

CRUISE CONTROL SYSTEM-HELLA GR66

CAUTION: DO NOT ENGAGE CRUISE CONTROL WHEN THE VEHICLE IS BEING USED IN LOW TRANSFER GEARS.

DESCRIPTION

The Cruise Control system consists of electro-mechanical devices, and comprises of the following components.

ELECTRONIC CONTROL UNIT (ECU)

The electronic control unit is located behind the lower dash panel attached to the underside of the instrument binnacle. The Microprocessor based E.C.U. evaluates the signals provided by the driver controls, brake pedal switch and the road speed transducer, and activates the vacuum pump in an appropriate manner. The E.C.U. also has a memory function for set speed storage.

DRIVER OPERATED SWITCHES

The main cruise control switch is located in the auxiliary switch panel and activates the cruise control system. The steering wheel switches provide 'set/accelerate' and 'resume/decelerate' features. These switches provide the interface between driver and cruise control system.

BRAKE PEDAL SWITCH

The Brake Pedal Switch is located under the lower dash attached to the brake pedal mounting bracket. The switch provides for fast disengagement of the cruise control system and rapid return of the throttle levers to the idle position when the brake pedal is applied.

ROAD SPEED TRANSDUCER

The Road Speed Transducer is fitted between the upper and lower speedometer cables. It is mounted on a bracket located on the left hand chassis side member adjacent to the rear engine mounting. The transducer provides road speed data to the E.C.U. The cruise control system cannot be engaged until the road speed exceeds 28 mph (45 km/h), the system will automatically disengage at a road speed of 26 mph (42 km/h).

VACUUM PUMP

The Vacuum Pump is located in the engine compartment attached to the left hand valance. The vacuum pump is energised when the main control panel is operated, and is actuated by the steering wheel and brake pedal switches. The pump provides a vacuum source to the cruise control actuator at the throttle levers. A control valve in the pump provides for steady increase of road speed or rapid purge of the system when the brake pedal is applied.

ACTUATOR

The Actuator is located in the engine compartment and is bolted to the throttle lever bracketry. The actuator provides the servo mechanism link between the cruise control system and throttle linkage and is operated by vacuum from the vacuum pump.

FAULT DIAGNOSIS

If the system does not function the following checks must be carried out.

- Fuse A6** • intact
- Vacuum hoses** • not split or disconnected
- Actuator** • diaphragm ruptured
- Vacuum Pump** • motor operational
- Brake Switch** • faulty or out of adjustment
- Speed Transducer** • faulty • check operation of unit
- Electrical Leads** • loose connections • faulty leads
- Stop Lamp Bulbs** • both bulbs faulty • replace: Fuse 13 intact.

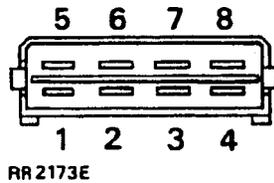
PRELIMINARY CHECKS PRIOR TO TESTING

1. Ignition switch "ON".
2. Fuse A-6 "OK".
3. Cruise Control master switch "ON".
4. Minimum 12.0V (Battery) available.

CRUISE CONTROL OPERATIONAL CHECKS

All system testing may be performed with a multi-meter and jumper wire at the ECU connector.

Sequence of connections viewed on harness plug connector to ECU



Colour coding/function of wiring to plug:

TERMINAL NO.	COLOUR	FUNCTION
1.	White/Yellow	Main power from master switch
2.	Red/White	12V + from set switch (when pressed)
3.	Purple/Green	Ground via vent valve switch and brake light filaments
4.	Black/Red	To vacuum pump motor
5.	Yellow	To speed transducer
6.	Blue/White	12V + from resume switch (when pressed)
7.	Black/Yellow	To vacuum pump solenoid valve
8.	Black	ECU ground

TEST PROCEDURE

Volt Meter Connections	Specified Result	Possible Problem if Results not as Specified
1. Terminal 1 and ground	Battery voltage	Fuse, wiring, master switch
2. Terminal 1 and 8	Batter voltage	Poor ground
3. Terminal 1 and 3	Battery voltage	Brake light ground, vent valve switch, wiring, brake light bulbs
4. Terminal 6 and 8 (press resume)	Battery voltage	Wiring, resume switch, cassette
5. Terminal 2 and 8 (press set)	Battery voltage	Wiring, set switch cassette
6. Terminal 5 and 8 • Rotate left-rear wheel, right-rear wheel remains on ground	0-12V fluctuating 6 times per revolution	Wiring, speed transducer

VACUUM SYSTEM • VACUUM PUMP TESTS

Connect a jumper wire between: Terminal 4 and 8 & 7 and 8 • vacuum pump must run and fully retract activator diaphragm. Remove jumper from Terminal 4 (7 & 8 still connected). Pump stops, but diaphragm remains retracted. Remove jumper from Terminal 7 • diaphragm extends.

If results are not as specified check: vacuum hose/connections, vent valve/adjustment, wiring to vacuum pump, vacuum pump.

ROAD TEST

CAUTION: DO NOT ENGAGE CRUISE CONTROL WHEN THE VEHICLE IS BEING USED IN LOW TRANSFER GEARS

WARNING: The use of cruise control is not recommended on winding, snow covered or slippery roads or in heavy traffic conditions where a constant speed cannot be maintained.

1. Start the engine and depress the main control switch to actuate the cruise control system. Accelerate to approximately 30 mph (50 km/h) and operate the 'set/acc' switch, immediately release the switch, remove the foot from the accelerator pedal, the vehicle should maintain the speed at which the 'set/acc' switch was operated.
2. Operate the 'set/acc' switch and hold at that position, the vehicle should accelerate smoothly until the switch is released. The vehicle should now maintain the new speed at which the 'set/acc' switch was released.
3. Apply the 'res/decel' switch while vehicle is in cruise control mode, the cruise control should disengage. Slow to approximately 35 mph (55 km/h), operate the 'res/decel' switch, immediately release the switch and remove the foot from the accelerator, the vehicle should smoothly accelerate to the previously set speed. Increase the speed using the accelerator pedal and release the pedal, the vehicle should return to the previously set speed.

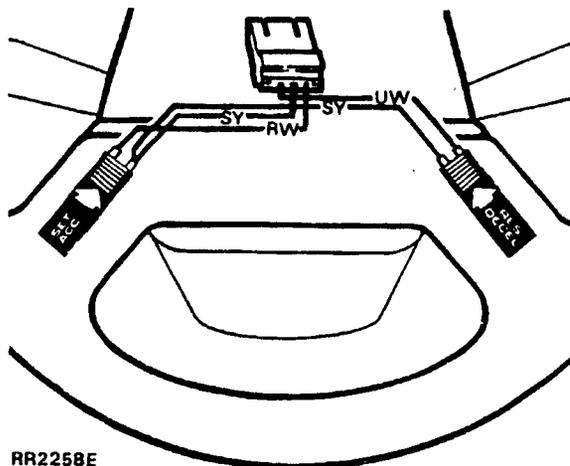
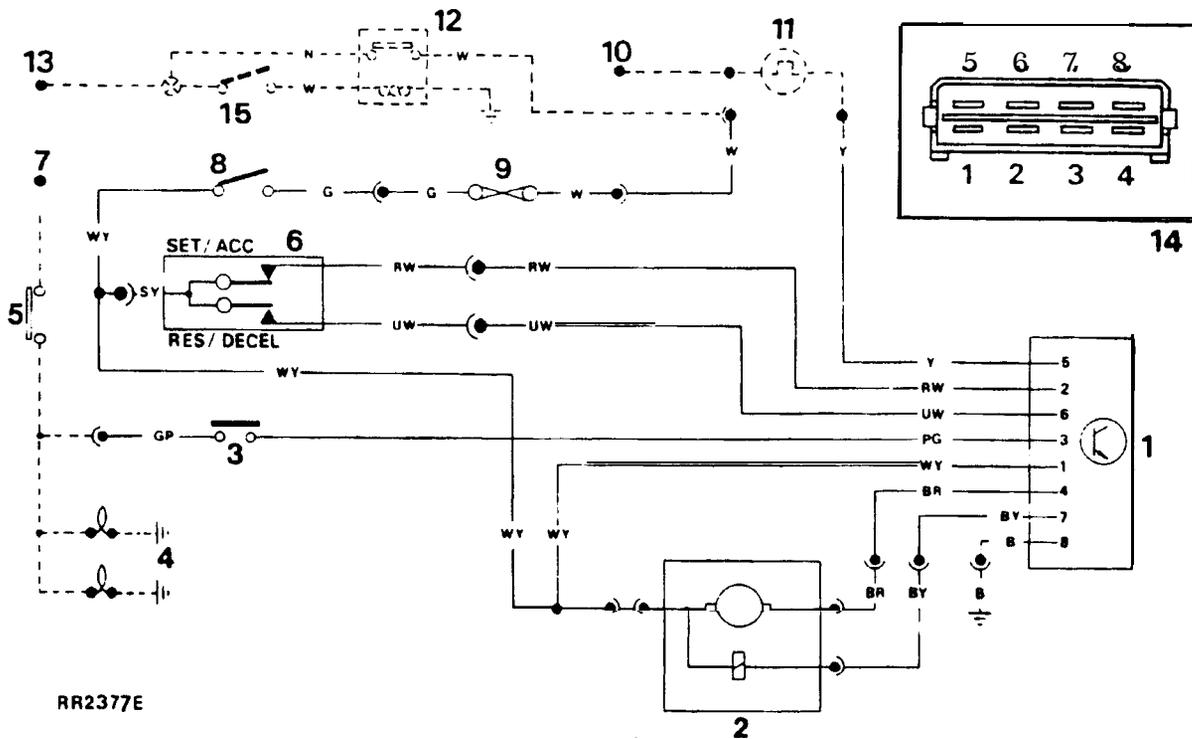
4. Operate the brake pedal, the cruise control system should immediately disengage returning the vehicle to driver control at the accelerator pedal. Operate 'res/decel' switch, vehicle should accelerate to previously memorised set speed without driver operation of the accelerator pedal.
5. Operate 'res/decel' switch and allow vehicle to decelerate to below 26 mph (42 km/h). Operate 'res/decel' switch, cruise control system should remain disengaged.
6. Operate the 'set/acc' switch below 28 mph (45 km/h), the cruise control system should remain disengaged. Accelerate, using the accelerator pedal to above 28 mph (45 km/h), operate 'res/decel' switch, and remove the foot from the accelerator pedal, vehicle should smoothly adjust to the previously memorised speed.
7. Depress the main control switch in the auxiliary switch panel, cruise control system should immediately disengage and erase the previously set speed from the E.C.U. memory.

CRUISE CONTROL-circuit diagram

- 1. Electronic cruise control unit.
- 2. Vacuum pump.
- 3. Brake switch/vent valve.
- 4. Stop lamps.
- 5. Brake switch.
- 6. Steering wheel set and reset switches.
- 7. Ignition supply to stop lamp circuit.
- 8. Cruise control switch • auxiliary switch panel.
- 9. Fuse A6-auxiliary fuse panel (7.5A).
- 10. 12V+ supply to speed transducer.
- 11. Speed transducer.
- 12. ignition load relay • item 1 main circuit diagram.
- 13. Battery feed.
- 14. Cruise control harness multi-plug pin identification.
- 15. Ignition switch • item 8 main circuit diagram
- ... Denotes existing main cable circuit.

Cable Colour Code - The last letter of a colour code denotes the tracer.

- | | | | |
|-----------|-----------|----------|---------|
| W. White | G. Green | U. Blue | R. Red |
| Y. Yellow | P. Purple | B. Black | S. Grey |



EARLY MODELS • Wiring identification

Illustration RR2258E shows the current cruise control wiring condition and colour coding from the steering wheel switches to the cassette plug, earlier models were colour coded differently and can be identified as follows:-

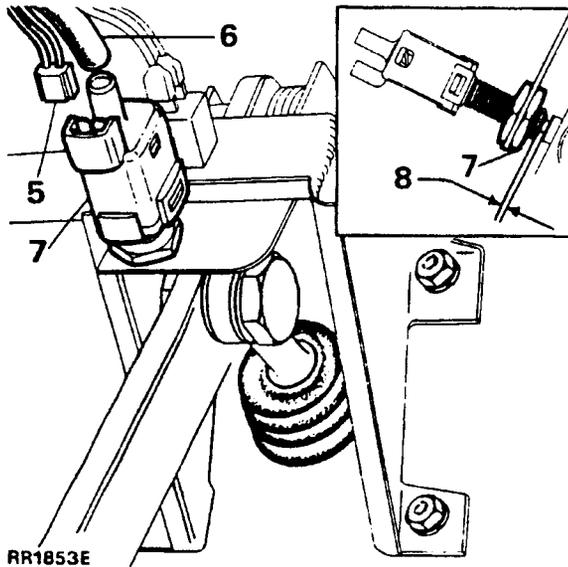
Latest condition	Early condition
Red/white	Green/red
Blue/white	Green/black
Grey/yellow	Red/blue

BRAKE SWITCH-VENT VALVE

Remove and refit

Removing

1. Disconnect the battery negative terminal.
2. Remove the six screws securing the lower dash panel.
3. Lower the panel and disconnect the rheostat switch multi-plug and remove the warning lamp control unit from the retaining clip.
4. Withdraw the lower dash panel from the vehicle.
5. Disconnect the electrical multi-plug from the brake switch/vent valve.
6. Pull the hose from the switch.
7. Unscrew the adjusting nut and withdraw the switch.



Refitting

8. Refit the switch and fit the adjusting nut. Adjust the valve to provide a clearance of 1.0 mm (0.039 in) between the valve body and inside shoulder of the contact button.
9. Fit the hose and multi-plug ensuring that they are secure.
10. Reverse the remaining removal instructions.

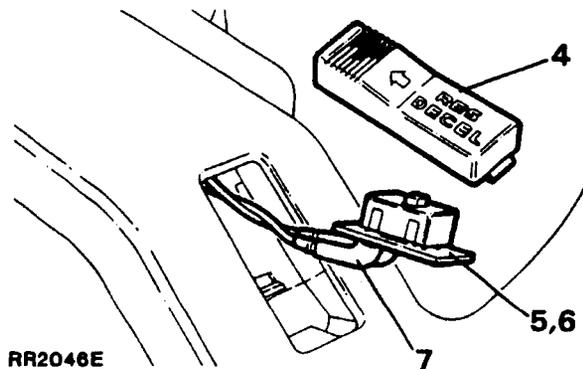
**DRIVER OPERATED CRUISE CONTROL
SWITCHES-STEERING WHEEL**

NOTE: MAIN CONTROL SWITCH. The removal and refit of the main control switch and bulb replacement is included in the Electrical Section 86, as part of the auxiliary switch panel removal.

Remove and refit

Removing

1. Disconnect the battery negative terminal.
2. Carefully pry the centre trim pad off the steering wheel.
3. Disconnect the electrical multi-plug located in the small opening below the steering wheel retaining nut.
4. Carefully pry the switch(es) out of the steering wheel spoke(s).
5. Release the small switch button from the opening within the spoke(s).
6. Carefully pull the switch and electrical leads through the spoke until access is gained to the electrical connections beneath the switch.
7. Disconnect the electrical leads from the switch and withdraw the switch(es).



Refitting

8. Reverse the removal procedure ensuring that the electrical leads are fitted securely.

SPIRAL CASSETTE

The spiral cassette is located below the steering wheel encased in the steering column shroud. Access to the unit is gained by removing the aforementioned items.

NOTE: To enable the steering wheel to be refitted in its correct radial position, ensure the front road wheels are in the straight ahead position.

Remove and refit

Removing

Service Tools:

18G 1014 Steering wheel remover

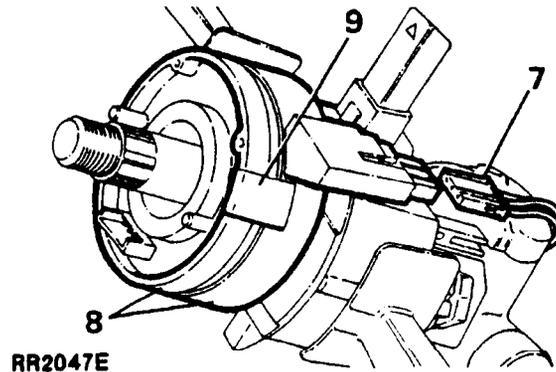
18G 1014-2 Adaptor pins

1. Disconnect the battery negative terminal.
2. Remove the steering wheel centre trim panel.
3. Disconnect the electrical multi-plug located in the small opening in the centre of the steering wheel.
4. Remove the steering wheel securing nut and serrated washer, using service tool 18G 1014 and adaptor pins, withdraw the steering wheel.

CAUTION: Apply adhesive tape to the upper and lower halves of the cassette to prevent the upper half of the spiral cassette rotating after the steering wheel is removed. Failure to do this will result in damage to the flexible tape inside the cassette.

5. Remove the six lower fixings securing the steering column shroud.
6. Release either the left hand or right hand fixing securing the top of the shroud.

7. Carefully ease the two halves of the shroud apart until access is gained to the electrical multi-plug on the bottom half of the cassette and disconnect the multi-plug.
8. Withdraw the cassette from the steering column.



Refitting

9. Remove the adhesive tape retaining the upper and lower halves of the spiral cassette.

NOTE: Ensure that the two driving pegs on the spiral cassette locate in the two holes on the underside of the steering wheel before refitting the steering wheel securing nut.

10. Reverse the removal instructions, ensuring that all electrical leads located beneath the steering column shroud are arranged so they do not become trapped between the shroud mating faces.

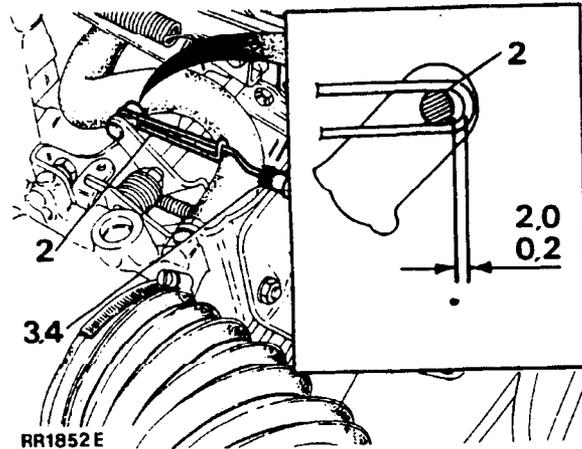
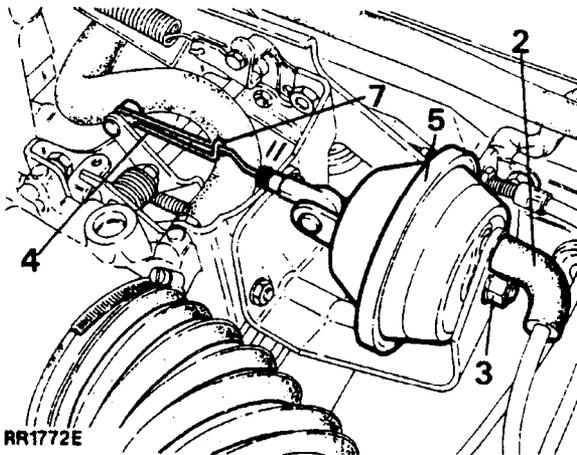
ACTUATOR

NOTE: The actuator itself is not a serviceable item, in the event of failure or damage fit a new unit.

Remove and refit

Removing

1. Disconnect the battery negative terminal.
2. Pull the short rubber elbow from the actuator.
3. Remove the nut securing the actuator to the throttle bracketry.
4. Detach the actuator from the bracket and maneuver the actuator operating link off the throttle lever.
5. Withdraw the actuator from the engine compartment.



Adjust the link

3. Remove the link from the actuator.
4. Rotate the socket joint on the actuator link clockwise or counter-clockwise to decrease or increase the operating length of the link.
5. Refit the link to the actuator and recheck the clearance between the link and lever.
6. With the throttle fully open, check that a gap of at least 3mm (1/8") exists between the side of the actuator link ("A" in illustration) and the side of the small spring which connects the inner throttle level to the outer throttle lever ("B" in illustration). Realign the actuator link by bending to achieve the correct gap if it is less than 3mm. Recheck the clearance at closed throttle/open throttle and check that the actuator link slides smoothly in the groove of the throttle lever.

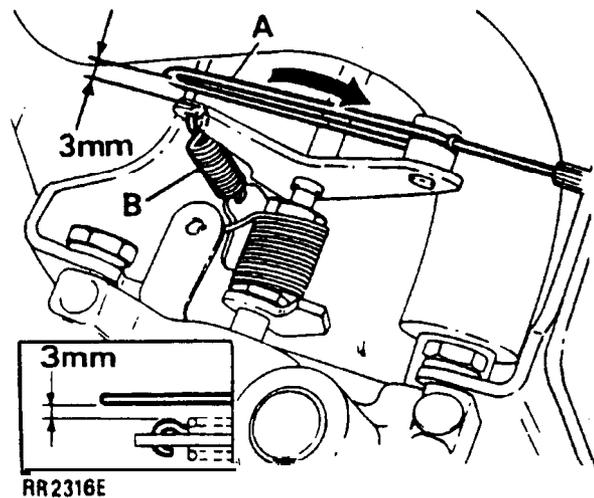
Refitting

6. Inspect the rubber diaphragm for condition. Fit a new Actuator assembly if the diaphragm is in poor condition.
7. Reverse the removal procedure, ensuring that the hook is fitted uppermost

ACTUATOR LINK-SETTING

NOTE: The setting procedure outlined is at minimum throttle condition only.

1. Ensure ignition is switched 'OFF'.
2. Check the clearance between the inside edge of the actuator link and recessed diameter of the throttle lever. Clearance should be 0.2 to 2.0 mm (0.008 to 0.080 in).

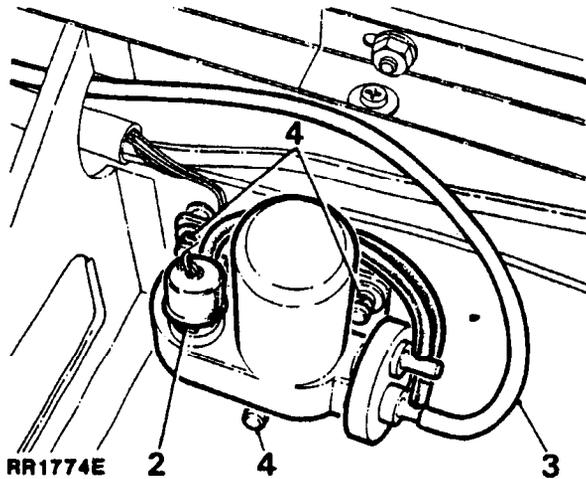


VACUUM PUMP

NOTE: The vacuum pump is not a serviceable item, in the event of failure fit a new unit.

Remove and refit**Removing**

1. Disconnect the battery negative terminal.
2. Disconnect the multi-plug from the top of the vacuum pump.
3. Disconnect the vacuum feed hose from the vacuum pump.
4. Withdraw the three vacuum pump rubber mountings from the left hand valance/inner fender assembly.



5. Withdraw the pump from the engine compartment.

Refitting

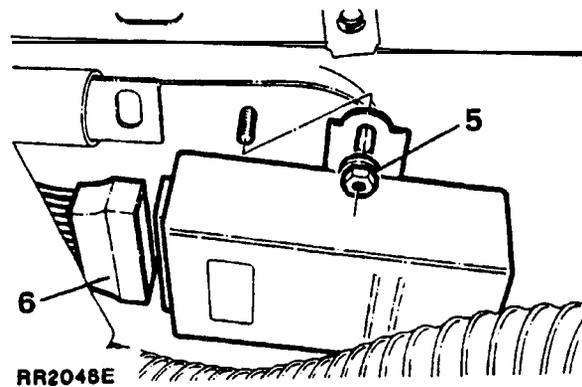
6. Reverse the removal procedure ensuring that the hose and electrical connections are secure.

**ELECTRONIC CONTROL UNIT (ECU)
- CRUISE CONTROL.**

The cruise control electronic control unit (ECU) is located behind the lower dash panel below the steering column, and is attached to the underside of the instrument binnacle, access to the ECU is gained by removing the lower dash panel.

Remove and refit**Removing**

1. Disconnect the battery negative terminal.
2. Remove the six screws retaining the lower dash panel.
3. Lower the panel and disconnect the electrical multi-plug from the rheostat switch and detach the warning lamp control unit from the retaining clip.
4. Withdraw the lower dash panel from the vehicle.
5. Remove the two fixings to enable the ECU to be lowered to give access to the electrical multi-plug.
6. Disconnect the multi-plug to the ECU, and remove the unit from the vehicle.

**Refitting**

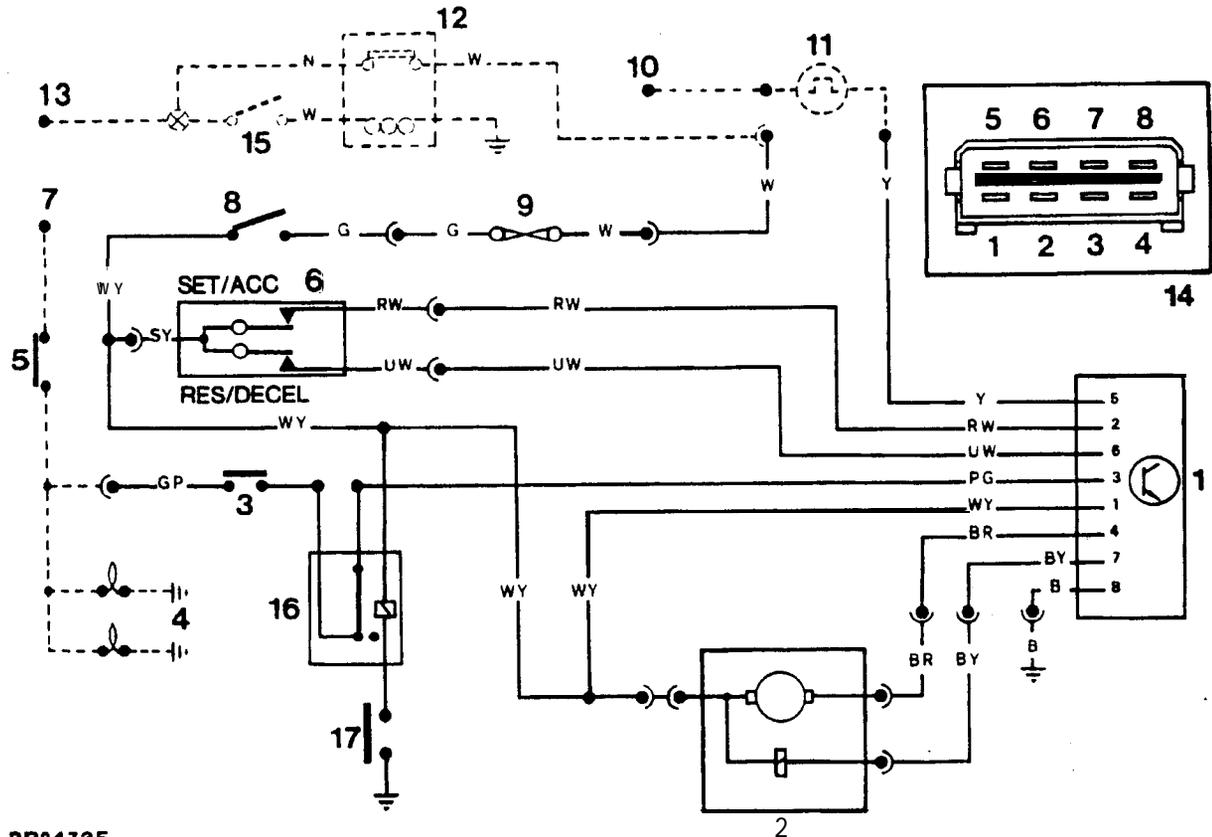
7. Reverse the removal instructions ensuring that the electrical multi-plug is securely reconnected.

CRUISE CONTROL - Circuit diagram
- 1989 Model Year

- | | |
|---|--|
| 1. Electronic cruise control unit | 10. 12V + supply to transducer |
| 2. Vacuum pump | 11. Speed transducer |
| 3. Brake switch/vent valve | 12. Ignition load relay-item 1 main circuit diagram |
| 4. Stop lamps | 13. Battery feed |
| 5. Brake switch | 14. Cruise control harness multi-plug identification |
| 6. Steering wheel set and reset switches | 15. Ignition switch-item 8 main circuit diagram |
| 7. Ignition supply to stop lamp circuit | 16. Relay - neutral lockout |
| 8. Cruise control switch-auxiliary switch panel | 17. Start inhibit switch |
| 9. Fuse A6-auxiliary fuse panel (7.5A) | ... Denotes exiting main cable circuit |

Cable colour code-the last letter of a colour code denotes the tracer.

- | | | | | |
|----------|----------|---------|--------|---------|
| W White | G Green | U Blue | R Red | N Brown |
| Y Yellow | P Purple | B Black | S Grey | |



RR2473E

ECU multi-plug identification

TERMINAL NO.	COLOUR	FUNCTION
1.	White/Yellow	Main power from master switch
2.	Red/White	12V + from set switch (when pressed)
3.	Purple/Green	Ground via vent valve switch, brake light filaments. neutral relay
4.	Black/Red	To vacuum pump motor
5.	Yellow	To speed transducer
6.	Blue/White	12V + from resume switch (when pressed)
7.	Black/Yellow	To vacuum pump solenoid valve
8.	Black	ECU ground

NEUTRAL LOCKOUT RELAY-CRUISE CONTROL

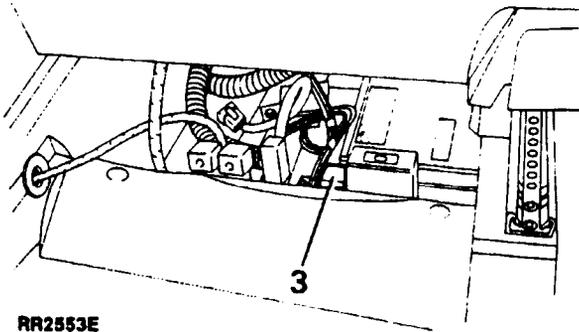
1989 Model Year vehicles have a relay in the electrical circuit which will disengage the cruise control system if neutral, or park, is selected in the main gearbox, when the system is engaged.

The relay is located under the rear of the front right hand seat adjacent to the emission maintenance reminder. Access to the unit is gained through the opening at the bottom of the seat when the seat is in its fully forward position.

Remove and refit

Removing

1. Ensure the seat is adjusted fully forward.
2. Disconnect the battery negative terminal.
3. Pull the relay from the terminal block.



RR2553E

Refitting

4. Reverse the removal instructions.

FAULT DIAGNOSIS

If the system does not function the following checks must be carried out,

- Fuse A6 • intact (C5 1990 Model Year).
- Vacuum hoses • not split or disconnected
- Actuator • diaphragm ruptured
- Vacuum Pump • motor operational
- Brake Switch • faulty or out of adjustment
- Speed Transducer • faulty • check operation of unit
- Electrical Leads • loose connections • faulty leads
- Stop Lamp Bulbs • both bulbs faulty • replace: Fuse 13 intact, (A5 1990 Model Year)
- Neutral Relay • operational.

PRELIMINARY CHECKS PRIOR TO TESTING

1. Ignition switch "ON".
2. Fuse A-6 "OK".
3. Cruise Control master switch "ON".
4. Shift lever in 'D'.
5. Minimum 12.0V (Battery) available.

CRUISE CONTROL OPERATIONAL CHECKS

All system testing may be performed with a multi-meter and jumper wire at the ECU connector.

TEST PROCEDURE

Volt Meter Connections	Specified Result	Possible Problem if Results not as Specified
1. Terminal 1 and ground	Battery voltage	Fuse, wiring, master switch
2. Terminal 1 and 8	Batter voltage	Poor ground
3. Terminal 1 and 3	Battery voltage	Brake light ground, vent valve switch, wiring, brake light bulbs
4. Terminal 6 and 8 (press resume)	Battery voltage	Wiring, resume switch, cassette
5. Terminal 2 and 8 (press set)	Battery voltage	Wiring, set switch cassette
6. Terminal 5 and 8 • Rotate left-rear wheel, right-rear wheel remains on ground	0-12V fluctuating 6 times per revolution	Wiring, speed transducer

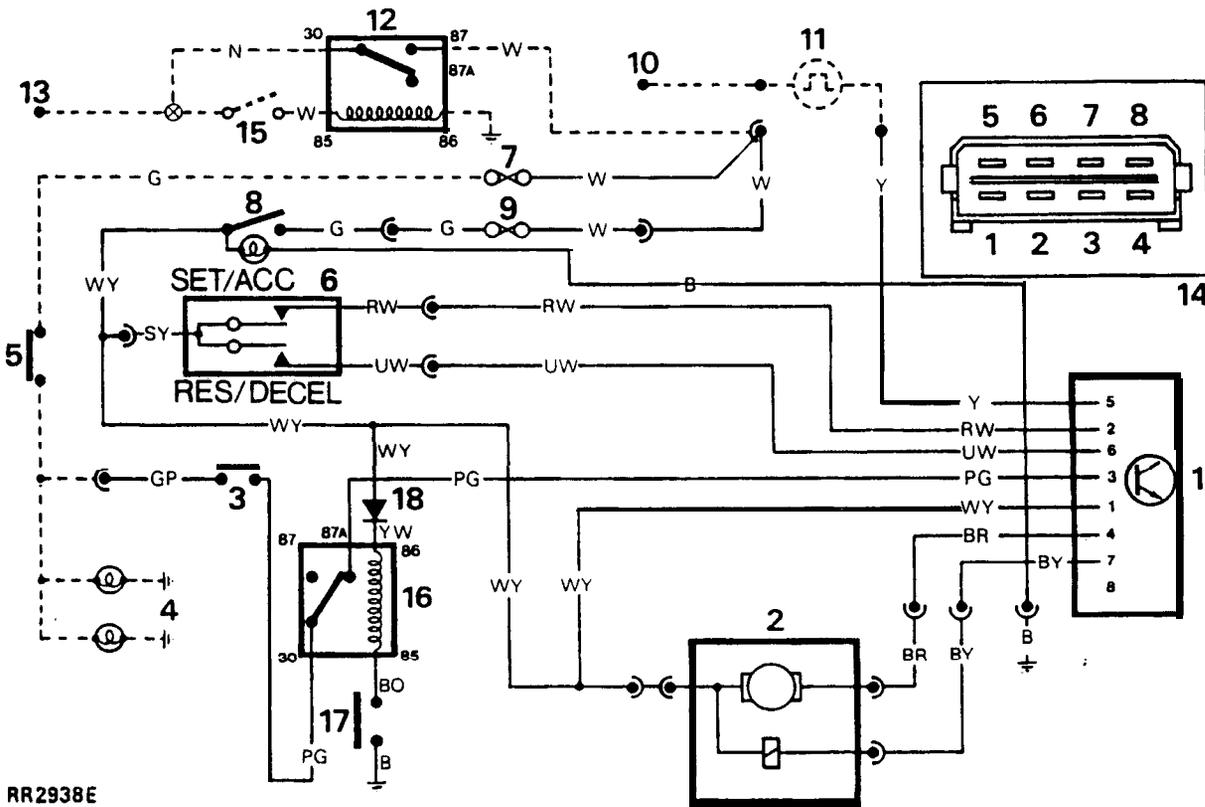
NOTE: Complete test procedure **by** carrying out the Vacuum System Test and Road Test procedure • see page 3, Section 19 • Cruise Control.

CRUISE CONTROL - Circuit diagram
 • 1990 Model Year onwards

- | | |
|--|--|
| 1. Electronic cruise control unit | 10. 12V + supply to transducer |
| 2. Vacuum pump | 11. Speed transducer |
| 3. Brake switch/vent valve | 12. ignition load relay-item 1 main circuit diagram |
| 4. Stop lamps | 13. Battery feed |
| 5. Brake switch | 14. Cruise control harness multi-plug identification |
| 6. Steering wheel set and reset switches | 15. Ignition switch-item 8 main circuit diagram |
| 7. Fuse AS | 16. Relay - neutral lockout |
| 8. Cruise control switch-auxiliary panel | 17. Start inhibit switch |
| 9. Fuse C5 (10A) | 18. Diode |
- Denotes exiting main cable circuit

Cable colour code the last letter of a colour code denotes the tracer.

- | | | | | |
|----------|----------|---------|--------|---------|
| W White | G Green | U Blue | R Red | N Brown |
| Y Yellow | P Purple | B Black | S Grey | |



RR2938E

ECU multi-plug identification

TERMINAL NO.	COLOUR	FUNCTION
1.	White/Yellow	Main power from master switch
2.	Red/White	12V + from set switch (when pressed)
3.	Purple/Green	Ground via vent valve switch, brake light filaments. neutral relay
4.	Black/Red	To vacuum pump motor
5.	Yellow	TC speed transducer
6.	Blue/White	12V + from resume switch (when pressed)
7.	Black/Yellow	To vacuum pump solenoid valve
8.	Black	ECU ground