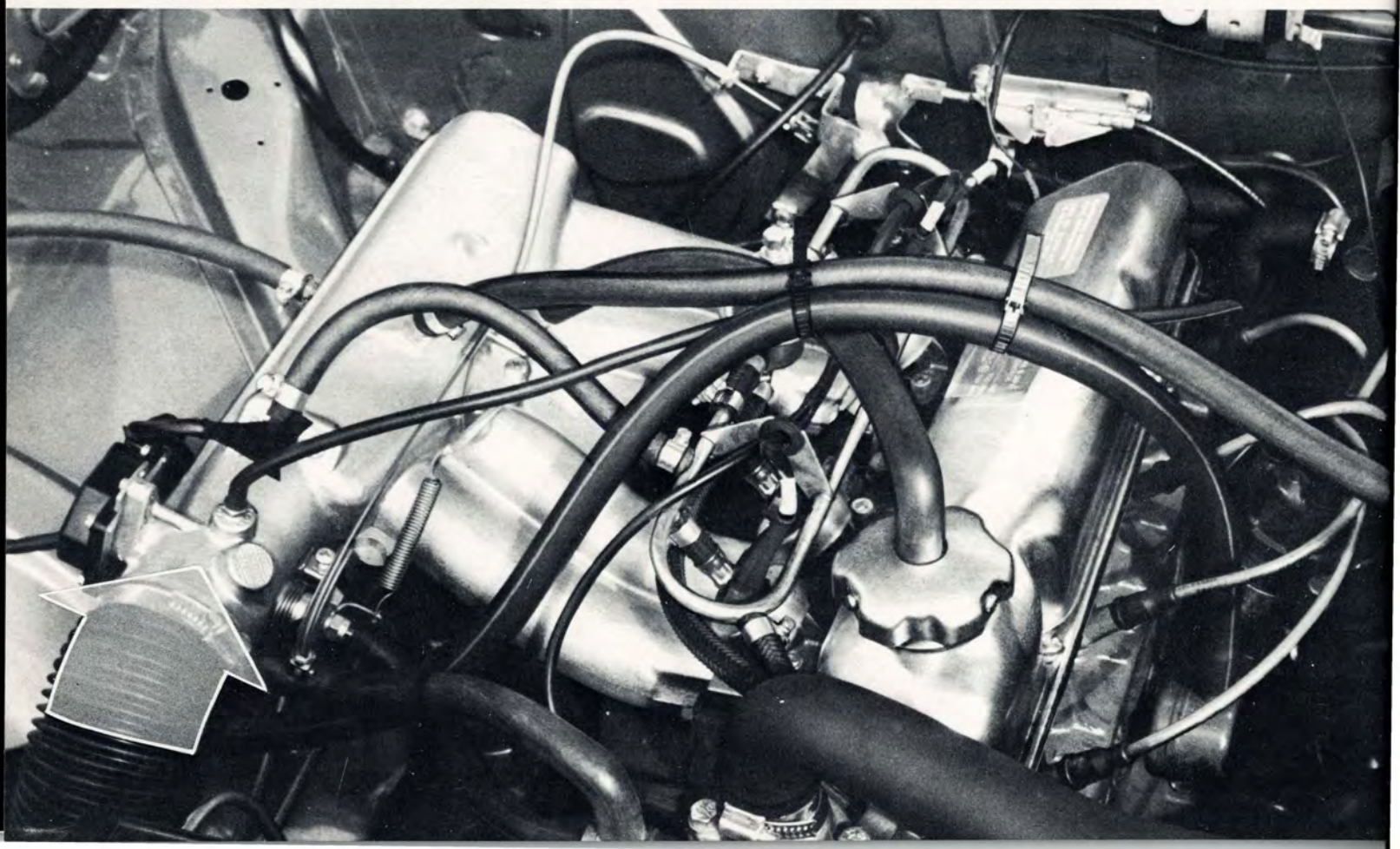
Computer controlling the B20F and B30F engines receives electronic signals from five sensors to regulate and control the length of time the fuel injectors remain open.



Electronic injector sprays a thin stream of fuel into the inlet port for each combustion chamber. The injector valve may remain open for as little as two thousandths of a second, or as much as twelve thousandths, depending on operating conditions sensed by the computer.



Intake air flow for the B20F fuel injected engine is regulated by a butterfly valve at the front of the air intake duct and proportionally directed to each of the four cylinders.



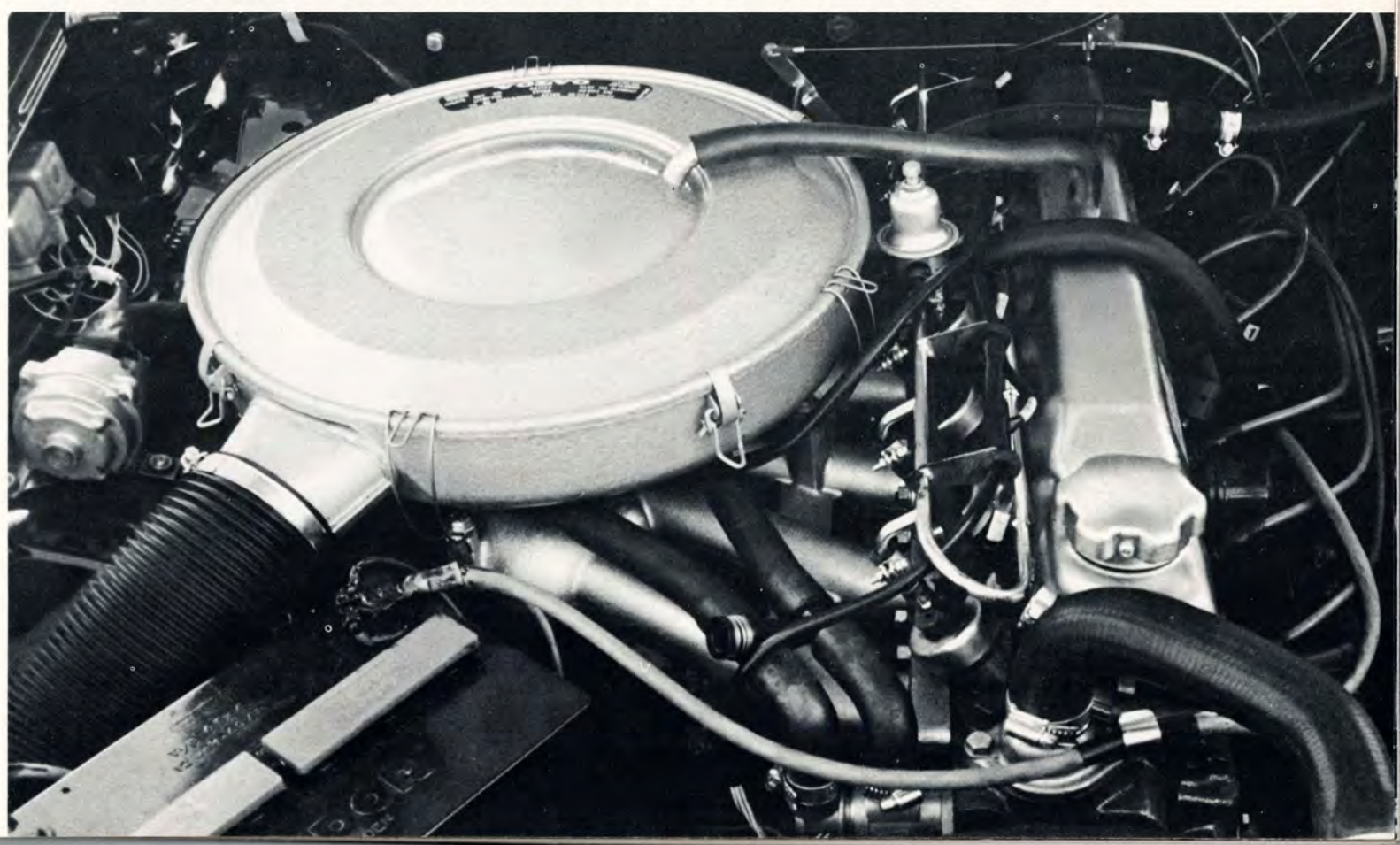
ment in every way parallel to that of the B20F. The same electronically controlled fuel injection system has replaced the dual carburetors of the B30A; a similar reduction in compression ratio permits the use of "regular" grade gasoline to produce 160 SAE net horsepower at 5800 rpm and 166 foot pounds SAE of torque at 2500 rpm.

This engine also contains improvements which shorten the electronic computer's response time and thus further reduce fuel consumption when full engine power is not required. This, in turn, reduces engine exhaust and the engine exhaust's hydrocarbon content.

Other modifications have been introduced to enhance safety and to improve engine performance relative to such requirements as heating and air conditioning. For example, the fuel pressure regulator is now located in the center of the intake manifold, where it is less subject to accidental damage. To further reduce the possibility of vapor lock, the return line to the fuel tank has been replaced by an internal recirculating system. Another instance of improved performance is provided by a new sensor for the "cold start" valve. This modification effectively eliminates the possibility of flooding under "cold start" conditions.

In view of the requirements of its additional cylinders and extra power, the new B30F has some additional features which distinguish it from the B20F. Among these are its larger air cleaner, which has been moved to a centrally located position on top of the engine; the new butterfly valve for the air intake system, which has been moved along with the air cleaner, the bigger 9½ inch clutch, and the dual exhaust manifold, which has twin pipes leading to the front silencer for improved engine breathing. The engine has also been provided with a special air conditioning compensation valve fitting in the hoses between the butterfly valve housing on the air cleaner and the supplementary air valve. This modification permits the installation of a special air-compensation valve to aid in maintaining idling speeds in the event of heavier engine loads generated by the air conditioning compressor. What this means, in effect, is that the installation of a Volvo air conditioner on the 164 need not be

Oversize air cleaner dominates the B30F engine compartment. Because air distribution is more critical in this six-cylinder engine, air flow through the intake ports originates from the center of the manifold rather than in front of the manifold as on the four-cylinder engine on the preceding page. Other fuel injection components are basically the same.



a hit-or-miss proposition. Instead, it can be readily integrated into not only the car's electrical system, but into its power system as well. The same can be said of such optional equipment as radios and stereo tape decks.

The new, more powerful alternator, which was introduced for the 164 in 1971, is now standard for all Volvos except those models still using the B20B engine. This alternator delivers 770 watts at 55 amps (in place of 450 watts at 35 amps). The increase in electrical capacity will provide additional power to operate the optional air conditioning system.

It is worth noting that this alternator delivers enough power to charge the engine's 12-volt, 60 amp battery even at idling speeds. A one hp starter assures quick starts in winter without excessive cranking; the moisture-proof ignition system has rubber seals originally developed for Volvo-Penta marine engines. The entire electrical system is easily reached for servicing, and the addition of an air conditioning unit does not interfere with routine servicing accessibility of either the electrical system or the fuel system and the replaceable oil filter.

The carburetted B20B engine is essentially unchanged this year. In line with Volvo's concern with cleaner exhausts, however, there are certain improvements to the B20B's intake manifold. Formerly the high temperatures in the intake manifold mixture chamber made the reduction of the nitrogen content of the exhaust gases rather difficult. In the light of further experience with carburetion testing, it was found that the mixture chamber itself was unnecessary. Consequently, the new manifold eliminates it, and in the process achieves a cleaner exhaust.

To get the engine's power to the rear wheels, Volvo uses either a four-speed fully-synchronized manual transmission or a three-speed automatic. Additionally, the 142E, 164E and 1800E/ES have electrically operated overdrive as standard equipment. The overdrive is controlled by a lever on the right side of the steering column, and it can be engaged without using the clutch pedal. Models equipped with overdrive have the equivalent of a five-speed transmission with clutchless shifting between the two highest gears. This is particularly valuable to the driver who covers long distances because it decreases both fuel consumption and engine wear.

The overdrive feature has become an integral part of Volvo's transmission program because of the fact that highway driving at high speeds seldom calls for anything like full engine power. It, therefore, makes sense to reduce the speed of the engine under these conditions. This is precisely the purpose of the overdrive: by decreasing engine speed fuel consumption, exhaust emissions and the engine's noise level are all reduced, while the road speed remains constant.

An even more rugged four-speed manual transmission is fitted on the 164E to favorably handle the heavier torque loads of the six-cylinder engine.

This year the 140 Series transmission is equipped with a new remote-control type shift linkage similar to that already in use on the 164.

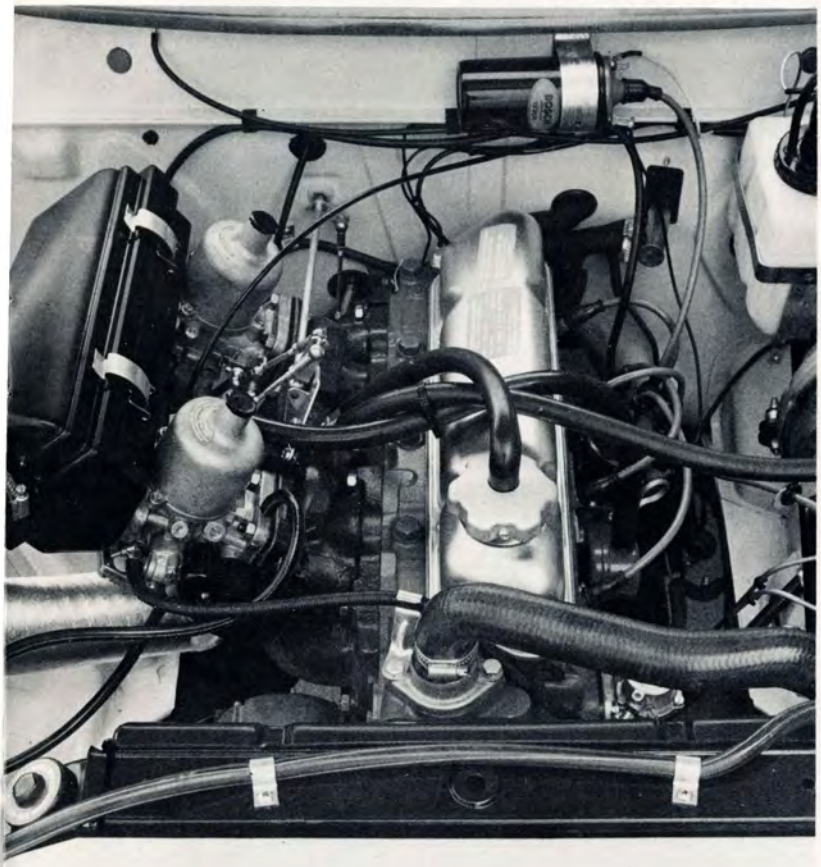
Its advantages are that the shorter lever gives easier and quicker shifting and that it can be reached more easily by the driver.

The Volvo automatic transmission, which is available in all models (and specially adapted to each engine) also features a new floor-mounted shift quadrant with a pushbutton interlock lever for the 140 Series and 164E.

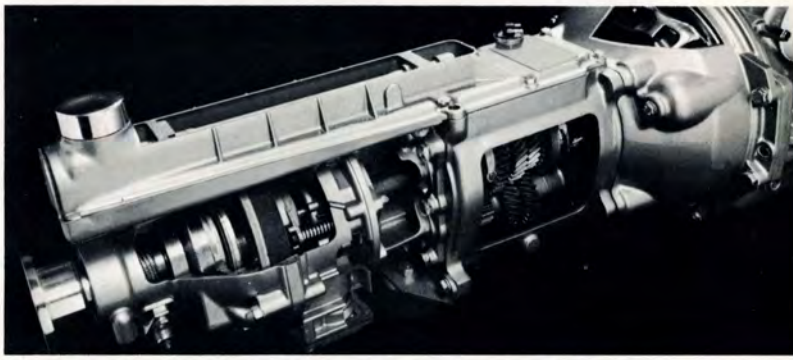
Its principal feature is the push-button located on the selector lever knob, which simplifies driving mode selection by eliminating guesswork or incorrect shifting from any of the six-positions along the quadrant. In effect, the selector lever cannot be moved from the "Drive" position into either "Neutral" or "First" unless the push-button is pressed *halfway* down, although the lever can move freely from "Drive" to the new "Second" position (which, by the way, is *not* "second gear" but rather a new mode designed for stop-and-go city driving and for engine braking on steep hills and curves). In the other direction, the pushbutton must be pressed *all* the way down in order to move the lever from "Neutral" into "Reverse" and "Park". These positions are all clearly indicated on the quadrant.

Beneath the floorboards the Volvo automatic transmission has been further modified and improved. The elimination of the rear pump, found to be unnecessary under normal driving conditions, now provides better performance and still another measure of fuel economy by reducing the load on the gears. This means, incidentally, that Volvos can no longer be tow started in the event of battery failure. To further improve performance, and more specifically, to better the transmission's heat dissipation characteristics, there have been further modifications to the transmission bands and clutches incorporating newly developed friction materials to provide smoother operation and longer life.

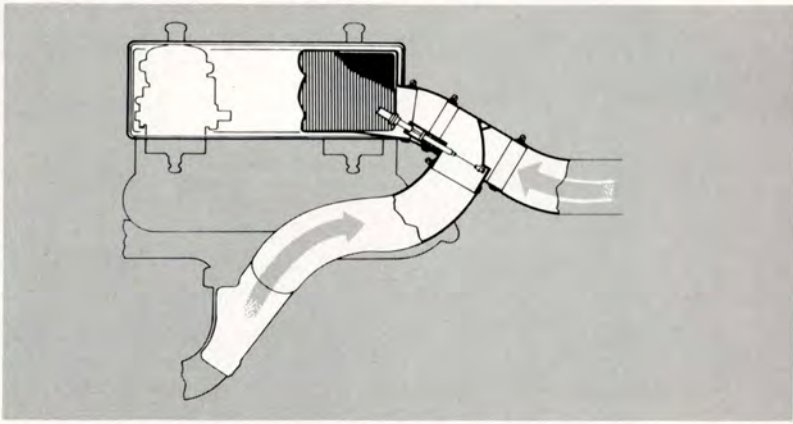
This two-litre 4 cylinder B-20B engine powers the 142/144, and has dual carburetors developing 118HP SAE at 5800 rpm.



M41 transmission is combined with electrically operated overdrive. Overdrive is standard on the 142E, 164E and 1800E/ES with manual transmission.



Pre-heating system for carburetted engines draws hot air from around the exhaust pipe and cool air from the front of the engine. The two branches meet in a coupling in front of the air cleaner. Thermostatically regulated flap valve is shown in a closed position.



The fan is coupled to a slip-clutch which limits the fan's speed when the car is traveling fast enough to provide ample air currents through the radiator.

Two-litre B20B engine has dual carburetors with moveable main jets which automatically vary the fuel/air mixture according to fuel temperature variations.

BRAKES

Volvo's concern with safety as a primary design consideration is nowhere more evident than in the four-wheel power-assisted disc brake system standard for all models. This system is still the most advanced in the industry, and it is far more effective than the front-wheel-only discs which are just beginning to appear as standard equipment on some cars.

The inherent advantage of discs, as opposed to the more conventional stationary drum-type brake is easily stated: brakes work by friction, and friction produces heat and wear. The disc is exposed to the air and is constantly spinning as the wheel turns, so that the heat produced in braking is rapidly dissipated. This capacity to withstand high temperatures means that disc brakes can take repeated hard braking without fading. Volvo's discs are designed to stop the car in four seconds when it is traveling 60 miles an hour. This kind of braking can produce temperatures as high as 900 degrees. Naturally, this produces wear on the brake pads which press against the disc, but the simplicity of the design makes the pads easily replaceable.

A further advance this year on the 164E is ventilated front discs to give an additional increase of cooling effectiveness. The discs are two-thirds thicker to permit radial drillings which function more or less like a centrifugal air pump.

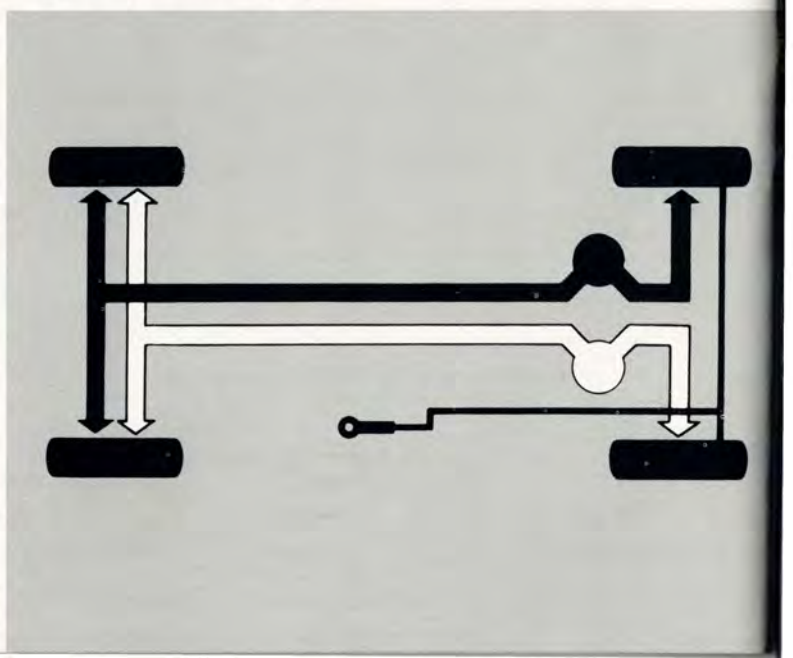
The discs, however, are only part of the system. Volvo's brakes are power assisted to multiply the effect of pedal pressure, and they are controlled by an exclusive three-wheel dual circuit system in which each circuit is connected to *both* front wheels and to one alternate rear wheel. This means that even if one circuit should fail for some reason, the other circuit will still provide 80% of full braking power. (A warning light on the dashboard will indicate the failure of one circuit). Each of the brake circuits, moreover, has a relief valve in the brake line to the rear wheels. The purpose of these valves is to assure that brake pressure on all four wheels closely matches the change in the car's weight distribution under different braking conditions. (The harder the brakes are applied, the more weight there is on the front wheels. The valves regulate the hydraulic pressure to the rear wheels so that under hard braking conditions, they receive a smaller proportion of the braking effort. This prevents premature rear wheel lock-up when the brakes are applied in emergencies).

There is also an auxiliary handbrake system with a brake drum in each rear wheel. This system has been improved this year by a modification in the handbrake linkage which is designed to insure full handbrake effect even if the linkage is not in perfect adjustment.

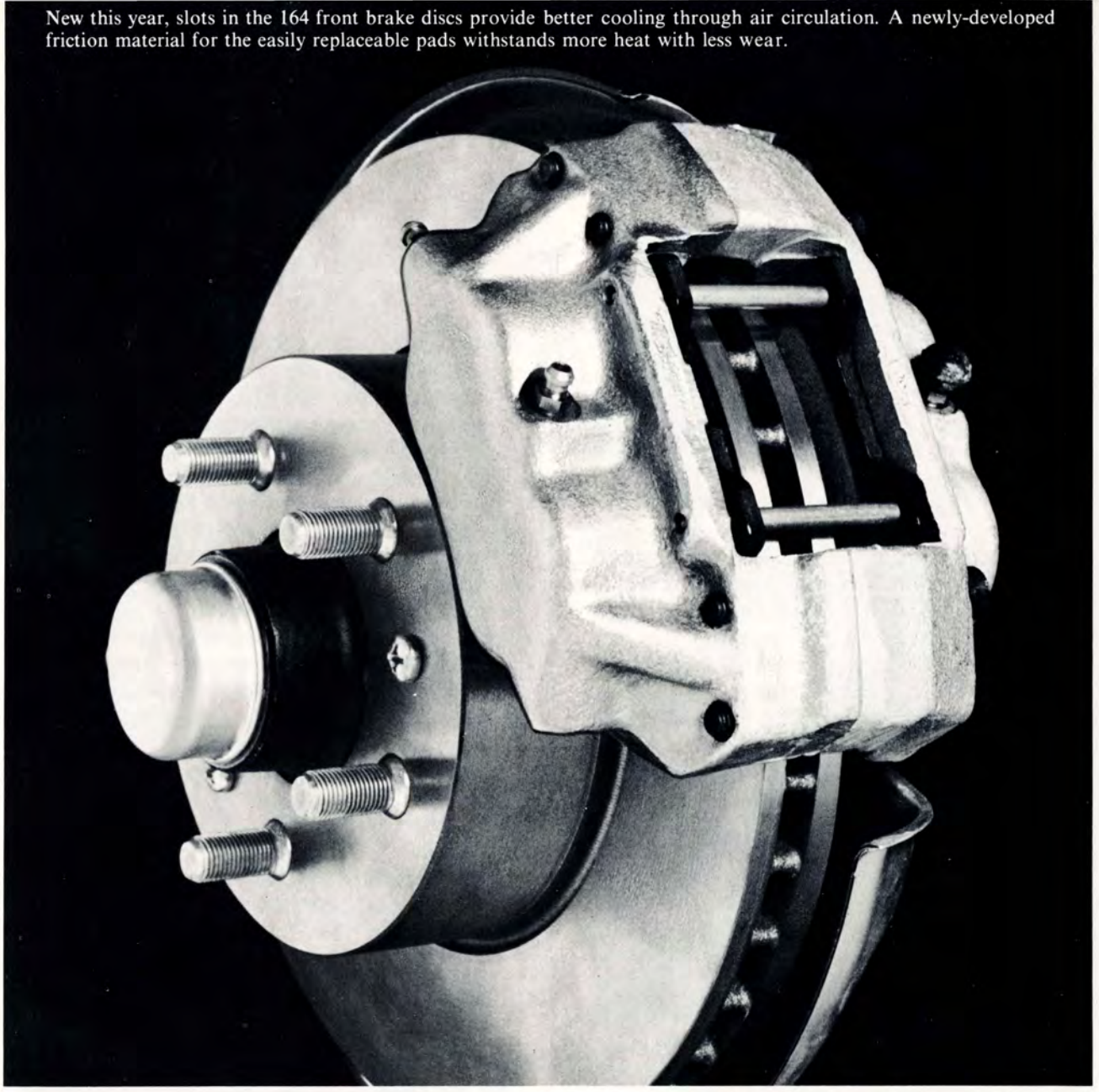
Reliability of the disc system has also been enhanced this year by the adoption of a newly-developed friction material for the pads which are designed to withstand a higher degree of heat with less wear.

Power brake assist, standard on all Volvos, and hydraulic brake fluid reservoir are shown here on a 164E.

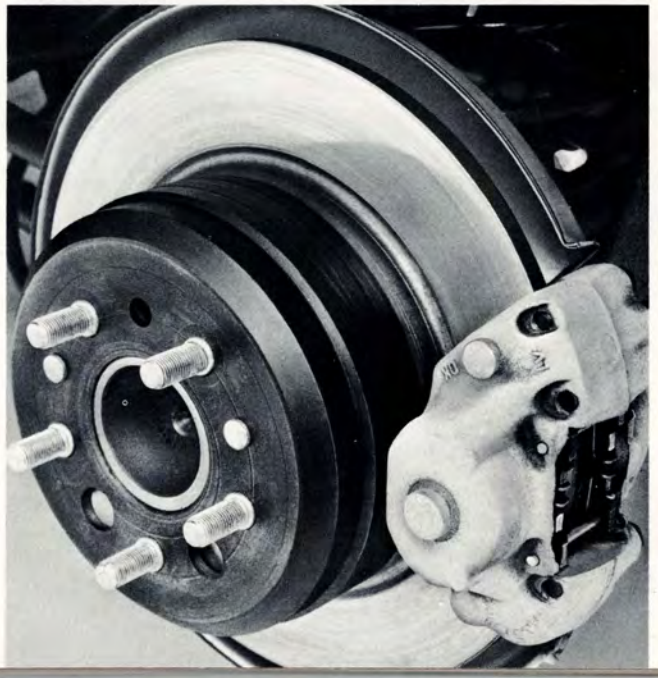
Dual brake system has each hydraulic circuit operating on three wheels for efficient straight line emergency stops. Pressure relief valves in both rear brake hydraulic lines prevent premature lock-up.



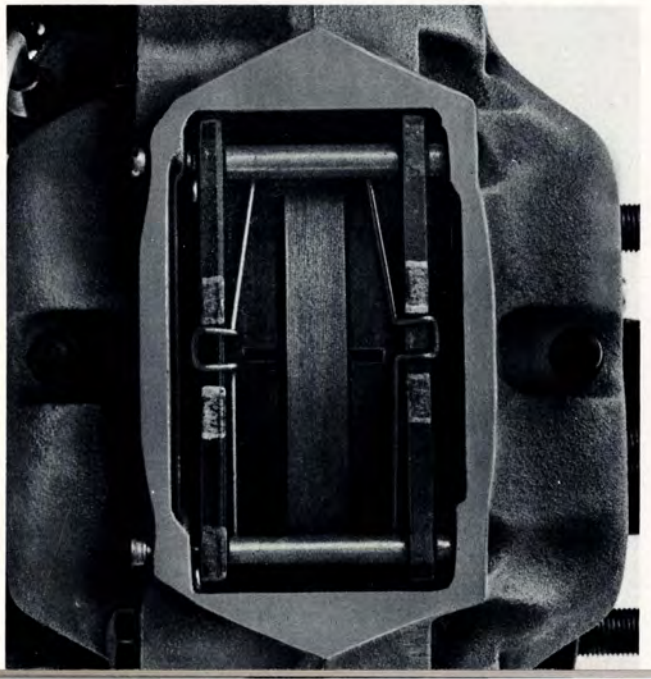
New this year, slots in the 164 front brake discs provide better cooling through air circulation. A newly-developed friction material for the easily replaceable pads withstands more heat with less wear.



Balanced brake design places smaller pads on the rear discs although the discs are actually larger. A separate hand-brake system is incorporated inside the drum.



Brake pads, held in position by steel pins on each side of the disc, are easily serviced. Though seemingly tight against the disc, the pads are actually free-floating until pistons forced by hydraulic pressure push them against the disc.



SUSPENSION AND STEERING

Because Swedish winters last six months and more, Volvo builds cars that can cope with bad weather and bad roads. This had led to an extensive research program for suspension systems and components, and to the adoption of a suspension system which is matched to the design of the car itself. This means rugged coil spring suspension and double-acting tubular shock absorbers on all four wheels in combination with extremely accurate control of the rear axle. Longitudinal movement of the solid and "live" rear axle is controlled by two rubber-mounted support arms; lateral movement is controlled by a track rod. Two more torque rods prevent the axle from turning during acceleration and braking.

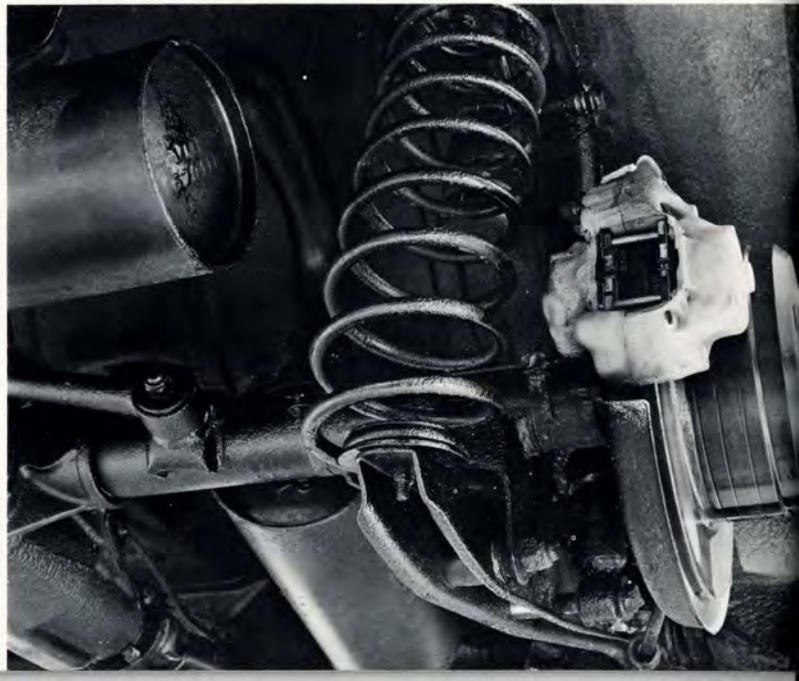
Since each of the system's functions — springing, control of axle movements and shock absorbing — is performed by a separate set of components, the suspension as a whole can be balanced so that it matches the design characteristics of the car. The result: a firm ride with unusually good control in the event of sudden swerves and other emergencies, as well as a smooth riding experience under more optimum conditions. This is in marked contrast to the soft and generally unresponsive ride of domestic cars. All models have a specially designed rear wheel bearing which absorbs lateral stress during cornering. To increase bearing life, stress is absorbed on both sides of the bearing and on each side of the car.

Individual Volvo models, moreover, possess special features keyed to their particular riding characteristics. The rear springs of the 145 station wagon are thus supplemented by a set of hollow rubber snubbers which are designed to limit vertical travel of the rear axle under heavy loads.

Steering systems, obviously, must also be tailored to the characteristics of each car. The 140 Series is equipped with a manual cam-and-roller type system which is precise and quick-acting due to its high mechanical efficiency and low friction and to the 140 Series' good weight distribution, which puts only about 50%

Independent front suspension on 164E features coil springs, rubber-mounted control arms and a stabilizer bar. Upper ball-joints allow for 5½" rims.

Rugged rear suspension has the axle carried by rubber-mounted control arms and torque rods. A track rod prevents axle shift.



of its total weight on the front wheels. This system can go from lock-to-lock in only four turns of the steering wheel and it gives the 140 Series a turning circle of no more than 30'4". The steering ratio is 17.5:1.

The 164E with its heavier engine, features a similar cam-and-roller type system. It is supplemented by a hydraulically powered recirculating ball-and-nut assist. The addition of this power assist effectively provides the kind of responsiveness that is lacking in most conventional power steering, and it makes steering and parking the 164E a matter of ease and precision. The 164E can easily match the VW Super-Beetle's 31'6" turning circle with only 3.7 turns from lock to lock. The steering ratio is 15.7:1.

The 1800E/ES have the same cam-and-roller type system as the 140 series. Their turning circle is 29'10" in only 3¼ turns. The steering ratio is 15.5:1.

All Volvos are equipped with a split-type safety steering column. The lower part of the steering column is designed to separate or telescope under severe frontal impact and to absorb the shock of the collision.

Goodyear Polyglas tubeless whitewall tires mounted on 15" safety wheels are standard for the 140 series. (Eight-ply rated 6.85x15 tires are installed on the 145 station wagon for increased load capacity.)

Hydraulic pump for the 164E power steering is belt driven off the crankshaft pulley. Reservoir, bottom center, is located next to the transparent radiator expansion tank.

The 1800E and the new 1800ES feature both wider 5½" wheels and larger and wider tires this year to improve high-speed handling characteristics.

SPECIFICATIONS:

Engine:

164E — Type B30F. Water cooled, six-cylinder in-line, cast iron block and head, seven-main bearing crankshaft. Pushrod operated overhead valves with gear driven four-bearing camshaft. Pressurized electronic controlled Bosch fuel injection with electric fuel pump. Bore: 3.50 inches. Stroke: 3.15 inches. Displacement: 182 cubic inches (2979 cc.). Maximum horsepower: 160 SAE at 5800 r.p.m. Maximum torque: 166 foot pounds SAE at 2,500 r.p.m. Compression ratio 8.7:1 Oil capacity: 6.3 quarts including filter.

142E, 145E and 1800E/ES — Type B20F. Water cooled, four-cylinder, in-line, cast iron block and head, five-main bearing crankshaft. Pushrod operated overhead valves with gear driven three-bearing camshaft. Pressurized electronic controlled Bosch fuel injection with electric fuel pump. Bore: 3.50 inches. Stroke 3.15 inches. Displacement: 121 cubic inches (1986 cc). Maximum horsepower: 125 SAE at 6,000 r.p.m. Maximum torque: 123 foot pounds SAE at 3,500 r.p.m. Compression ratio 8.7:1. Oil capacity 4.0 quarts including filter.

142, 144 and 145 — Type B20B. Water cooled, four-cylinder in-line, cast iron block and head, five-main bearing crankshaft. Pushrod operated overhead valves with gear driven three-bearing camshaft. Twin horizontal 1.75 inch S.U. carburetors supplied by a mechanical fuel pump. Bore: 3.50 inches. Stroke: 3.15 inches. Displacement: 121 cubic inches (1986 cc.). Maximum horsepower: 118 SAE at 5,800 r.p.m. Maximum torque: 123 foot pounds SAE at 3,500 r.p.m. Compression ratio 9.3:1. Oil capacity: 4.0 quarts including filter.

Clutch

Diaphragm spring type, single dry plate — 9½ inch on 164E, 9 inch on 164, 8½ inch on 140 Series and 1800E/ES.

Electrical System

Voltage: 12. Battery capacity: 60 amp hour. Starter output: 1 h.p. Alternator rating: 55 amps on fuel injected models; 35 amps on carburetted models.

Cooling System

Sealed, anti-freeze coolant circulated by engine driven pump. Transparent expansion tank. Capacity: 164E – 12.8 quarts; 140 Series – 8.8 quarts; 1800E/ES – 10.0 quarts.

Fuel System

Sealed system with evaporation control. Tank capacities: 1800E/ES – 10 Imp. gallons; all other models – 12.8 Imp. gallons.

Suspension

Front: Independent with rubber-mounted control arms. Steering knuckles supported by ball joints. Stabilizer bar. Coil springs with double-acting telescopic shock absorbers. Permanently lubricated.

Rear: Solid rear axle carried by longitudinal, rubber-mounted control arms and torque rods. Transverse location by rubber-mounted track rod. Coil springs with double-acting telescopic shock absorbers.

Wheels and Tires

164E – pressed steel wheels, rim size 5-1/2J x 15 inches. Whitewall radial ply 165SR15 tires. 140 Series – pressed steel wheels, rim size 5J x 15 inches. Whitewall polyglas tires except on 145 which has 8-ply rated whitewall 6.85 x 15 tires. 1800E/ES – pressed steel wheels, rim size 5-1/2 x 15 inches. Radial ply 185/70HR 15 tires.

Steering

164 — Cam and roller type with recirculating ball and nut power assist. 3.7 turns lock to lock. Turning circle: 31 feet 6 inches. Steering ratio: 15.7:1.

140 Series — Cam and roller type with four turns lock to lock. Turning circle: 30 feet 4 inches. Steering ratio: 17.5:1.

1800E/ES — Cam and roller type with 3¼ turns lock to lock. Turning circle: 29 feet 10 inches. Steering ratio: 15.5:1.

Transmissions

Manual: Four-speed, fully synchronized with floor-mounted remote shift lever. Ratios:

	1800E/ES/142/144/145	164
1st	3.13:1	3.54:1
2nd	1.99:1	2.12:1
3rd	1.36:1	1.34:1
4th	1.00:1	1.00:1
Reverse	3.25:1	3.54:1

Manual with Overdrive: Standard equipment on 1800E/ES, 164E, and on the 142E, operates electrically on fourth gear. Reduction ratio: 0.80:1.

Automatic: Optional on all models except 145E. Hydraulic three-speed with torque converter and part throttle kick-down. Floor-mounted illuminated gear selector with standard PRND21 quadrant.

1st	2.39:1
2nd	1.45:1
3rd	1.00:1
Reverse	2.09:1

Rear Axle

Hypoid type. Ratios:

	Manual	Automatic
142/144	4.10:1	4.10:1
142E/145	4.30:1	4.10:1
164E	3.73:1	3.31:1
1800E/1800ES	4.30:1	3.91:1
145E	4.10:1	

Brakes

Power assisted, self-adjusting four-wheel disc brakes. Twin circuit hydraulic system, each circuit operating on both front wheels and one rear wheel. Each circuit alone provides 80% of total four-wheel braking effectiveness. Two pressure relief valves operate on rear wheels.

Front: 10.7 inch discs. Pad area: 164 and 1800E/ES — 27.0 square inches; 140 Series — 22.8 square inches.

Rear: 11.6 inch discs. Pad area: 14.4 square inches.

Handbrake: Mechanical drum brakes acting on both rear wheels. Lining area: 27 square inches. Dashboard warning light.

Hydraulic power assist ratio: 164 — 1:4; 140 Series — 1:3; 1800E/ES — 1:2.7

Gauges and equipment

Fuel and water temperature gauges, speedometer. Alternator, oil pressure, headlight beam, directional signal, handbrake and footbrake warning lights. Two-speed 100-watt electric blower. Electric rear window defroster. Two-speed electric windshield wipers plus electric windshield washers. Electric clock. Rear window wiper and washer on the 145. Automatic backup lights. Variable instrument lighting. Illuminated glove compartment on 164 and 140 Series. Interior courtesy lights. Cigarette lighter. 1800E/ES also have tachometer, oil pressure and oil temperature gauges. The 142E includes tachometer in an exclusive sports instrument cluster.

Exterior Dimensions

	142/144	145	164E	1800E	1800ES
Length	182.7	182.7	185.6	171.3	172.6
Wheelbase	103.2	103.2	107.1	96.5	96.5
Width	67.4	67.4	67.4	66.9	66.9
Height	56.7	56.7	56.7	50.4	50.4
Track, front/rear	53.2	53.2	53.2	51.6	51.6
Ground clearance	7.1	7.1	7.1	4.3	4.3
Curb weight	2620/2680	2810	3060	2490	2690

Interior Dimensions

	142/144	145	164	1800E	1800ES
Front seat width, hip height	55.9/56.3	56.3	56.3	53.5	53.5
Front seat width, shoulder height	52.4/54.7	54.7	54.7	50.8	50.8
Rear seat width, hip height	53.5/56.3	56.3	56.3	40.2	40.2
Rear seat width, shoulder height	53.5/54.7	53.2	54.7	49.2	49.2
Front seat width	22.4	22.4	22.4	19.7	19.7
Front seat depth	19.3	19.3	19.3	19.3	19.3
Rear seat depth	18.5	18.5	18.5	13.0	13.0
Headroom, front seat	37.4	37.4	37.4	36.8	36.8
Headroom, rear seat	35.1	35.1	35.1	26.4	32.7

Luggage Compartment Dimensions

	142/144	145	164	1800E	1800ES
Cargo loading height	—	23.1	—	—	30.7
Maximum width	61.0	55.9	61.0	58.3	49.2
Tailgate opening height	—	31.5	—	—	15.8
Cargo area length maximum	47.6	74.1	47.6	33.1	59.8
Cargo area length minimum	—	44.5	—	—	32.7
Volume, cubic feet	23.6	70.0	23.6	—	35.0

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