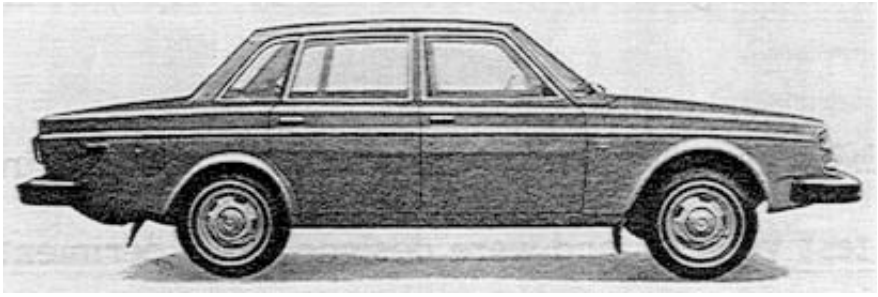
This page could be found on VCNA's website but suddenly disappeared. Since we think it contains some useful information we have put a copy of it here on our website. Volvo 164 Club of Sweden, January 15, 2001.

PARTS FAMILIARIZATION WORKBOOK NO. 2
240/260
Section 1: 1975 through 1978 240/260 Models
INTRODUCTION - Part 1



The 240/260 was developed in the late 1960s and early 1970s. Experience with the 140 was combined with new designs to meet future safety laws and emissions requirements. The object was to develop a Volvo that could be sold into the 1980s.

In addition, North America became the largest car market for Volvo -- more new cars were sold here than in Sweden for the first time in 1973. The new model would have to be designed to carry the responsibility of the growing Volvo car market. This meant that proposed changes to safety and emissions laws for 1975 and later would have to be anticipated before they happened. This tough job was made even tougher by the 1973-74 oil embargo crisis.

The Volvo parts market grew steadily throughout 1970 to 1975 on the strength of the 140, 160 and 180 models. Volvo earned a reputation for building one of the safest cars that were both dependable and practical. It was this safety reputation that produced a special test car that greatly influenced the development of the 240/260.

The Volvo Experimental Safety Car (VESC) appeared in 1972. Ten cars were produced as test vehicles and were designed as experiments to develop new safety features. A few of these new features were:

- Better front and rear crash protection.
- Larger impact-absorbing bumpers.
- Automatic seatbelts.
- Air cushions front and rear that inflated automatically.
- Front seat headrests that were recessed and sprang up when a collision occurred.

Of the few VESC models built, most could be driven on the street. They were not intended to be sold to the general public. Instead, a few of the safety features pioneered on the VESC were used on the 240/260.

The many improvements made to the 240 during the past years have helped to stimulate more car sales.

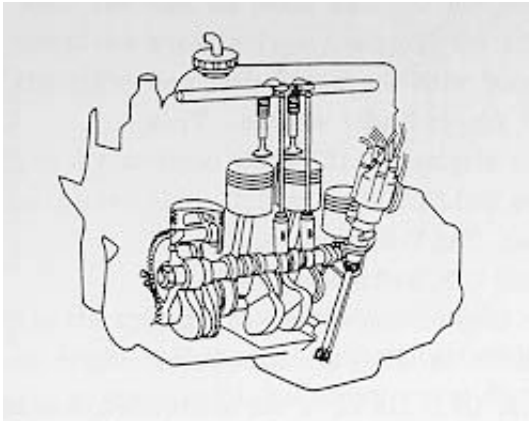
Section I of this workbook is divided up into the following segments:

Engine - 240 model
Engine - 260 Model
Electrical
Drive train
Brakes
Suspension
Body - 240 model
Body - 260 model

ENGINE - 240 MODELS

The first 240 models (1975) were fitted with the B-20F four-cylinder, overhead valve engine. This dependable pushrod engine came equipped with continuous injection (CI) described in Workbook No. 1, 140 Engine Section.

Internal engine parts (bearings, rods, seals, pistons, camshaft) for the 1975 B-20F engine are identical to the earlier 1974 version. However, many parts were externally added onto the engine to meet tougher 1975 clean-air laws.



In 1975 two levels of emissions standards came into being. Volvos were built to meet the federal (also called 49 state) standards or the tougher California standards. All 1975-78 Volvos sold in California have more emissions parts on them.

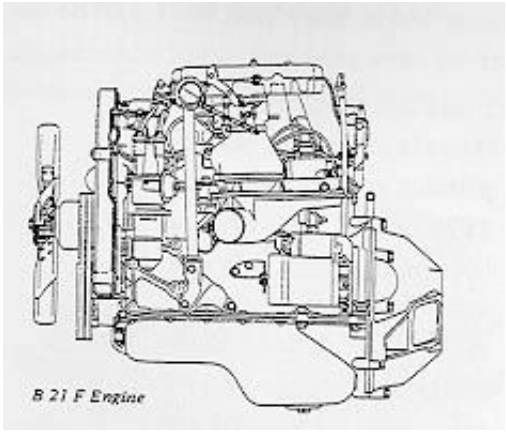
The 1975 B-20F has the following emissions parts:

- Positive crankcase ventilation
- Exhaust gas recirculation
- Air injection system
- Catalytic converter (California only)

The CI fuel system cleaned up things on the intake side and the above parts cleaned up things on the exhaust side. This was the system most cars on the road used to meet emissions laws until Volvo came out with a revolutionary new system in 1977. This new system (Lambda-sond) uses a computer to control events in the intake system and the exhaust system. More about this and other emissions parts later on.

The B-20F pushrod "four" was used in the 240 only in 1975. By the end of that year, it was time for a new generation of engines that could produce more power, run smoother and tackle tighter emission laws.

In 1976, for the first tirne, all 240 models for North America were equipped with the newly designed B-21F four-cylinder engine. This engine displaces 2,127 cubic centimeters (cc) (2.1 liters = 130 cubic inches). The B-21F was used in all 1976-82 U.S. 240 models. A B-21F Turbo engine was also developed and used in 1981-85 240 Turbo models. (A B-21FTI, "I" for intercooled, was used from 1984-1985.) NOTE-: A B-21A engine (carbureted) was introduced in Canada in 1977 and available to 1984.

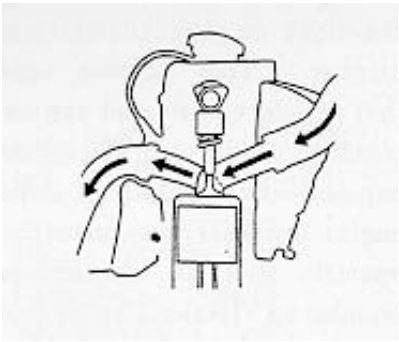


This new engine was more than a redesign of the old engine. The B-21 shares very few parts with the B-20 engine. The reliable main bearings, steel crankshaft and connecting rod bearings from the bottom end were just about the only major engine parts that carried over from the B-20.

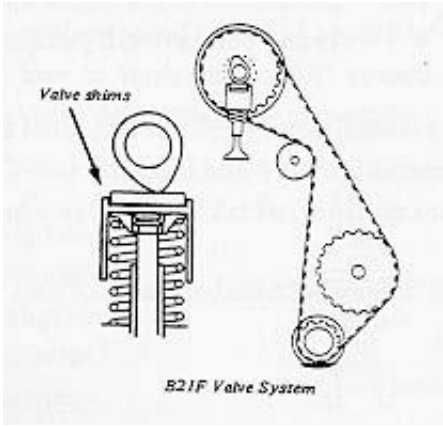
Engine parts are sometimes referred to as "bottom end" or, "top end" parts. The bottom end refers to the lower internal section of the engine. This includes all the parts located along with the crankshaft in the bottorn of the block. The top end refers to the parts on the top of the block -- cylinder head, gaskets, springs and valves.

The B-21 F engine has a cast-iron block and features three major changes from the B-20F:

- An aluminum alloy cylinder head for lighter weight and better cooling of the valves and valve seats.
- A cross-flow head design that has the intake (induction) on the left side of the engine and the exhaust on the right side.
- An overhead camshaft driven by a toothed belt that eliminates pushrods and rocker arms.



This new top end locates the camshaft in the cylinder head instead of in the cylinder block as on all other Volvo four-cylinder engines. Parts that need routine replacement include the toothed belt (called a timing or drive belt) and round metal discs called shims. These shims are placed between the valve lifters and camshaft lobes to adjust the valve clearances.

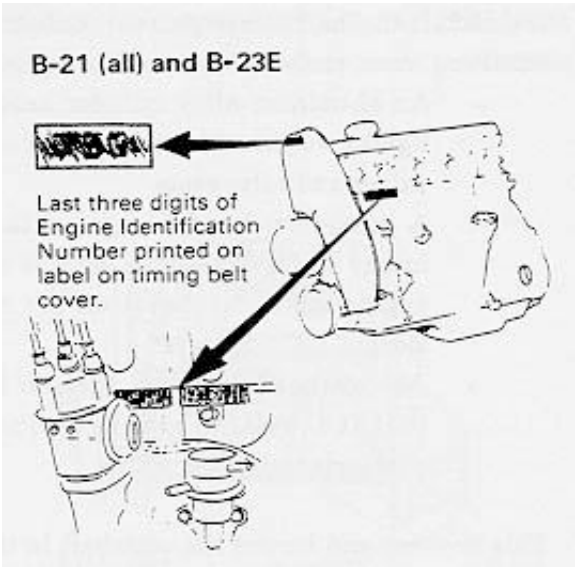


B21F Valve System

Twenty-five individual shims are available from 3.30 to 4.50 mm in thickness. A kit containing 82 shims may also be available.

The camshaft in the B-21F is located on top of the cylinder head. Separate replaceable camshaft bearing shells (like the B-18/B-20) are not used.

NOTE: Camshafts, cylinder heads, engine blocks, intake/exhaust manifolds and most other top end parts from the B-21 will not fit the B-18/B-20 engines.



Finding a camshaft part number usually will require obtaining the six-digit engine identification number. This number confirms that you have selected the correct camshaft for the car.

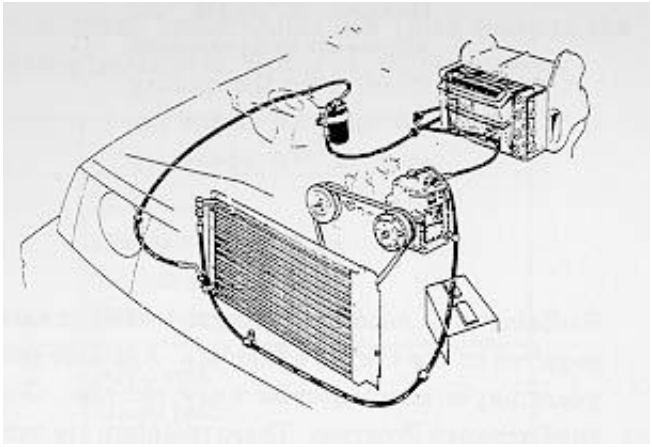
The second three digits appear on a printed label located on the front timing belt cover. If you have a doubt, check the engine compartment.

A flat, pleated-paper air filter is located in a housing on the left front side of the engine compartment in 1976-78 and later 240 non-Turbo B-21F models. B-21FT and B-21A engines use a different air filter, which is located in a housing on the right front side of the engine.

One oil filter part number and one fuel filter part number fit all 240 models through 1979.

Air conditioning was available as an option on the 1975-78 240 models. In addition to the adding of refrigerant to the system and replacing the compressor belt, the following parts might need replacement on high-mileage cars:

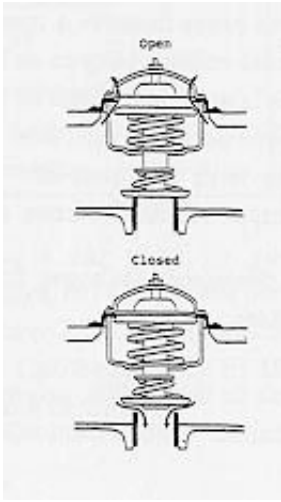
- Pressure hoses
- Compressor clutch
- Receiver drier
- Temperature sensors
- Expansion valve



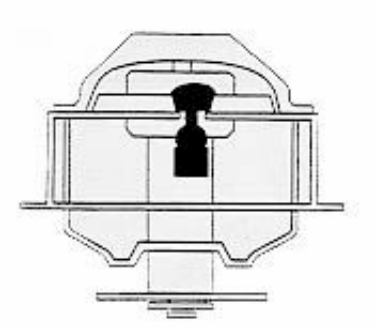
Front-end accidents can also destroy the condenser - a part that resembles a small radiator located in front of the larger engine cooling system radiator.

NOTE: A/C repairs and system charging require special tools and expertise. If replacement is needed, please check with your dealership's service adviser or service manager.

The cooling system is a refined version based on the design of the 140. An aluminum water pump, coolant throughout the engine block, cylinder head and radiator. The thermostat is available in two different temperature settings (197F/92C, 189F/87C). It is located in the water outlet neck at the front of the engine on the left side (unlike the B-20, which has it on the top front). Genuine thermostats come complete with a new gasket.



Genuine Volvo thermostats have a special feature. A "jiggle" pin allows air to be released (bled) from the cooling system. Air inside the system can speed up corrosion.



Radiators will need replacement sooner on cars where the coolant was not changed as required in the Owner's Manual. Age also gets to this part, so Volvos older than five years may be candidates for a new radiator.

Replacing a radiator can also mean that you may need new hoses and coolant as well.

Keep on top of things as it may be time to replace these parts too.

As promised, let's get further into the parts of the Lambda-sond emissions control system.

Back in the 1960s, scientists worked on ways to control three major pollutants in car exhaust: carbon monoxide (CO), hydrocarbon (HC) and nitrous oxide (NOX).

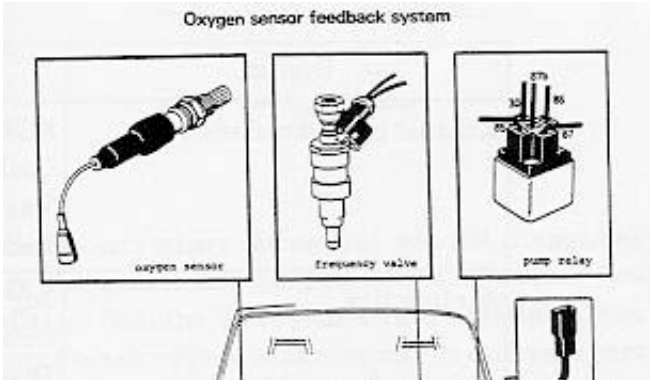
Laws were passed requiring new cars to meet certain minimum standards for each of these three pollutants. As the laws got tougher, more emissions parts were needed.

A number of different emissions parts systems were developed to reduce CO, HC and NOX on 240 Volvos from 1975 to 1978. Listed below is a quick recap of the systems (and the individual parts) that were installed on Volvos during those years:

System	Parts
Exhaust gas recirculation	EGR valve Coolant temp sensor Vacuum amplifier EGR line (pipe)
Air Injection	Air pump Drive belt Diverter valve Check valve Air manifold
Positive crankcase ventilation	Flame shield Hose Nipple
Lambda-sond	Lambda-sond (oxygen sensor) Electronic control unit Frequency valve
Catalytic converter	Three-way converter Two-way converter Mounting studs/nuts

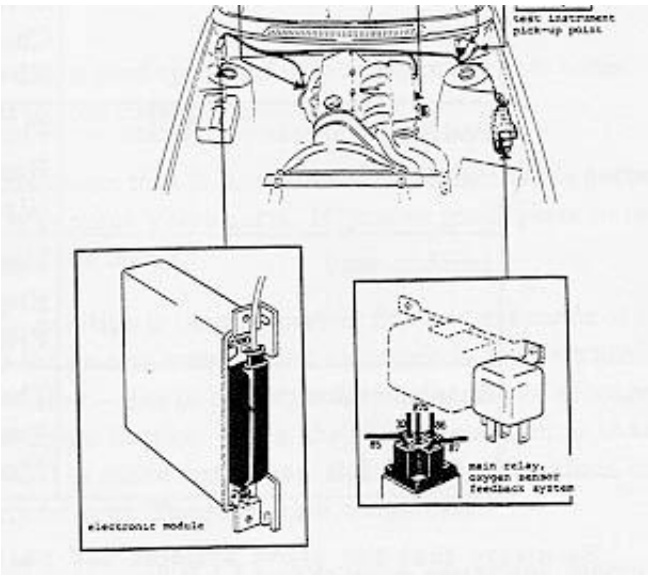
Be aware that the above systems and parts fitted to a car vary by year and federal/California standards. For instance, a federal standard 1977 244 will have EGR and PCV. A California emissions standard 1977 244 will have PCV, Lambda-sond and a three-way catalytic converter. Lambda-sond was fitted to California 240s in 1977 and 1978. Federal (49 State) cars did not get Lambda-sond system until 1978.

Direct your efforts at remembering specific emissions equipment names and locations -- not the many possible system combinations.



The Lambda-sond emission control system was first used on the 1977 Volvo 240 in California. Before this breakthrough, a standard catalytic converter, EGR, an air pump and fuel injection were used to get the lowest levels of CO, HC and

NOX.



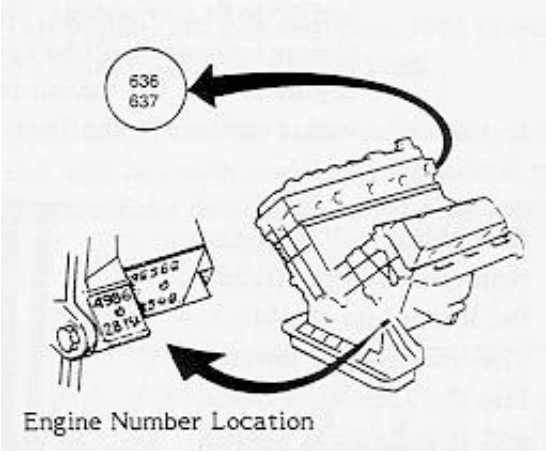
The trick is to keep the air/fuel ratio at a certain very specific level at all engine operating conditions. The Lambda-sond system uses an oxygen sensor that compares the air in the exhaust to that of the atmosphere outside. A signal from the sensor to the control unit causes adjustments to the fuel system to keep emissions at the specific level required.

This is a simple explanation of a very complex process that occurs in fractions of a second. The end result was that engineers now had a system that had potential to meet upcoming stricter standards without the penalties of poor fuel economy and driveability. Volvo was the first car manufacturer to develop (with Robert Bosch GMBH) this system and use it on a production car. This system is not applicable to diesel engines.

Routine maintenance of this system includes replacement of the oxygen sensor.

Diagnosing a problem requires trained skill. Because this system is tied into the fuel injection and ignition systems, a qualified professional Volvo technician is best able to determine what parts should be replaced.

Engine - 260 Models



Engine Number Location

In the summer of 1971, Volvo joined into an agreement with Peugeot and Renault to develop a V-6 engine. In 1974, this engine was introduced in a new model -- the Volvo 264 -- for the European market. The first model year for the 260 in North America was 1976.

The V-6 in the 1976-79 260 models is an all-aluminum design with replaceable iron cylinder liners. It is designated the B-27F (2,660 cc/162.5 cubic inches). Other variations produced are the B-27A (carbureted) and B-27E (European fuel injection not for North America).

There is a separate overhead camshaft for each bank of cylinders. The camshaft lobes operate the valves via rocker arms. Each cam is driven by a separate chain, and there is a third chain for the oil pump.

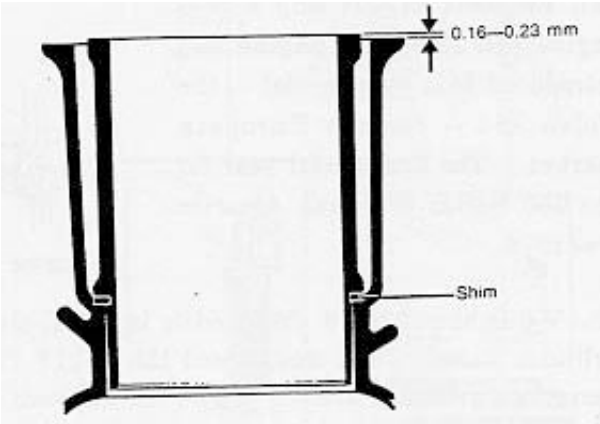
Except for the oil filter, this engine does not share any major parts with other Volvo engines. The

B-18, B-20 and B-21 Volvo engines use a cast iron cylinder block with cast-in cylinder bores and coolant passages.

With the V-6, coolant circulates around the entire diameter of the piston bore (outside the liner), giving rise to the name "wet liner" engine. When a V-6 needs rebuilding, each piston, piston ring set, and the sleeve is replaced as one unit.

TIP

Oversize pistons are not needed and are not available for the V-6. Do you know why? When the other Volvo engines mentioned above are rebuilt, usually the cast-iron cylinder bores have to be enlarged slightly (called boring) to fit new pistons. Naturally, if the cylinder bore is larger, larger pistons (oversize) will be needed. One of the advantages of a wet liner engine is that the cutting process is eliminated because the entire bore is replaced by the liner.



Assembling a V-6 engine requires correctly fitting the liners into the block. The iron liner is lowered into the aluminum block and it rests on a special shim (sometimes called a gasket or seal).

The shims keep coolant out of the engine crankcase as well as determine how far the liner protrudes from the top of the block. This protrusion seals the liner against the cylinder head.

TIP

These shims are usually available in four thicknesses. Your Authorized Volvo technician needs to provide a size and/or the color marking on the shim.

Camshafts and rocker arms are among the top end parts that will require replacement. Remember that many cylinder head parts need to fit a left and a right side.

The valve cover gaskets are usually the only parts that will need replacing when routine intake and exhaust valve adjustment is required. The B-21F design that uses shims to adjust valves is not used on the V-6.

The same oil filter that fits nearly all other Volvo gasoline engines fits the B27F! Remember that family of applications mentioned in Workbook No. I? Well, this is yet another example. And there are more.

The B-27F came equipped with continuous injection (CI) and the same emissions systems as the four-cylinder B-21F. Differences exist with how each model met the federal and California emissions standards.

A recap of the applications is listed below:

U.S. 240/260 SERIES

Year	Model(s)	Engine Type	Exhaust Gas Recirculation		Air Injection Reactor		Catalytic Converter 3-Way		Catalytic Converter 2-Way		Crankcase Emission Control System		Altitude Compensating Regulator		Evaporative Control System		Lambda-Sond	
1975	242, 244, 245	B-20F	x	•	x	•			•		x	•			x	•		
1976	242, 244, 245	B-21F	x	•	x	•			•		x	•	x	•	x	•		
1976	262, 264, 265	B-27F	x	•	x	•			•		x	•	x	•	x	•		
1977	242, 244, 245	B-21F	x				•				x	•	x	•	x	•		•
1977	262, 264, 265	B-27F	x				•				x	•			x	•		•
1978	242, 244, 245	B-21F	x				•	x			x	•			x	•		•
1978	242, 244, 245	B-21F					x	•			x	•			x	•	x	•
1978	262, 264, 265	B-27F	x					•	x		x	•			x	•		•
1978	262, 264, 265	B-27F					x	•			x	•			x	•	x	•

x U.S. (49 States)

• California

CANADA 240/260 SERIES

Year	Model(s)	Engine Type	Exhaust Gas Recirculation		Air Injection Reactor		Catalytic Converter 3-Way		Catalytic Converter 2-Way		Crankcase Emission Control System		Altitude Compensating Regulator		Evaporative Control System		Lambda-Sond		Pulsair	
1975	242, 244, 245	B-20F																		
1976	242, 244, 245	B-21F																		
1976	262, 264, 265	B-27F																		
1977	242, 244, 245	B-21F				•														
1977	262, 264, 265	B-27F				•														
1978	242, 244, 245	B-21F				•														
1978	245	B-21A	x			•														
1978	245	B-21A																		•
1978	262	B-27F					x	•								x	•			
1978	264, 265	B-27F	x																	

x with automatic transmission

• with manual transmission

The altitude compensating regulator automatically adjusts fuel injection pressure for different altitudes.

The evaporative control system helps prevent gas tank fumes from getting into the atmosphere. The fumes are channeled back to the engine for burning.