Mercedes W124 Cruise control diagnostics

1982-1995 Electric Servo Cruise Control Diagnostics

These diagnostics are for use with the 14-pin type cruise control system found on Mercedes made from 1982 to approximately 1995.

Please note that not all cars had this type of cruise control. Around 1991 Mercedes launched the ASR system, combining ABS with cruise and idle control to give birth to a traction control system. If your car has ASR then it does not have this 14-pin type cruise control system.

STEP 1 - Preliminary Checks
Is your Speedometer working OK? If you've got no speedometer, then the cruise control is likely not getting a speed signal either.

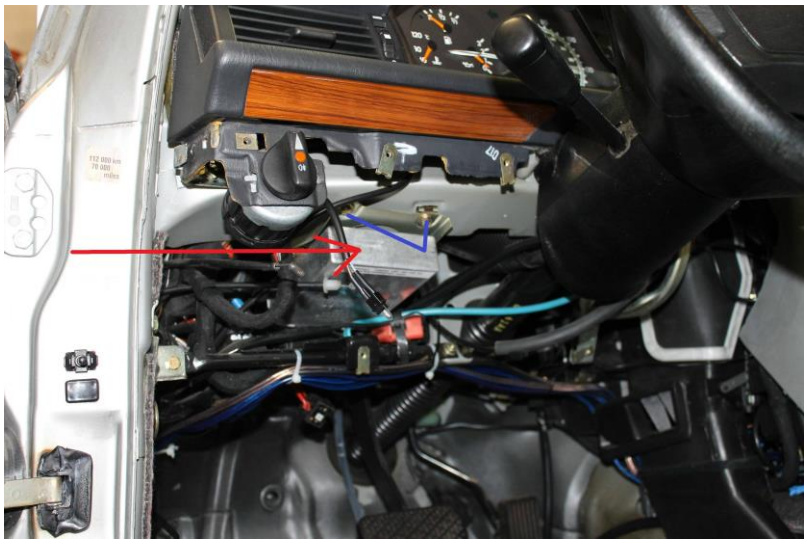
On the 124/201/123 chassis cars:
Your speedometer is cable driven. A small shaft spins inside of a cable and that drives your speedometer needle. On the back of the speedometer there is a sensor to pick this signal up and convert it to electrical signals for the cruise and other components. If your speedometer needle bounces a bit, it CAN cause problems for the cruise control. This was the case on my 300D 2.5, I had a 5 mph bounce in the speedometer needle at times, this made the cruise control buck and surge a lot! A new cable is $60-$100. The later model 124 (93+) have electronic speedometers and are not affected by this.

All Brake Light bulbs intact? The cruise system gets a critical signal by tapping into the brake light circuit. If you've applied the brakes, this will disable the cruise system. If you're brake lights are not working or you have a bulb out that might effect that signal and cause the cruse system to malfunction.

If you've check out all of the above, go to step 2.

STEP 2 - Road Test
Test the cruise first on the road. Once above 30 mph, hit the cruise control stalk in the 'accel set' direction. If it tries to work, engages momentarily, then your problem is *most likely* the cruise amplifier, see #3. If it does not work at all see #4.

STEP 3 - Possible Amplifier Repair Needed



124 Location Description:

You'll first have to remove the driver's side lower dash piece. The 124's cruise control is located just to the left of the steering column. It is mounted on a bracket which is held in by two bolts (indicated by the blue lines in the photo. Once you remove these bolts you'll be able to access the amplifier easily. Note that the cruise controls that I service might not be installed on all models. Around 1993 Mercedes switched to a different engine management system and some cars cruise control were routed to it (typically 300/400/500E). If you are in doubt, drop me an email with your VIN and I can check for you.

As a precautionary measure before changing the amplifier to a new working unit, you should check out the health of your cruise control actuator, See Step 5.

STEP 4 - Signal Testing

Test the signals being sent to the cruise control unit. The cruise control stalk might not be working properly or your brake disengage might not be working.

Cruise Control Signal Testing

Testing the Cruise Control's Voltage Signals:

The 14-pin connector contains a few connections that can easily be tested with a cheap voltmeter/digital multimeter.

These connections are crucial to the operation of the cruise system. As they provide the unit with power, switch settings and brake signals.

If any of these numbers do not match, you most likely have a wiring issue or perhaps bad cruise control switch:

Step 1)
-Put your meter into the Volts DC range (20 VDC if you have manual range settings).

-Ground the black probe to a known ground or you can use pin 12 or 14. One of them might not have a pin in the harness that is OK.

Step 2)
During this step you will need to place your red/positive probe into the pin below and if necessary toggle the cruise stalk in the appropriate direction or apply the brake pedal.

-Test for voltages:

Pin 1 - Power - Should Read Battery Voltage (~12V)
Pin 2 - Decel/Set - 0 Volts initial, Battery Voltage when toggled.
Pin 3 - Off - Battery Voltage initially, 0 when toggled
Pin 4 - Accel/Set - 0 Volts initial, Battery Voltage when toggled.
Pin 6 - Resume - 0 Volts initial, Battery Voltage when toggled
Pin 8 - Brake Pedal - 0 Volts initial, Battery Voltage when toggled.

If everything checks out go to #5, if not, you probably have to replace the cruise control stalk. I've not really seen many broken/bad ones but it's always possible. If the brake disengage pin does not pass, then you'll need to investigate the brake switch at the brake pedal assembly.

STEP 5 - Actuator Testing

Test the cruise control actuator and make sure the linkage is connected! As the cruise control actuator ages, it will tend to draw more current from the cruise control amplifier, there is a limit on what the amplifier can provide. Should the actuator draw past this limit then there is a good chance that eventually it will kill the amplifier.

Testing the VDO Cruise Control Actuator

The cruise control actuator consists of the following items:

1) DC Motor
2) Solenoid
3) Position Feedback Potentiometer
4) 3 Gears

The first thing we should to when evaluating the health of your cruise actuator is to perform a series of resistance checks. These checks will tell us the health of items 1-3 above. Items 4 will be checked when you perform the current draw test below.

I've listed the tests in the below image and I've included the values from my actuator that I use for bench testing.

Note: In the chart below, ground refers to pin 1 on the actuator as it is the ground for the actuator.

CRUISE CONTROL PIN OUT

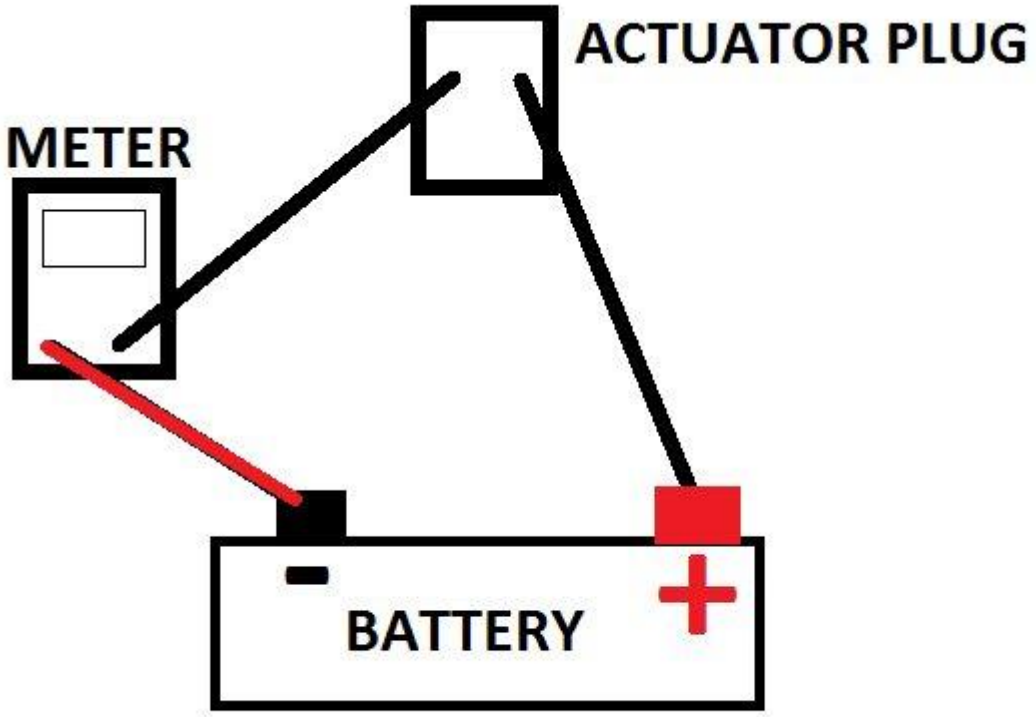
Actuator Resistance Health Check

Measure @ Pins	Tests	Expected Values	My Values
2 to 3	Pot Wiper to Pot End	Near 0 Ohms	1.4 Ohms
3 to Ground	Pot Total Resistance	2.8 Kohms to 4.0 Kohms	2.8 K Ohms
7 to Ground	Solenoid	Infinity or Near 40 Ohms (Depending On Model)	Infinity
4 to 5	Motor Bush	3 to 30 Ohms	12 Ohms
4 to Ground	For Motor Brush Short	Infinity	Infinity
5 to Ground	For Motor Brush Short	Infinity	Infinity

Next we want to check the current draw on that DC motor. As too much current can damage the amplifier. You want to monitor current when pins 4 and 5 are connected to power. Ideally you should see between 120-180mA or .12-.18 Amps.

I've see units with .2-.22 that still function normally. If you're up near 250mA or .25 I'd say it's time to consider changing up the actuator. I don't have the abilities to rebuild the actuators so you will have to look at either a used unit or a rebuilt unit.

When you test current you want to place your multimeter in series with the object in test. That means to put the meter in the path of current flow. This differs from when you check voltages. When you check voltage you put the meter in parallel with the object in test.



1) You'll need access to a power supply of 12-13.5V. Some spare wire and your car's battery will do. I use an old computer power supply.

2) You'll need a meter that will measure DC current. Most cheap meters will do this. For this demonstration I'll use a cheap Cen-Tech meter I bought on Amazon. Here's the one I've got, also available from Harbor Freight Cenn-Tech 90899 I also have a more expensive Triplett 9045 unit.

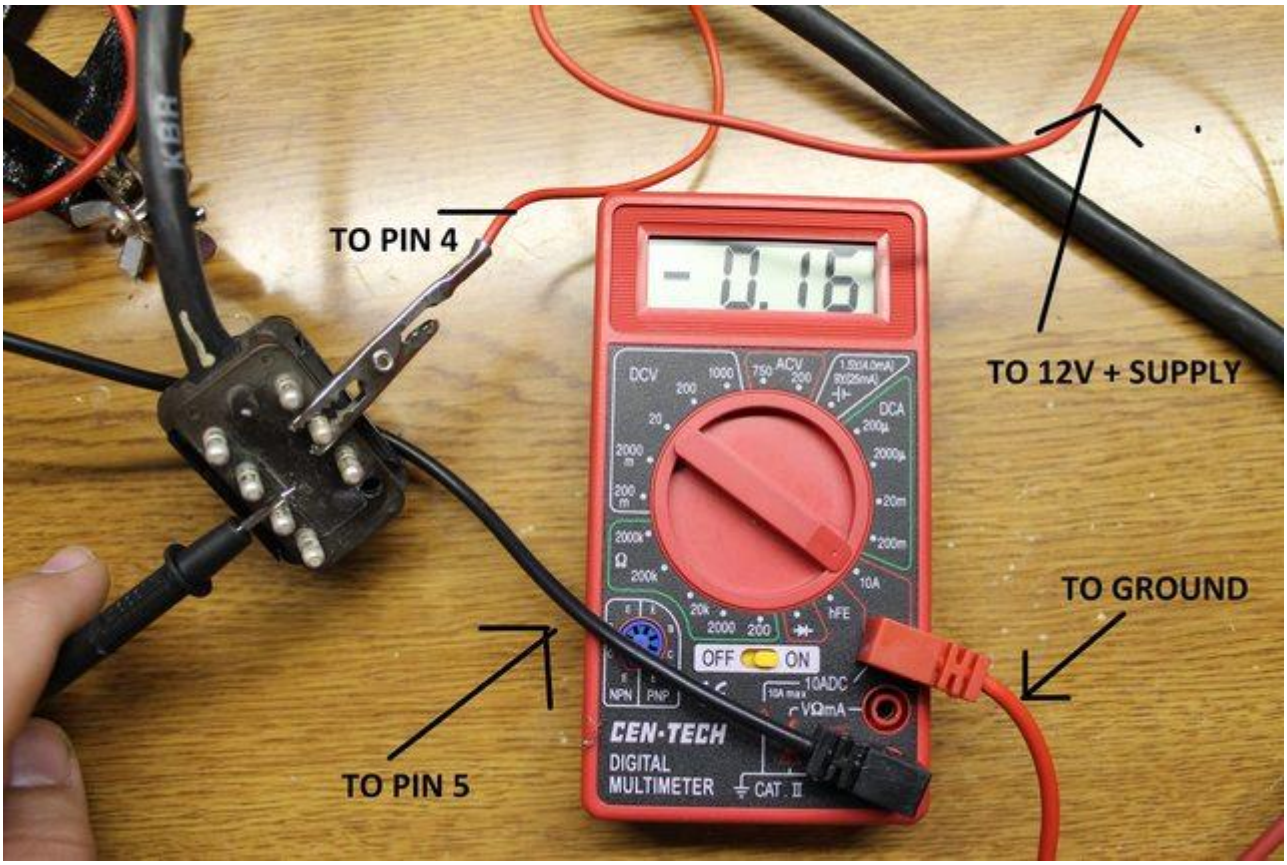
3) Next you'll want to configure the meter properly. Most meters will have a 10A position somewhere on it. This means it can handle up to 10 Amps of current. You'll want to use this as most of these meters are fused to a low current. This also will avoid confusion trying to interpret the results on the display. The display will show in amps. In addition to setting the dial to 10A you'll need to put the red lead in the 10A position. See photo below.

4) You'll want to wire a solid connection from either side of the battery or power supply. For this demonstration I chose to connect the 12V supply to the actuator's pin 4.

5) Next you'll place the meter in the path of the other wire as shown in the picture above.

6) Turn on your power supply or tap the lead to pin 5. You should hear the motor whur and a reading should appear.

7) Now we want to ensure the solenoid is functioning, to do this simply ground pin 6 and tap 12V to pin 7. You should hear a loud click. Only tap for a brief second.



If this checks out, go to #6, otherwise replace the actuator with one that tests out OK and start back at #1.

STEP 6

Well, if you've tested everything that I've said the only thing left to be faulty is the cruise control amplifier, or a broken wire.

Continuity testing is typically performed if you want to make sure that there are no breaks in a wire. At our cars' age it's always a possibility.

To begin this testing all you will need is a multi-meter, a length of wire, and a helper! This test is done with both the actuator and the amplifier disconnected and the car off!

Step 1) Set Multi-Meter to Resistance mode or Continuity mode if so equipped.

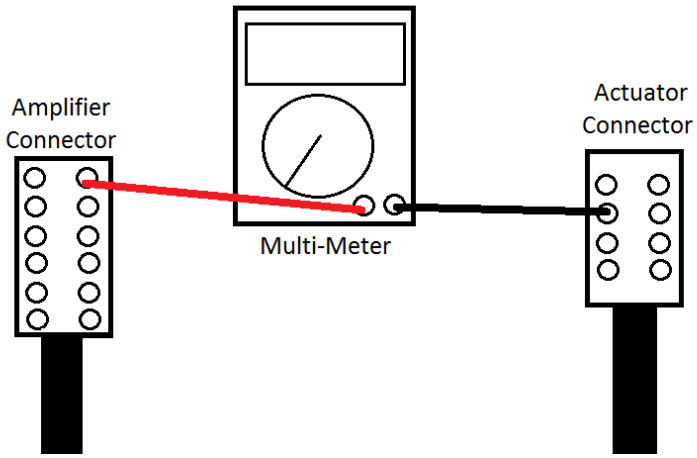
Note: DO NOT HOOK UP THE LEADS AS SHOW IN THE PICTURE. RED LEAD SHOULD BE IN THE VOLTS/RESISTANCE TERMINAL (MIDDLE TERMINAL)

Resistance mode range on this meter is in the blue box. Set it to the 2000 or 200 range.

Step 2) Use the table below to connect your probes. You will need a length of wire to extend one of the probes to be able to reach the connector.

Simply connect one probe to the pin indicated in the amplifier connector (yellow). Then connect the other probe to the associated pin on the actuator connector (blue)

The meter will read out a value if you have continuity between the two points. It it does not read anything and simply says "1____" try adjusting the range to a higher setting. If you still see no value then there is a break in the wire somewhere.



CRUISE CONTROL PIN OUT - Continuity Testing

14-Pin Connector Electromechanically Actuated System

Amplifier Pin	Wire Color W126	Wire Color W123	Wire Color W201	Function	Actuator Pin	Function
1	Black / Pink	Red / Yellow	Black / Yellow	Power: 12Vdc		
2	Yellow / Green	Yellow / Green	Yellow / Green	Decel/Set (from switch)		
3	Grey	Grey	Grey	On/Off (from switch)		
4	Green	Green / Red	Grey / Red	Accel/Set (from switch)		
5	White	White	White	Actuator Engage Solenoid (output)	7	Engage Solenoid
6	Blue/Red	Blue / Red	Blue / Red	Resume (from switch)		
7	Black	Black	Black	Motor Control	4	Motor
8	Black/Red	Black / Red	Yellow / White	Brake Disengage (brake light bulbs)		
9	Violet	Red	Red	Actuator Positional Feedback	3	Potentiometer End
10	Blue	Blue	Blue	Motor Control (output)	5	Motor
11	Green/Black	Green / Yellow	Green / Yellow	Speed Signal		
12	Brown	Brown	Brown	Ground	1, 6	Grounds
13	Yellow	Yellow	Yellow	Actuator Positional Feedback	2	Potentiometer Wiper
14	Brown	Brown	Brown	Ground		