



SENSUS

A technology factsheet on Volvo Cars' user interface
technology across the range

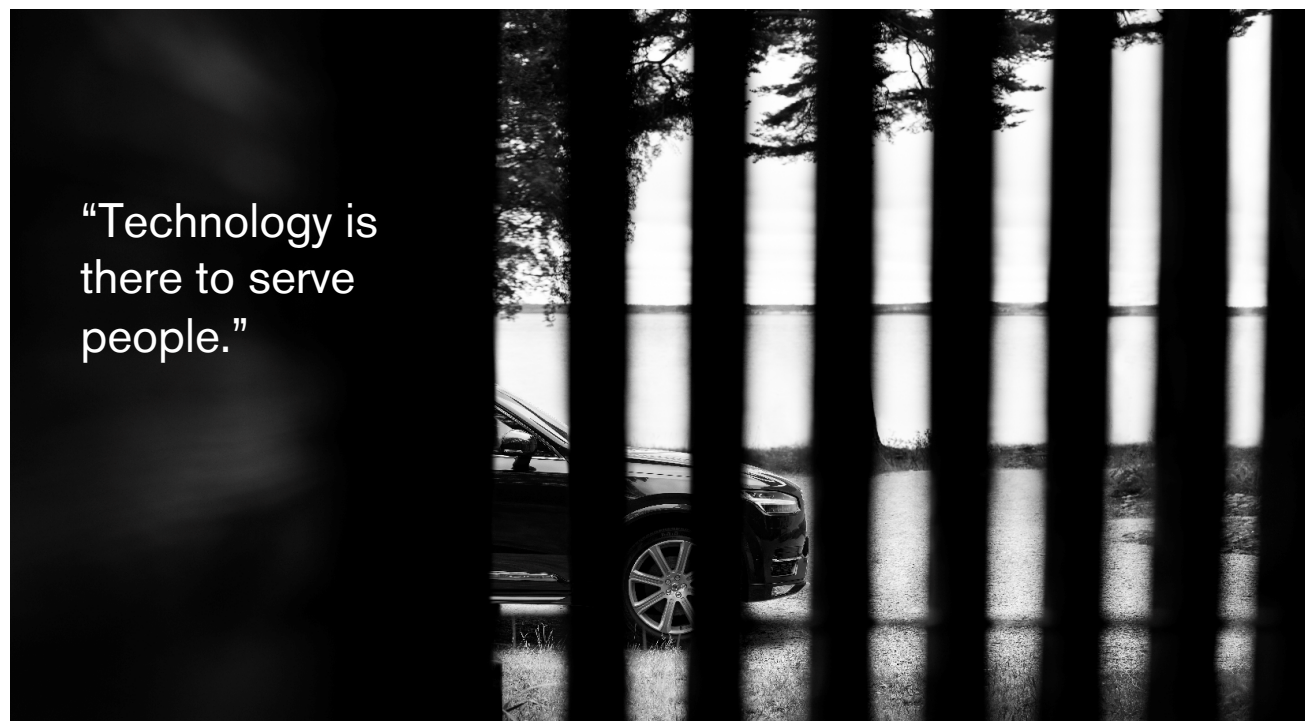




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The Volvo approach to connectivity



Volvo Cars believes that technology is there to serve people. Increasingly though, we see quite the opposite, with row upon row of physical buttons, complex menu structures, distracting control systems and a multitude of apps added simply because they can be added to a connected car.

At Volvo Cars we approach connectivity, entertainment, navigation and car control systems from a completely different perspective – a human-centric one.

Research

Our in-depth user experience research has taught us many things. The most basic learning forms the backbone of our entire strategy – that people should be at the centre of everything – not the technology. It is this approach that has led to a more thought-through and curated approach to connected

services, native applications and smartphone integration.

Experience

We make cars at Volvo. Our primary concern is the user experience. Therefore, anything that does not actively add to the experience is not included.

We understand that certain technologies are essential in today's connected world. Making them easy, safe and enjoyable to use in a car is where we come in.

Curated content

Our aim is to use the most relevant and recent technology to deliver curated content that actively adds to the driving experience.

We call our in-car user interface Sensus.

Introducing Sensus

“In a world where we are approaching a convergence of services and entertainment solutions it is more important than ever to ensure that we do not become slaves to technology. With Sensus, Volvo Cars is using what we call intelligent reduction to deliver a streamlined, curated experience that delivers the services and applications that will make your life easier and more enjoyable,” says Dr Peter Mertens, Senior Vice President Research & Development at Volvo Car Group.



Sensus is the name we give our entertainment and driver support solutions in the car. Our intention is to ensure that the driver is always in full control and enjoying the driving experience. To achieve this we uncomplicate the interaction experience.

Connected, enjoyable experience

Volvo Cars' Sensus solution is based on the concept of a fully connected and enjoyable experience in the car.

Our approach is quite straightforward. We use the latest and most relevant technology to deliver a superior user interface and an enjoyable user experience based on what people want and what makes their lives easier.

Instinctive by nature

Volvo understands what people want – seamless connectivity and an easy-to-use interface that allows them to access some of the services and applications that they have become used to outside the car.

What do you want to do?

Sensus is designed around five basic behaviours and desires:

- Entertainment
- Connectivity
- Navigation
- Services
- Control

By delivering a suite of applications and interfaces that support these basic and most human of requirements, Volvo Cars has created an award-winning and ground-breaking approach to in-car technology.

Now and whenever...

Volvo Cars' approach to driver control

Volvo has spent a lot of time researching the main causes of car accidents since the company was founded back in 1927.

Distraction is a major cause of accidents on today's busy roads. Volvo Cars has performed a lot of user interface research in recent years aimed at developing the least distracting driver control interface available.

As everyone knows it is important to keep your eyes on the road. With Volvo's approach all critical

information is presented via the Head-Up display or in the Driver display. Non-critical information is delivered via the centre display.

Volvo calls this the 'now and whenever' approach, reflecting the importance of the information that is displayed via the Head-Up display, Driver display or Centre display.

This is why Volvo has developed one of the best voice and steering wheel control systems in the automotive industry.

Now

Whenever



Volvo On Call

Volvo On Call was one of the first automotive telematics services available when launched in 2001.

Volvo On Call was initially developed as telematics safety system that alerts the emergency services if you are involved in an accident or if you require roadside assistance due to a flat tyre. Volvo On Call also acts as a security system which allows stolen vehicles to be tracked.

Over the years we have added a wide range of features and functions to this distinctive subscription service that allows Volvo car drivers to stay in touch with their car – no matter where they find themselves.

Remote control

Volvo's pioneering approach to intuitive convenience and telematics services delivers a host of clever solutions that allow you to control your car remotely using your smartphone or a Windows 10 desktop-based Volvo On Call app.

Lost and found

If you have ever lost your car in a parking garage you will appreciate the Car Locator function, which allows you to flash the lights and sound the horn to help you locate your car. Similarly, you can lock and unlock your car from a distance – or check that it is already locked once you have left it. If you forgot to lock it Volvo On Call will remind you and allow you to lock the car remotely.

Send Destination

You can search for a destination using Volvo On Call from the comfort of your sofa and send it to your car's navigation system, so it is ready to go when you are.

Calendar integration

By giving Volvo On Call access to your calendar data you will be offered the option of sending meeting



Level of functionality will vary depending upon the Volvo model.

addresses to your the Sensus Navigations system, so your car is ready to guide you to your next meeting.

Preconditioning

One of the most widely used Volvo On Call features allows you to remotely set and start or stop your parking heater. In our newer 90 Series cars this is extended to cooling the car in warmer climates – so the car is always ready for you.

Twin Engine support

Volvo's growing range of Twin Engine plug-in hybrid cars is supported by a charging function in Volvo On Call that allows you to monitor the status of the high-voltage battery and even allows you to pre-program charge times. It will also remind you if you forget to plug-in your Twin Engine to the charging station.

Wearables

Volvo On Call now comes with smartwatch and wearable support, working with iOS and Android operating system-based smartwatches as well as Microsoft Band 2, where you can use the Cortana digital assistant for voice control of your car remotely. Volvo On Call also offers support for Widget and 3D touch.

Bluetooth®

Hands-free and Wi-Fi hotspot

Research shows that driver distraction accounts for up to 90 per cent of traffic accidents.

Volvo Cars believes that providing a built-in hands-free phone solution that also provides a Wi-Fi hotspot is a way to effectively reduce distraction connected to phone usage in the car.

This is one of the reasons why Volvo offers seamless connectivity and Wi-Fi sharing from your smartphone to the car. It also makes your life easier.

Volvo cars use Bluetooth® technology as standard.

Bluetooth® connectivity means that your phone can be connected to the car automatically when you enter, allowing a safe and easy hands-free experience. When you leave the car the system disconnects back to your phone, so you can continue your phone conversation when you leave the car.

Your smartphone can be operated via integrated controls on the steering wheel and your contact list is accessible via the centre display when you wish to make a call.

Voice Control of your phone is also available if you have chosen the optional Sensus Navigation system.

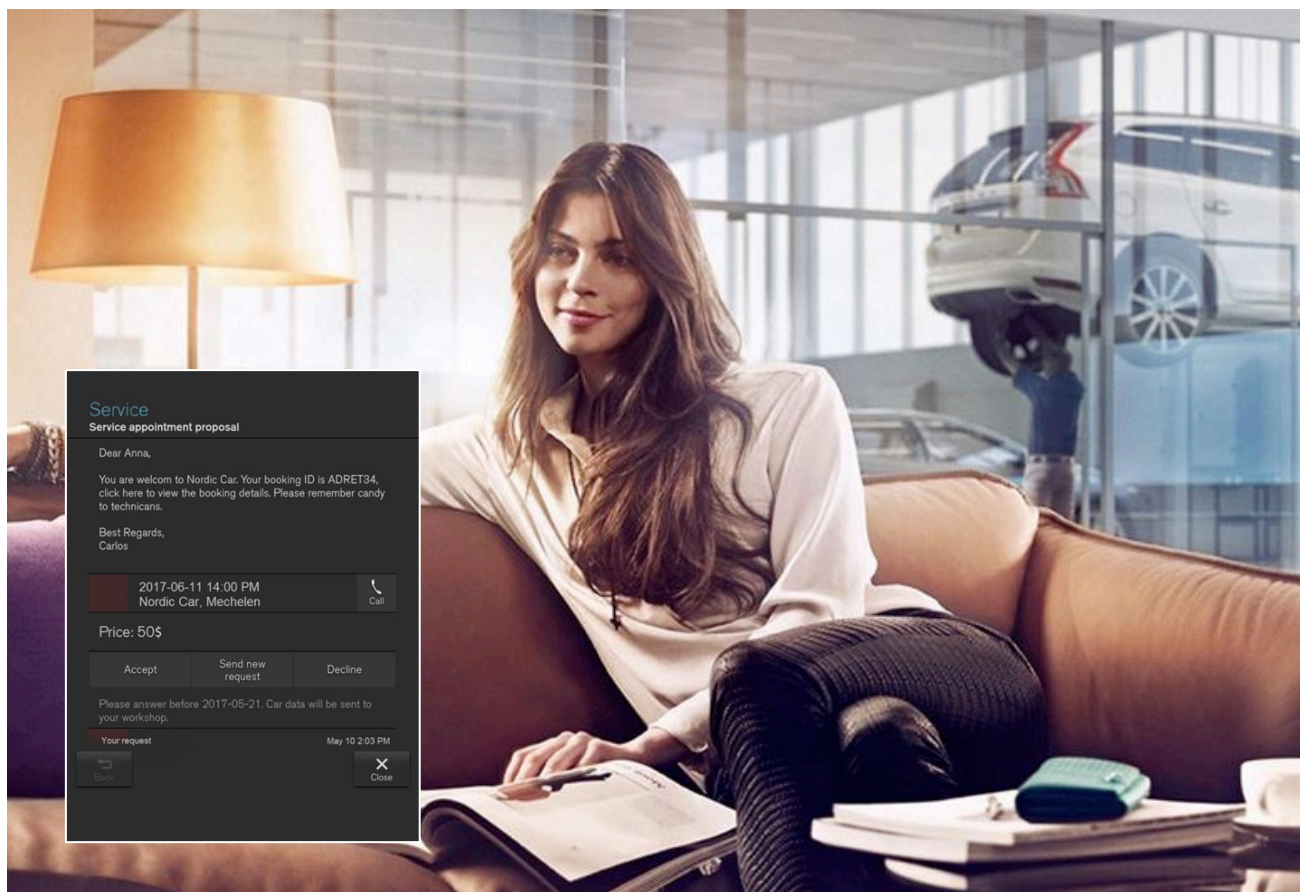
Thanks to Bluetooth® technology and the integrated steering wheel controls you can also use a streaming music service, such as Spotify on your phone in the car and stop/play/skip tracks as you wish. Track information is also visible in the centre display.



The *Bluetooth*® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Volvo Car Group is under license. Other trademarks and trade names are those of their respective owners.

Level of functionality will vary depending upon the model and options chosen.

Connected Service Booking



Connected Service Booking is a new service which supports the driver with car maintenance scheduling.

When the car is due to be serviced, or in the case of an unexpected fault, the car will alert you and offer to book time with your personal service technician and provide several booking alternatives to suit your calendar.

Once you choose a time that is convenient you only need to choose 'book now' and the appointment will be made, ensuring that your Personal Service Technician is aware of what needs to be done to the car.

Connected Service Booking aims to make car maintenance as easy as possible.

In-car Delivery

Understanding how best to use available technology is the key to increasing customer satisfaction. Technology should set you free – not enslave you.

It is with this in mind that we got to work devising a way to use existing connectivity platforms to make your life easier.

In-car Delivery is a new service from Volvo that allows online orders to be delivered directly to the boot of your car.

Utilising Volvo On Call functionality, In-car Delivery allows single-time access to whomever you wish to deliver goods or services to your car when it is parked. If your service provider offers this feature they will simply book time to deliver directly to your car, and you will be notified via your Volvo On Call App.

Delivered straight to your boot

The thinking is that you can have your packages, your groceries, your dry-cleaning, etc. delivered directly to your car while you are at work or at play, essentially turning your car into a preferred delivery address.

In-car delivery is currently available in Sweden and Norway, and will be extended to additional markets over time.



SENSUS



90 Series



S90



V90



XC90

SENSUS

Control



Touch screen technology



Volvo Cars' new portrait 9-inch tablet-like touch screen, available in our 90 Series cars, has taken in-car entertainment, connected services and car feature interaction to a new level.

The award-winning solution is based on a clever infrared positioning system which uses the location of your touch to determine your desired input. As the screen is based on infrared (IR) technology it also delivers an almost reflection-free surface – perfect for use in moving objects like cars.

Unlike traditional capacitive touch screens it can also be operated when wearing gloves or by people with long fingernails who might otherwise have difficulty placing their fingertips on the screen. The size of the screen also allows for larger, easy-to-see and use virtual buttons.

Anyone familiar with smartphone or tablet computer interaction can easily operate the centre display with touch, swipe and pinch movements.

Touch screen operation



Operation of the touch screen is very straightforward with four 'tiles' delivering menu choices:

- Navigation
- Media
- Phone
- Messaging

Volvo's in-depth user research has shown that these are the most commonly used features, along with the climate settings which are always present at the base of the screen.

The tiles expand when selected revealing more functionality, but the other three tiles remain visible and easy to select when these functions are required.

In addition to the main screen with four tiles, two further screens exist on each side of the main screen and can be accessed by swiping to the left or right.

These screens contain car settings and other entertainment applications, respectively.

Steering wheel controls

Several functions are operated via the easy-to-use steering wheel controls.



On the left-hand spoke driving function-related systems are located, including Speed limiter, Adaptive Cruise Control and Pilot Assist.

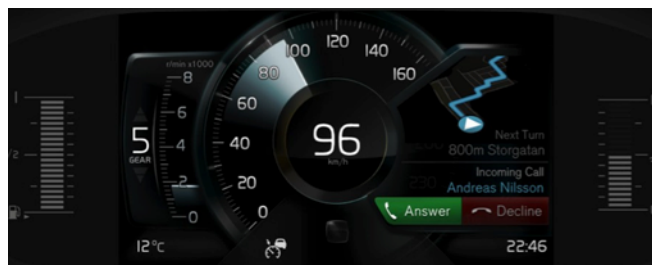
On the right-hand spoke entertainment-related features like audio, phone, connectivity and navigation can be accessed along with Voice Control and a dedicated menu scrolling button with four axis.

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Control



Driver display



Volvo Cars' driver displays use the latest high resolution screen technology to present a wealth of important information.

The display comes to life when you enter the car and presents speed, rpm, fuel/battery gear changes, navigation and incoming phone call information amongst other useful features.



Attention has been paid to ensuring that the display presents clearly visible information in an easy-to-understand design.

Built-in light sensors control the brightness of the display depending upon exterior lighting conditions, and the driver can choose between several different visual settings.



The driver display is available in both 8- and 12.3-inch formats.

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Entertainment



Audio supremacy

Premium sound by Bowers & Wilkins

Audio excellence has always been an integral part of the Volvo Cars experience. Today is no exception. Volvo has teamed up with British audio legend Bowers & Wilkins to create one of the best in-car audio experience available today.



The Bowers & Wilkins system uses bespoke acoustic technology developed over the British company's five decades of pioneering research into loudspeaker design.

The system is derived directly from acoustic technology developed for reference speakers used in some of the world's most demanding acoustic environments, including London's legendary Abbey Road Studios.

The result of the collaboration uses a combination of high-performance, low-distortion speaker designs, including extended range aluminium tweeters and Kevlar® midrange units, reflecting components found in Bowers & Wilkins award-winning premium loudspeakers. It also features a centre speaker with

Bowers & Wilkins tweeter-on-top technology for the first time in a car, providing a more open, spacious sound.



With 18 Bowers & Wilkins speakers, and an air-ventilated sub-woofer built into the chassis, Volvo's 90 Series cars deliver a distinct sound system tuned to perfection by Volvo's own audio engineers and the experts from Bowers & Wilkins.

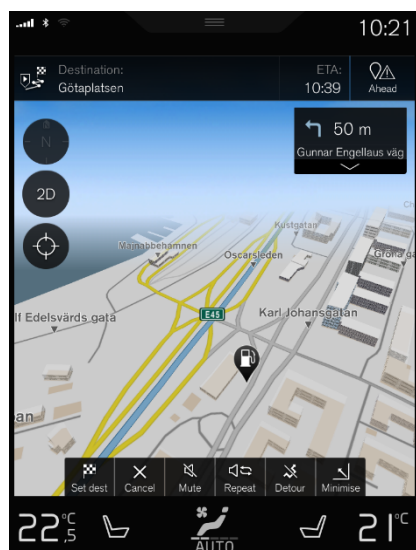
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Navigation



Sensus Navigation

Always there to guide you



Volvo's Sensus Navigation system provides easy access to navigation functions for both front seat passengers. The maps are always up to date with over-the-air updates.

Specific location/navigation-based apps are provided with Sensus Navigation, including:

- **Park&Pay** (find and pay for parking)
- **Yelp** (local business/restaurant/entertainment finder)
- **Glympse** (send your location to friends or family)
- **Local Search** (local business information)
- **Send to car** (send a destination to your car from your phone using Volvo On Call or via the Web with wego.here.com)
- **WikiLocations** (location-based information from Wikipedia)
- **Weather**

Relevant for 90 Series

Smartphone integration

Volvo Cars' Sensus user interface can now be equipped with smartphone integration, which allows you to access specific phone features directly via the touch screen.



Image shows Apple Car Play in car screen



Image shows Android Auto in car screen

Sensus works seamlessly with both Apple CarPlay and Android Auto.

Unlike other automakers, Volvo Cars has a fully native integration, ensuring a better overall experience and removing the need to switch from your phone's screen to the car screen.

As you can see from the images above with the examples of CarPlay and Android Auto integration,

your car's other 'tiles' are available at all times. Smartphone applications will vary depending upon the type of smartphone you use.

Ultimately, Sensus is not about hardware or gigabytes of memory – it is about using the best available technology to deliver a distinct, easy-to-use and enjoyable user experience.



Native applications

Sensus comes with a range of native applications such as Spotify, TuneIn and Douban to name but a few. Applications included vary by region and by country to ensure that Volvo drivers have access to the services and entertainment that they enjoy the most.

Below you can see a snapshot of the available applications.

App Name	US	EU	CN	JP	Require Sensus Navigation
Volvo ID	X	X	X	X	
Local Search	X	X	X	X	Navi
Weather	X	X	X	X	Navi
TuneIn	X	X		X	
Douban FM			X		
Pandora Internet Radio	X				
Find Parking			X	X	Navi
QingTing FM			X		
Yelp	X	X			Navi
Send-to-car	X	X	X		
Glympse	X	X		X	Navi
Pay for parking	X	X			Navi
Find Fuel, Hotel, Restaurant				X	Navi
Spotify	X	X		X	
Record and Send	X	X	X	X	
WikiLocations	X	X			Navi
Apple CarPlay	X	X	X	X	
Android Auto	X	X		X	

SENSUS



40 & 60 Series



V40



S60



V60



XC60

SENSUS

Control



User Interface At your fingertips



The Sensus driver interface in the 40 and 60 Series cars allows you to explore and personalize the hi-tech features of your car to suit your needs.

All information is displayed in a high-resolution 5-inch or 7-inch colour screen.

The multimedia audio systems with 7-inch screen will also display the Road Traffic Information (RTI) navigation system, park assist camera, DVD, digital TV etc.

Everything is conveniently controlled using the centre console or steering wheel controls – so you can keep your attention on the traffic and your hands on the steering wheel. And with our new Sensus Connect solutions, you convert the 7-inch Sensus screen into an internet-connected infotainment hub. It will give you further access to advanced in-car infotainment and connectivity, while enabling future web and cloud based in-car functionality.

The function buttons below the screen provide access to a wide range of features.

NAV takes you to the Navigation app, where you can set your destination.

The **RADIO** button provides available radio functions in AM/FM and optional DAB/SIRIUS services where available.

The **MEDIA** button provides access to the built-in harddrive, where you can save your music in mp3 format, or access to a USB memory stick in the arm rest containing your favourite sounds or the AUX contact for your media player.

The **TEL** button enables you to make use of the Bluetooth® hands-free connection to your phone, with your contacts list visible in the screen.

The **MY CAR** button enables you to view and change all system settings.

Finally the Internet **'GLOBE'** button provide access to a broad range of native apps, which you can explore in detail on page 24.

SENSUS

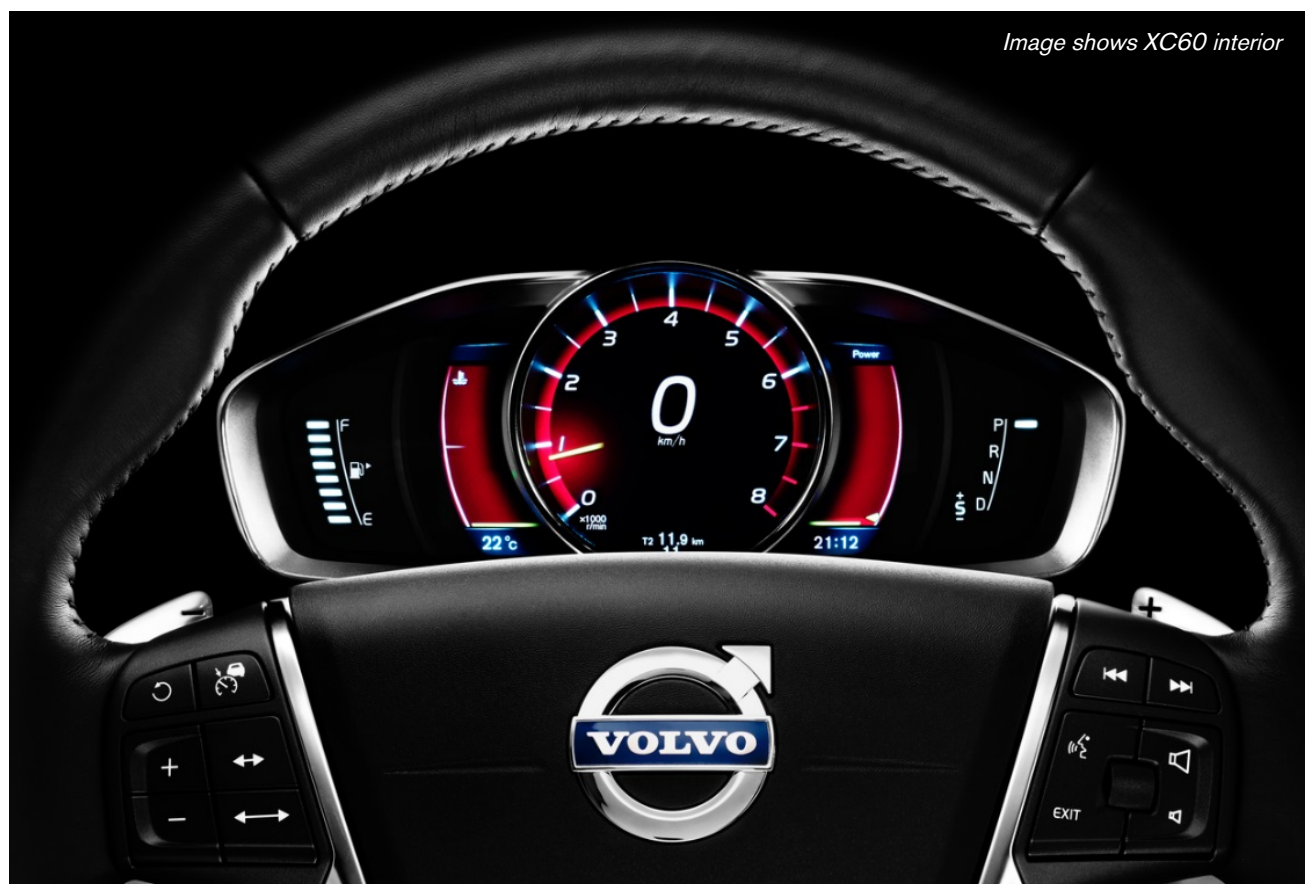
Control



Driver display

Adaptive, digital, personal

Image shows XC60 interior



Volvo's digital driver display uses the latest high resolution screen technology to present a wealth of important information.

The display comes to life when you enter the car and presents speed, rpm, fuel/battery, navigation and incoming phone call information amongst other useful features.

Attention has been paid to ensuring that the display presents clearly visible information in an easy-to-understand design.

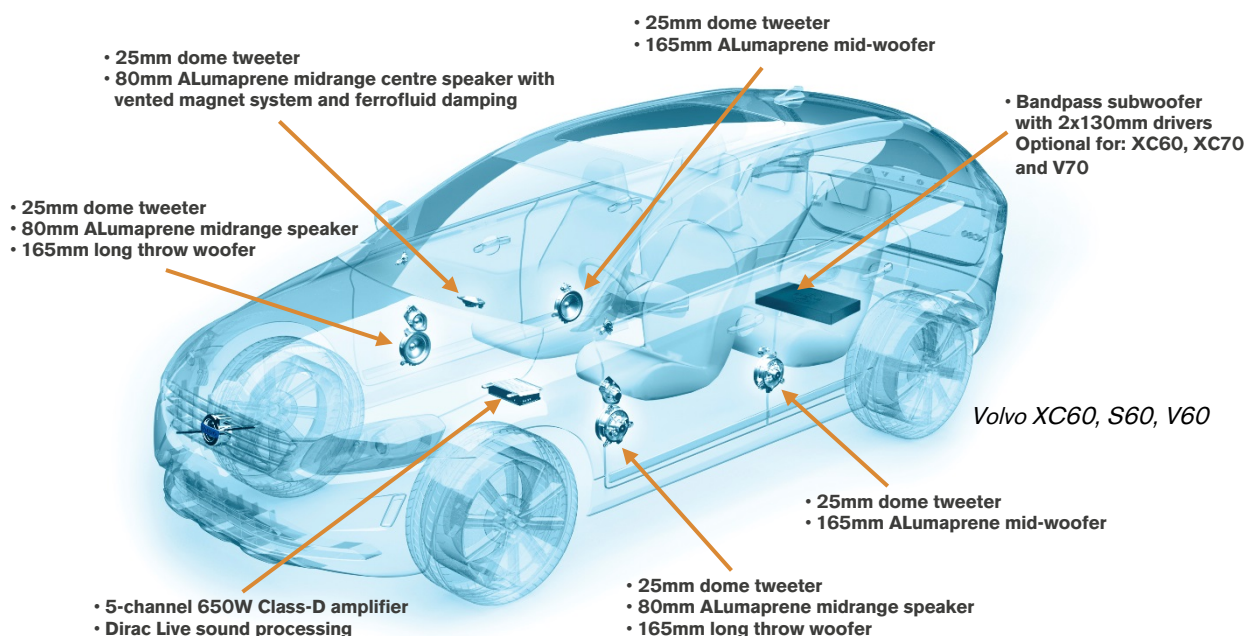
Built-in light sensors control the brightness of the display depending upon exterior lighting conditions, and the driver can choose between several different visual modes.

The driver display is available in both 5 and 7-inch formats.

Relevant for the following models: XC60, S60, S60 Cross Country, V60, V60 Cross Country, V40, V40 Cross Country

Premium Sound by Harman Kardon

Sounds that you surrender to



Class-D

With the high-performance Class-D amplifier delivering up to 650 watts, the result is a fun and detail-rich sound with a superior high sound pressure level.

Dirac Live

Dirac Live sound processing compensates sound colorations and creates a natural stage of sound in front of the listener for a more authentic live experience.

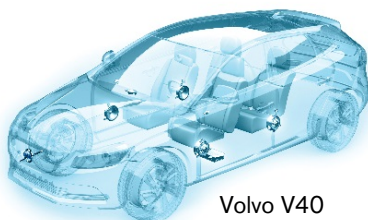
ALumaprene

New ALumaprene mid-range speaker technology, with its increased diameter, creates an improved, accurate, and lively performance.

Harman Kardon® is a natural partner for us. Volvo Cars has always placed great emphasis on delivering high-end audio with the latest technology to create a distinctive in-car experience.

The 25 mm cloth-dome tweeters are perfectly tuned to work with mid-rangers and woofers, while ALumaprene mid-range speakers and mid-woofers provide optimum damping characteristics. Using the same mid-range speaker in the doors and in the centre creates excellent tonal response and high staging. The long-throw woofers with high excursion ensure rich bass performance, making a sub-woofer unnecessary.

With its crystal clear highs, powerful basses and low-distortion mid-ranges, the Harman Kardon sound system provides an unmistakable listening experience for passengers in all seating positions.



SENSUS

Navigation



Sensus Navigation

Always there to guide you



Volvo's Sensus Navigation system provides easy access to navigation functions for both front seat passengers.

Voice Control is standard with Sensus Navigation, and it can also be used in conjunction with your phone, removing the need to take your hands off the wheel.

Specific location/navigation-based apps are provided with Sensus Navigation, including:

- **Park&Pay** (find and pay for parking)
- **Yelp** (local business/restaurant/entertainment finder)
- **Glympse** (send your location to friends or family)
- **Local Search** (local business information)
- **Send to car** (send a destination to your car from your phone using Volvo On Call)
- **WikiLocations** (location-based information from Wikipedia)
- **Weather**

Relevant for the following models: XC60, S60, S60 Cross Country, V60, V60 Cross Country, V40, V40 Cross Country

Native applications

Sensus comes with a range of native applications such as, TuneIn and Douban to name but a few. Applications included vary by region and by country to ensure that Volvo drivers have access to the services and entertainment that they enjoy the most.

Below you can see a snapshot of the available applications.

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App Name	US	EU	CN	JP	
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Local Search	X	X	X	X	Navi
Weather	X	X	X	X	Navi
TuneIn	X	X		X	
WikiLocations	X	X			Navi
Find Parking	X	X	X	X	Navi
Pay for parking	X	X			Navi
Glympse	X	X		X	Navi
Find Fuel	X	X		X	Navi
Send-to-car	X	X	X		Navi
Rdio - discontinued	X	X			
Stitcher	X	X		X	
TuneIn	X	X			
WikiLocations	X	X			Navi
Yelp	X	X		X	Navi
SBS RadioPlay		X			
Storytel		X			
Pandora*	X				
Douban FM			X		
QingTing			X		
Find Hotel				X	Navi
Find Restaurant				X	Navi
EULA	X	X			Navi
Audio program			X		

Relevant for the following models: XC60, S60, S60 Cross Country, V60, V60 Cross Country, V40, V40 Cross Country.

Some apps may not be available in all countries.

*Pandora is also available in Australia and New Zealand.

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Connected, enjoyable experience



V O L V O

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