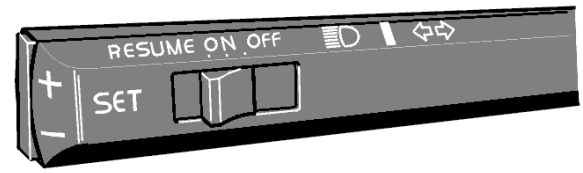
Selector switch

General



The cruise control selector switch is located on the turning indicator stalk. To activate cruise control vehicle speed must be above 35 km/h, the switch must be ON and the SET button must be pressed in.
When the system has been engaged vehicle speed can be adjusted up or down by pressing the + or - SET button. Every time the SET button is pressed the vehicle speed setting changes by 1.6 km/h (1 mph). If the control module is switched off (by pressing the brake/clutch pedals, the ON/OFF button or by moving the gear selector from D to N) that latest vehicle speed setting is stored in memory until the ignition is switched off. This vehicle speed can be restored by moving the ON/OFF button to the RESUME position.

Braking

Vehicle speed can always be reduced by braking. Cruise control is automatically disengaged. This also happens when the clutch is depressed.

Acceleration

The car can be accelerated with cruise control engaged. When the accelerator pedal (AP) is released the car returns to its set speed.
Vehicle speed can also be increased by pressing the + button. The car will maintain the same speed it has when the button is released.

Disengaging cruise control

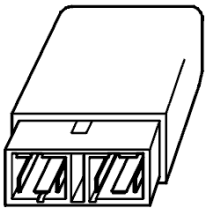
Cruise control is disengaged if one of the following occurs:

- Selector switch is set to OFF.
- Vehicle speed drops below 35 km/h (22 mph).
- The brake or clutch pedals are used, activating a control circuit via a pressure switch on the pedal.
- The brake pedal is used, activating another control circuit via the stop (brake) light switch.
- Park/Neutral position (PNP) switch on automatic transmission models. Emergency switch. Activated by the control module if the wheels lock or spin. The system is also disengaged the engine cannot achieve the set vehicle speed.

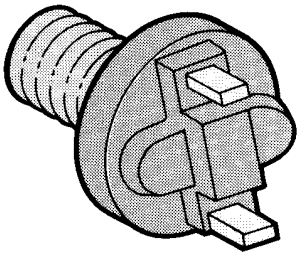
Electrical overview

Control module

The control module compares selected speed with actual speed. If necessary the control module activates a vacuum pump or regulator, which in turn control a vacuum servo. This servo is connected to the accelerator

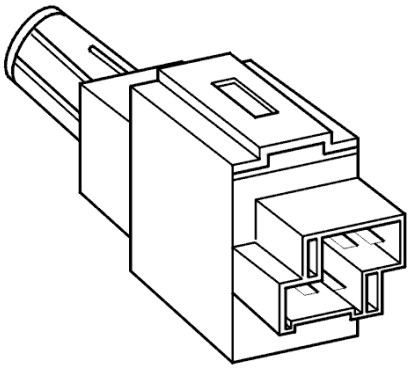


pedal (AP) and therefore controls vehicle speed.
The selected speed is stored in the control module memory until the cruise control is disengaged by moving the switch on the direction indicator stalk to the OFF position, or until the speed stored in memory is changed by using SET+ or SET-.
The control module incorporates several safety functions to prevent damage due to system failures. Vehicle speed must be above
35 km/h (22 mph); the selector switch must be in the ON position, and the SET button must be pressed in before the control module can operate the vacuum pump relay.
If the car has automatic transmission the control module is switched off when the gear selector lever is in the P or N positions.
In addition to electrical safety functions there are several pneumatic safety devices, see Vacuum control.
The control module monitors the system and disengages cruise control during abnormal acceleration (wheel-spin) or deceleration (wheels locking). The control module also disengages the system if vehicle speed drops below 75% of the selected speed. This may occur when driving up steep slopes when the engine cannot maintain a constant speed.
Another important control module function is to store diagnostic trouble codes (DTCs) allowing fault-tracing using the Volvo Scan Tool (ST).
In order to operate correctly the control module requires several sensors. These are described below with their functions.



Stop (brake) light switch

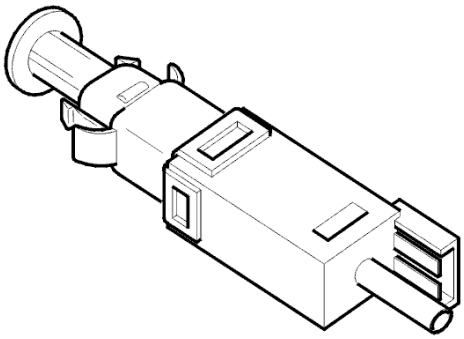
The stop (brake) light switch acts as an extra safety device in case the brake pedal is depressed and the vacuum valve does not open. When the brakes are used the control module is no longer grounded via the stop (brake) light bulbs and the system is disengaged. If the bulbs are defective cruise control will not operate. Always check the stop (brake) light bulbs first if there is a fault in the system.



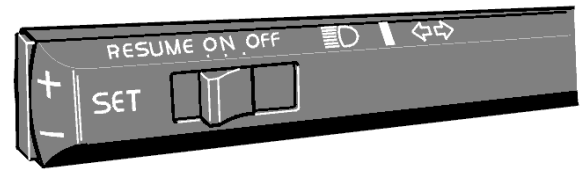
From 1995– there is a new type of stop (brake) light switch, however, its function is the same.

Pedal valves (electrical)

These are located above the brake pedal and clutch pedal (manual transmission) and have the same function



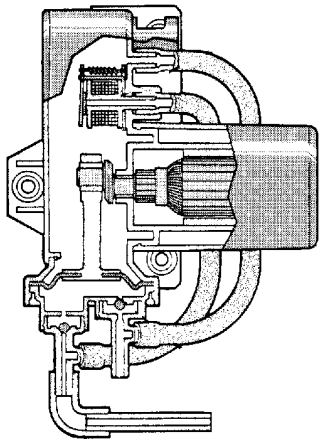
as the stop (brake) light switch. They cut off the supply to the pump and regulator in the pump unit. This opens the pump regulator and allows air into the vacuum system. Normally when the pedal is up the valve is closed.
The pedal valves are combined electrical/vacuum valves. When the pedal is depressed the vacuum circuit is broken.



Selector switch

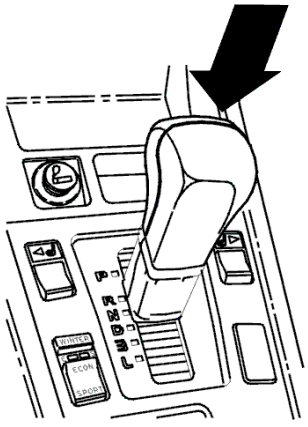
The switch incorporates:

- a switch for switching the system off and on
- two buttons to increase and decrease vehicle speed.
- a sliding switch to resume the selected speed.



Vacuum pump and regulator

If vehicle speed drops the vacuum pump is turned on and the vacuum in the servo increases. The servo presses down the accelerator pedal (AP) a little and vehicle speed increases again. If vehicle speed increases the regulator allows air into the vacuum system reducing the vacuum. The vacuum pump is driven by an electric motor. This is switched on when the SET+ button is pressed in and the control module relay is operated. The motor drives the pump until the vacuum servo has a sufficient vacuum to maintain the selected speed.
When extra power is required, when driving up a hill for example, the vacuum pump is switched on again in order to increase the system vacuum until the selected speed is achieved. When driving downhill the regulator vacuum valve is opened to allow air into the system, reducing the vacuum to the vacuum servo.

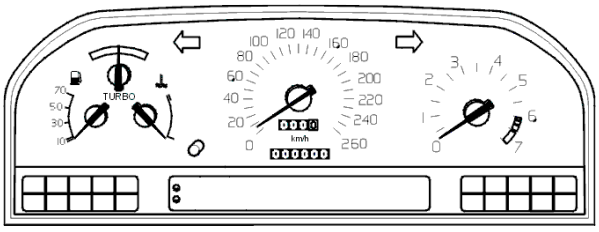


Park/Neutral Position Switch (PNP)

The control module is switched off when the automatic transmission gear selector lever is in the P or N positions. However, the selected speed is stored in memory.

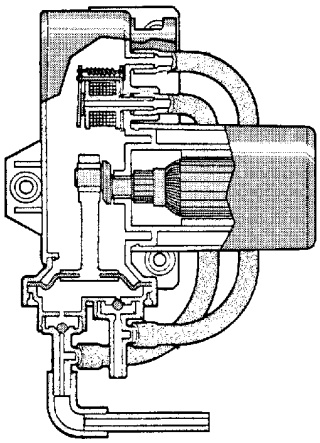
Vehicle speed signal (VSS)

The cruise control module requires information about



the actual vehicle speed. This information is obtained from the speedometer. In cars with manual transmission the mechanical movement of the speedometer cable is converted into a speed-related pulsed frequency via a reed element switch in the instrument panel. This signal is then transmitted to the control module. In cars with automatic transmission this information is provided by the Aisin Warner transmission. This cable is routed to the instrument panel.
Data from all these sensors allow the control module to control vehicle speed. Actual speed control is carried out using a vacuum servo next to the accelerator pedal (AP). The vacuum for this servo is governed by a pump or control valve, the regulator.

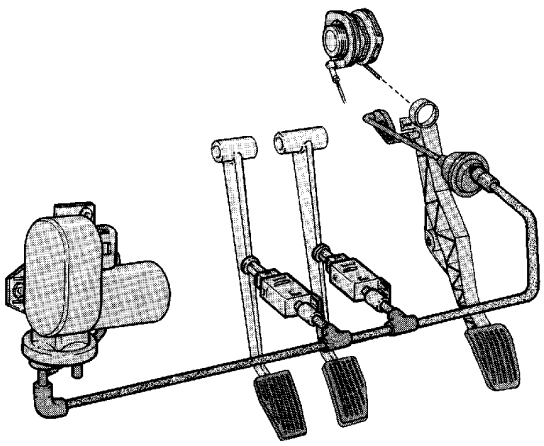
Vacuum overview



The accelerator pedal (AP) servo is vacuum assisted. The vacuum is created by a vacuum pump. Air can be allowed into the servo via the regulator, which is also located in the pump housing. As an extra safety measure pedal switches have valves which allow air into the system when the pedals are used.

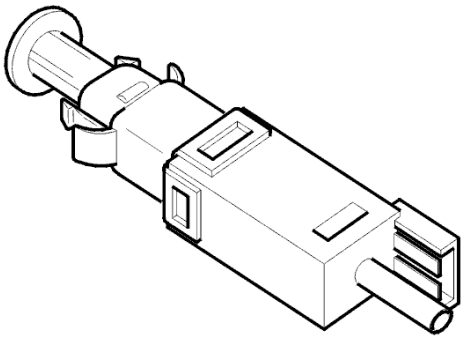
Vacuum pump and regulator

If vehicle speed drops the vacuum pump is turned on to increase the vacuum in the system. If vehicle speed increases the regulator allows air into the system to reduce the vacuum. The vacuum pump is driven by an electric motor which is switched on when the SET+ button is pressed and the control module relay is closed. The relay switches the power supply to the pump motor. The motor drives the pump until the vacuum servo has a sufficient vacuum to maintain the selected speed. This speed is transmitted to the control module via a signal from the speedometer. The control module then opens vacuum pump grounding.
When extra power is required, when driving up a hill for example, the vacuum pump is switched on again in order to increase the system vacuum until the selected speed is achieved. When driving downhill the regulator vacuum valve is opened to allow air into the system, reducing the vacuum to the vacuum servo and reducing throttle opening.



Vacuum servo

This is located above the accelerator pedal (AP) and consists of a housing containing a diaphragm to which a control rod is connected. When a vacuum is introduced behind the diaphragm it moves in that direction pulling the control rod with it. This in turn acts on the accelerator pedal (AP).



Pedal valves (vacuum valves)

These are integrated with the pedal valves.
Each vacuum valve is operated via a spring-loaded piston. The valve is self-adjusting.
Normally, when the pedal is released, the spring is compressed and the vacuum valve is closed.
If the clutch or brake pedals are depressed, the spring pushes the piston back.
The vacuum valve opens, allowing in air and disengaging cruise control.