

VOLVO 140 series engineering features





Introduction

This book contains illustrations and technical descriptions of all significant features of the 1969 Volvo 140 Series models. It goes a step beyond the sales literature to give you a more complete analysis of the quality, performance, economy, comfort and safety features built into these cars.

A careful reading of this book will give you a clear understanding of the engineering quality that is an important but generally hidden strength of these automobiles.

For example, the 1969 models contain 354 new parts including a new engine. Only three of these parts are readily noticeable. The other 351 are hidden underneath the cars, inside the engine, transmission and differential and under the hood. This book is designed to bring these improvements out into the open and to highlight the significant features continued from previous models.

The New B20 Engine

Volvo's new engine has been developed over a four year period for the 140 Series cars. It produces greater horsepower throughout the speed range and 10% additional torque.

The performance increase is especially noticeable on initial acceleration and when passing. The gain in pulling power means less shifting and greatly improved low speed flexibility, two very important advantages in everyday driving. New carburetion and final drive ratios also add to the faster acceleration and general performance increase.

The two-litre engine is a complete redesign, although very similar to the previous B18 engine. Each component was evaluated and new parts developed so that the B20 is stronger, quieter and will have an even longer life.

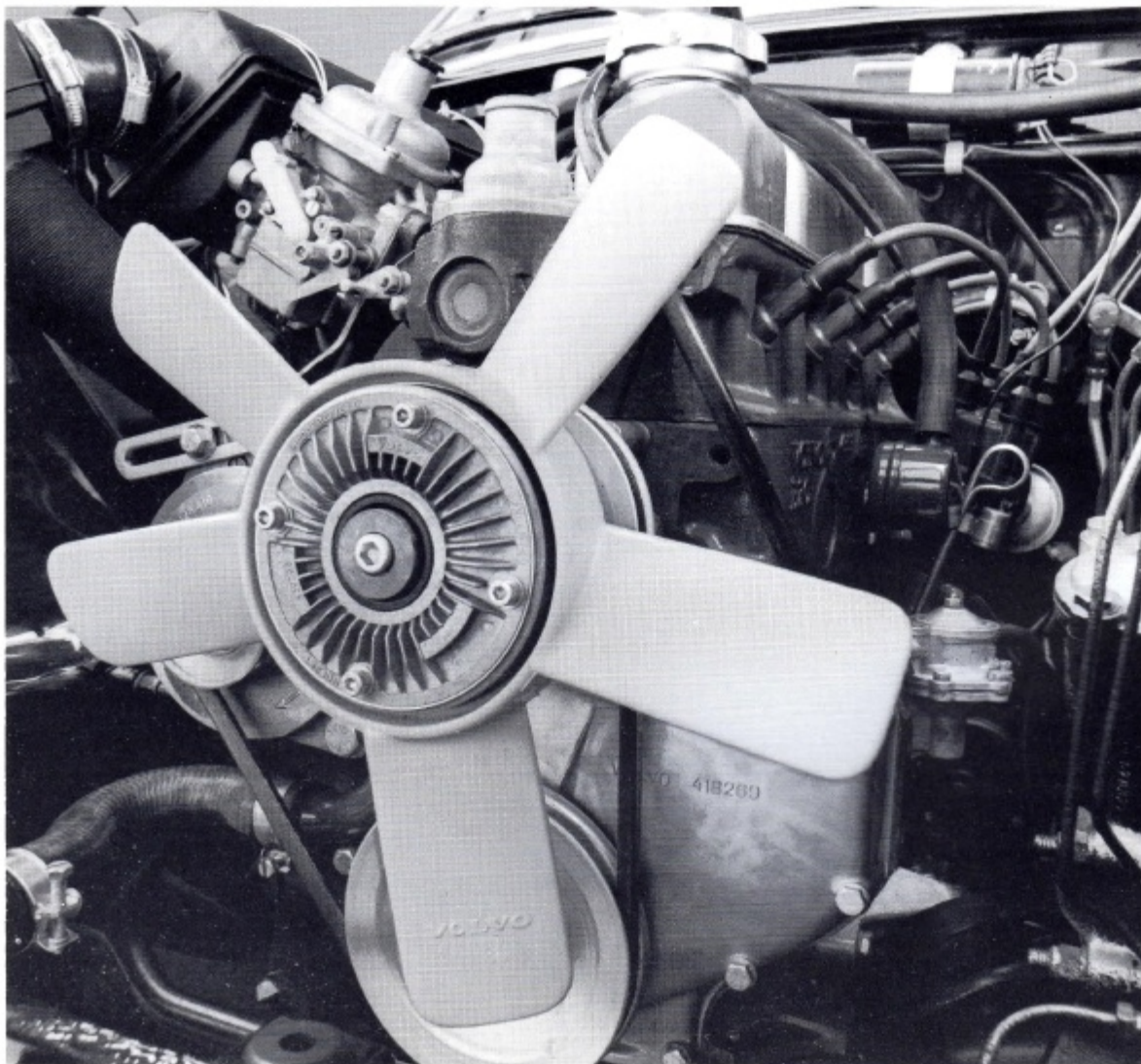
The displacement has been increased by using a new block with a greater bore of 3.50". This has resulted in an even more modern over-square design, since the stroke remains at 3.15". The cylinder wall thicknesses and the surrounding water jackets are identical to the old engine, but there is increased pressure in the cooling system, up 6 p.s.i. to 10

p.s.i. to raise the boiling point to 250° F. The coolant is 45% permanent type antifreeze. Engine lubrication also is improved with a new oil pump of 50% greater capacity and a lower pick up point in the oil pan. Oil pressure will be maintained even during hard cornering and severe braking.

Another important interior engine change is the valve train, redesigned for higher continuous r.p.m. Larger intake valves with chromed stems are used. In addition, the valve key design is new. The valves have greater rotation, lengthening their life. Also, there is improved sealing between the intake valves and guides to further reduce oil consumption.

The compression ratio is 9.5:1, slightly decreasing the octane requirement for best performance and proper idle. Premium gasoline is still required.

The main, connecting rod and camshaft bearings are made of a new material to increase engine life. The lead-bronze bearings have a 50% higher load capacity and, coupled with the induction-hardened five main-bearing crankshaft, make the B20 engine even stronger than its predecessor. In addition, the connecting rods are strengthened.



B20 ENGINE – Volvo's new powerplant features a nylon fan which has its speed controlled by a slip clutch.

The most noticeable change under the hood is Volvo's unique air induction system. It is designed to supply the carburetors with air of constant temperature for maximum performance and low exhaust emissions. The engine also benefits from fast warm up and is quieter in operation.

The induction system draws air from two sources through flexible tubing and regulates the flow with a thermostatically controlled flap valve in a housing at the air cleaner. Depending upon the temperature at the housing, cool air is taken from the front of the engine and/or hot air is taken from the exhaust manifold. The exact range of adjustment varies only a few degrees from the optimum temperature of 88° F. The entire mechanism is completely automatic.

When the engine is cold, all the intake air is drawn from the branch terminating at the exhaust manifold, the first external engine part to get hot. The choke is only needed initially as the temperature of the air rises so fast that the choke may be closed in about 30 seconds. As the temperature rises, the system adjusts to take air from both branches.

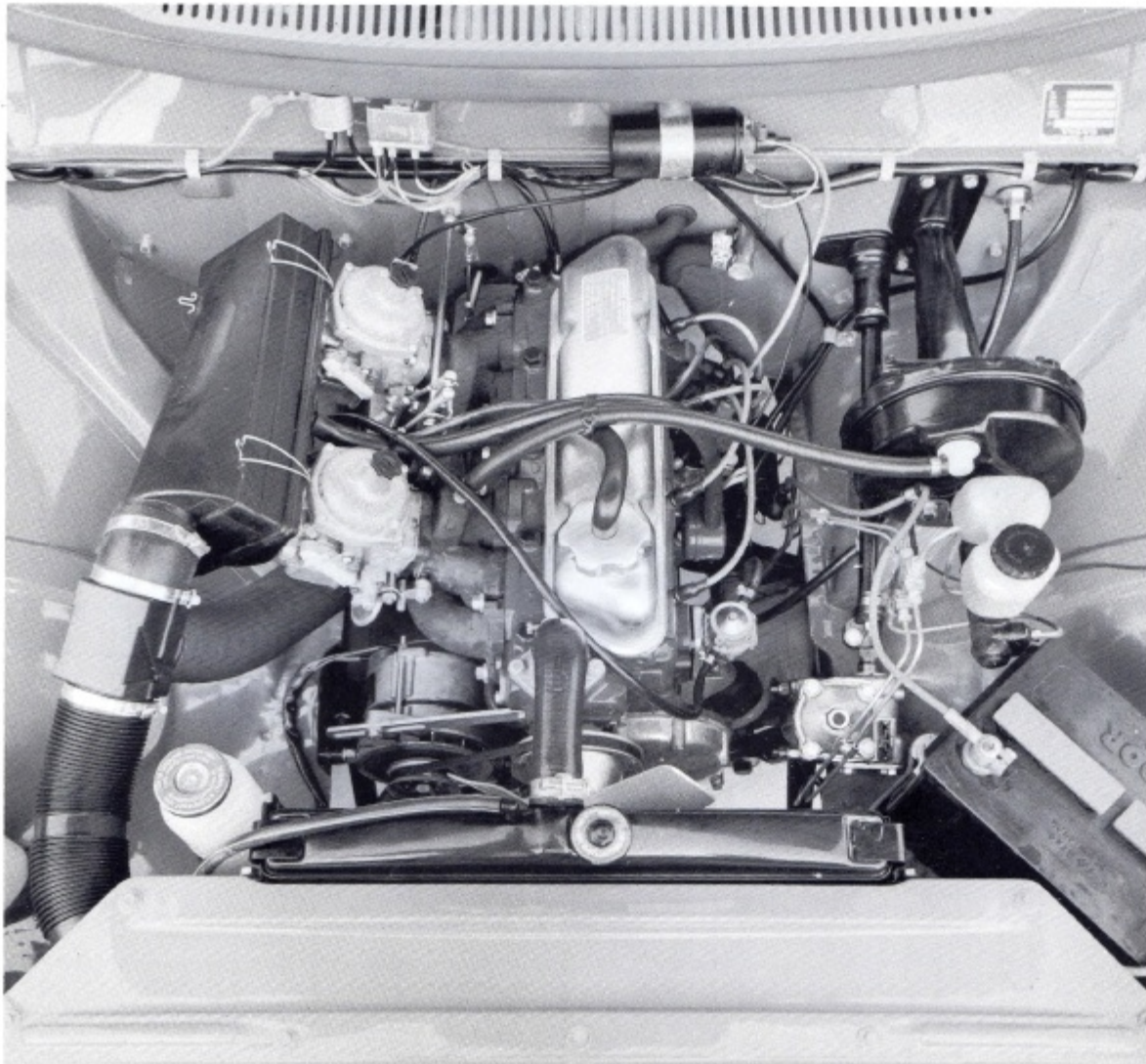
From the carburetors, the air/fuel mixture travels to a pre-

heating chamber inside Volvo's unique dual induction manifold. There, the mixture is further heated and blended to produce better combustion and cleaner exhaust. At high engine speeds, valves inside the manifold open to permit direct flow into the combustion chambers. This system requires no maintenance since there are no pumps or injectors to clog or fail. This manifold was introduced on cars built for America in the summer of 1967 and now is a feature on all dual carburetor Volvos throughout the world.

Another important change is the new temperature compensating carburetion supplied for B20 engines. The dual Zenith-Stromberg 1 $\frac{3}{4}$ " single-throat units were developed and produced especially for Volvo.

Each new engine is individually tuned at the assembly plant and after the carburetors are adjusted they are sealed to prevent maladjustment. The only possible adjustment is to the idle, but the narrow range will prohibit unacceptable emission levels.

Combined with Volvo's unique air induction and internal emission control systems, these carburetors provide a thor-



ENGINE COMPARTMENT
Ample working room around the B20 engine assures easy servicing.

oughly modern approach to the problem of supplying the exact fuel/air mixture for the required engine speed.

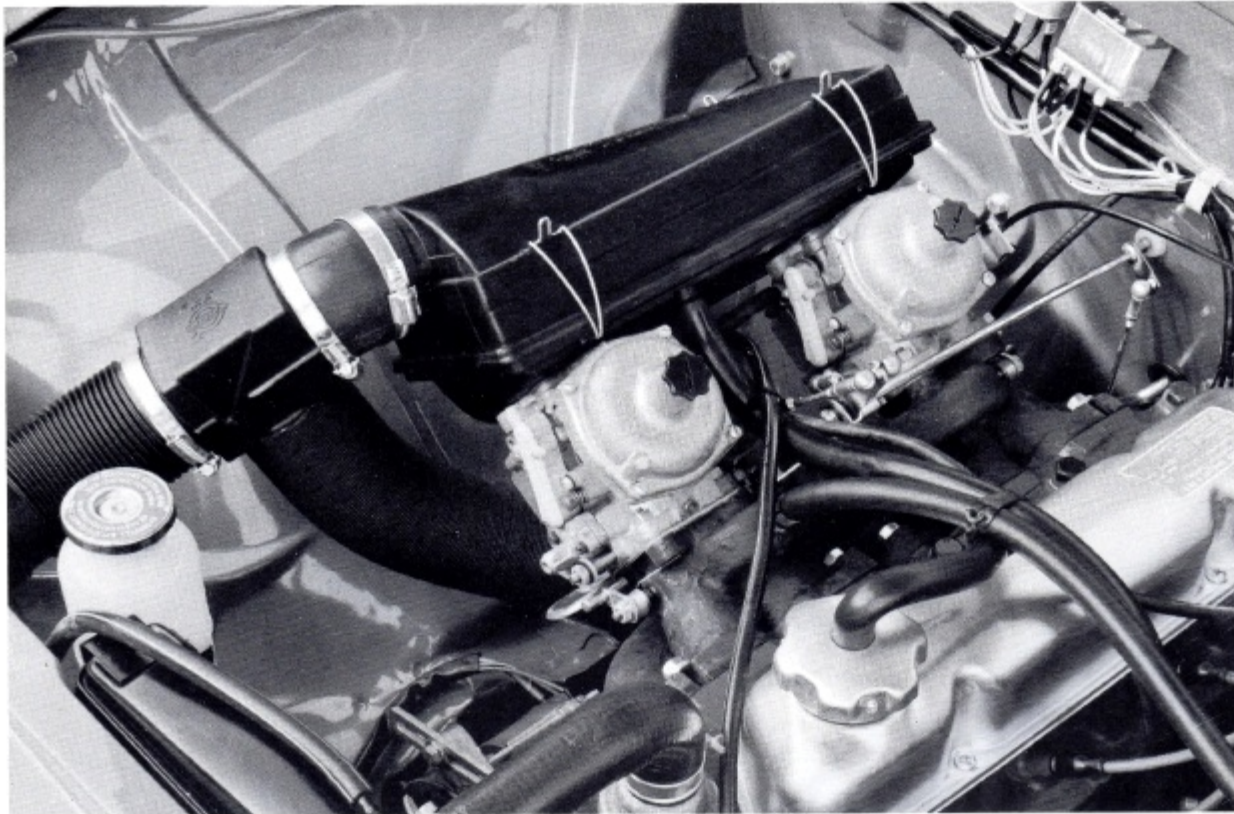
Another very noticeable change under the hood is a new fan which operates independent of engine speeds. The asymmetric fan is made of nylon.

Maximum speed of the fan, however, is limited to 3,000 r.p.m., regardless of how fast the engine is turning. The limitation of fan r.p.m. at highway speeds means much quieter engine operation. Also, high speed power loss is reduced.

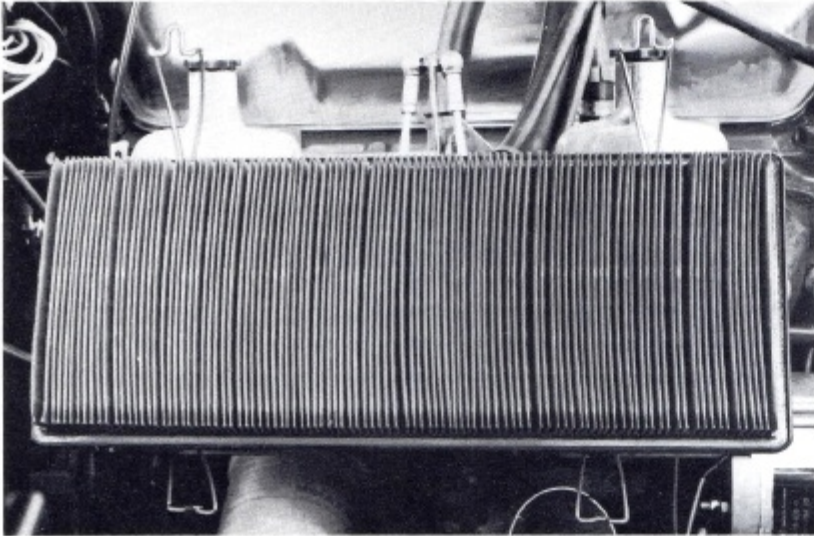
A stronger diaphragm clutch disc and new flywheel have been added to handle the additional torque produced by the B20 engine. The four-speed synchromesh transmission has a reinforced reverse gear. Three-speed automatic transmissions now have a part throttle kick down due to modifi-

cations in the valve body. Automatic down shifts to second gear occur with only a moderate increase in throttle pressure from speeds of 25 to 37 m.p.h. Hot or cold readings of the automatic transmission oil level now can be checked with a dip stick that allows for expansion of the fluid. The previous dip stick could only be read properly when the transmission oil was hot.

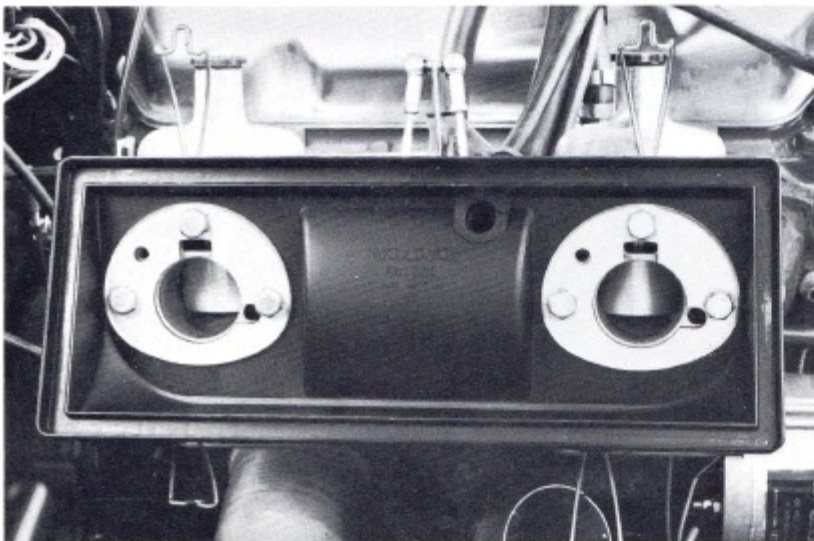
The final drive ratios have been changed on all 140 Series models except the 142 and 144 automatic versions which remain at 4.1:1. The lower 4.3:1 ratio compliments the bigger, more powerful engine and improves acceleration in the standard transmission sedans. The station wagons, which had a higher ratio, will benefit from reduced engine speed.



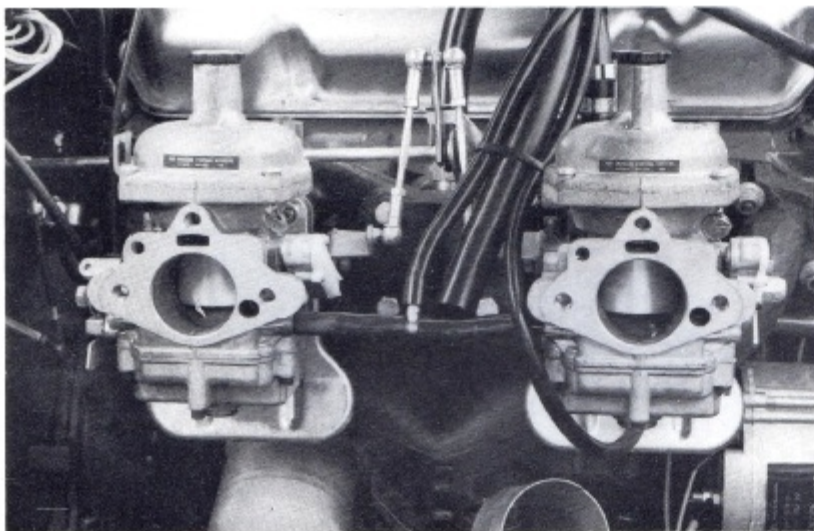
INDUCTION SYSTEM – New air/fuel induction system on B20 engine permits fast engine warm up.



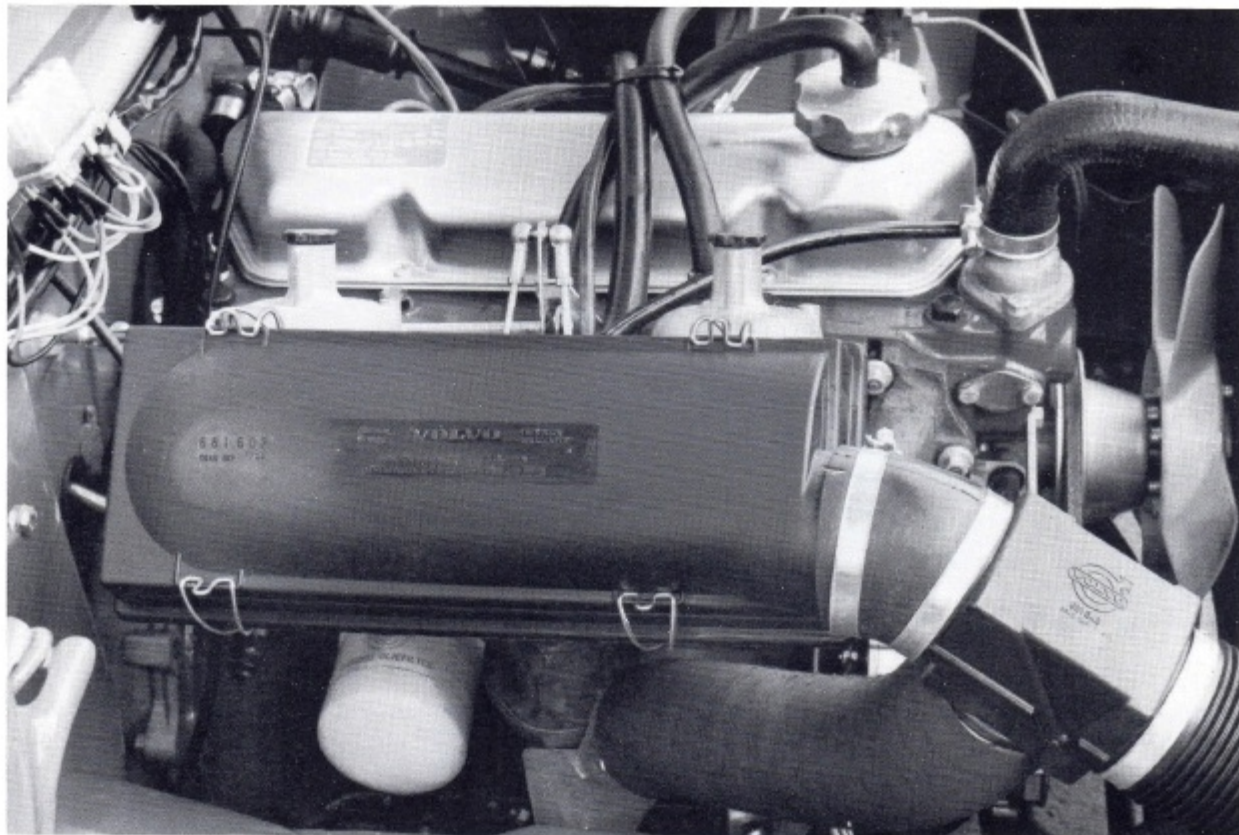
AIR FILTER – Single filter is protected inside the air cleaner housing and lasts for 25,000 miles.



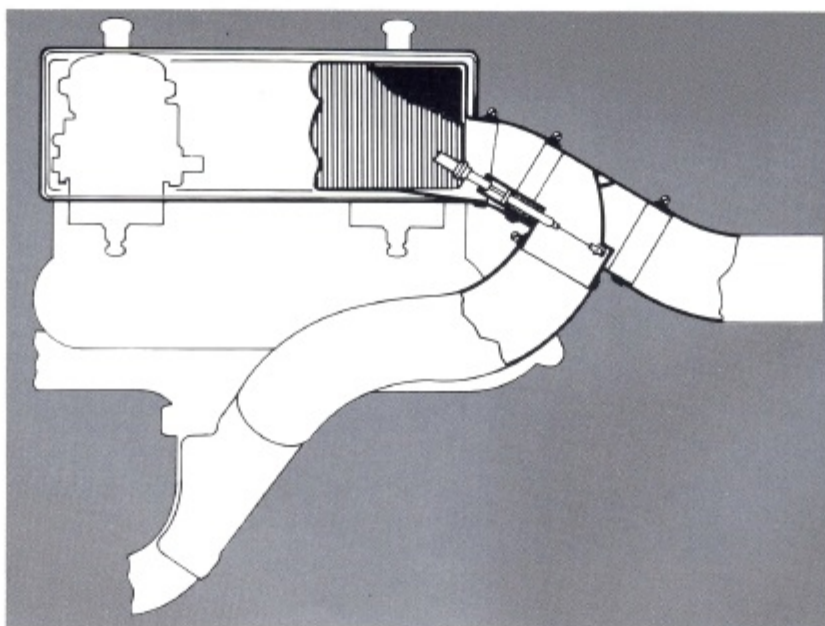
CARBURETOR INSPECTION
Cover and filter are easily removed to check piston operation.



ZENITH-STROMBERG CARBURETORS
Emission carburetors are tuned on the engine assembly line, then sealed to prevent maladjustment.



AIR INDUCTION SYSTEM – Two air intake branches, drawing hot air from the exhaust manifold and cool air from the front of the car, meet at a coupling in front of the air filter housing.



AIR INTAKE – Flap valve in the coupling is positioned in this drawing so that only hot air enters the engine from the branch to the heated exhaust manifold.



FLAP VALVE – Sensor in front controls the flap valve, shown partly open to take air from both branches.

Volvo 140 Series engine and transmission specifications:

Engine

Type B20. Water cooled, four-cylinder in line, cast iron block and head, five main-bearing crankshaft. Pushrod operated overhead valves with gear driven camshaft. Bore: 3.5 inches. Stroke: 3.156 inches. Displacement: 121 cubic inches (1986 cc.). Maximum horsepower: 118 b.h.p. SAE at 5,800 r.p.m. Maximum torque: 123 foot pounds SAE at 3,500 r.p.m. Specific power output: 1.03 b.h.p. SAE per cubic inch displacement. Compression ratio: 9.5:1. Oil filter: Full flow. Oil capacity: 8¼ pints including filter. Clutch: Diaphragm spring type 8½ inch single dry plate.

Cooling System

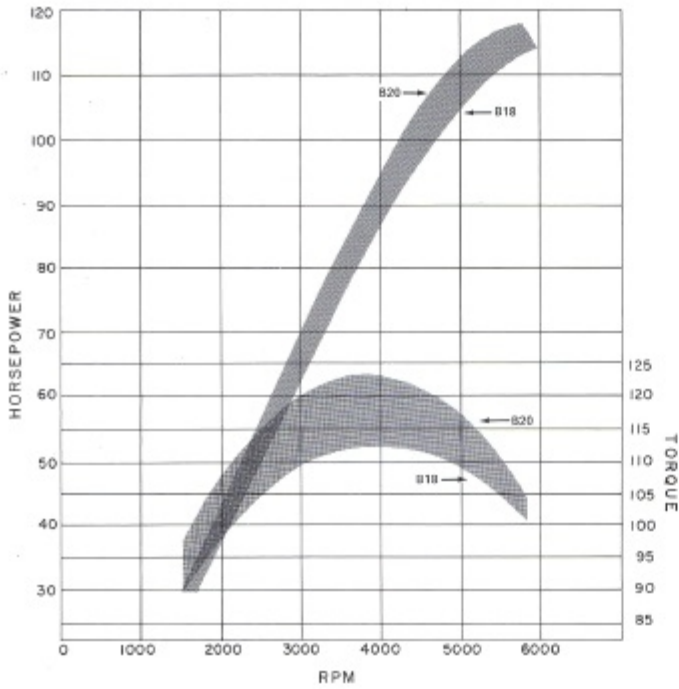
Sealed. Coolant circulated by engine driven pump. Transparent expansion tank. Capacity: 2½ gallons.

Fuel System

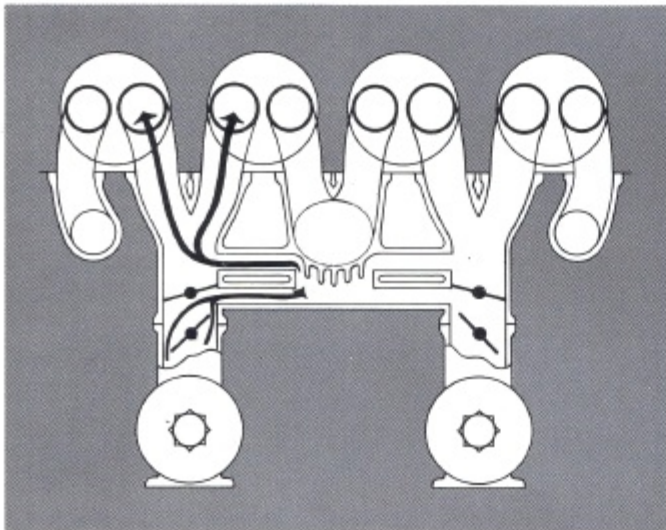
Twin horizontal Zenith-Stromberg CDSE (Emission) carburetors supplied by a mechanical pump. Tank capacity: 15½ gallons.

Transmissions

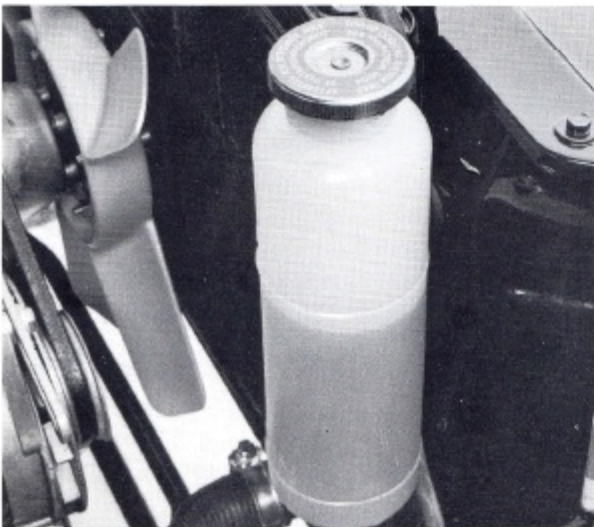
Manual: Four-speed, fully synchronized with floor mounted gearshift lever.



B20 POWER CURVES – Increased horsepower and torque of the new engine is shown by the shaded area.



DUAL INDUCTION MANIFOLD– Secondary valves inside the manifold open and close to regulate direction of fuel/air mixture.



RADIATOR FILLING – The sealed cooling system with 10 p.s.i. pressure has a transparent expansion tank for visual inspection of the coolant level.

		Overall
Ratios:	1st	3.13:1
	2nd	1.99:1
	3rd	1.36:1
	4th	1.00:1
	Reverse	3.25:1
		13.46
		8.56
		5.85
		4.30
		13.98

Automatic: Hydraulic torque converter, three-speed with column mounted gear selector. Standard gear quadrant: P,R,N,D,L.

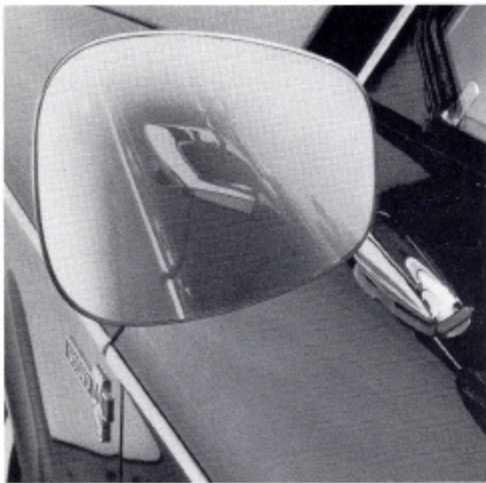
		Overall (Sedans)	Overall (Station Wagon)
Ratios:	1st	2.39:1	9.80
	2nd	1.45:1	5.95
	3rd	1.00:1	4.10
	Reverse	2.09:1	8.57
		8.57	8.99

Rear Axle

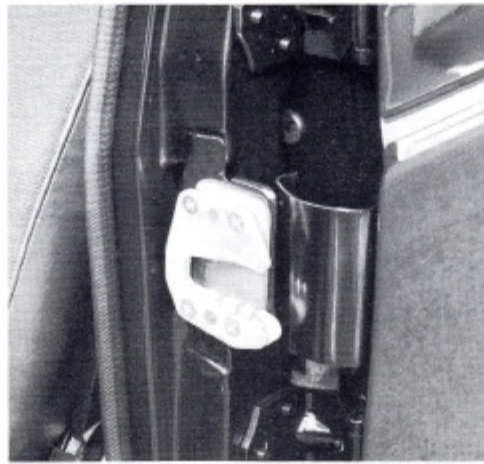
Hypoid type, ratio 4.3:1 for manual transmission sedans and all station wagons; 4.1:1 for automatic transmission sedans.



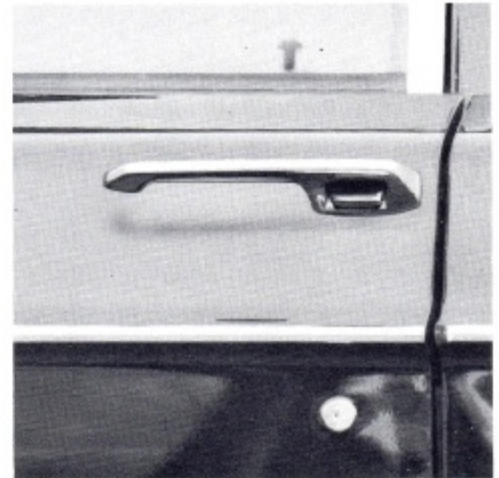
B20 EMBLEM – Grille insignia identifies 1969 models as being equipped with the new two-litre engine.



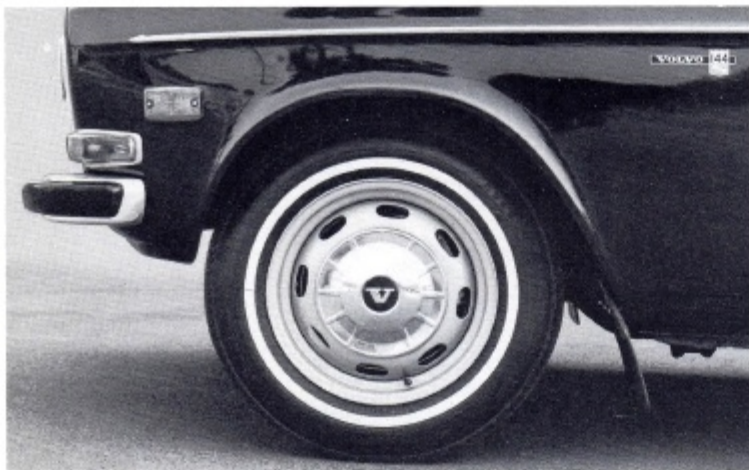
TINTED SIDE VIEW MIRROR – Spring loaded safety mirror gives a clear view of following traffic.



DOOR LATCHES – Crash tests have proved that the patented latches keep doors closed during severe impacts.



DOOR HANDLES – Pushing the broad lever will open the door even if it's covered with ice.



WHEELS AND TIRES – Larger wheel openings house fifteen-inch safety rims and new bigger tires.



WIPERS AND WASHERS – Two-speed electric wipers clear the windshield with repositioned 16" blades and hidden washers.



REAR LIGHTING – Distinctive rear lighting combines tail, brake, directional signal and backup lights all in one unit.



142 DOORS – Entry and exit is easy through opening more than 4 feet wide.



144 DOORS – Two stop positions are included for the doors that open to an 80° angle.

Exterior

An emblem on the grille of all 1969 140 Series cars identifies the models as being equipped with the two-litre engine.

Compact design, large glass area plus distinctive front and rear lighting makes the 140 Series cars easily recognizable. Outstanding visibility is accomplished with over 3,800 square inches of glass, 4,600 square inches in the station wagon. Curved side glass also has helped create a compact car with the interior room of much larger cars.

Full width wraparound bumpers protect the front and rear. Made of rust proof anodized aluminum, they are fitted with full length rubber strips which prevent bumper dents and scrapes by absorbing the force of minor impacts.

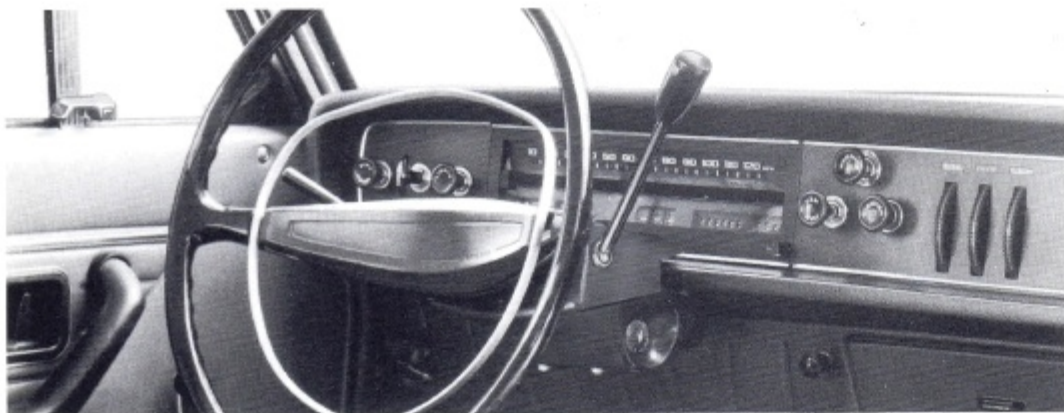
Front turn signal lights wrap around the fenders, making them clearly visible from the sides as well as from the front of the car. Large rear tail light lenses contain turn signals, parking lights, stop lights and backup lights all in one unit. Side reflectors are placed at the four corners of the car, amber in front and red in the rear.

Besides opening wide, the doors fit exactly with the unit body assembly. They latch securely with newly designed locks patented by Volvo.

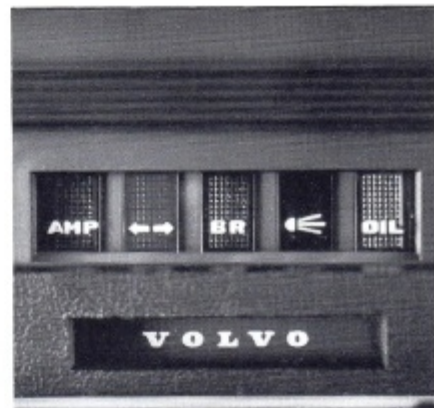
The cars have a high ground clearance of 7.1", obtained by using 15" wheels. Even when fully loaded, clearance is still 4.9", much greater than the industry average.

Volvo 140 Series specifications:

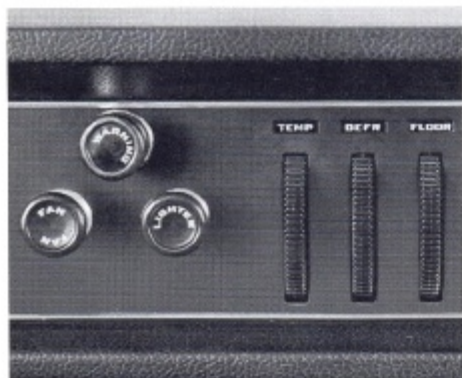
Wheelbase—102.4 inches. Overall length—182.7 inches. Overall width—68.1 inches. Overall height—56.7 inches. Track, front and rear—53.1 inches. Ground clearance—7.1 inches. Curb weights (approx.)—142-2,520 pounds, 144-2,600 pounds, 145-2,715 pounds. Glass areas—windshield-1,250 square inches, total sedan-3,830 square inches, total station wagon-4,608 square inches.



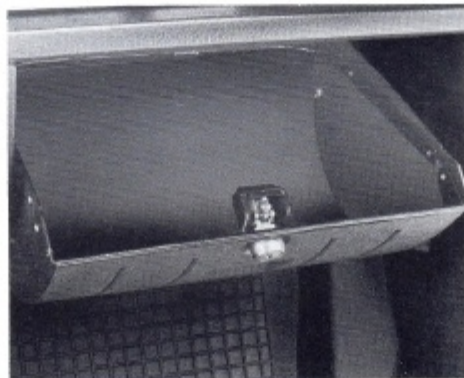
DASHBOARD — Fully padded instrument panel is supplemented by impact absorbing panels covering the entire area beneath the dashboard.



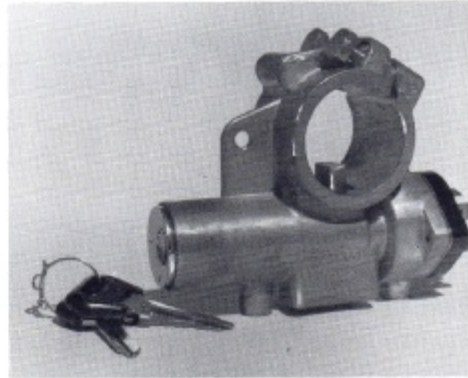
WARNING LIGHTS — The hand brake light, in the center, also warns of a brake circuit failure.



HEATER CONTROLS — The direction and intensity of heat is thermostatically regulated by dialing illuminated discs.



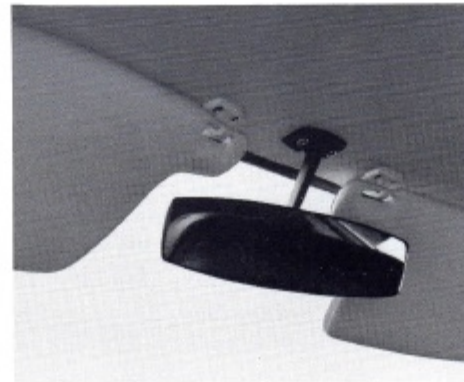
GLOVE BOX — A lockable, illuminated compartment is standard equipment.



IGNITION SWITCH — The four-position switch is combined with a foolproof steering lock.



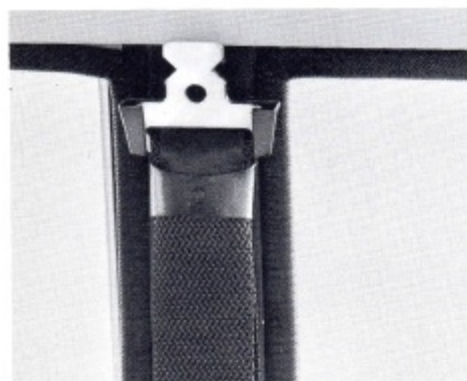
AIR CONDITIONING — Cool air comes from three adjustable outlets built into the underdash panel.



SUN VISORS — Full width padded visors are hinged to provide glare protection from the sides as well as from the front.



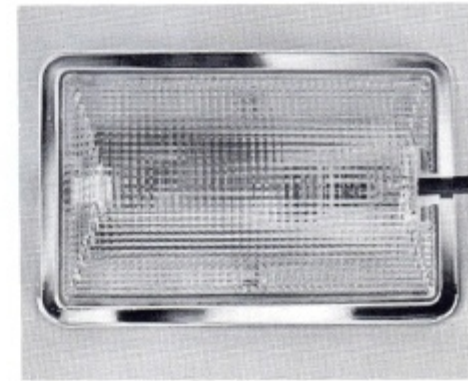
HOOD RELEASE— An inside handle is supplemented by a secondary latch under the hood.



SHOULDER BELT HOLDER — Volvo's 3-point safety belts hang conveniently on the door posts when not being used.



SHOULDER BELT ATTACHMENT — Both driver and passenger belts, which can be fastened with one hand, lock in a quick release center mount.



INTERIOR LAMP — Convenient to all passengers, the lamp provides full interior lighting.

Interior

Volvo 140 Series cars make maximum use of interior space to provide comfort and convenience for five passengers. Interior dimensions are much greater than the exterior size suggests. Extensive use of glass has resulted in excellent visibility. All four corners of the car can be seen from the driver's seat. Doors, roof, sun visors, seat backs and dashboard are padded. The instrument panel and flat safety knobs all are conveniently mounted on the dashboard which is completely shrouded with crash padding.

A matching underdash panel extends the full width of the car and includes a lockable, illuminated glove compartment. Made of impact absorbent plastic, the panel provides leg protection for front seat passengers.

Durable carpeting covers the tunnel and the entire floor is protected by a textured rubber mat for easy cleaning. The headlight dimmer switch is incorporated into the turn signal lever so that lights can be dimmed without requiring the driver to move his foot from the pedals. A foolproof steering wheel lock is combined with the four-position ignition switch. For positive theft protection, the integral lock operates automatically when the key is removed with the ignition switch in the "lock" position. In the "garage" position, the key may be removed without locking the steering.

Located in the instrument cluster is an odometer with an extra digit. It will read to one mile short of a million before it returns to zero. Volvo added the extra digit to satisfy dealers and used car customers who complained that they couldn't tell the true mileage of most used Volvos.

The Volvo impact absorbing steering wheel has a padded center, and the full horn ring is made of soft metal which will bend but not break.

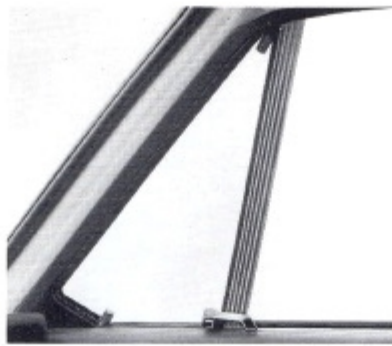
Dashboard and roof mounted passenger assist handles are provided. The roof mounted handles have hooks attached for hanging clothes. Three ashtrays also are standard.

Volvos have been equipped with lap/shoulder belts since 1959 — nine years before the safety regulations required them on all cars sold in America. The Volvo belts snap into a center mount with one hand operation and have only one adjustment point.

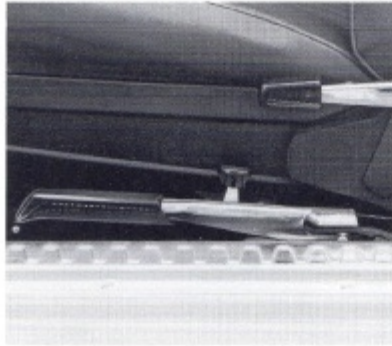
The Volvo 140 Series interior dimensions:

	Inches		Inches
Front seat width, shoulder height	52.0	Height above floor, rear seat	13.0
Front seat width, hip height	49.8	Distance from steering wheel to front seat backrest	18.9
Rear seat width, shoulder height	52.8	Distance from pedals to front seat backrest	37.8
Rear seat width, hip height	56.3	Distance from pedals to rear seat backrest	71.7
Front seat width	22.4	Distance from front seat back to rear seat back	33.1
Front seat depth	19.3	Width, front door (144)	35.4
Height, front seat backrest	23.6	Width, rear doors (144)	32.7
Headroom, front seat	37.4	Width, doors (142)	47.3
Headroom, rear seat	35.0		
Height above floor, front seats	13.4		

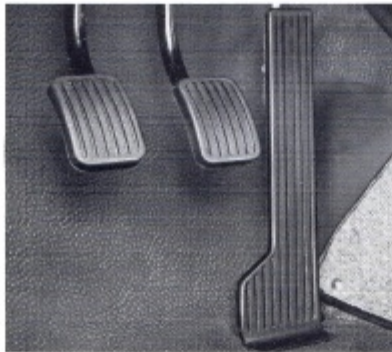
VENT WINDOWS
Safety latches on the frameless vent windows also are an anti-theft feature.



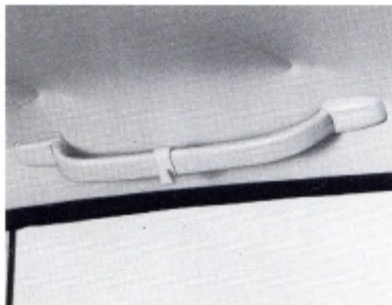
HAND BRAKE LEVER
The parking brake is separate from the four-wheel disc system, having its own drums for the rear wheels.



PEDALS — The large correctly positioned pedals are supplemented by a footrest.



ASSIST HANDLES
Handles assure easy exit and entry and also serve as convenient clothes hangers.



DOOR AND WINDOW HANDLES — Hard rubber window regulators and recessed door handles provide convenience and full protection.



REAR WINDOW HINGE — In the 142, spring loaded latches open side windows in the rear passenger compartment.

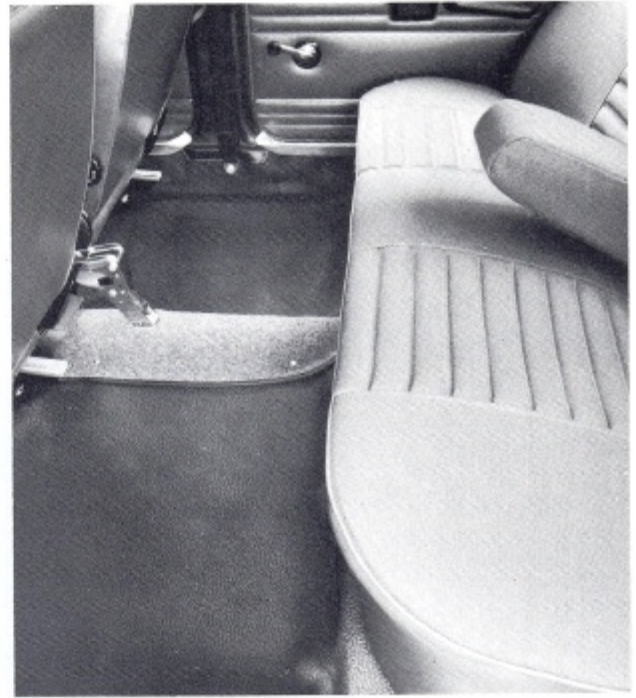




NEW UPHOLSTERY – Seats in the 1969 models are upholstered with a long wearing, washable miracle fabric for increased comfort.



FULLY RECLINING SEATS – By removing the headrests and adjusting the rear seat cushion, the seats can be converted for sleeping.



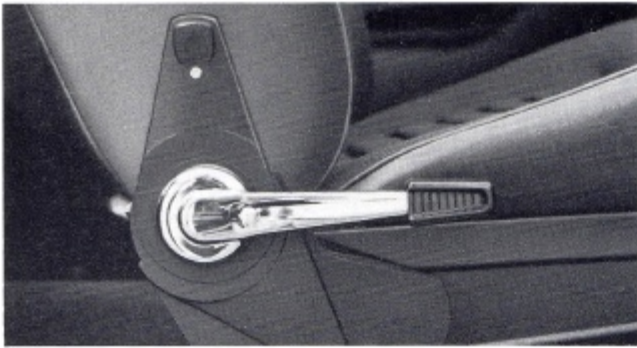
REAR SEAT KNEEROOM – Room for back seat passengers is greater than many full-size American cars.



HEADRESTS – Adjustable headrests for comfort and safety are standard in matching colors and material.



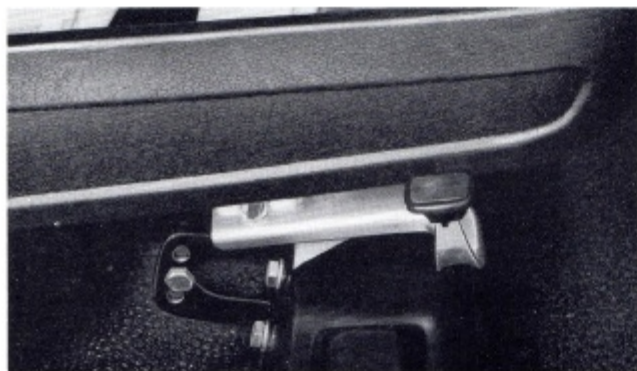
REAR SEAT ARMREST – A fold-down armrest is standard on the sedans.



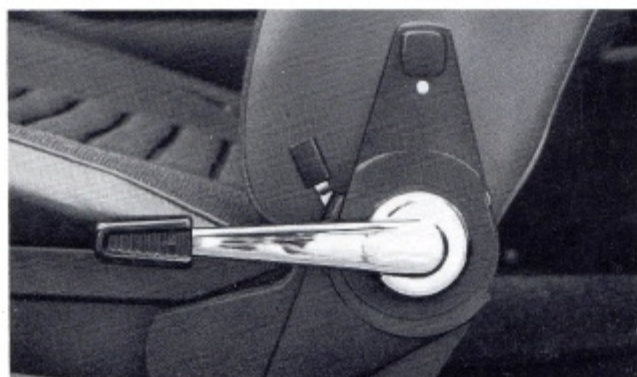
SEAT BACK ADJUSTING LEVER — The lever is part of an anti-whiplash device that absorbs the impact of a rear end collision by letting the seat fold back.



LUMBAR SUPPORT — Knobs adjust the tension in the lower seat back for driving comfort.



SEATING POSITIONS — Raising or lowering the front seats or further increasing legroom are simple adjustments.



SEAT BACK RELEASE — Handles on the left sides of the front seats can be reached by the driver in the two-door 142.

Seating

Volvo 140 Series cars have the most exceptional seats in the automobile industry.

For example, the front bucket seat backs have an exclusive anti-whiplash friction device. If subjected to the force of a ten mile-an-hour collision from the rear, the front seat backrests recline automatically to minimize whiplash injuries.

This friction device, operated by a lever, also permits infinite adjustment of the seat back angle from bolt upright to fully reclining.

For 1969, Volvo 140 Series seats now are fitted with upholstery in three new colors. A new spun acrylic fiber is used for the cushions and backrests to provide more comfort. This woven synthetic fabric has advantages over vinyl upholstery because it keeps the seats cooler in summer and warmer in winter. Selection of the fabric came after extensive hot and cold weather tests of 47 samples. This extra strong material also provides better grip, is easy to clean and does not discolor. Furthermore, it is fire retardant and anti-static. Sides and backs of the seats and the headrests are matching vinyl.

The headrests add to prevention of whiplash injuries and are adjustable for height. They can be removed and the seats fully reclined.

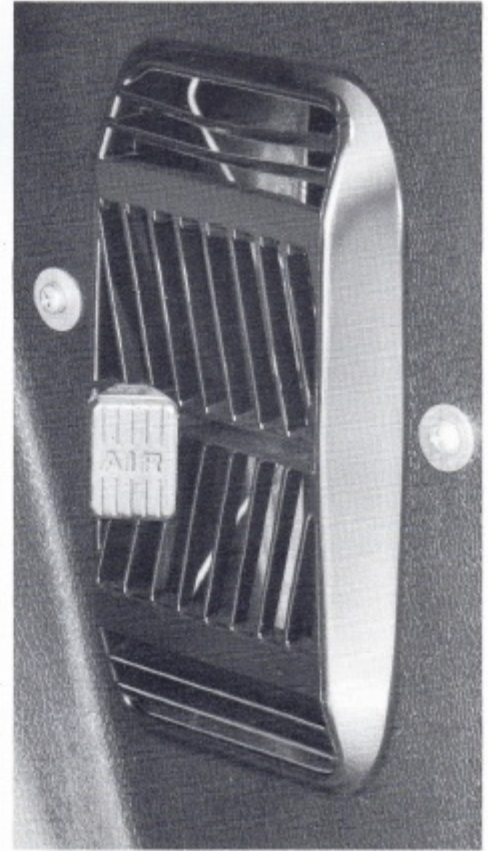
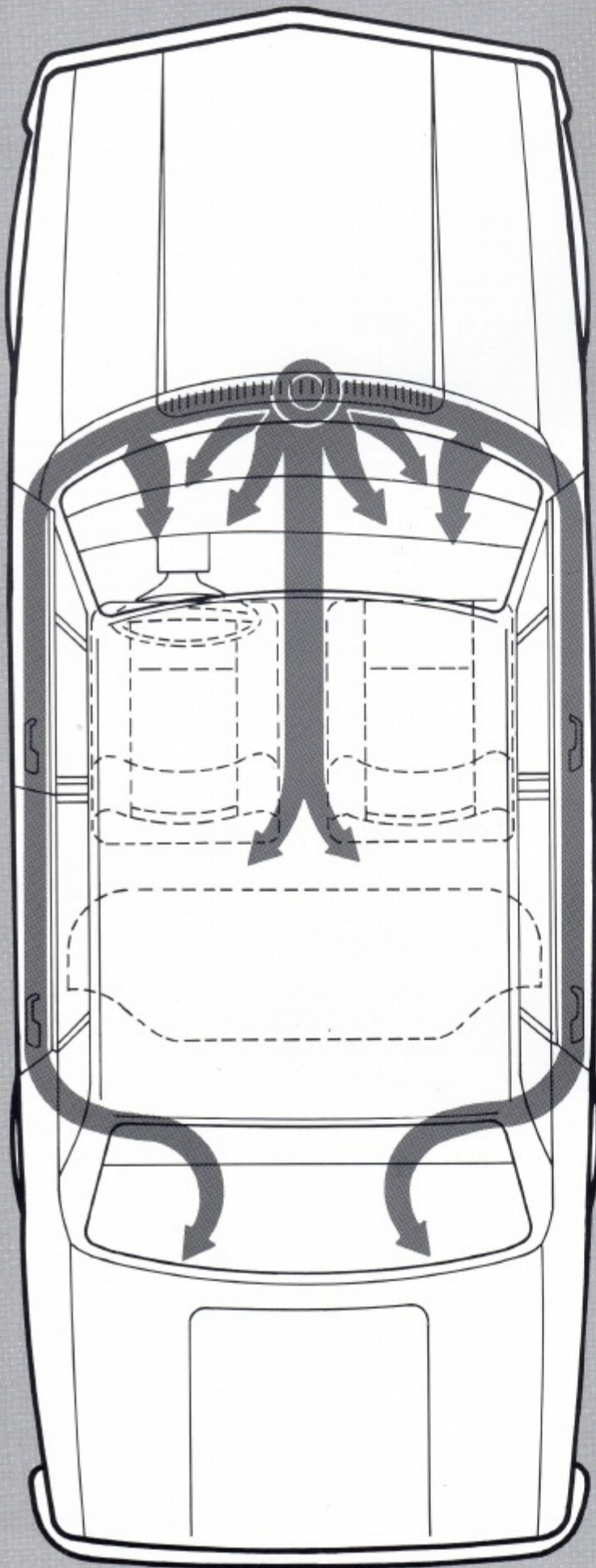
Adjustable lumbar supports are operated by knobs on the sides of the backrests. Marked "firm" and "soft", they turn to alter the tension of special strips located in the critical area contacted by the lower part of an occupant's back.

Upholstery at the top of the front seat backrest is supported by a flexible steel strap to protect rear seat passengers if they are flung forward.

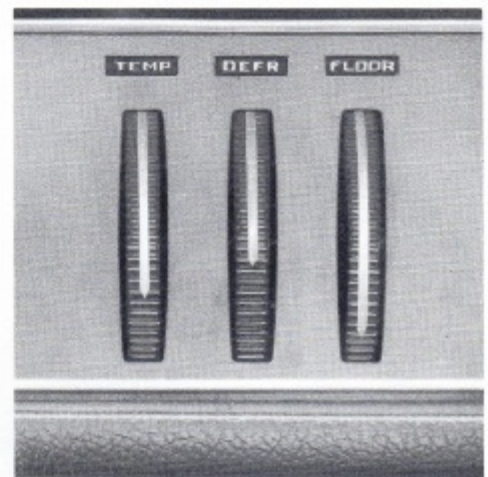
The front passenger seats also can be turned around to face the back.

Rear seat passengers ride comfortably too. In addition to ample kneeroom even with the front seats all the way back, cushioning with proper support provides comfort equal to the comfort designed into the front seats. A center folding armrest in the sedans, side armrests and separate rear seat heating are other rear compartment features.

HEATING SYSTEM — Ten separate outlets evenly distribute the air flow.



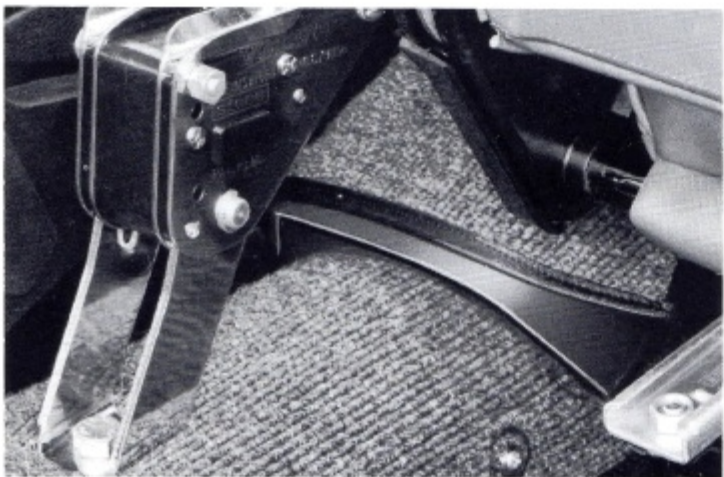
TWO POSITION FRESH AIR VENTS — Air drawn from an intake at the base of the windshield enters the passenger compartment through two of these side vents.



CONTROL KNOBS — Heating system features easy to operate dials to control air temperature and distribution plus two-speed booster fan.



REAR WINDOW DEFROSTERS – The exclusive heating and defrosting system extends to the rear window, keeping it clear of ice or mist for proper visibility.



REAR SEAT VENTS– The rear floor receives temperature controlled heat via extra ducts in the transmission tunnel, so that rear seat passengers keep warm without overheating the passengers in the front of the car.

Heating and Ventilating

The powerful Volvo heating system is so effective that its full capacity is needed only in extremely cold weather – about 25 ° F. below zero. Two separately adjustable systems with ten outlets direct hot air to the front and rear floors and to the windshield and rear window. Three vertically mounted discs, recessed into the dashboard, control the temperature, flow and distribution of air. Fingertip operated, these discs have illuminated strips for easy identification at night.

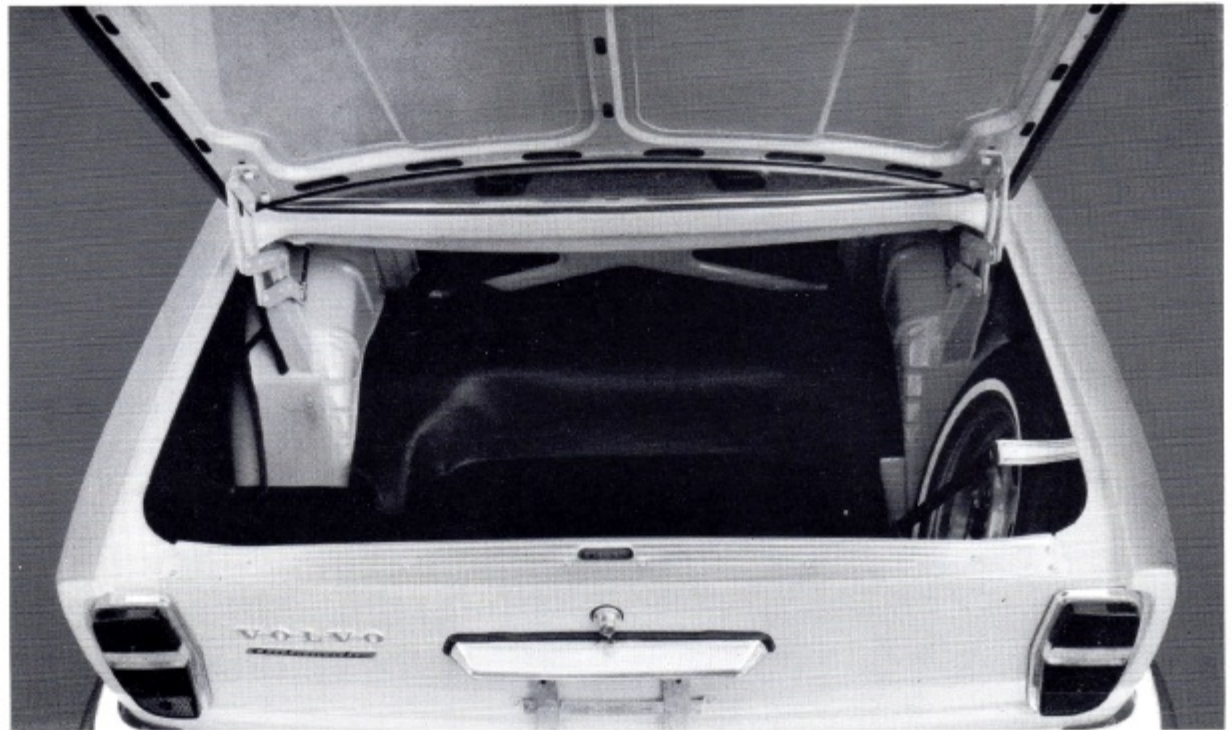
The temperature selected is automatically maintained by a thermostat regardless of changes in speed, outside temperature or engine temperature.

Three of the outlets warm the front seat passengers and, through ducts on the transmission tunnel, heat passes to the rear floor to hold even temperatures throughout the car.

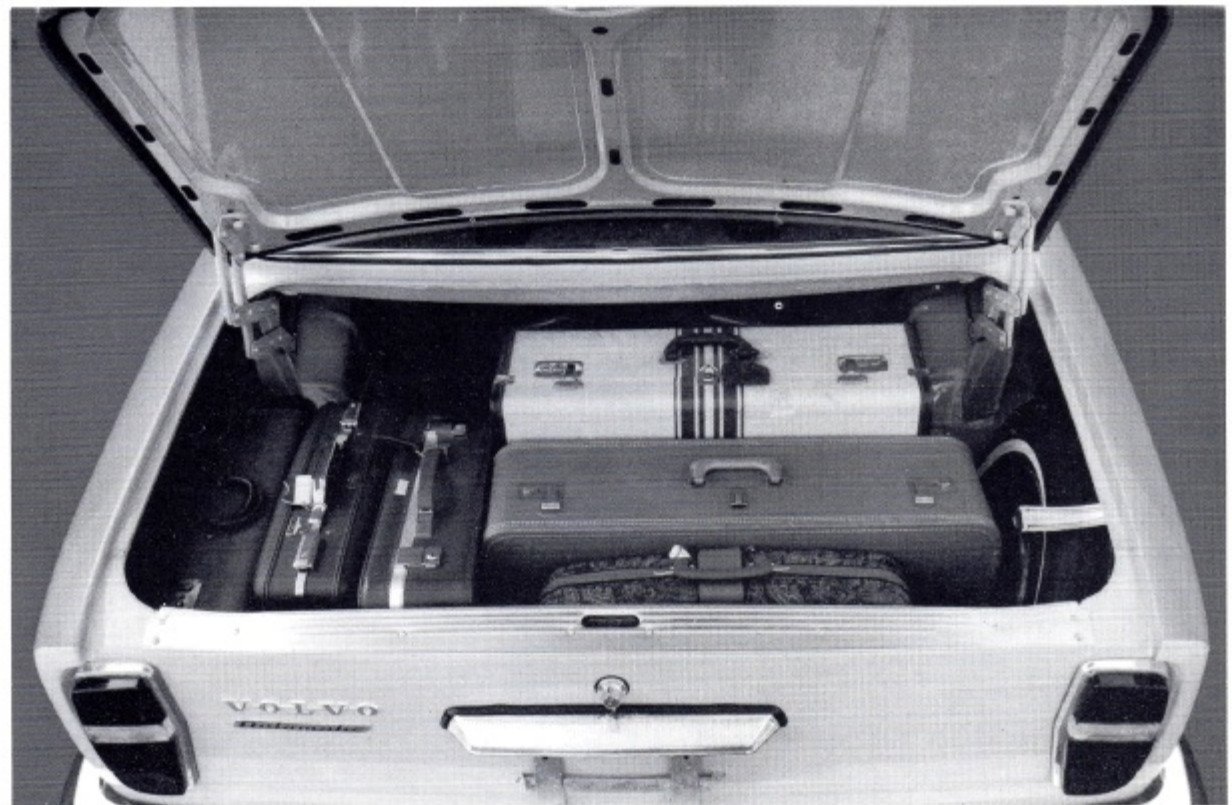
The defroster system takes air to three windshield vents and, in the sedans, to dual outlets for the rear window. The ducts that carry air along both door sills to the rear also prevent condensation, the major cause of rust, by keeping the rocker panels dry.

The rear window in the 145 station wagon now is defrosted by means of special electrically heated wires imbedded in the glass.

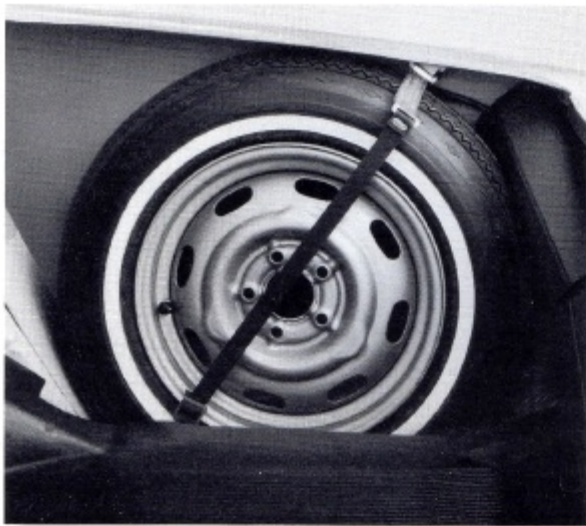
Driving the air is a two-speed blower. Opening a window slightly will further increase the air volume at low speed.



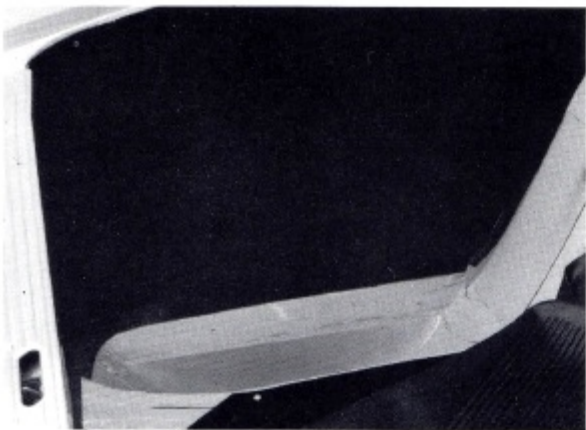
LUGGAGE COMPARTMENT — 140 Series sedans have 23.6 cubic feet of storage space and room for two tires.



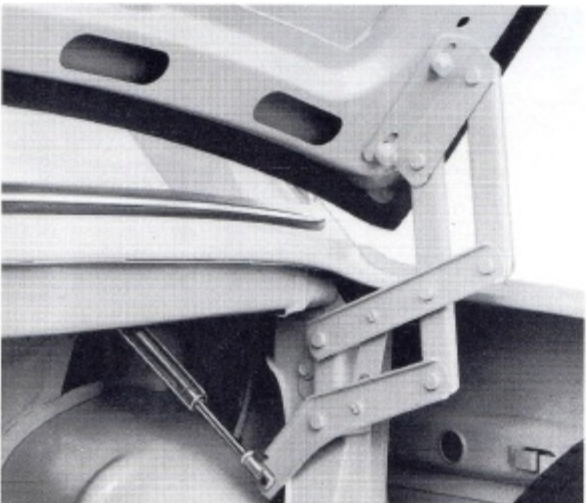
FULL TRUNK — Loaded with six suitcases, there is still room in the rear of the trunk for more luggage.



SPARE WHEEL HOUSING – A recessed area enables vertical mounting of the spare tire for accessibility.



EXTRA SPARE LOCATION – Two tires can be carried in the trunk or the extra space can be used to store tools or an accessory spare gas can.



OPENING MECHANISM
Two gas operated cylinders enable the trunk lid to be opened easily to any position.

Luggage Compartment

The rear end of the sedans received the same careful planning that went into the passenger compartment. Although the Volvo is a compact car, its trunk has more usable space than many full size cars. The flat trunk lid, with a latch that can be left securely closed but unlocked, covers 23.6 cubic feet of storage area.

Recessed wells in either side can hold two spare tires in a vertical position where they are always accessible. The second well, hidden by the floor mat, can be used to store tools or an accessory spare gas can.

Volvo 140 Series luggage compartment dimensions:

Width, minimum and maximum	52.0-55.0 inches.
Width, with tire removed	61.0
Height	22.0.
Length	47.6.
Capacity	23.6 cubic feet.



Volvo 145 — The station wagon does all the things Volvos are noted for doing and it carries more while doing them.



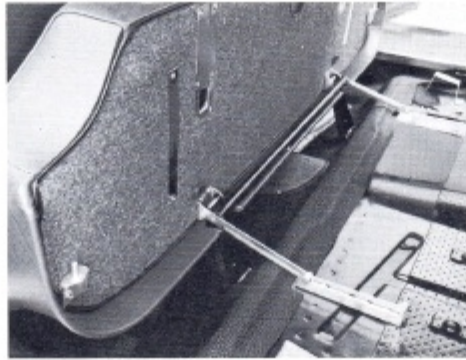
REAR SEAT — A full width rear seat provides room for three passengers.



ONE-PIECE TAILGATE — Gas operated cylinders lift the rear door to reveal 70 cubic feet of cargo area.



FOLDING MECHANISM — The upholstery is protected from damage and the levers are recessed to prevent accidental opening.



REAR CUSHION HINGES — Special guide rails locate the cushion vertically so it doesn't limit front seat travel.



SEAT BACK RELEASE — A handle on either side turns to fold the seat back flush with the floor.



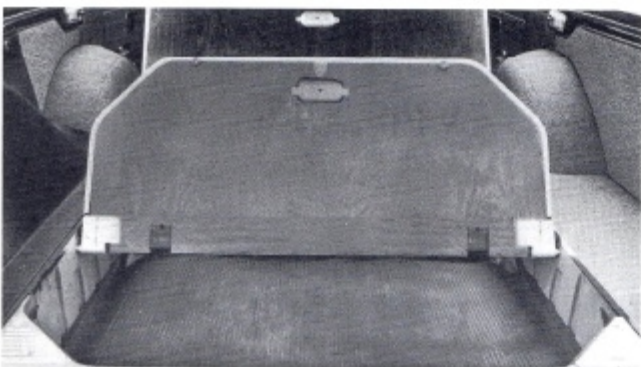
SPARE WHEEL HOUSING — Vertical mounting of the spare means the wagon doesn't have to be unloaded to change a flat.



EXTRA STORAGE SPACE — The 145 has an extra well with a removable lid.



REAR QUARTER WINDOWS — The two-piece rear windows open for ventilation.



UNDER FLOOR SPACE — The lids covering the under floor compartment form the frame for an accessory rear facing seat.

145 Station Wagon

The Volvo 145 shares engineering features with the sedans and has many of its own. Efficient planning of interior space has resulted in more than 70 cubic feet of cargo area despite modest exterior dimensions. Both front and rear passenger areas share the sedans' spaciousness and folding the back seat doesn't interfere with front seat travel.

Mechanical specifications remain the same as the sedans with the exception of stronger rear springs and shock absorbers. Final drive ratios in both the standard and automatic transmission versions have been raised to provide for reduced engine r.p.m. at highway speeds.

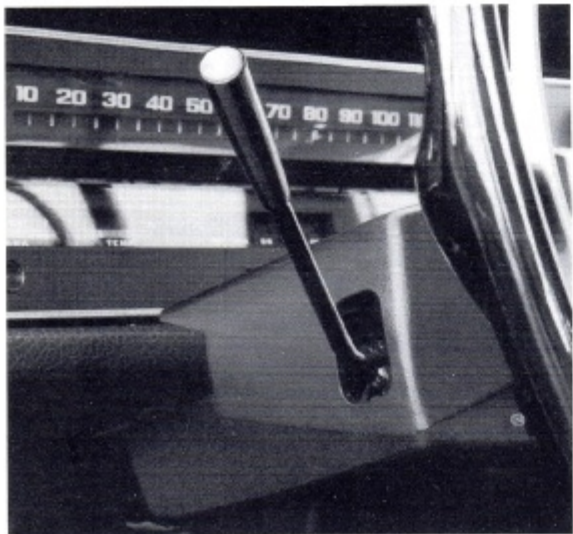
The 145 has a low loading height and a flat floor which is fully upholstered. The rear seat backrest and the bottom of the cushion, which folds vertically, also are upholstered as are the wheel arches.

Total glass area in the 145 is 4,608 square inches, giving excellent visibility. Because the tailgate is one piece, an extra large electrically defrosted rear window is fitted. Two tinted outside rear view mirrors are standard.

Opening the tailgate either from outside or inside is easy because two gas cylinders do the lifting. An extra luggage compartment roof lamp lights automatically when the tailgate is opened.

Volvo 145 station wagon cargo area dimensions:

Volume	70 cubic feet.
Underfloor space	3.5 cubic feet.
Length, maximum	74.0 inches.
Length, minimum	44.5.
Width, minimum and maximum	52.0 - 55.0 inches.
Width, with tire removed	61.0
Height	22.0.
Length	47.6.
Capacity	23.6 cubic feet.



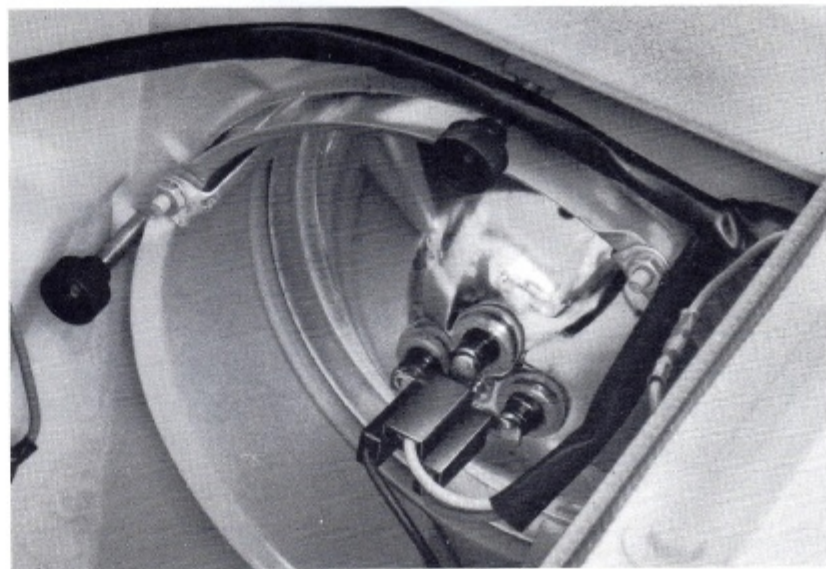
SIGNAL CONTROL — A lever mounted on the steering column gives fingertip operation for dimming high beams and operating directional signals.



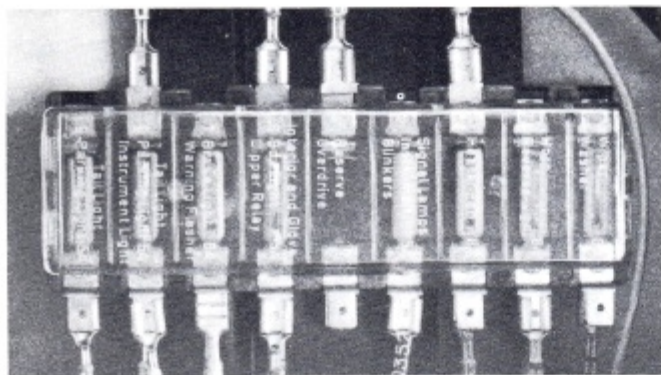
HEADLIGHTS — Two lamps do the work of four because they get full voltage from the electrical system.



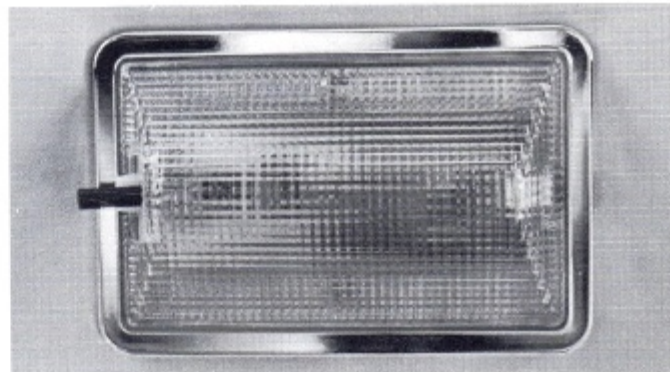
WINDSHIELD WASHER — A powerful motor pumps cleaning solution onto the windshield from a 1½ quart container.



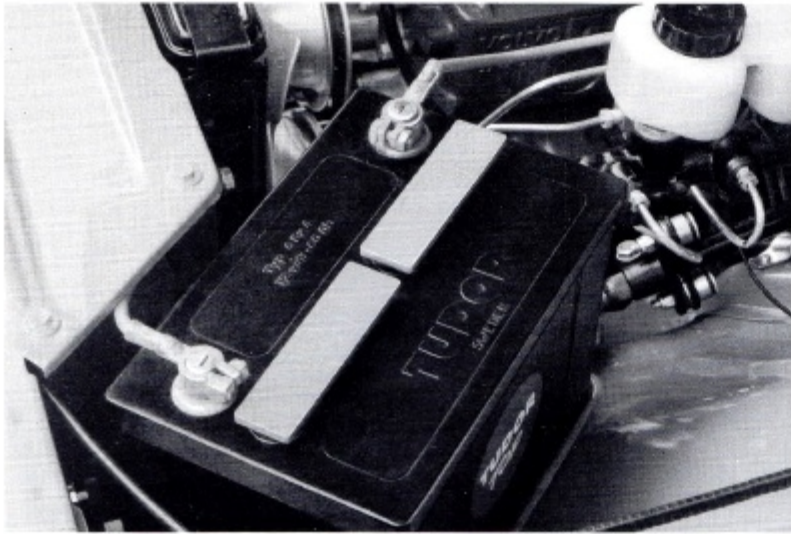
HEADLIGHT ADJUSTMENT — No tools are needed because the knurled knobs are accessible by merely opening the hood.



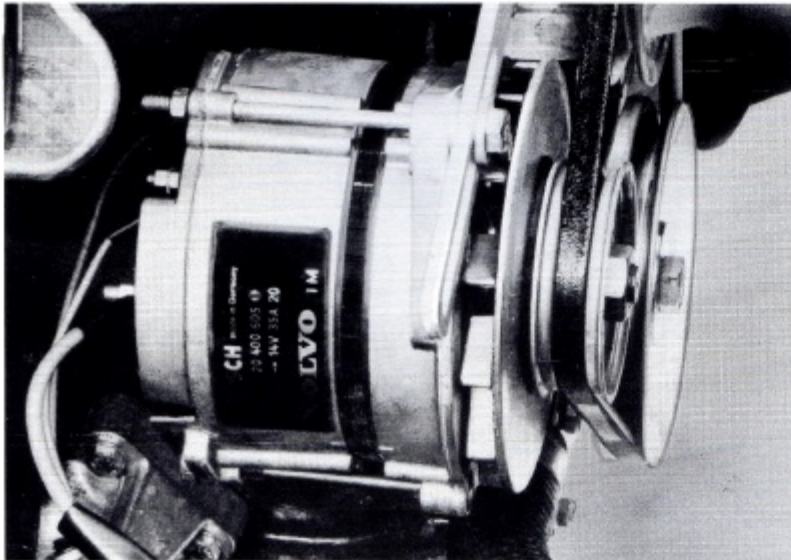
FUSE COMPARTMENT — The nine fuses are mounted inside the car to give instant accessibility.



INTERIOR LIGHTING — An additional lamp automatically lights the station wagon cargo area when the tailgate opens.



BATTERY – To supply current for cold morning starting, Volvo uses a high capacity battery.



ALTERNATOR – Full battery charging, even in the coldest weather, now takes place at idle speed.



STARTER – To assure reliable starts in very cold climates, Volvo uses a heavy duty starter that's exceptionally powerful for this size engine.

Electrical

Electrical power has been further improved for 1969. The electrical system is the most powerful on the market for a two litre engine. Capacity is more than enough to start the engine in the coldest weather and to operate all accessories, including air conditioning.

Volvos start with a 12-volt system and a 60 amp-hour battery usually supplied for large V-8 engines. The starter produces one horsepower to start engines at the coldest winter temperatures.

An alternator is supplied on 1969 models. Maximum output is 490 watts, over 1/3 more than the heavy duty generator previously used. This is enough power to keep the battery fully charged regardless of operating conditions. A new coil also is fitted.

To protect the electrical system from moisture, the spark plug connectors have new silicon rubber seals. The distributor cap and the suppressors are now made of polyester.

Volvo 140 Series electrical specifications:

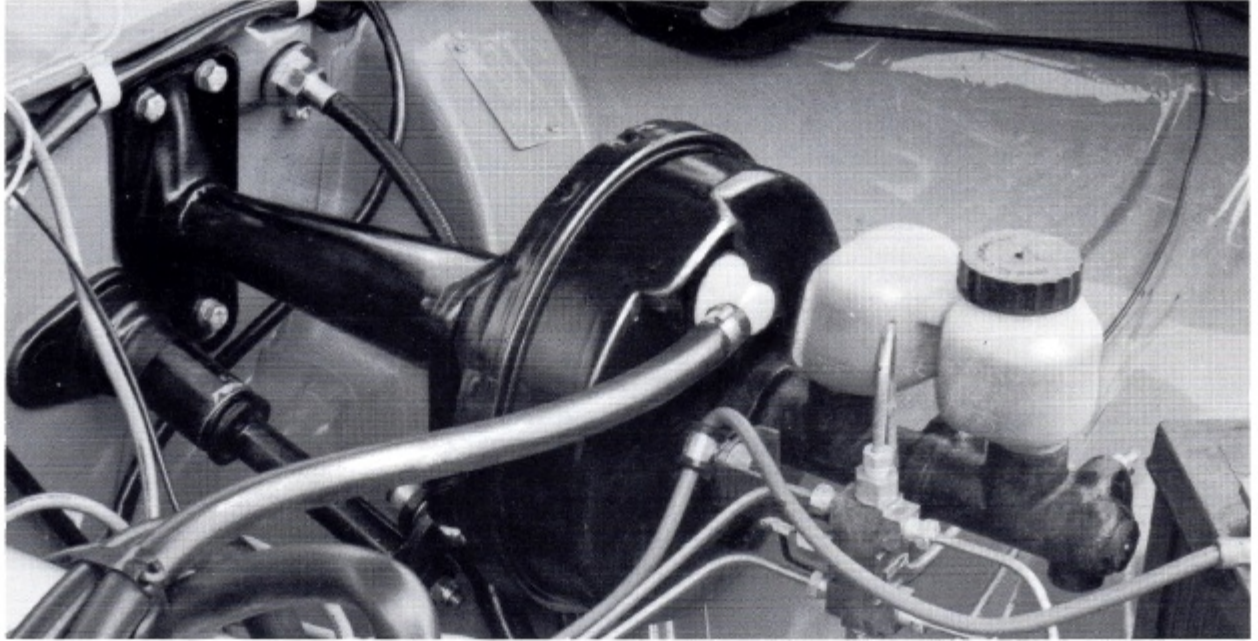
Voltage	12
Battery capacity	60 amp hours
Alternator	490 watts
Starter motor output	1 h.p.

Gauges and equipment

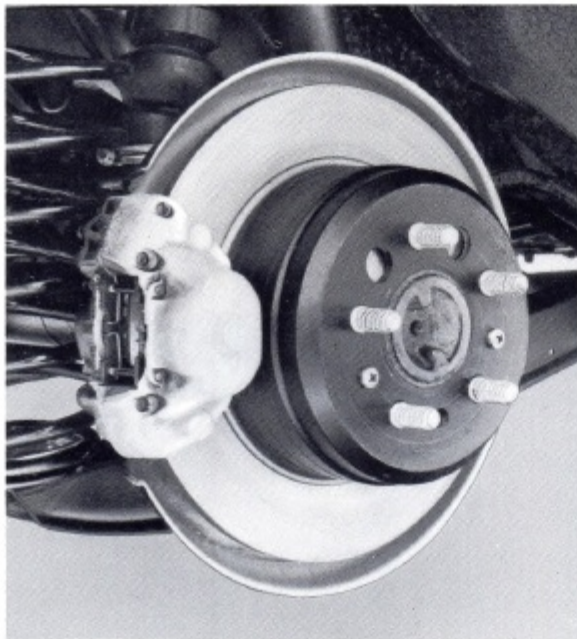
Fuel gauge and water temperature gauge, alternator, oil pressure, headlight beam, directional signal, hand brake and foot brake warning lights. Two-speed electric blower. Electric rear window defroster in the 145. Two-speed electric windshield wipers plus electric windshield washers. Automatic backup lights. Variable non-glare instrument lighting. Illuminated glove compartment. Interior courtesy lights. Cigarette lighter.



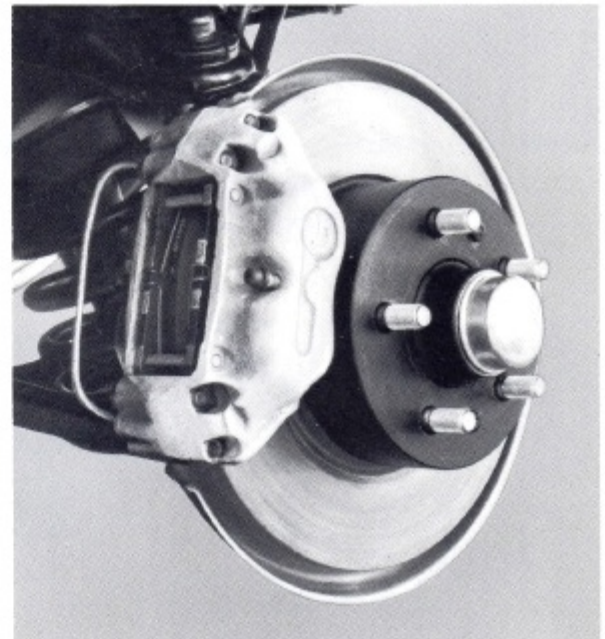
ELECTRIC DEFROSTING – New for 1969 is the electrically heated rear window in the 145 station wagon.



POWER BOOSTER AND DUAL HYDRAULIC SYSTEM — The Volvo needs only 10 more yards to stop from 60 m.p.h. if its power brakes and one hydraulic circuit should become inoperative.



REAR DISC BRAKES — A separate hand brake system is enclosed inside the drums.



FRONT DISC BRAKES — Large calipers have four pistons each, two for each hydraulic circuit.

Brakes

The 140 Series cars have an advanced braking system that was developed more than one year before the safety controversy started.

All four wheels have self-adjusting disc brakes with a swept area of 417 square inches. They are power assisted and have a comfortable maximum pedal pressure of 70 pounds.

Volvo's exclusive 3-wheel dual brake system has each circuit operating on both front wheels and one rear wheel. Not only is it more efficient than the four other possible dual brake systems, but it also eliminates the hazard of control loss during heavy braking. With one circuit inoperative, a 140 Series Volvo maintains directional stability even during panic stops.

Proof of this efficiency is the fact that a Volvo needs only ten more yards to stop from 60 m.p.h. with only one circuit operative.

The 140 Series hydraulic system has three immediate failure warnings built into it. In addition to the instrument panel warning light, both pedal travel and pedal pressure will increase noticeably if one of the circuits should fail. However, the pedal pressure of 175 pounds remains well within acceptable limits.

Contributing to the ability of the Volvo to stop straight is a pair of special pressure relief valves incorporated into both rear brake hydraulic lines. They regulate hydraulic pressure which prevents rear wheel lockup, the primary cause of loss of control during emergency braking.

To back up this advanced foot brake system, Volvo has added an efficient hand brake which features a brake drum for each rear wheel. An automatic dashboard reminder light warns the driver that the hand brake is applied.

Volvo 140 Series brake specifications:

Power assisted 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. Special safety valves prevent rear wheel lock-up during emergency braking.

Front: Self-adjusting 10.7" discs - pad area 22.8 square inches

Rear: Self-adjusting 11.6" discs - pad area 14.4 square inches

Pedal pressure

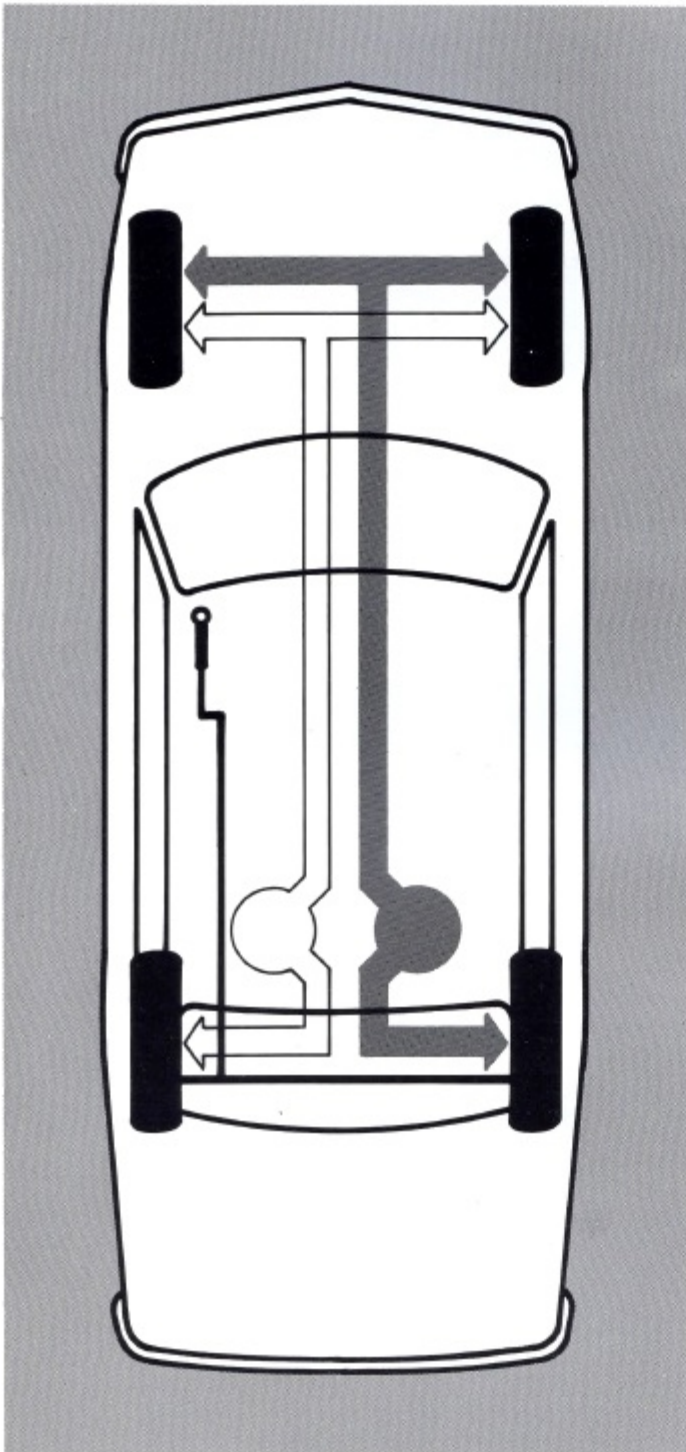
Maximum pressure required, full system with power assist70

Maximum pressure required, full system without power assist115

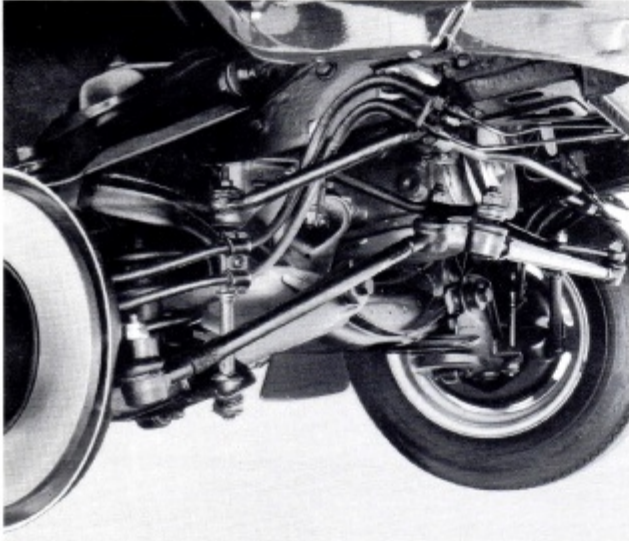
Maximum pressure required, half system175

Maximum pressure that can be exerted by women200

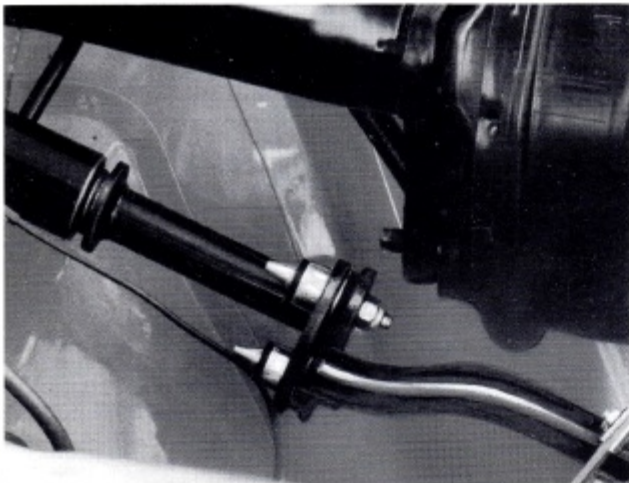
Handbrake: Mechanical drum brakes acting on rear wheels. Lining area: 27 square inches. Warning light on dashboard.



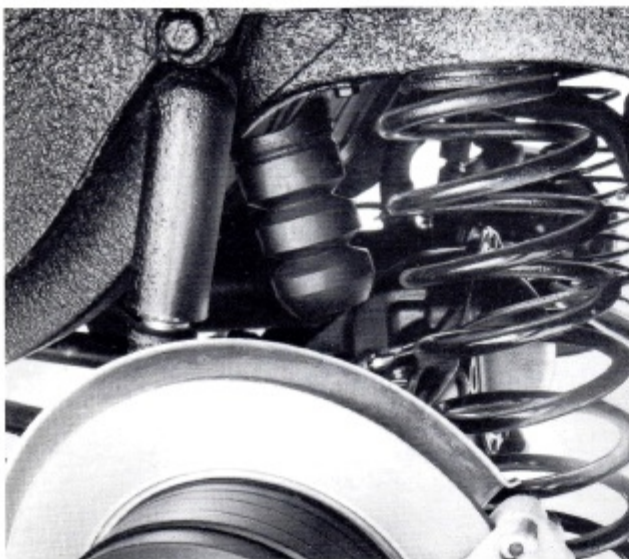
DUAL BRAKE SYSTEM - If one brake circuit fails, a separate hydraulic circuit, also operating on both front wheels and one rear wheel, provides efficient, straight line emergency stops.



FRONT SUSPENSION – Upper and lower control arms with ball joints are used in conjunction with coil springs and double-acting shock absorbers.



STEERING COLUMN – The two-piece column incorporates a special safety joint that will shear upon impact.



REAR SUSPENSION – Auxiliary hollow rubber springs, originally installed on the 145 station wagon, are now included on all 140 Series models.

Suspension and Steering

Good handling means that the suspension is designed to give well founded confidence during hard driving. When a car slightly understeers like a Volvo, the front end tends to move to the outside of the turn. When this happens, the car can be kept headed into the turn by simply turning the steering wheel around a bit more. This is a natural and therefore logical move, even for an inexperienced driver. Volvo's understeer slightly by design and have superior stability and balance.

A margin of safety is built into the suspension, permitting full loads and allowing the Volvo to tow 80% of its total weight. Tires on the 1969 models are larger and have greater speed and load ratings. Large 15-inch wheels and tires enable the disc brakes to be properly ventilated. Big tires also smooth out a bumpy road better than a soft suspension does and permit higher speeds at lower engine r.p.m.

Assisting the new American-sized tires in providing for additional load carrying are auxiliary springs supplementing the rear suspension. Taken from the 145 station wagon, these rubber springs prevent bottoming on rough roads or when the car is heavily loaded.

Volvo cam and roller steering gives precise control with only four turns lock to lock. The high front wheel turning angle enables the car to make a tight 30' 4" turning circle. Steering effort has been lightened on 1969 models.

The steering column has a unique safety design. It is made in two sections which meet in the engine compartment. Brackets on each section are coupled together by two steel pins suspended in hard rubber bushings which also effectively absorb road noise and vibration. Normally this column performs as a solid unit. In a collision, however, the two sections separate.

Volvo 140 Series suspension and steering specifications:

Front suspension –

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 suspension –

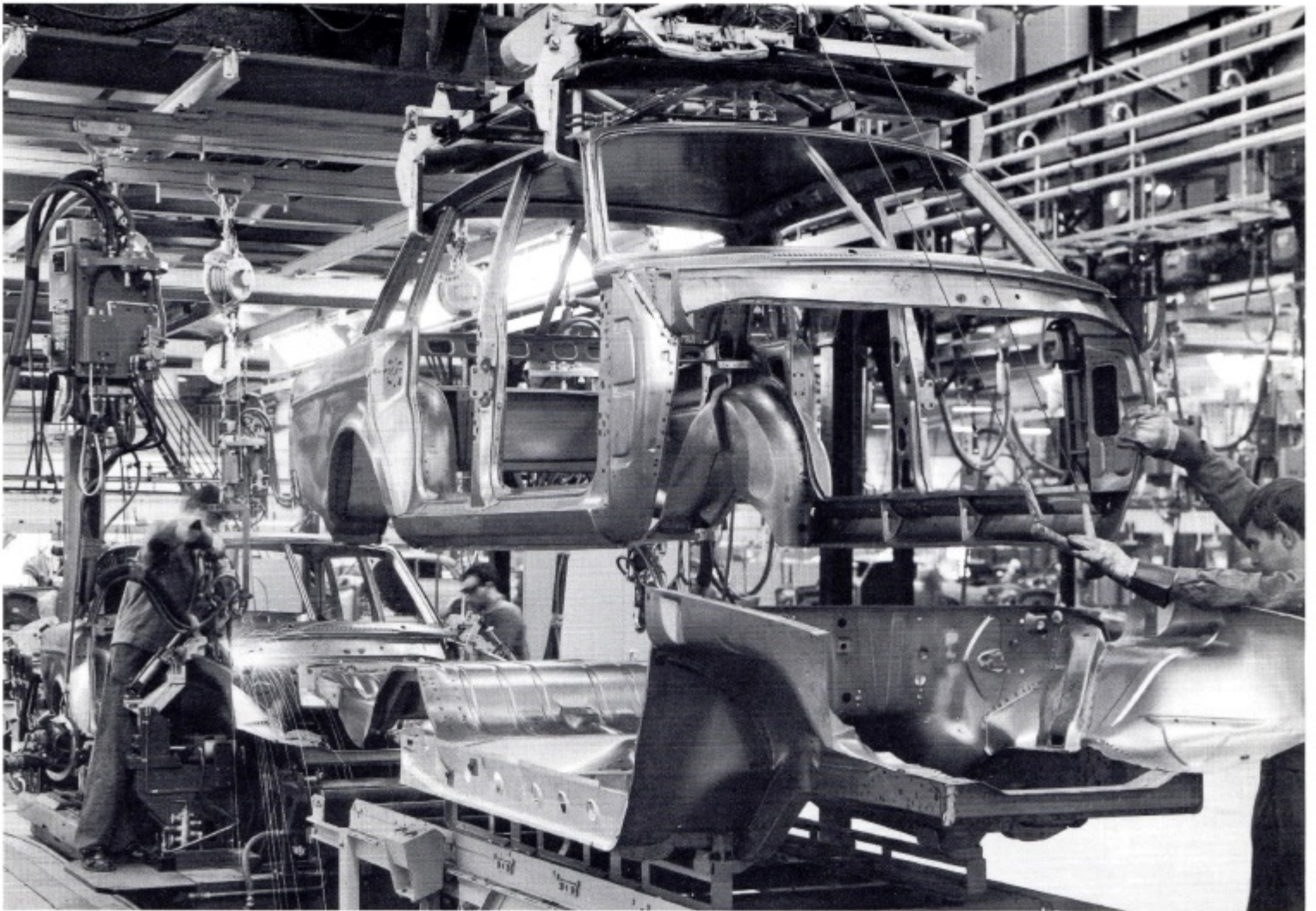
Solid rear axle carried by longitudinal, rubber mounted control arms and torque rods. Transverse location by rubber mounted track rod. Coil springs and auxiliary rubber springs with double acting telescopic shock absorbers.

Wheels and tires –

Pressed steel wheels, rim size 4½ Jx15 inches. 6.85x15 tires, wide base, whitewall, low profile, tubeless.

Steering –

Cam and roller type with four turns lock to lock. Turning circle 30 feet 4 inches. Two-piece safety steering column.



10,000 WELDS — The upper body assembly joins with the floor assembly for the final major welding operation.

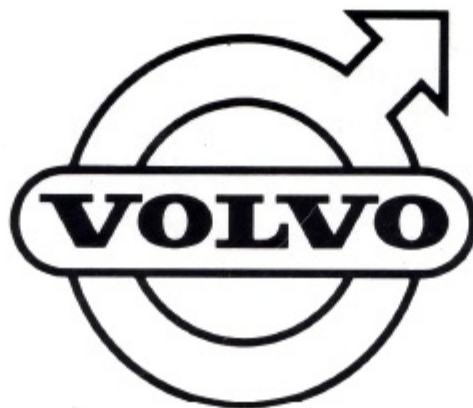
Production

Volvo bodies equal the durability of the operating components because of unit construction. Body components are stamped in large sections for maximum strength and precise dimensions. The exact measurements mean, for example, that doors and door openings fit perfectly.

The stamped steel body parts are taken to an automatic welding line where giant body jigs attach each component in exactly the right place. Each of the 10,000 welds on the car is strong enough to support the total body weight.

Twice the weight of an entire car can be supported by each of the pillars surrounding the passenger compartment. Together, then, one Volvo can support the weight of ten more stacked on top of it.

Crash tests have proven in practice what Volvo engineers had created in theory -- an exceptionally strong passenger compartment protected by front and rear body sections that successfully absorb large amounts of collision energy. In a series of rear end collisions and 30 m.p.h. barrier collisions the front and rear body sections absorbed all the energy. The passenger compartment was not deformed at all.



The factory reserves the right to make changes at any time, without notice, in prices, colors, materials, equipment, specifications and models and also to discontinue models.

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