

Rover SD1 Hella GR65 Cruise Control System (“Cruise”)

This system is fitted as an optional extra on Rover SD1 2.6 and 3.5 litre models from VIN 288121 onwards. It maintains the vehicle cruising speed, which has been selected by the driver, without any manual correction through the accelerator pedal. The use of “Cruise” is not recommended on winding, snow covered or slippery surfaces.

The main components of the system are:

- **Pneumatic Actuator** is connected to the throttle linkage by a connecting rod. A vacuum depression pipe is connected to the vacuum control unit. Different types are fitted to the 2.6 and 3.5 litre models, the latter having a longer connecting rod.
- **Vacuum Control Unit** contains a vacuum pump and a vacuum control valve; both controlled by signals from an Electronic Control Unit (ECU).
- **Switch and Vent Valve** is fitted in the normally closed position, so that it can be switched by the operation of the brake pedal. If the car is fitted with a manual gearbox it has a second identical unit in similar position acting against the clutch pedal. The switch and vent valves are wired in series with the brake light switch and are also connected into the vacuum circuit so that if either the clutch or brake pedal is operated, the cruise control vacuum is immediately vented (dumped). Simultaneously, the ECU switches the system off, electrically, in response to a signal from the stop light circuit.
- **Electronic Control Unit (ECU)** activates the vacuum pump and the vacuum control valve in response to signals from the Driver’s Control Switch depending upon the vehicle speed. It also reacts to signals from the stop light switch and the brake/clutch switch and vent valves.
- **Driver’s Control Switch** activates and sets the system when switched by the driver to his/her requirement.
- **Speed Transducer** at the gearbox provides the vehicle speed signal to the ECU in addition to its usual signals to speedometer and trip computer.
- **In Line Fuse** rated at 5 Amp is fitted into the vehicle white-wire ignition circuit and is situated behind the instrument panel. The system is also protected by fuse B5 (7.5 Amp), which is in the stop light circuit.
- **Overspeed Relay** is a safety device designed to protect the engine from excessive speed. When a previously set speed is exceeded to such an extent that engine speed is close to its safety limits, the Overspeed relay switches off, thereby breaking the ignition feed to the ECU and vacuum control unit. For example this can occur if the driver selects a lower gear then operates the “RESUME” switch on the Driver’s Control. The Overspeed relay does not operate if the driver decides to accelerate when “Cruise” is in operation. There are two types of Overspeed relay for the 2.6 and 3.5 litre models (DRC 8092 and DRC 8091 respectively).

Control Switch Functions

- The Driver's Control Switch has 4 positions, one of which is latching, whilst the others are non-latching. The "ON/OFF" function latches only in the "OFF" position, parallel to the steering wheel, pushing the lever towards the windscreen. To switch the system "ON" the lever is moved to its central position.
- The driver can "SET" the system to maintain the road speed required by lifting the lever momentarily towards the steering wheel. When the lever is released it will return to its central position. "Cruise" will not operate under 23 mph.
- To increase the "SET" speed, the lever is lifted towards the steering column and held against its stop whereby speed increases until the lever is released. The car now cruises at the new setting.
- If the brake or clutch pedal is depressed, or the lever is pressed downwards, away from the steering column, "Cruise" immediately de-activates. The speed setting is retained in the ECU memory.
- Moving the lever towards the driver, parallel to the steering wheel, will "RESUME" the system to smoothly accelerate the car back to the "SET" speed, providing it is travelling in excess of 23 mph when selected.

Cruise Control Vacuum Operation

- The system has its own vacuum pump and vacuum control valve incorporated in the Vacuum Control Unit making the system independent of inlet manifold depression.
- Two mechanically operated vent valves are mounted so they vent vacuum from the system whenever the clutch or brake pedal is depressed. This venting function is fast; ensuring "Cruise" becomes inoperative very quickly with rapid throttle closure.
- The control valve in the Vacuum Control Unit has a smaller vent hole producing slow venting of vacuum therefore slower throttle closure for gradual deceleration.
- When the vacuum pump is operating, most of the air is vented to atmosphere. A small part is however vented back into the control unit housing, slightly pressurising it. This assists smooth operation of the system, both during "RESUME" or when "Cruise" is disengaged by the Driver's Control Switch.
- The Pneumatic Actuator is designed to give a damped response to any fluctuations in vacuum, producing smooth operation of the overall system.

Safety Functions

- The ECU does not activate the Vacuum Control Unit at speeds below 23 mph.
- The Overspeed relay does not switch the main supply to the ECU and the Vacuum Control Unit until a signal is registered from the ignition coil, i.e. engine is running.

- The Overspeed relay switches off the feed to the ECU and Vacuum Control Unit if engine speed exceeds 5200 or 4800 rpm on the 3.5 or 2.6 litre models respectively.
- When the stop light circuit is activated, system vacuum vents immediately. However the brake/clutch switch and vent valves are designed to allow the electric circuit to the ECU to remain live momentarily after the switch starts to move. The period is about 0.125 inches after the spring-loaded pin begins to open, allowing the ECU to register the stop light switch has indeed been operated. “Cruise” then disengages.
- When “Cruise” is deactivated by the rocker switch function of the Driver’s Control Switch, the ECU switches the system off. The system vacuum vents slowly through the vacuum control switch valve and allows the throttle to close gradually, providing gentle deceleration. The ECU retains its memory.
- ECU memory is cancelled when the latching switch is set to “OFF” or when the ignition is switched off.

Cruise Control Electrical Operation and Functions

- **When “Cruise” is “OFF”** at the Driver’s Control Switch and the engine is running, signals from the speed transducer to the ECU and from the coil to the Overspeed Relay are both present. The ignition circuit feeds the Driver’s Control Switch. The stop light switch feeds a signal to the ECU when the brake pedal is depressed. “Cruise” has no effect on the car.
- **When “Cruise” is “ON”** at the Driver’s Control Switch, the ignition circuit feed activates the Overspeed relay providing it also receives a signal from the coil signifying the engine is running, which in turn activates the ECU and Vacuum Control Unit. The Overspeed relay does not operate if the engine speed exceeds the limits set by the manufacturers (see above). When the ECU receives a speed signal from the gearbox speed transducer, it switches on the vacuum pump in the Vacuum Control Unit by completing the earth path from the pump motor. With the pump now operating, the Vacuum Control Valve does not close unless the ECU receives a signal from the “SET” position of the Drivers Control Switch. So, there is no vacuum in the system as the valve is open to atmosphere and “Cruise” has no effect.
- **When “Cruise” is “SET”** and released at the Driver’s Control Switch, providing the Overspeed relay receives a coil signal to switch the circuit on and the speed signal exceeds 23 mph, it instructs the ECU to operate the vacuum control valve, thus completing the vacuum circuit. The Actuator gradually compresses, holding the throttle open enough to maintain the “SET” speed. The ECU now toggles the vacuum control valve on and off to maintain the chosen speed irrespective of road conditions and load.
- **When “Cruise” “RESUME”** circuit is activated at the Driver’s Control Switch, it signals the ECU, momentarily, to close the vacuum control valve again until the car is travelling at the speed held in the ECU’s memory, and is maintained as above.
- **“OFF” via the Brake Light Switch** occurs as the foot brake is applied and the stop lamp activates. A signal is applied momentarily through the brake and clutch switch

and vent valves, via the rocker switch “OFF” position to the ECU. The ECU breaks the earth path for the vacuum control valve, thus venting the system. It also vents at the brake switch and vent valve. The ECU speed memory is not cancelled.

- **“OFF” via The Rocker Switch** at the Driver’s Control Switch causes a break in the ECU circuit to earth via the stoplights. The ECU in turn immediately switches off the earth to the vacuum control valve allowing the vacuum system to vent. This venting is slower than the brake and clutch switch vent valves, which allows the vehicle speed to decline gradually. The ECU retains its speed memory.
- **“OFF” via The Latching Switch** at the Driver’s Control Switch disconnects the ignition feed to the system which is consequently shut down and the ECU speed memory cancelled, as it is when the ignition system is switched off.

Cruise Control Fault Diagnosis and Rectification

Visual Check

- Before commencing, switch the ignition on and verify correct operation of the brake light circuit. If the switch is set incorrectly or faulty the ECU will subsequently receive a signal to de-activate the vacuum control valve in the Vacuum Control Unit.

Vacuum System

- Check the vacuum pipes for correct fitment at the Vacuum Control Unit, the Pneumatic Actuator and the brake and clutch switch and vent valves. There are three types of black vacuum pipe depending upon the vehicle type.
 - 2600 Model: There is a hook at the braided end, which fits to the actuator.
 - 3500 Carburettor Model: The actuator connection is straight and braided.
 - 3500 Efi Model: The actuator connection is straight, braided and marked yellow.
- Check the linkage between throttle mechanism and the actuator. It should not stick or foul and must have 0.1 - 0.3 mm (0.004 - 0.016 inches) play in the linkage.
- Check the switch and vent valves at the brake and clutch have 0.3 - 0.9 mm (0.012 - 0.035 inches) gap between the plunger head and the switch and vent valve thread

Electrical System

- Check the in-line fuse, situated behind the instrument panel.
- Check the stop light circuit fuse (B5) in the vehicle’s main fuse box.
- Check the harness connections to the Speed Transducer circuit, Stoplight switch, the Brake/Clutch Switch and Vent Valves, the Drivers Control Switch plug, the ECU, the Vacuum Control Unit and the Overspeed Relay.

Cruise Control Road Test Checks

- Start the engine. Move the Driver's Control Switch to the "ON" position and accelerate to 30 mph. Raise the lever to the "SET" position and release. Release the accelerator. "Cruise" maintains the speed at which the lever is released.
- Hold the lever in the "SET" position. "Cruise" will accelerate the car smoothly until the lever is released and then maintain the new speed as above.
- Move the lever down to the "OFF" position and release. "Cruise" will disengage.
- Allow the car to slow to a lower speed (above 23 mph) and move the lever to the "RESUME" position and release. "Cruise" will accelerate car smoothly to the previously selected cruise speed.
- Increase speed using the accelerator and release. "Cruise" will slow the car and maintain it at the previously set speed.
- Depress brake pedal and release. "Cruise" will disengage.
- Select "RESUME" and "Cruise" returns the car to the set speed.
- For Manual Transmission cars only, at cruise speed, depress the clutch pedal. "Cruise" will disengage.
- Select "RESUME" and "Cruise" returns the car to the set speed.
- Note: "Cruise" disengages when the lever is depressed to "OFF" or the brake and/or clutch pedal is depressed. It also disengages when the vehicle speed differs from the set speed by more than 25%, but the ECU speed memory is retained.
- "Cruise" is switched off when the lever is moved forward to "OFF" and when the ignition is switched off. This time, the ECU speed memory is lost.

This essay is intended only to describe the components and functions of the Hella Cruise Control System as fitted to the Rover SD1. If readers are uncertain about performing maintenance on their own system, be sure to obtain appropriate documentation or skilled assistance.

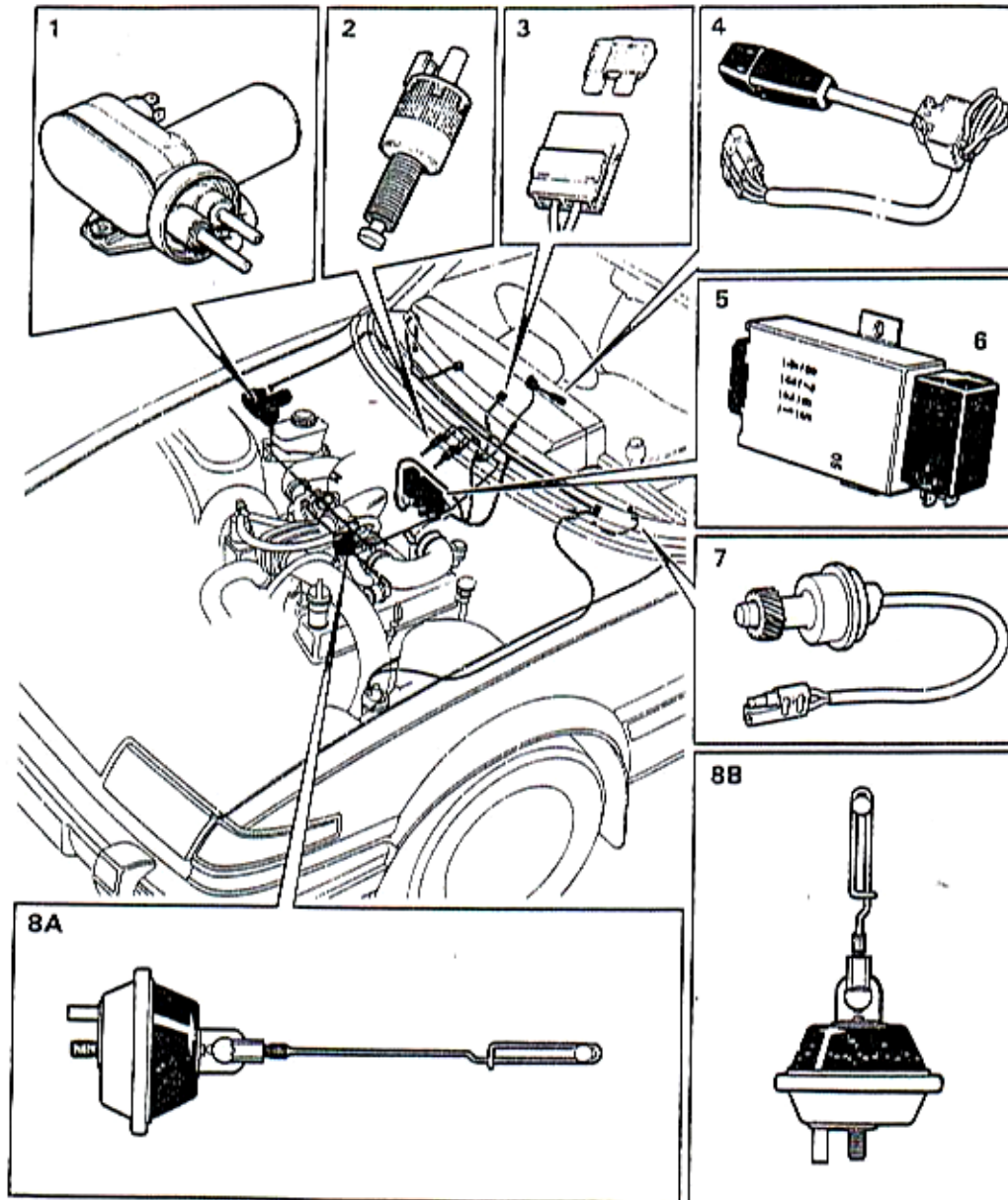
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HELLA CRUISE CONTROL TECHNICAL DESCRIPTION

An Optional Extra Fitted To Rover SD1 Vehicles
From Vehicle Identification Number 288121 Onwards



Cruise Control Components Location - Hella type GR65 (Right hand steering shown)

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|----------------------------|------------------------------------|-------------------|
| 1 Vacuum control unit | 2 Switch and vent valve | 3 Line fuse |
| 4 Control Switch | 5 Electronic control unit | 6 Overspeed relay |
| 7 Gearbox speed transducer | 8 Pneumatic Actuator A 3500 B 2600 | |