

Spring 2021

v6 | n1

# Volvo TechTips

Information for the Independent Volvo Specialist

[VolvoTechTips.com](http://VolvoTechTips.com)

## XC90/XC70 Fuel Tank Removal and Replacement

Replacing Volvo Water Pumps

MOST Networks and Infotainment  
Systems Problems and Solutions

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**V O L V O**





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**Caution:** Vehicle servicing performed by untrained persons could result in serious injury to those persons or others. Information contained in this publication is intended for use by trained, professional auto repair technicians ONLY. This information is provided to inform these technicians of conditions which may occur in some vehicles or to provide information which could assist them in proper servicing of these vehicles.

Properly trained technicians have the equipment, tools, safety instructions and know-how to perform repairs correctly and safely. If a condition is described, DO NOT assume that a topic covered in these pages automatically applies to your vehicle or that your vehicle has that condition. Volvo Car USA LLC, the Volvo name and Volvo logo are registered trademarks of Volvo Corporation.

## FEATURES

Volvo MOST  
Networks and  
Infotainment  
Systems  
Problems and  
Solutions  
Working on these  
"infotainment"  
systems is not as bad  
as you may think.



Replacing Volvo  
Water Pumps  
The water pump is a  
vital part of the coolant  
system and should be  
checked frequently  
during services.



Volvo XC90 (2003-2013)/  
XC70 (2001-2007)  
Fuel Tank Removal and  
Replacement

This job is not a common  
repair, and it is somewhat  
complex. Only in a few  
cases will the fuel tank  
be replaced in order to  
fix an evaporative  
system issue.



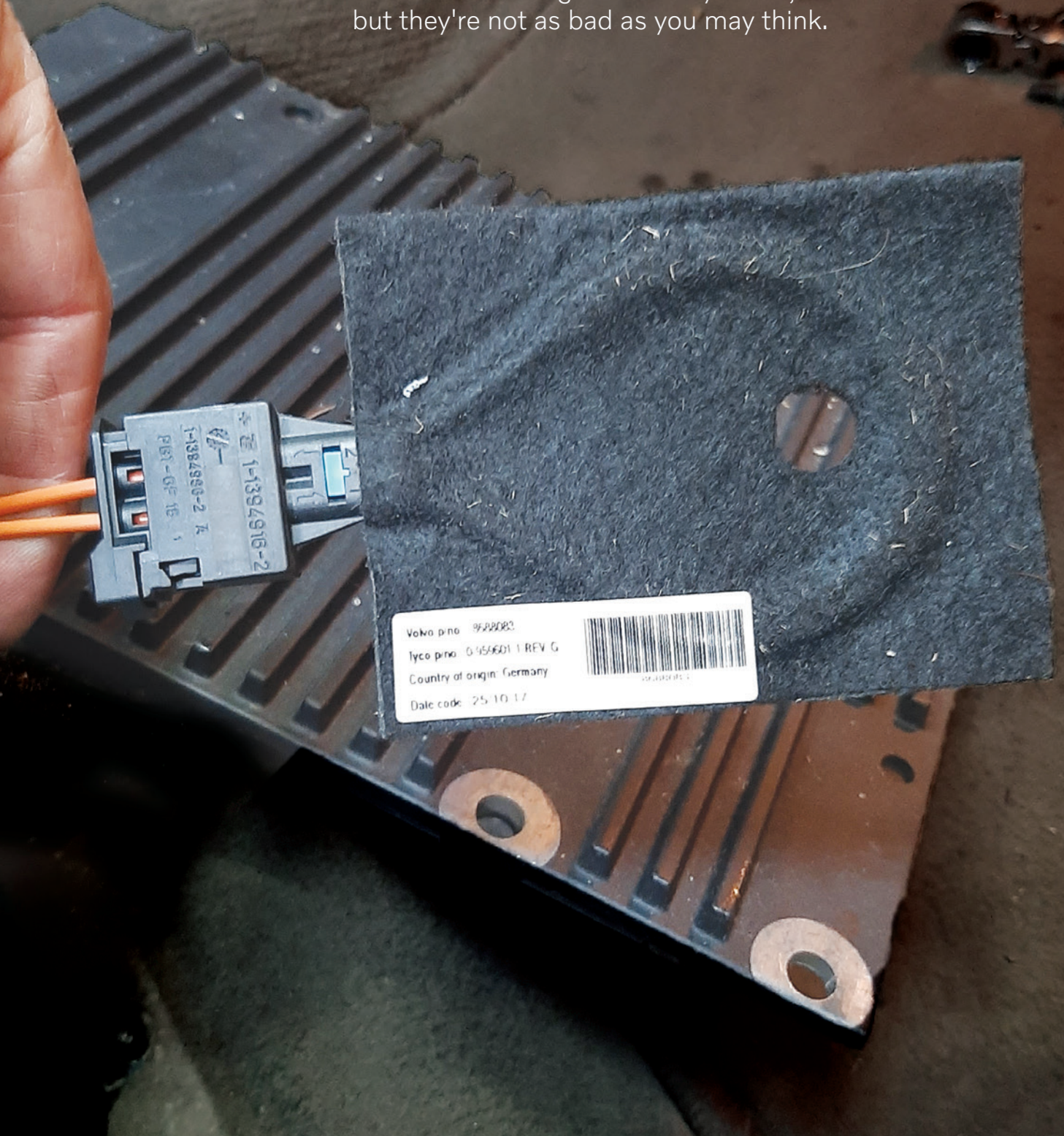
## Also Inside:

RepairLink Shop and CollisionLink Shop 12  
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# Volvo MOST Networks and Infotainment Systems Problems and Solutions

Does the word “Infotainment” make you cringe?  
Well you’re not alone. A lot of technicians are  
nervous about working on these systems,  
but they’re not as bad as you may think.



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The first part of the word "Infotainment" is "Information," and that's what you will need to master these systems.

The fact is that you will probably never be able to master all these systems because of the fact that they are always changing. New systems and functions are coming out a few times a year these days.

Volvo's newest infotainment offering is called Sensus Connect. And with its large tablet-based control screen, it is one of the most advanced and most connected systems on the market today. Everything runs through the Sensus system and the driver can customize everything.

The Sensus has three ways for the driver to interact with it — touch screen, voice control, and it even has a way to read our handwriting.

In the aftermarket we are not really dealing with these Sensus cars yet, but they are right around the



Sensus screen

corner, and if you don't keep up with new technologies you will be left behind.

Have you ever had a customer come into the shop with a complaint of something not working right, just to find out that the customer did not know how to use a particular feature or function of their vehicle?

Of course you have. And this is probably happening a lot more lately. That's because, over the years, in-car features and technology have become increasingly more advanced, and the number of tasks that your car can perform has increased exponentially.

It's like getting a new phone for most people. The new smart phones can do so much, but most people only know how to use about 30% or 40% of their phone's features. On infotainment systems like Volvo's Sensus Connect, the phone features only represent about 10% of what these systems can do.

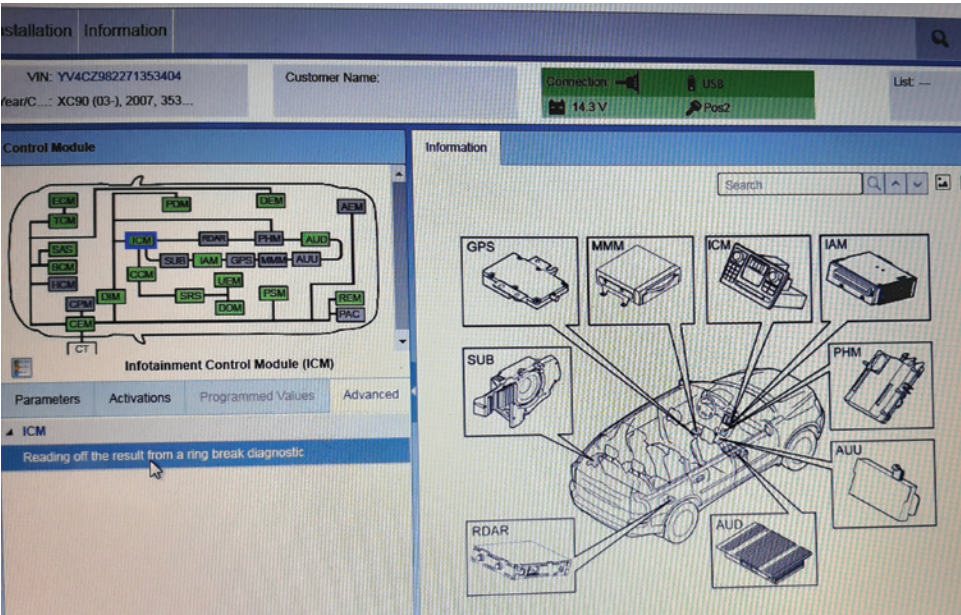
The point is that, as these systems get more complex, you will not only have to fix them, but a lot of your job will become customer education.

When you get some of these newer Volvos in the shop you should take some time to "passively" play with some of the functions and capabilities of these remarkable infotainment systems. Of course, try not to change any of the driver's personal settings, but get to know these systems so you can educate your customers.

You or your service writer will have to interview the customers that have these later Volvos to determine if the issues they are experiencing are actually a problem or just user error or user lack of knowledge.

When diagnosing problems with Volvo infotainment systems you are going to need to have Volvo's VIDA software and a DICE tool. You may be able to check parts of the systems with a newer high-end scan tool, but VIDA is the only tool that will get you there in any kind of plausible time.

VIDA has a powerful diagnostic tool when it comes to the MOST network. The MOST ring



If you are trying to diagnose a problem in one of Volvo's Infotainment systems, the Volvo VIDA software has a great test to help find the cause — the MOST network ring break diagnostic procedure. You can find it in Vehicle Communication, select ICM under the Advanced tab.



break test will help you quickly and effectively test the MOST fiber optic network.

The wide range of Volvo infotainment systems would be much too large to cover in this one article, but we will touch on a few common issues.

When dealing with Volvo infotainment issues, you should always make it a habit to check for Technical Journals or TJs. You may find that some issues can be fixed with just a software update.

Below is the abridged Technical Journal (TJ 34021.1.1) that may help you avoid a common mistake that many technicians have made.

On pages 8 and 9 is a Volvo service bulletin that will help you diagnose a very common Key Off battery drain issue with some of the cars that use a satellite radio receiver.



It's also a good idea to get one of these MOST bypass loops. They are pretty cheap to buy and will allow you to bypass a MOST network module to help confirm a MOST ring break caused by a defective component. A bypass loop is available from your local Volvo dealer parts department. Part number is 8688083.

## SiriusXM Radio inop or NO Sound on SAT

### Source

REF: No: TJ 34021.1.1
Issuing Department: Technical Service
FUNC Group: 3900
FUNC DESC: Media, navigation and communication
ISSUE DATE: 2018-08-08
STATUS DATE: 2018-09-18

### Vehicle Type

For affected vehicles, refer to Service Manger Bulletin 00-013 for a types cross reference.

### CSC Customer Symptom Code

Code	Description
2P	Satellite radio/Does not work

### DTC Diagnostic Trouble Codes

Rows beginning with \* are modified

NOTE: If using a printed copy of this Technical Journal, first check for the latest online version.

### Description:

RDAR = Remote Digital Audio Receiver

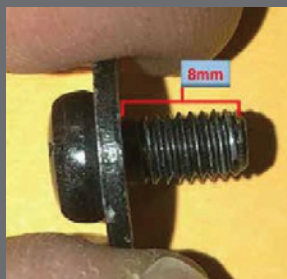
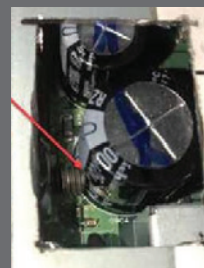
The customer may report no sound on the Satellite Radio source or that Sat radio is inoperative on any channel.

If a new or known good RDAR unit is plugged in, it will work normally. However, after mounting the unit, it may become inoperative immediately or after a period of time (several days or weeks).

### SERVICE:

Check the length of the RDAR mounting screws. If too long a screw is used in the mounting hole closest to connector "A" on the RDAR, it can make contact with and damage one of the internal capacitors (see image on right).

The screws should be no larger than M5 x 8 mm in order to avoid interference with the internal components of the RDAR (see images below).





## What does MOST mean?

MOST (Media Oriented Systems Transport) is a high-speed multimedia network technology optimized by the automotive industry. It can be used for applications inside or outside the vehicle.

The serial MOST bus uses a daisy-chain topology or RING and Synchronous data communication to transport audio, video, voice, and data signals via plastic optic fiber (MOST25, MOST150) or electronic connectors (MOST50, MOST150) physical layers.

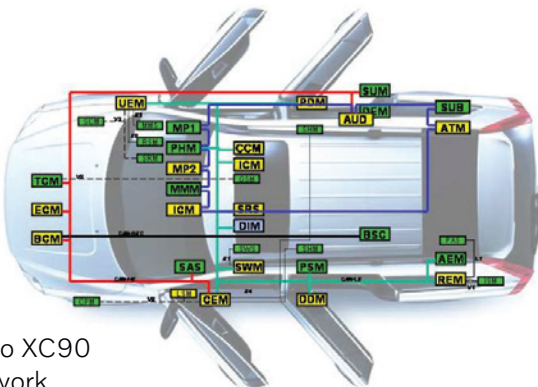
MOST technology is used in almost every car brand worldwide, including Audi, BMW, GM, Honda, Hyundai, Jaguar, Lancia, Land Rover, Mercedes-Benz, Porsche, Toyota, VW, SAAB, Skoda, Seat and, of course, Volvo.

## Fault tracing MOST networks

The ICM has detected an open circuit in the MOST network. The MOST network is a fiber optic ring network. This means that all control modules, which are connected to the network, must be powered and grounded for the infotainment system to work. If a control module for any reason is unable to receive or send signals on the MOST-net, or if there is an open circuit on the fiber optic line, then the ICM will shut off all functionality.

Communication on the fiber optic net is one-directional. The control modules on the MOST-net receive the light signals, amplify them, and then send them on. The MOST connectors for the control modules contain two fiber optic cables — one for incoming and one for outgoing signals.

If the fault is intermittent, it has been registered previously but is no longer present. Intermittent faults can be caused by interference at start-up of the MOST network (ECM), or can be a different type of fault which occurs on different occasions. The fault is evaluated depending on how it occurs. If the fault recurs, fault trace for permanent faults.



Volvo XC90  
network

An intermittent fault may be difficult to diagnose using ring break diagnosis because a condition for this is that the fault occurs while the diagnostics program is running. If the fault is permanent, perform a ring break diagnosis to locate the open circuit.

## Fault management on the MOST network

General: The MOST network is monitored by the ICM. If it detects a fault in the MOST network, a diagnostic trouble code is stored in the infotainment control module.

There are different types of DTCs depending on the type of fault. A general rule is that, if the light pulse in the MOST network disappears, the entire network stops working.

Fault types which are processed are:

- No communication from a control module.
- Faulty communication on the MOST network.

There may be no communication from a control module. The ICM knows which control modules are connected to the MOST network. If any control module on the MOST network ceases to communicate, a diagnostic trouble code is stored in the ICM. There is a DTC for every control module on the MOST network for this fault.

Missing communication may be due to an internal fault in the control module or because the function is incorrectly implemented in the control module.

## Faulty communication

For faults when messages cannot be sent on the MOST network, DTC ICM-U1A2400 is stored.

Causes of this fault may be:

- A control module, except the infotainment control module, has a defective optical connector.
- A control module has an internal fault which means that the optical connection stops working. A control module on the MOST network is not powered. If there is no power supply, the optical connector stops transmitting light.
- The optical cable is damaged or there is an open circuit. This fault can occur if the bend radius of the cable is too small or if the cable is kinked or trapped.
- There is dirt or oil on the optical connectors which impedes the light.
- The connection to a control module has come loose.
- The fiber optic terminals in the connector are cross-connected.
- There is a loose connection because the fiber optical wiring is incorrectly installed, or the fiber



## RDAR = Remote Digital Audio Receiver (satellite radio tuner)

This TJ replaces TJ25950 and previous versions of TJ26188.

### Vehicle Type

For affected vehicles, refer to Service Manger Bulletin 00-013 for a types cross reference.

There is no need to replace the RDAR due to:

1. No function, Locked condition:
  - Not possible to select SAT1 or SAT2 as an audio source.
  - SAT1 or SAT2 may be visible, but there is no reaction from the system when selecting them.
  - It will not be possible to access any Sirius menu items.
  - This Locked condition in combination with other factors may result in a higher than normal standby-current consumption. DTC 0008 or U300098 (overheated) may be set.

Analysis of units returned to TMA shows that almost all units could have been recovered. Software is now available to prevent this condition from recurring.

- 1A. To recover P1 and XC90 units:
  - Remove the fuse or the power/ground connector to the RDAR and reinstall after ten seconds.
  - Perform an RDAR upgrade with VIDA. This will recover the unit and prevent the condition from recurring.
  - It will now be possible to select satellite radio as an audio source. An Updating Channel List message will be displayed.
  - If there is no active subscription, the procedure is complete. Channel 184 may become visible or the Updating Channel List message may remain as long as there is no active subscription. Both conditions are normal.
  - If there is an active subscription, the unit should be refreshed by entering the 12-digit Sirius ID and clicking on Send Activation Request at [care.siriusxm.com/retailrefresh\\_view.action](http://care.siriusxm.com/retailrefresh_view.action) while the vehicle is running, the audio system is on, and you have a clear view of the sky. The web page will display the message "Activation Request Sent."

After a few minutes, the vehicle will receive the signal, the channel list will be updated, and audio will be available on the channels included in

the subscription. If the web page displays the message "Please enter a valid ESN," even though the correct ESN was entered, there is no active subscription.

Code	Description
LM	Battery/Dead battery
LN	Battery/Weak or low electrical power
FC	Audio other/Other audio problems
DP	Radio/Does not work
2P	Satellite radio/Does not work

NOTE: In addition to the 12-digit Sirius ID being on the unit itself, it can also be found in the Warranty Inquiry screen for some vehicles where the original unit has not been replaced previously.

#### 1B. To recover P3 units:

- It is normally not possible to recover the unit using VIDA on P3 cars.
- Lift the luggage compartment floor, unplug the power/ground connector to the RDAR and plug it back in after ten seconds.
- Copy the 12-digit Sirius ID number printed on the label.
- Have the vehicle running, the audio system on, and you have a clear view of the sky.
- Go to [care.siriusxm.com/retailrefresh\\_view.action](http://care.siriusxm.com/retailrefresh_view.action), enter the ESN, and choose "Send Activation Request."

The web page will display the message "Activation Request Sent." After a few minutes, the vehicle will receive the signal and SAT1 and SAT2 will be selectable. It will be possible to tune to channel 184.

There may or may not be audio on channel 184. This is dependent on the hardware variant and is normal.

Any abnormal current consumption issue caused by the RDAR will be solved.

If the web page displays the message "Please enter a valid ESN," even though the correct ESN was entered, this method will not work for the particular ESN; proceed to 1C.



Once the unit has been recovered, perform an RDAR upgrade which will prevent the condition from recurring.

If they like, the customer can call Sirius and purchase a valid subscription as usual.

- 1C. Only necessary if 1B does not recover the unit:
- Call the Sirius/XM Dealer Support (800) 852-9696, press 2.

To minimize confusion, use these exact instructions when speaking to the agent:

- State that you would like to "Add a receiver to an engineering account and send an Engineering Restore signal."
- You will be asked for the 12-digit Sirius ID No.
- You will be asked for the account number: 112762201932.
- You may be asked for an address: 1 Volvo Drive, Rockleigh, NJ 07647.
- You may be asked to tune to channel 184. This will not be possible due to the current state of the unit; ask the agent to send the signal anyway.
- The agent should now be able to add the receiver to the account and send the Engineering Restore signal.

If the Sirius agent is unfamiliar with this procedure, you may have to assist them.

The exact steps the agent needs to follow are:

1. Click on the blue "plus" symbol (+) next to "Overrides."
2. Type in "ENG" (in capital letters).
3. Click on "Override Promo Code."
4. Click "All Audio Packages."
5. Scroll down to "Engineering Restore" (it must be exactly "Engineering Restore," nothing else).
6. Choose "Next."

After a few minutes, the vehicle will receive the signal and SAT1 and SAT2 will be selectable.

An Updating Channel List message may be displayed or the display may be blank.

Once the unit has been recovered, perform an RDAR upgrade which will prevent the condition from recurring. The fault is now repaired; any abnormal current consumption issue caused by the RDAR will be solved.

If they like, the customer can call Sirius and purchase a valid subscription as usual.

## **RDAR recovery 0.2 hrs 36004-2 software download — See VST**

2. Specific channels are not available:  
This can be caused by the Sirius channel lock settings in the vehicles menu as described in the owners manual.
3. A total vehicle stand-by current draw of approximately 60 mA which drops to under 25 mA after a key cycle. This draw is triggered when the power feed to the RDAR module is interrupted for a short period of time (a few seconds) and then reconnected. This often occurs during the fault tracing process — for example when the battery cable is temporarily disconnected to insert an ammeter, when a fuse is pulled and reinstalled, when the module is unplugged and plugged in again, etc... The draw disappears after a key cycle.

The procedure for checking Stand-By current is found in VIDA:

- Information->Fault Tracing->General Diagnostics and Tests->311 Battery

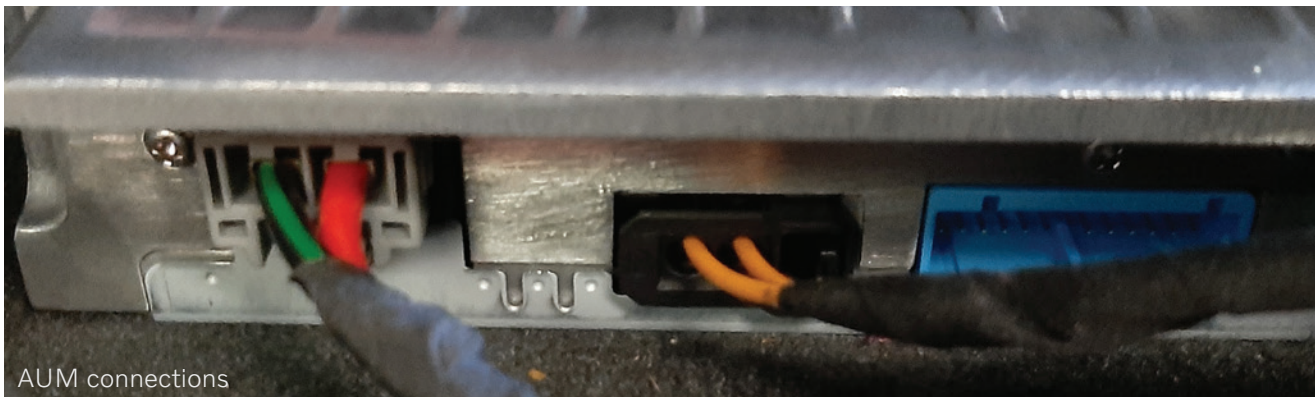
- A portion of the procedure is attached
- 4. An RDAR unit may need to be replaced:
  - If the unit can not be brought online according to the above, and after review by Prior Approval Department.
  - For an internal DTC that can not be erased.

For other confirmed functional issues, as agreed with the Prior Approval Department. Refer also to TJ 25130.

This information is also published in SMB 39-001 and PB 39-001.

5. Confirm that the vehicle is not affected by other known stand-by current issues:
  - C70: Battery drain due to Convertible Roof Module (CRM), see TJ 24318.
  - P3: Too high quiescent current may drain the battery, see TJ 23515. •

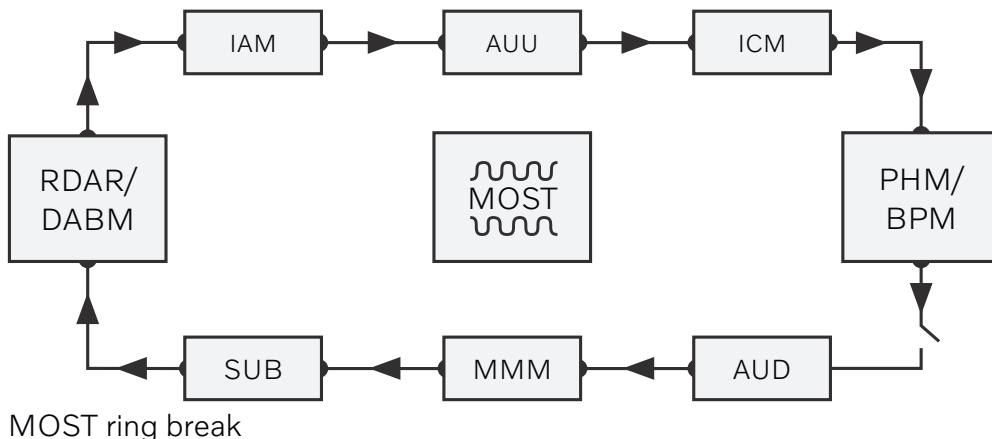




AUM connections

- optic terminal pin has been pressed back in the connector.
- A bridging connector has come loose or is damaged.

Ring break diagnostic procedures are used to remedy DTC ICM-U1A2400. If a break is discovered in the MOST network after running a ring break diagnostic procedure, DTC ICM-U1A1587 will be stored in the ICM. If this is the case, you can determine which control module the open circuit is located in by reading off from the ICM.



open circuit will transmit a message to the ICM. By using the incoming messages the ICM can identify on which control module the open circuit has occurred.

Hint: It is important to know which control modules are connected and in which order they are connected in order to know which control modules lie before and after the indicated control module.

## Ring break diagnostics

General: This function is important when fault tracing the MOST network. Ring break diagnostics are used when there is an open circuit in the MOST network and DTC ICM-U1A2400 has been stored in the ICM.

Ring break diagnosis means that all control modules send a message to the ICM in reverse order of how they are located in the MOST-net. This means that Accessory USB Unit (AUU) sends first and not last (this applies to S80/V70/XC70, for XC60 Remote Digital Audio Receiver (RDAR)/Digital Audio Broadcast Module (DABM).

The control module which is not working will not transmit a response to the ICM. This also means that the control modules which are connected before the defective control module will be unable to transmit a message to the ICM.

The same applies to open circuits in the optical cable in the MOST network. No control module before the

## Example for S80/V70/XC70

A MOST network contains all eight control modules. There is an open circuit in the cable between the Phone Module (PHM) and the Audio Module (AUD). See the MOST ring break illustration above.

In a ring break diagnosis the ICM receives replies from the control modules on the MOST network. Those located before the Audio Module, such as the Phone Module, cannot transmit their reply to the ICM.

The ICM now receives a response from all control modules except the integrated Phone Module, and therefore identifies the control module which is first in the loop, and which responded — in this case, the Audio Module.

If there was no open circuit, the ICM would have responded "OK." ●



## Keep the Work Flowing

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Plus, your local Volvo dealer is here to help.

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**V O L V O**



# RepairLink<sup>SM</sup> Shop and CollisionLink<sup>®</sup> Shop

These programs represent the fastest, most accurate ways to source Volvo mechanical and collision repair parts.

If you've ever received an incorrect automobile repair part, you weren't using RepairLink<sup>SM</sup> Shop or CollisionLink<sup>®</sup> Shop. But you could. They're both free!

Fast, accurate, and free. You haven't heard those words all in a sentence about collision and repair parts sourcing, until now. RepairLink Shop and CollisionLink Shop online catalogs now offer the best way for independent service providers to order mechanical and body repair parts.

Independent service providers handle maintenance for over one million of the Volvo cars on US roads. Volvo makes it easy for independent shops to shorten the time between parts order and fulfillment.

Powered by OEC, RepairLink Shop and CollisionLink Shop are fast because they tie into several existing shop management systems or most major estimating systems. The platforms then import data directly from your reports into a parts order.

The platforms streamline the parts ordering process. They eliminate multiple phone conversations, the need to describe a diagram that one party in the conversation cannot see, the back-and-forth faxing to confirm a part

illustration, and other steps that slow transactions over the phone. RepairLink Shop and CollisionLink Shop automate search and order confirmation and, unless the technician has an unusual question, complete the entire process online.

## Price discounts

Both platforms show any price discounts or promotions offered by the shop's preferred Volvo dealership. Many promotional discounts are available only to RepairLink Shop and CollisionLink Shop users. Volvo offers OE part performance at an extremely good value, with prices that are often comparable to those you might find in the aftermarket. Once your purchasing agent approves the order, he or she transmits the order to your preferred Volvo dealer's parts department with one click.



The pure electric Volvo C40 Recharge will begin production in the Fall of 2021. The fastest way to procure parts will be through RepairLink Shop and CollisionLink Shop.

## Detailed OE information

The process is accurate because it relies on parts data received directly from Volvo. When using RepairLink Shop, your technician and the dealer parts rep see the same part diagrams and illustrations for ordering purposes, or if the technician has any questions, for an apples-to-apples conversation.

Part diagrams in RepairLink Shop provide great detail. Your technician can see in an expanded diagram those components that need to be removed in order to get to the part being replaced. The depth of detail assists both the rookie and the veteran in identifying additional related parts that he or she may need to purchase in order to complete the repair.

## Aftermarket data lag

Repair information for aftermarket shops is often sourced from a third-party provider. It may have a time lag from the date that part data enters the system compared to the date the new or updated part was

originally introduced by Volvo. That time lag means your order may include some parts for which the description, part number, or other data is not accurate.

Today, a part number can be superseded and out of date in two to three months, sometimes even sooner. The age of part information is much more critical to part number accuracy today than it was just ten years ago.

Parts information in the RepairLink Shop and CollisionLink Shop online catalogs is always current. And data accuracy is a result of the information being provided directly from Volvo.

## Automatic parts order generation

The primary benefit of RepairLink Shop and CollisionLink Shop is that they offer sourcing of higher quality OEM parts at prices that can be competitive with the aftermarket.

When ordering by phone, a purchasing agent must copy or print and fax the parts list to the dealership. With the CollisionLink Shop platform, the software extracts the parts list from the shop billing or estimating system and searches the Volvo database for any part substitutions or part number updates. It applies any applicable price discounts. All of this occurs automatically, with no manual input required from the purchasing agent, and no need to exit the shop billing or estimating system.

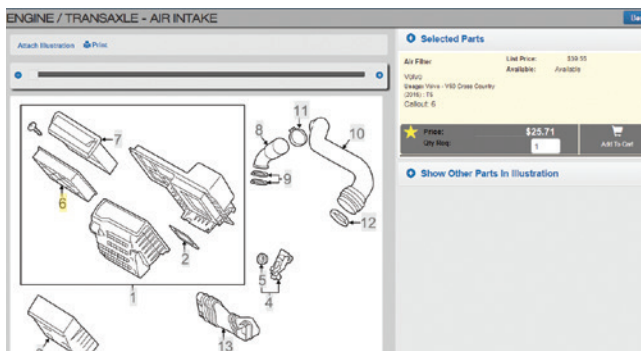
The purchasing agent reviews the details, then submits the parts order with one click. There is no time lost faxing back and forth between the shop and the dealership to confirm part details, and no worries about anyone writing a part number incorrectly. RepairLink Shop and CollisionLink Shop remove the risk of human error.

Sourcing OE parts online significantly improves order accuracy by eliminating the need for verbal transmission of part description and number data. Of course, shop purchasing agents who prefer to speak to someone can use RepairLink Shop and CollisionLink Shop to save time by checking part number details online, and then placing the order over the phone.

An aftermarket part that is delivered quickly or at lower cost is of no value if it does not fit or function as well as the OE part. The RepairLink Shop and CollisionLink Shop online catalogs are as convenient as using an aftermarket supplier, but offer the added benefits of reduced time to populate and transmit a parts order. They offer accurate and current data for outdated, recalled, or superseded part numbers, and sharing of price discounts with repair shop purchasing agents.



RepairLink Shop from OEC links with shop estimating systems to streamline your parts ordering process and bring you part discounts.



Add parts to your order directly from Volvo part illustrations.



## Part function: Windshields

Many components that could in the past be selected based primarily on fit must now also be chosen based on safety-related performance considerations. For example, the windshield in the 2016 XC60 includes Automated Driver Assistance System (ADAS) functionality, so the glass must meet exact technical specifications for clarity, thickness, light refraction, color reproduction, and other factors. Aftermarket windshields may not only fail to meet Volvo fit and durability requirements, but may also not meet the specifications required to allow ADAS connectivity and functionality. Windshields on other Volvo models also include ADAS capabilities, but because the systems are application-specific, the glass may have different specifications for different Volvo models.

## Part function: Bumpers

The software that controls sensors embedded in Volvo bumpers is programmed for the expected thickness of Genuine Volvo bumpers and of any coating over the sensor. If a bumper of the wrong thickness is installed, sensor signals to the various accident avoidance or impact reduction technologies on the vehicle will have incorrect timing. This can negatively affect safety system performance.

Volvo Genuine bumpers are pre-painted to the correct color, and quickly snap into place. An aftermarket bumper may take up to 2.5 hours to work into position, plus have to be finish painted. The extra labor and paint and materials cost wipes out any savings from purchasing an aftermarket bumper.

## Part function: Brake pads

The materials in Volvo rotors, pads, and calipers are engineered to stop the vehicle in a set distance under certain conditions. Volvo brake pads are engineered to function within the exacting specifications of new systems, including Volvo Electronic Brake Assistance (EBA), Electronic Brake Distribution (EBD), Antilock Braking System (ABS), and City Safe, the system that provides automatic braking in the event that the driver fails to respond quickly enough to an emergency braking need. Software will activate braking systems for the amount of time specified in the brake control unit algorithms. These brake control systems expect pads to

function within factory-specified ranges and there's no guarantee that aftermarket pads that do not meet the correct specifications will perform as required.

## Part function: Oil filters

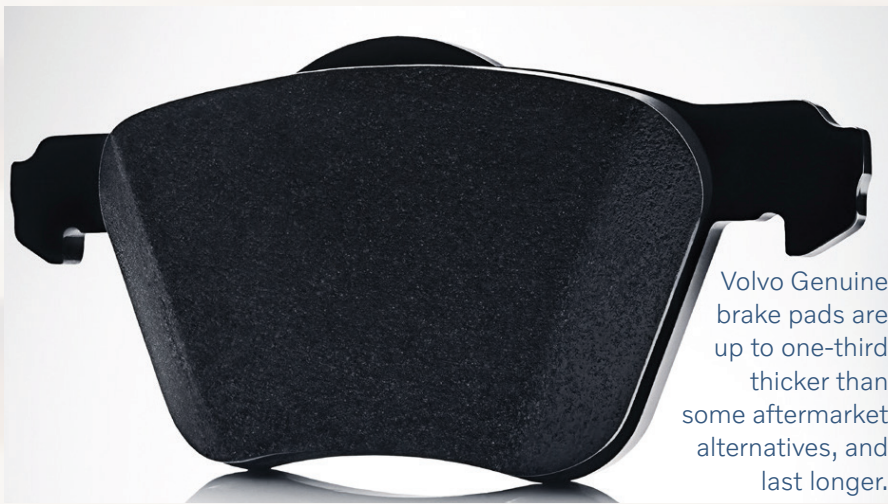
In a comprehensive test of the filtering efficiency (ISO 12103-1 dust filtering standard), service life, and operating characteristics of 15 different oil filters, the Volvo Genuine oil filter proved to be the winner. Factors such as outstanding cleaning efficiency, limited impact of viscosity on pressure drop across the filter, and broad working temperature range all contribute to enhanced engine wear protection and capacity for long service intervals.

Volvo brake discs (rotors), engine air filters, bumpers, structural components, mirrors, windshield wiper blades, and batteries are just a few additional examples of the many parts that offer significant safety and performance advantages over aftermarket versions. Purchase mechanical parts using RepairLink Shop, and body parts through CollisionLink Shop.

## Vehicle build data direct from Volvo

Most aftermarket parts diagrams ask the technician to make several choices to narrow the options in a parts search. In RepairLink Shop or CollisionLink Shop, the technician enters the VIN and the software pulls up that vehicle's build list directly from a Volvo database. The technician bypasses most questions in the typical aftermarket parts options funnel. RepairLink Shop or CollisionLink Shop present the correct part number, saving time, reducing potential for human error, and increasing order accuracy.

For a technician who is seeing a particular repair for the first time, RepairLink Shop and CollisionLink Shop assist by putting guard rails around the part order decision-making process.



Volvo Genuine brake pads are up to one-third thicker than some aftermarket alternatives, and last longer.

### After-hours ordering

Independent shops have the ability, using RepairLink Shop and CollisionLink Shop, to access Volvo part data, illustrations and diagrams, and to place orders, all after hours if desired. This 24/7 access is a huge advantage. It allows shop managers to order parts overnight and receive them as early as 9 AM the next day, rather than having to wait for an afternoon delivery of an order placed in the morning.

### Insurance and estimates

Insurance providers influence what parts a collision repair facility chooses. Independent shops can use Volvo CollisionLink Shop price discounts to help keep critical parts included in the OE-sourced portion of the estimate.

### Access is free to Volvo wholesale customers

As a customer of a Volvo dealer parts department, an independent shop can access RepairLink Shop and CollisionLink Shop at no cost. The OEC technology automatically integrates with most online shop estimating and billing systems used by aftermarket facilities.

### e-Commerce

Vehicle owners can go to the Volvo business-to-consumer e-commerce website at [simplepart.com/volvo.html](http://simplepart.com/volvo.html) to purchase parts or accessories from a local Volvo dealership parts department. Repair shops may also purchase from the site, but it is geared to vehicle owners, not wholesale customers.

### Light bulb moment

Given the higher Volvo part quality, cycle time saved through a more efficient ordering process, and accuracy gained by using the automated OE parts sourcing system, RepairLink Shop and CollisionLink Shop are worth it. And independent shops that use RepairLink Shop and CollisionLink Shop enjoy Volvo Genuine parts discounts that are not often offered to shops that do not use these purchasing platforms.

When you've had one too many deliveries of parts that were the wrong fit or function, that 'light bulb moment' brings you to RepairLink Shop or CollisionLink Shop. This fast, accurate, and free parts sourcing service keeps you a loyal RepairLink Shop and CollisionLink Shop customer. ●

*Thanks to OEC for providing information for this article.*

# WHEN SAFETY IS ON THE LINE, THE RIGHT PART IS VITAL

Find Volvo OE parts online

**repairlink<sup>SM</sup>** **collisionlink<sup>®</sup>**

With 24/7 online ordering, RepairLink<sup>SM</sup> and CollisionLink<sup>®</sup> give shops access to competitively-priced OE parts. Increase speed of repairs, accuracy of orders and customer loyalty through state-of-the-art online technology and the preferred parts procurement solution of shops.

Visit [OEConnection.com/TechTips](http://OEConnection.com/TechTips) for more information

[RepairLinkShop.com](http://RepairLinkShop.com) [CollisionLinkShop.com](http://CollisionLinkShop.com)





# Replacing Volvo Water Pumps



Drain at the bottom of the radiator





Coolant system diagnosis and repair can sometimes be a problem. A coolant leak can sometimes take time to find. The vehicle could leak when it's cold, or maybe you will need to warm up the engine and then check for leaks. Often pressurizing can help to find a leak in the system.

Water pumps after a certain age can start to lose their integrity. A seal can begin leaking, or maybe the bearing is going out and making noise. Either way, the water pump is a vital part of the coolant system and should be checked frequently during services.

The model and year will determine which water pump the vehicle has. There are two different water pumps fitted to these engines — one driven by a belt around the water pump, and the other driven by the power steering pump. We will go over both versions and how to install each one.



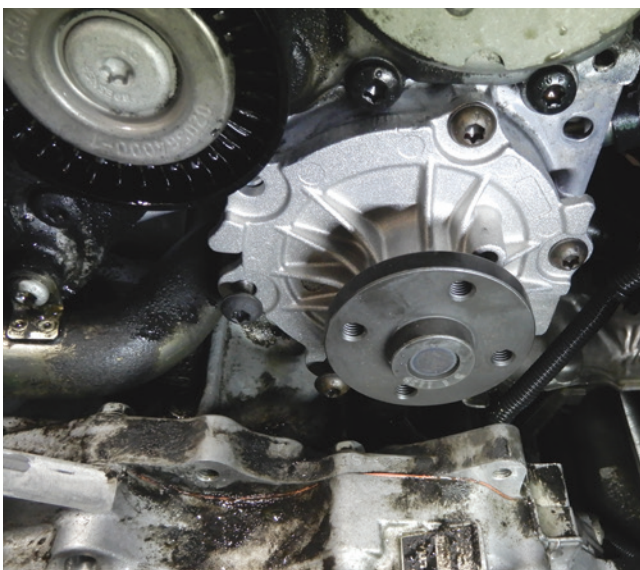
### Replacing water pump driven by power steering pump

Let's first go over the water pump that is driven from the power steering pump.

First let's put the vehicle on the hoist and drain the coolant completely and then reinstall the plug so there will be no dripping. While the vehicle is on the hoist, remove the clamp at the throttle housing fresh air intake from the air cleaner housing. This will save time not lowering and raising hoist.

Lower the vehicle back down and remove the air filter housing and disconnect the mass air flow sensor. Remove four T25 Torx screws from the filter housing. Remove the air filter top housing with plastic pipe to the throttle housing and remove. Now pull up on the bottom portion of the filter housing and remove it from the vehicle.

Disconnect battery and remove. The battery tray has four bolts that hold it in place. Remove those four bolts



Here are the Volvo 3.0 L and 3.2 L water pumps.

3.2 liter engine



and remove the battery box from the vehicle. Be careful of the hood cable, route it around the battery tray.

Remove the bracket at the back of the air conditioning compressor to make room to remove the belt at the tensioner. There are three 10 mm bolts.

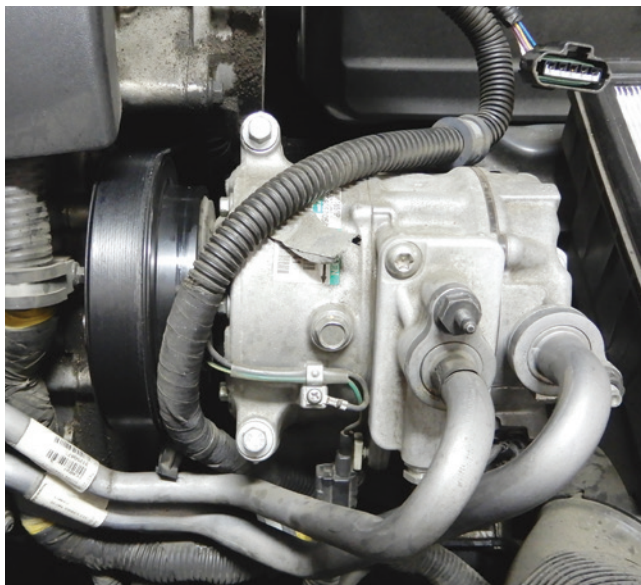
The power steering pump drives the water pump. First, loosen the belt by using a 19 mm wrench, pushing down on the belt tensioner and then inserting a 3 mm hex key or similar diameter pin or drill bit into the hole on the tensioner to hold it in the released position.

Remove the other two brackets at the air conditioning compressor. Using an A/C machine, recover the refrigerant in the system. The connection for the low pressure side is under the cowl at the wiper arm.

Once the system has been evacuated, remove both lines that are connected to the A/C compressor. Be sure to cover both the hoses and the connections at the compressor with tape. This will help keep any debris or moisture from getting into the system.



Low pressure connection for A/C machine hook up



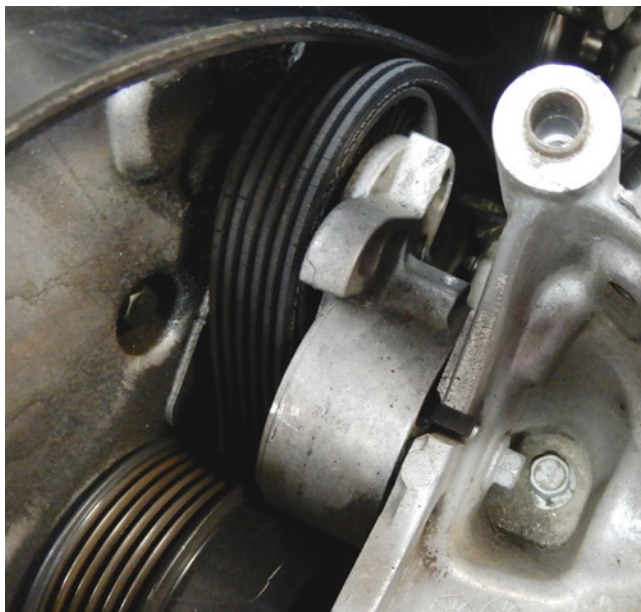
A/C compressor



Air filter housing with fresh air tube



A/C bracket from compressor to engine



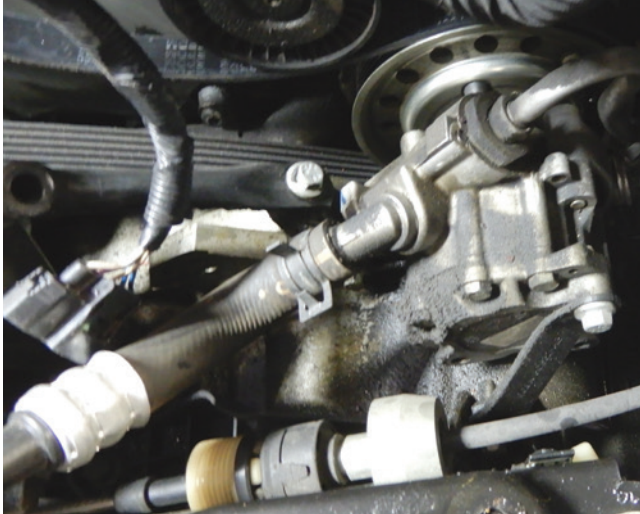
Tensioner under A/C compressor



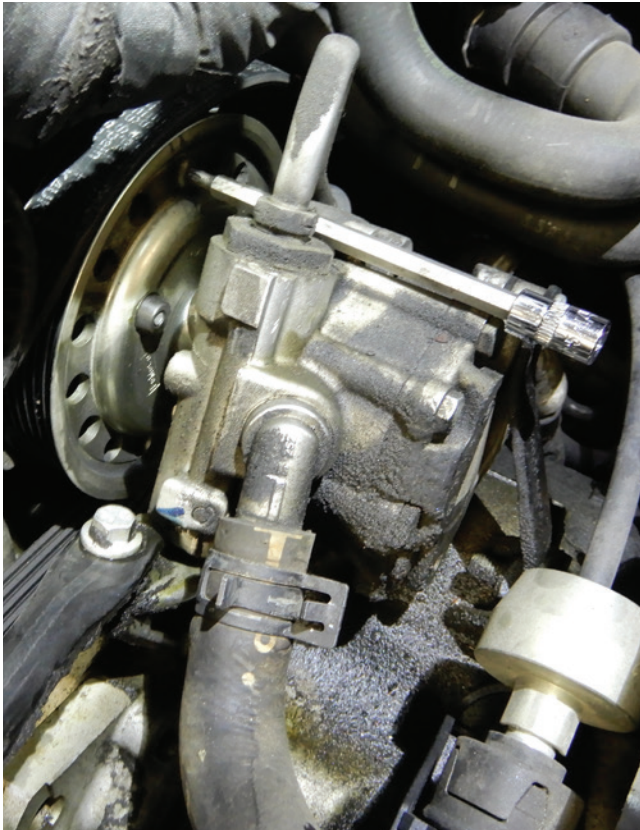
Remove the other two bolts at the compressor and remove the compressor out of the way.

Now that the air conditioning compressor is out of the way, remove the tensioner at the bracket under the A/C compressor.

This will give room to remove the belt out of the way and get access to the power steering pump and then the water pump.



Power steering pump connected to water pump



T25 Torx screws positioned in the correct position to remove

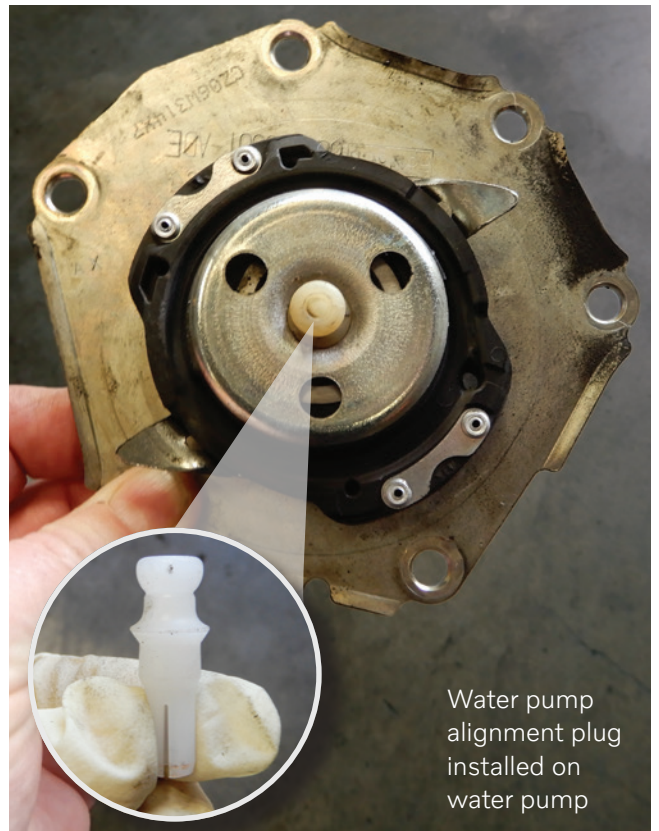
Remove the power steering lines, and use a rag to capture escaping fluid. Set the lines out of the way.

Now that lines are out of the way, rotate the pulley until you see the T25 Torx fasteners.

There are two of these T25 Torx fasteners. Once they're removed, push in on the drive pump spring and wiggle out the power steering pump.



Genuine OE Volvo water pump



Water pump alignment plug installed on water pump





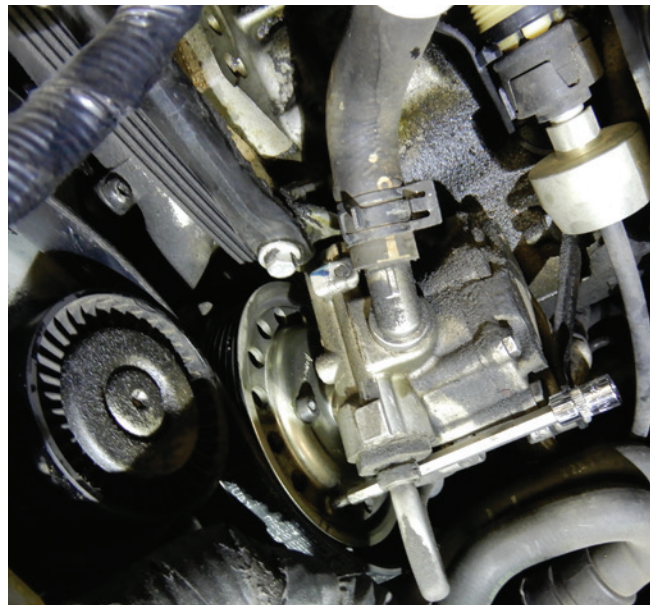
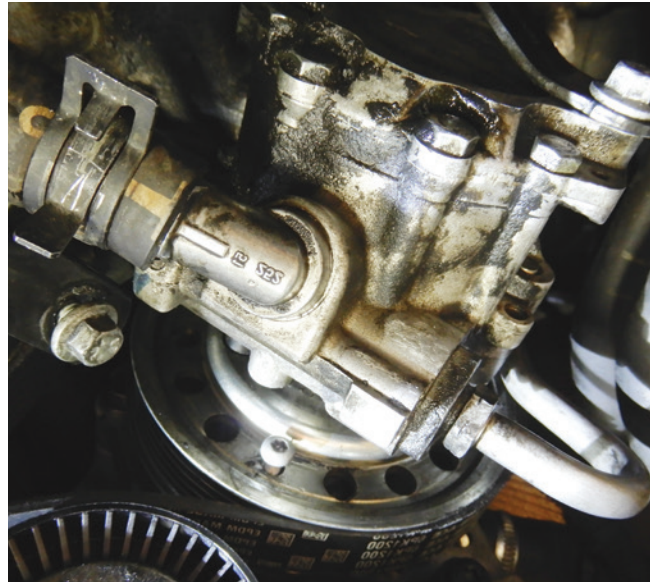
Water pump with spring assembly

Now that the water pump is exposed, maybe it was leaking or maybe the bearing is going out and there is a lot of movement. Either way, remove the bolts securing the water pump to the block and remove the water pump.

Make sure to clean the surface at the engine block and remove the o-ring. Install a new water pump o-ring into place; you might have to put a little silicone on the o-ring to make it stay in place. Now install a genuine Volvo water pump, part number 31219000. Install new bolts and tighten down, making sure the o-ring stays in place.

Now that pump is on the engine, remove the spring assembly from the old water pump and install it on the new pump, making sure that it sits in the right position. Take the alignment plug from the water pump kit and put it into place at the middle of the water pump.

Once the spring assembly is on the water pump, then you can install the power steering pump. This part can be a little tricky. First run a new belt, part number 31251046, so it fits around the water pump. Set the



Correct position for starting screws and tightening the T25 Torx fasteners at pulley

power steering pump into place making sure to align the plastic nubs from the spring assembly and pop into place.

Now install two of the mounting bolts at the bottom of the pump and secure. Install the bracket at the back of the steering pump and secure.

Now we're going to install the two T25 Torx screws to connect the power steering pump to the water pump. Start the screws at the eleven o'clock position and move to the one o'clock position to tighten.

Remember to align the pulley in the correct position to be able to tighten it at the one o'clock position.

This would be a good time to replace drive belt, part number 31251046, the tensioner, part number 31401286 and the idler pulley, part number 31401193.

Next, set the air conditioning compressor into place, routing the drive belt around correctly. Install the bolts to secure the A/C compressor. Connect the electrical connectors at the compressor. Install the brackets at the compressor and for the power steering hard pipe.

Remove the pin out of the tensioner in order to tension the drive belt around the A/C compressor, the water pump and the power steering pump. Hold onto the tensioner pin as you might be able to use it in the future.

Install the battery tray box into place, making sure to route the hood cable through the battery tray. Install the four bolts to hold down the tray. Reinstall the battery and reconnect both positive and negative terminals.

Secure the cowling at the top of the battery and around the wiper arm area. Install the plastic pipe from the air cleaner to the throttle housing. Lift the vehicle up to tighten the clamp at the throttle housing. Lower the

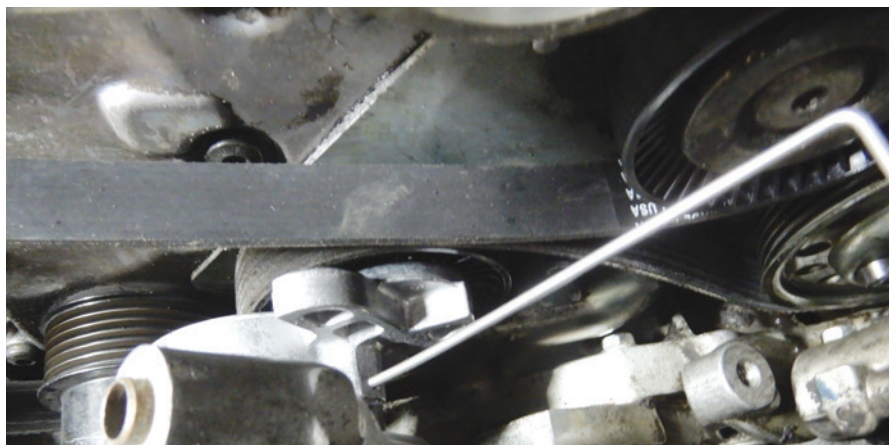
vehicle and install the air cleaner box. Put the air cleaner filter in place and close up the box securing four screws that hold it together. Attach the electrical connector for the air mass meter. If you have discharged the A/C system, evacuate and recharge the system.

Add coolant to the system until it's full at the marks on the reservoir. Volvo recommends vacuum filling on all engines.

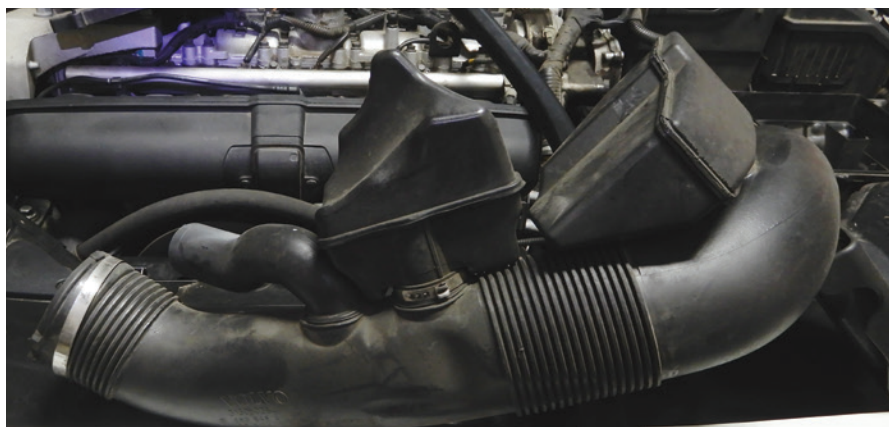
Be sure to check the power steering fluid and top off. Before starting the vehicle, turn the steering wheel back and forth to release all air from the system. This could take up to twenty times. You will see air bubbles in the power steering reservoir start to go away.

Once the bubbles are all gone, start the vehicle and check the power steering fluid to make sure it is full. Check the coolant level and keep it to the full mark. Check to make sure there are no leaks from the coolant system or power steering system.

Test drive the vehicle until the full operating temperature is achieved. Recheck everything again just to be sure the vehicle is in perfect condition.



Drive belt tensioner in place



Pipe from air cleaner lid to throttle housing.

Here's a quick look at what we just talked about — replacing the water pump driven by the power steering pump.

- Disconnect MAF sensor
- Disconnect intake
- Remove air cleaner housing
- Remove the battery and tray
- Lock the tensioner open
- Remove the A/C compressor
- Remove bracket between A/C compressor and steering pump
- Free the bracket behind steering pump
- Remove the power steering pump and the pulley
- Remove water pump from engine

### Replacing water pump for belt-driven water pump

Replacing this water pump is a little less intimidating. This pump is run directly by the drive belt and not by the power steering pump.

Adjust the vehicle on the hoist, and remove the coolant cap

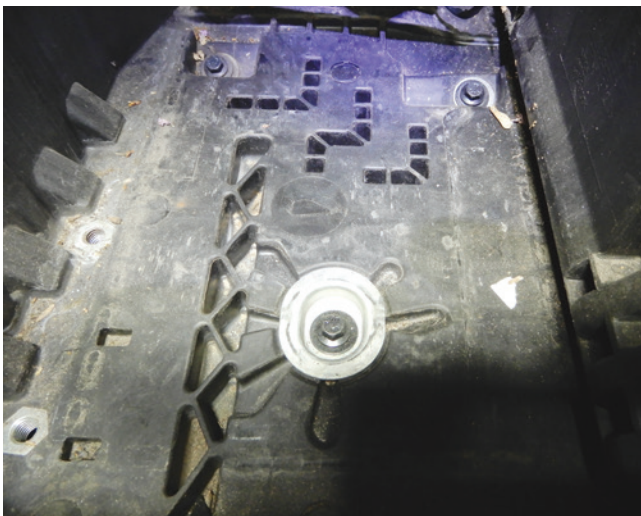




Throttle housing



T30 Torx bracket for air conditioning lines



Battery tray or box

at the reservoir. Raise the vehicle up and drain the coolant at bottom of the radiator.

Once coolant is drained, tighten the drain plug, and loosen the clamp at the throttle housing while the vehicle is still on the hoist. Lower the vehicle and remove the air filter lid, disconnect the air mass meter and pull off the hose at the throttle housing with lid.

Disconnect both negative and positive battery connections and remove the battery and battery tray from the vehicle and set aside. Using a 19 mm wrench, pull back on the tensioner and insert a small 3 mm drill bit or pin to hold the tensioner in place. Remove the belt. If the belt and tensioner make noise or are old, this would be a good time to replace them.

Depending on how much room you need, it might be a good idea to remove the air conditioning compressor out of the way. Just remove all brackets

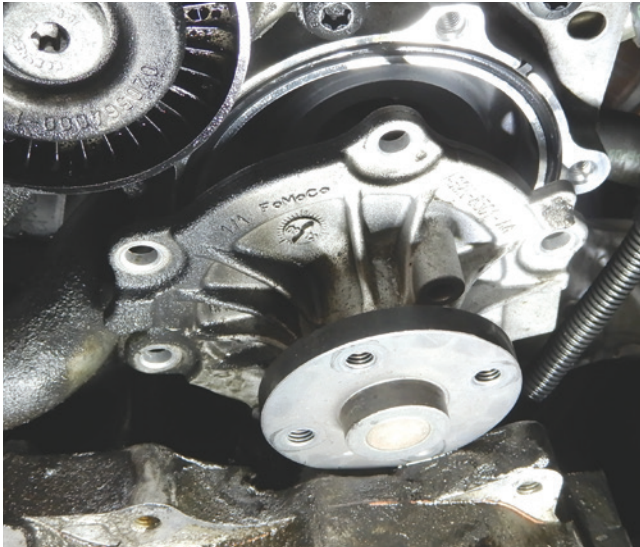


Water pump exposed with front pulley

and electrical connections. Remove the bolts holding the A/C into place.

There is a T30 Torx screw that supports the two A/C lines. Just remove it and then you will be able to set the A/C compressor off to the side without discharging the system. If the lines seem to be in the way, you can use an A/C machine and recover the refrigerant from the system and remove the hoses from the compressor. Be sure to tape up the compressor and hoses to prevent letting in moisture or debris.



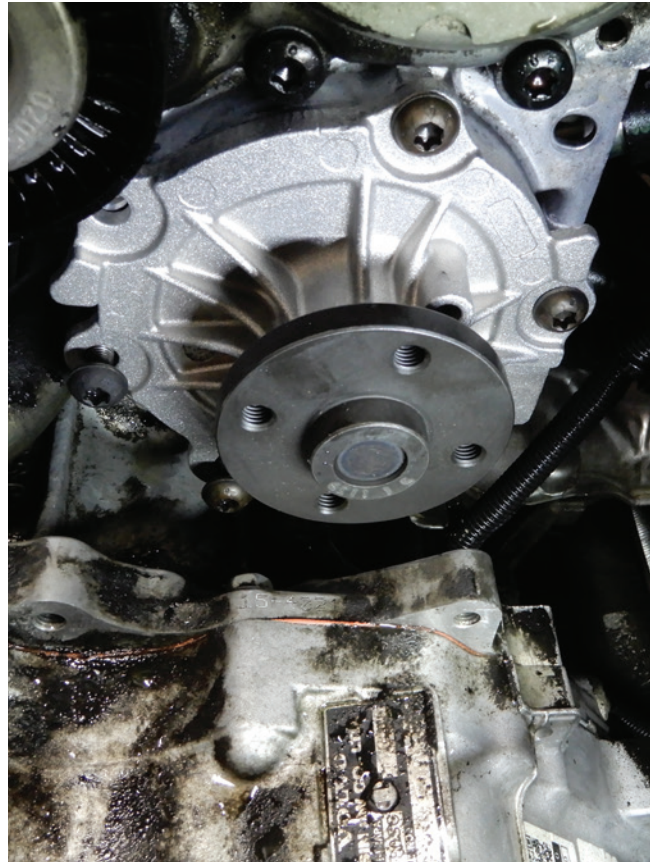


Water pump removed from vehicle

Now that the water pump is exposed we can remove the front pulley. Four 10 mm bolts hold it on; just remove all four and the pulley will come off.

There are six T40 Torx fasteners that need to be removed from the water pump in order to remove it. The one T40 Torx fastener on the bottom can be hard to reach. Use a small Torx bit and a wrench to remove this one.

Clean the surface and remove the o-ring. Make sure to always use Genuine Volvo parts. The correct part number for the water pump is 31293303. Install the new pump making sure the o-ring stays in place. It would be a good idea to use silicone, a small amount, on the o-ring so it will stay in place. Secure the six bolts for the water pump. Route the belt around the water pump and install the front pulley with the four bolts.



Water pump installed on engine

Replacing the drive belt, tensioner, and idler pulley would be a good idea at this point. The drive belt part number is 30757007, the tensioner is 31401286 and the idler pulley is 31401193.

Now that the belt, tensioner and pulley have been replaced, let's set the air conditioning compressor into place and route the drive belt around the compressor. You might have to pull the tensioner back a bit to loosen tension for compressor to sit in place. Install the bolts to secure the compressor. Install the brackets for the compressor and hook up the hoses that were removed. Make sure the o-rings are good and in place, and secure the hoses.

Put the battery tray back into place and bolt down accordingly. Sometimes these battery tray bolts are very rusty and the heads are rounded off, so you might have to replace them. Once the battery tray is in place, install the battery and hook up both negative and positive connections, with the negative connection last.

Pull out the pin for the tensioner in order to tighten up the drive belt. Now that everything is in place, add new coolant to the system and fill. Once again, vacuum filling is recommended. Start the vehicle and run up to operating temperature. Make sure there are no leaks and test drive the vehicle. ●



# The Case for Using Volvo-Specified Engine Oil

Regular oil and filter changes are a way of life for any vehicle. The life of a Volvo engine depends on this simple routine service.

But is it really so simple?

Well sure. You just use a genuine Volvo oil filter and engine oil meeting API service designation SP, the latest such designation.

Right?

Well, actually not.

SP-compliant oil is certainly quality oil, and it's what you use in most of the cars in your shop, so is it the best choice for Volvo vehicles as well?

Before you answer, consider this. Some other high-end European auto makers have their own standards for engine oil, and so does Volvo. So is Volvo-specified oil different? Better? And why?

Let's start with the "why."

Since around 2015, Volvo has specified 0W-20 synthetic engine oil for its gasoline-powered cars and SUVs. Such oils provide good cold cranking along with protection when the oil is hot and thin. But there's much more to the story.

Engine oils do a lot of other things as well. They must have anti-wear agents like titanium compounds, they must have low volatility to control oil burn-off, yet they must be free-flowing. Today's smaller engines have smaller oil passages and finer oil filtering media, so the oil must be able to pass through readily. And engine oils must have excellent dispersement qualities in order to keep particulates from collecting into harmful deposits.

Now all quality oils meeting the current API standard will have these features. And, in addition to the standards set by the American Petroleum Institute (API), there are international organizations that set engine oil performance specifications as well. Some of these criteria are not part of the API standards, and some that overlap API standards have differing specifications.

As it turns out, Volvo requires oil that exceeds a number of these various standards, both domestic and international. Such standards feature a variety of scientific units of measure, too complex to



explain in this article. But what is important is that Volvo-specified oil meets and often exceeds the API service designation standards, and also meets or exceeds some of these international standards as well.

For example, there's a European ACEA standard for fuel economy as it relates to engine oil. The latest specification (as of 2016) is >3.0%. Volvo-approved oil is specified at >3.4%. A similar but separate standard for engine oil fuel economy has been jointly established by API and ILSAC. These standards are referred to as ILSACGF-6A and ILSAC GF-6B, and specified Volvo-approved oil meets, and often exceeds, these standards as well.

SAE standard J300 for high temperature high shear strength is set to be >2.6. Volvo specifies >2.75.

And SAE J300 dictates that 0W-20 oil must have a minimum viscosity of 6.9, while Volvo requires a minimum viscosity in this test of at least 7.0.

Furthermore, there are a variety of engine oil testing conventions established by the American Society for Testing and Materials. These establish procedures for testing all sorts of products and materials, including engine oil. Some of these conventions include:

ASTM D5293	Low temperature cold cranking properties
ASTM D4684	Low temperature pumping viscosity properties
ASTM D445	High temperature kinematic viscosity
ASTM D4683	High temperature shear rate

So, without getting too much further into the weeds, you can see that getting oil to meet U.S. and international standards can be challenging. But oil companies, in concert with Volvo, have many other criteria that oil must meet. Here's just a sampling of characteristics that are tested:

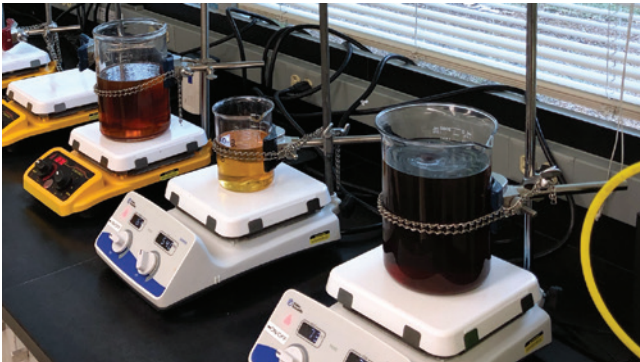
- Pour point
- Volatility
- Anti-foam
- Fuel compatibility
- Gel prevention
- Shear stability
- Copper corrosion

And there's even a European "black sludge" test that measures an oil's "dispersability" -- it's ability to keep particulates from coagulating within the crankcase.

Here's the point: Engine oil must be able to do much, much more than lubricate and protect crankshafts and engine bearings, piston rings and cylinder walls, camshafts and followers, and other vital engine



The device here is an advanced automatic kinematic viscometer as shown in Castrol's testing laboratory. This instrument is used to measure the high temperature viscosity of oil measured per ASTM standard D445.



Before oil is subjected to various testing regimens it must be heated and mixed to exacting standards in order to assure that all of the base oil and additive components are uniformly distributed throughout the blend. Photos courtesy of Castrol USA.



components. Volvo engineers have gone to great lengths to partner with oil companies in search of the optimal formulations to protect Volvo's legendary reputation for longevity and performance, while yielding the best possible fuel economy and lowest emissions levels.

As it turns out, there is only one oil that has met all of these requirements and has been approved for use in late-model Volvo vehicles, and that oil is Castrol Edge Professional V OW-20. And it is this oil that Volvo recommends for all cars and SUVs starting with the 2015 model year. ●

*Thanks to Castrol for providing information for this article.*

## Decoding Oil's Alphabet Soup

The global economy has given rise to international cooperation on nearly every level of commerce. And that international impact is well known in the automotive industry. We have the so-called "foreign" car companies manufacturing vehicles on our shores, and we are making cars and parts all over the world.

So it is no surprise that there are entities all over the globe establishing standards for pretty much everything, including engine oils. Some of them are old familiar favorites, while others may be new to you. Here are a few of them, along with a brief explanation of their role in establishing engine oil characteristics.

### SAE ([sae.org](http://sae.org))

Surely we're all familiar with the Society of Automotive Engineers. They have established standards for classifying oil viscosity, in familiar numbers like SAE OW-20, in which the first number demonstrates the oil's functional viscosity in cold temperatures and the second number identifies the oil's viscosity in hot temperature operation.

### API ([api.org](http://api.org))

The American Petroleum Institute provides service designations for oil quality and performance. Such service designations start with the letter "S" for Spark-ignited engines (gasoline-powered engines) or the letter "C" for Combustion-ignited engines (diesel-powered engines). The second character of the service designation is an alpha character. The most recent standard for gasoline engines is SP, and oils meeting this standard are backwards-compatible to previous standards. Oil may also be labeled as API "Resource Conserving" when meeting certain API criteria for the ability to enhance fuel economy.

### ILSAC

ILSAC is the International Lubricant Specification Advisory Committee (ILSAC), which is a joint effort of U.S. and Japanese automobile manufacturers. ILSAC standards are based on and developed in conjunction with API and address fuel economy, emissions, and other parameters. The current ILSAC standard

is GF-6. Sub-categories include GF-6A, which is backwards-compatible for use in older vehicles, and GF-6B, which applies to emerging new-generation OW-16 engine oils.

### ACEA ([acea.be](http://acea.be))

ACEA is the European Automobile Manufacturers' Association. The acronym is derived from the French *Association des Constructeurs Europeens d'Automobiles*. This organization's members are more than a dozen European vehicle manufacturers and directs many procedures and standards, including those for engine oil. ACEA-compliant oils are identified with an alpha-numeric designation. The highest quality oils meet ACEA C5 or C6.

### ASTM ([astm.org](http://astm.org))

ASTM is the American Society for Testing and Materials. This organization develops procedures for testing all sorts of products and materials, including engine oil. These testing protocols are typically developed by both professional and volunteer representatives of the industries they serve. Their testing standards and procedures are accepted worldwide as being objective, thorough, and precise.

### HTHS

This stands for High Temperature High Shear, which represents properties that allow oil to provide resistance to flow at elevated operating temperatures. This feature provides added protection to moving engine parts in high operating temperatures.

### SAPS

SAPS is an acronym; it stands for Sulfated Ash, Phosphorus, and Sulfur. It represents a particular ratio of such content in engine oils and is commonly used as part of engine oil recommendations by European auto makers. These vehicle manufacturers can specify varying levels of these materials for different engine families.

# Every Volvo is Born with Castrol® Inside

Volvo Cars recommends  
Castrol® EDGE® Professional V 0W-20



Castrol EDGE Professional V 0W-20 is exclusively engineered in collaboration with Volvo Cars for use in Volvo Drive-E engines. Every litre is certified CO<sub>2</sub> neutral according to the highest global standard.

Engineered with patented **FLUID TITANIUM**, Castrol EDGE Professional transforms to be stronger under pressure and reduces metal-to-metal contact to unlock the true performance of the engine.

Castrol EDGE Professional V 0W-20 is exclusively available for Volvo Cars authorized dealerships.

**Castrol**  
**EDGE**  
**PROFESSIONAL**





Volvo XC90 (2003-2013)/  
XC70 (2001-2007) Fuel Tank  
Removal and Replacement



The need for fuel tank replacement can be caused by a variety of problems. This job is not a very common repair, and it is a somewhat complex task.

Most shops will perform this repair because the tank was damaged by an accident or cracks caused by overenthusiastic off-road driving.

Only in a few cases will the fuel tank be replaced in order to fix an evaporative system issue.

## Case study

In this article, we will cover a 2005 XC90 2.5 L Turbo that had to have its fuel tank replaced because of a leak in the evaporative emission system.

The Volvo in this case study came into the shop with an illuminated Check Engine light.

After interviewing the customer, the service advisor found out that the Check Engine light had been on for a couple of weeks, and the car did not exhibit any other symptoms, such as poor engine performance .

The customer also stated that in the last few months, three other shops had tried to fix this problem. These shops had already replaced multiple parts including the gas cap and Diagnosis Module Tank Leak pump (DMTL pump). This pump is more commonly call a Leak Detection pump (LDC pump).

Our technician hooked up the car to Volvo's VIDA scan tool program and ran a scan for codes and stored freeze frame data.

The ECM had stored codes ECM 439C (PO442), ECM 421C (PO444), and ECM 421D (PO445).

The codes were active at the time the car came into the shop so the technician knew that the car had an active issue.

These codes can be caused by:

- A loose gas cap
- Sticking, clogged or inoperative canister purge valve
- A leak in the hoses or lines anywhere in the EVAP system
- A leaking or clogged EVAP canister
- A cracked or damaged EVAP canister
- A malfunctioning DMTL pump (one of the more common problems on higher mileage Volvos)
- A damaged or leaking fuel tank
- An electrical problem, such as contact resistance, open or short of the electrical connectors or wiring to the EVAP system components
- Or any combination of the above.



LDC pump

NOTE: Replacement of the vehicle's fuel tank for an evaporative emissions system problem is the exception to the rule. You should only consider it if you have performed all the appropriate testing for the codes and symptoms that your customer's car is exhibiting, unless you see a hole or crack in the tank. It is critical that you make sure that all the EVAP system components and hoses are intact and functioning properly.

Bottom line is that fuel tank replacement should never be one of the first steps in fixing an EVAP leak.

You can use Volvo's VIDA software system to run an evaporative system (tank system) test on most of their models. You can use this valuable test data to help you pinpoint the problem and, once you have figured it out, you can use the test again to verify the repairs.

But this article is about fuel tank replacement, not EVAP system diagnosis.

The technician ran the proper testing and, after confirming that all the EVAP components were operating properly, the technician used a smoke machine to test the sealing integrity of the fuel tank system.

Using the smoke testing machine with an adapter, the technician hooked up to the fuel filler neck and saw smoke coming out from under the car in the space between the body and the top of the tank.

Since the space between the body and the fuel tank is so tight, further disassembly was needed to ascertain the source of the leak.



There are two access plates in the floor above the fuel tank used to access the fuel pump assembly on the right rear, and the secondary fuel level sender on the left rear.

To access these covers you will need to remove the rear seats and, in the case of cars with a third row of seats, you will have to remove the tracks and seats from the third row.

Removing the rear seats is the same procedure you will have to do to replace the fuel pump assembly or fuel level sensor.

Once the rear seats had been removed, the two access plates were removed and the technician was able to see that the smoke was not leaking out of the fuel pump or sender seals.

Using a mirror and a flashlight the tech saw that the smoke was coming from the top of the fuel tank on the right side. The technician concluded that the tank was cracked and recommended that the fuel tank be removed to confirm the crack and replace the tank as needed.

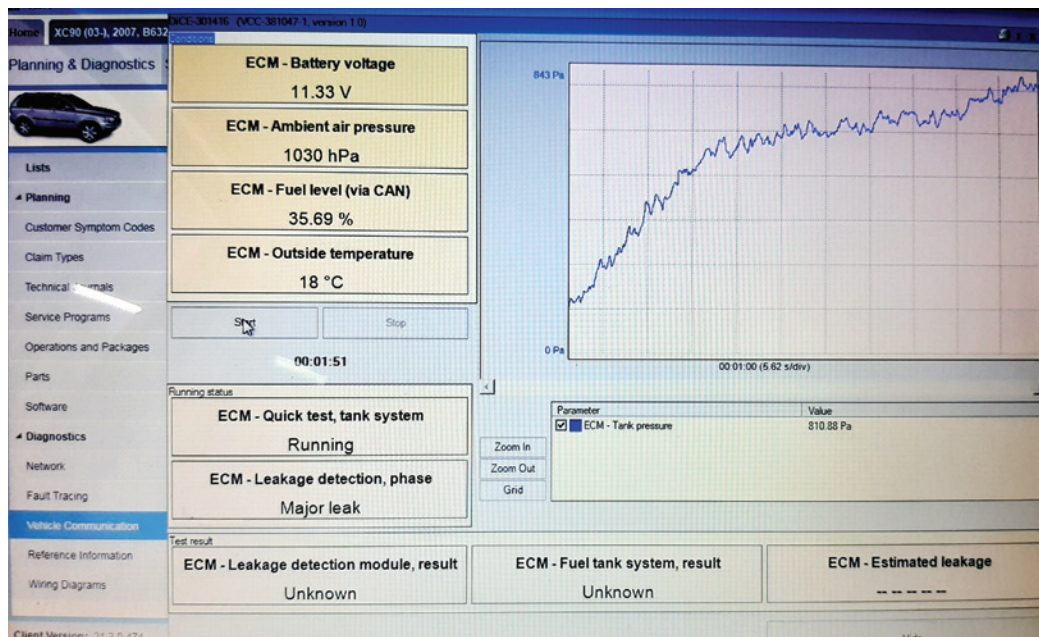
This is a big job on one of these all-wheel drive cars, so make sure that you have eliminated everything else before you start taking the entire rear end apart.

You will more than likely want to drain the fuel in the tank before you begin. There are several ways to do this. If you're lucky, the tank will be below a quarter full and you can lower the tank and use a hand pump and hose to pull out fuel into a suitable container.

If you want to do it by the book (Volvo's book), the following is what Volvo recommends.

### Fuel tank draining (the Volvo factory way)

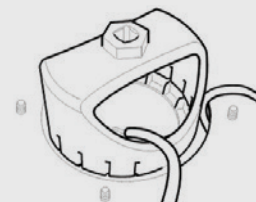
Preparation: Disconnect the battery negative terminal.  
See Battery, Disconnecting.



When diagnosing an EVAP system leak on a Volvo, one of the best tools you can use is Volvo's VIDA software system. Most Volvo models can run an EVAP system test using VIDA. This will not only help you find the problem, but will also allow you to verify a repair.

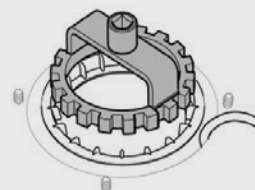
### Special Tools

999 5720 Wrench



999 5721 Adapter

999 7314 Spanner



*NOTE: As the illustrations in this service information are used for different model years and/or models, some variation may occur. However, the essential information in the illustrations is always correct.*

**Warning! RISK OF EXPLOSION!!! THE USE OF A FRESH AIR MASK IS RECOMMENDED.**

Remove the outer rear seats (second row).

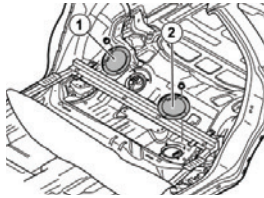
Remove the center rear seat.

Fold the carpet back.

Remove:

- Ventilation pipe (1). This only applies to 7-seat vehicles.
- The insulation block (2).
- The insulation block (3).

Removing the cap over the level sensor: Remove the covers (1 and 2) over the fuel pump and level sensor assemblies.



Access covers

Remove the hoses from the right-hand level sensor. Cover the area around the combined tank unit and between the doors with absorbent material.

Caution! Make sure dirt does not enter the fuel tank.

## Draining the fuel tank

Special tools: Use wrench tool number 999 5720.



Tank removed from the body



When you need to remove the rear end member, place lift pads on body seams so you will have access to remove the subframe mounts and bolts.

Clean and remove all dirt from the right and left-hand combined tank units.

Remove the screw on the fuel pump assembly. Insert the heavy-duty hose and suck out the remains from the bottom of the right-hand side of the fuel tank.

Connect hose adapter 999 5721 to the heavy-duty hose. Suck out the remains from the bottom of the level sensor reservoir.

Carefully remove the overflow pipe from the reservoir.

Remove the thin hose 999 5721 adapter from the heavy-duty hose. Connect the thin hose to the overflow pipe. Use a hose clamp.

Pump until a lot of air comes out.

Open the left-hand level sensor; use wrench 999 7314 Spanner. Insert the heavy-duty hose and suck out the remains from the bottom of the left-hand side of the fuel tank.

## Removing the fuel tank

After removing the seats and access covers from the rear floor area, remove or disconnect the electrical connectors from the fuel pump assembly on the right, and from the secondary fuel level sensor on the left.

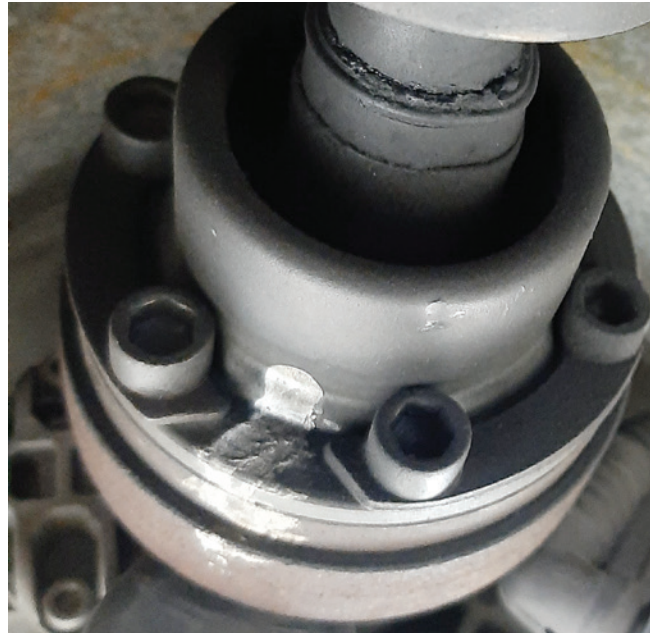


Remove E brake hardware.

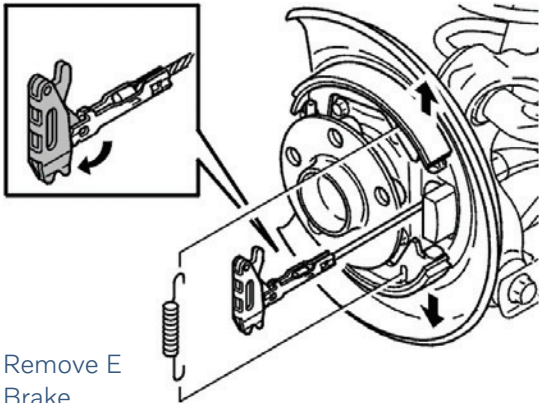
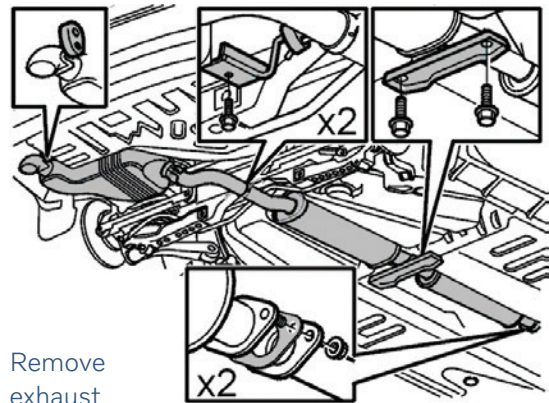




Pinch off the brake hose.



Driveshaft flange bolts

Remove E  
BrakeRemove  
exhaust

You are going to have to lower the entire rear end suspension assembly out the car to get the gas tank out, so there are a few things to disconnect first.

Start with the brakes.

Remove the rear wheels.

You can take out the whole rear end member with the rear brakes assembled, but you will have to remove the parking brake cables. This is easier if you disconnect the cables at the rear backing plates.

Unbolt the calipers and temporarily hang them from the rear suspension. Next, remove the brake rotors and then disassemble and remove the parking brake shoes.

It makes it easier if you remove the brake calipers and clamp the lines to keep the fluid from leaking.

Disconnect the parking brake cables from the rear brake backing plates and let them hang down..



Remove canister hoses.





Rear end removed

Remove the six hex bolts at the rear drive shaft flange, and let the drive shaft hang down using a bungee cord to support it.

Disconnect the Differential Electronic Module (DEM) connectors.

You will next have to remove the exhaust and rear muffler assembly by unbolting the assembly at the catalytic converter flange. Replace the gasket when you reassemble.

NOTE: Hang up the three-way catalytic converter to prevent damaging the flex boot.

Remove the ABS cable harness from the clips on both sides of the fuel tank.

Support the rear member with a transmission jack, or lower it down on a support cart and unbolt the four main bolts holding it to the body. Lower the rear subframe a little to be able to disconnect the pipes and connectors from the EVAP canister and leak detection pump.

Now lower down the rear member or lift the car off to remove the rear end assembly from the car.



Remove filler hose and vent hose.

## Removing the fuel tank

Next, with the rear end removed, support the fuel tank and remove the hose clamp from the filler neck hose and disconnect the vapor bleed pipe.

When you are sure that the fuel tank is totally disconnected from all the pipes, hoses, and electrical connections, you are ready to lower it out of the car.

Remove four bolts for the fuel tank supporting straps.

With the tank balanced and supported on a transmission jack or lifting table, slowly lower the tank out of the car, checking for hoses or wires that may still be attached.

When the technician got the tank out of the car, the EVAP problem was obvious. A rodent decided that the top of the fuel tank was a great place to get a snack.

The vapor lines on top of the tank are not replaceable separately, so the whole fuel tank had to be replaced as a unit.

## Reassembly

Start by installing the new fuel tank and securing it with the four bolts and tank supporting straps.



Lowering tank



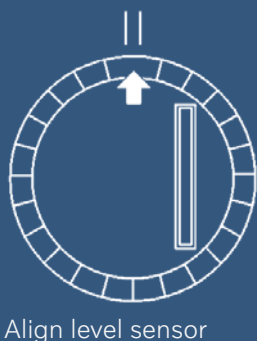
## Installing the right-hand level sensor

- Place the overflow pipe approximately half a centimeter to the left-hand side.
- Grip around the right level sensor reservoir. Pinch the level sensor reservoir so that the float is held in its lowest position.
- Lower the reservoir carefully while rotating it backwards around the front-rear shaft on the float.
- Install the overflow pipe on the reservoir.

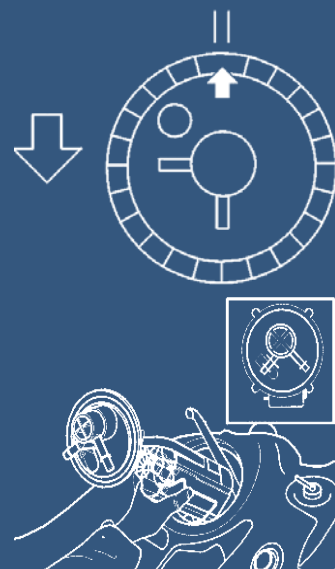
## Installing the left-hand level sensor

- Install a new o-ring, lubricated with lubricant, P/N 1161580.
- Push down the left-hand level sensor so that the raised rectangular section on the level sensor runs along the car.
- Check that the o-ring is not trapped.
- Tighten the screw to 60 Nm. Use wrench 999 7314 Spanner. Wipe up any fuel spillage.
- Position the wiring in the cutout in the rubber ring.

NOTE: Check that the arrow on the cover is between the markings on the tank. If the arrow is outside the markings the fuel level sender will give an incorrect value and the float may catch against the inner wall of the tank. If not: slacken off the screw and adjust the position of the sensor. Tighten as above.



NOTE: Check that the arrow on the cover is between the markings on the tank. If the arrow is outside the markings the fuel gauge sensor will give an incorrect value and the float may catch against the inner wall of the tank. If not: Slacken off the screw and adjust the position of the sensor. Tighten as above.



Well that's the long version, but note that there are more than a few ways to drain the fuel from the tank.

In the case of the XC90 in this article, the tank was almost empty so the technician decided to just drop the fuel tank out of the car with the fuel in it.

NOTE: Some of you may be thinking, "Why don't you just repair that rat-chewed fuel tank vapor line with a piece of hose and a couple of hose clamps?" Well, there are a few reasons why that is a bad idea. One thing is that this is a fuel vapor line that is under pressure at times and filled with flammable fuel vapors.

Another good reason to replace the whole fuel tank with a new unit from your Volvo parts dealer is liability and safety.

Let's say that your shop "fixed" that vapor hose instead of replacing the fuel tank with a new part, and let's say that, down the road from the day your shop "fixed" this car, the customer gets into a bad rear-end wreck, or maybe rolls the car over, and that "fix" is compromised. You can see the possibilities.

So don't take any chances, only use a new OE fuel tank from Volvo for a repair like this.

You will have to swap over the old pump and level sending units; follow instructions in the "draining fuel tank" section of this article.

Reinstall all parts in reverse order, fill the new tank with fuel and check for leaks.

Finally, use VIDA to run a quick test of the fuel tank leak detection system. ●

## Right-hand level sensor, continued

- Install a new o-ring, lubricated with lubricant, P/N 1161580.
- Press the right-hand level sensor down so that the fuel line connections are pointing forward and to the right.
- Check that the o-ring is not trapped.
- Tighten the screw to 60 Nm. Use wrench 999 5720. Install the hoses on the level sensor. Wipe up any fuel spillage.
- Position the wiring in the cutout in the rubber ring.

## Install on both sides

- The wiring in the sockets on the rubber seal.
- The cover over the level sensors and tighten the nuts to 6 Nm.

Connect the wiring and the connectors.  
Fold the carpet down and reinstall seats.

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**Contact your local Volvo dealer for a complete selection of Volvo Genuine Parts.**

\* U.S. only. Warranty excludes consumable "wear item" parts, labor and Volvo accessories.



**V O L V O**



A low-angle, close-up shot of a male mechanic with dark hair, wearing a dark blue or black button-down shirt. He is looking upwards with a focused expression, his head tilted back. The background is dark and filled with the mechanical parts of a car, including what appears to be a wheel hub and suspension components. The lighting is dramatic, with strong highlights on the mechanic's face and shirt, and deep shadows in the surrounding mechanical parts.

# A Partnership for Satisfied Volvo Owners

What do independent repair facilities and authorized Volvo dealers have in common?

Our shared commitment to make Volvo drivers happy through safe maintenance solutions. One way to achieve this is to only install Genuine Parts.

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But there's more. Volvo can support your business on many levels. We cater to your needs with easy ordering, unrivaled availability, and you get access to technical information. Satisfied Volvo customers are the basis of a rewarding relationship.

\*Warranty excludes consumable "wear item" parts, labor and Volvo accessories. U.S. only.

**V O L V O**