

BCI – Diagnosis step by step

Dear installer,

Analogue connection points from cars, necessary for aftermarket systems such as telematics, taximeters and cruise controls, are not always suitable to connect or often no longer present. A Beijer CAN Interface (BCI) offers a solution and provides these systems with good and reliable signals, such as a speed signal. However, if such a system does not function properly immediately after the installation, it must be checked whether all the conditions for a successful installation have been met. In that case, we distinguish BCI conditions and external factors. The following step-by-step plan can help you to make a good diagnosis and solve problems, without needing to call in third parties.

BCI conditions

A BCI can only function properly if the following conditions are met:

Step 1 | Is the BCI software version suitable for the car?

Prior to every BCI-installation, it's necessary to research if the software version of the BCI is suitable for the relevant car. You can find the software version on the back of the BCI, on a white sticker. It consists of 15 characters and starts with the letter 'P': P*.****.*.*****.***.

If the software version is known, you can check on the corresponding Application List whether the BCI is suitable for the car. The corresponding Application List can be found by entering the software version in this link: [Beijer Application Lists](#). Scroll on the Application List to the correct car model and determine the best BUS-ID based on the required outputs. Enter the BUS-ID on INCAR home. Connect the BCI according to the CAN connections belonging to that BUS-ID from the INCAR instruction.

If it turns out that the BCI is *not* suitable for the vehicle, or if the software version is too old and an Application List does not open, please contact your supplier. If the BCI is suitable for the car, continue to the next point.

Step 2 | Wire color of the CAN-connections

We now know for sure that the BCI must function in the car in question. The next question is whether the BCI is also connected to the correct CAN wire colors of the car and whether, for example, the CAN-High and CAN-Low connections have not been interchanged. The INCAR instruction (the one-time login can be found on the BCI Quickstart) describes exactly which wire color is CAN-High and which wire color is CAN-Low. If all that is also correct, continue to the next point.

Step 3 | The location of the CAN-connections

If the problem is still not solved, despite the BCI being connected to the prescribed wire colors, the question is where in the car the CAN-connections were made? Are these the CAN-connections that are prescribed in the INCAR instruction or is the BCI connected to another location with the same wire colors? It is important that always the prescribed location, mentioned in the INCAR instruction

of the specific car is used. This is relevant since it is uncertain if the BCI will function properly in the car at another location with the same CAN-wire colors.

If the location differs, connect the BCI to the prescribed location and check if it works again.

It could also happen that there are *two* sets of CAN-wires in the car in *one* wire bundle, of which only one set works. In that case, first try the other set.

Please note: take out the plug from the BCI before changing the connections! If all these conditions are met and the system still does not function properly, continue to the next point.

Step 4 | Check the power, permanent 12V (30)

If the used CAN-connections are the same as the prescribed CAN-connections, the question is if the power is connected correctly. The power has to be *permanent 12V (30)*. This means that the power can not fall out. Neither after some time if the car is already completely at rest.

Please note: connecting a BCI to a permanent power may not result in any battery problems, because the BCI uses a negligible amount of current (<1mA). If the connected power seems to fall out after all, the BCI will start to initialize again and again as soon as the power comes back up after it fell out.

An undesirable situation, because the system will not directly get the desired signals from the BCI because of that.

Please note: although the battery is not always accessible, a fused power coming directly from the battery is preferable. Namely car manufacturers more often choose to switch off powers over time (f.e. 1-2 hours), that seem permanent at first sight.

Step 5 | Check the ground (31)

If the power is connected correctly and permanently present, only a wrong ground-connection could stand in the way of a properly functioning system. The fact that a ground-connection has to be made properly, preferably soldered at an original ground point, is obvious. Something that not everybody knows, is that the BCI should always be connected to the same ground point as the system. If this has not happened and one of the ground contacts does not make 100% contact with the chassis, for example because of excessive paint, air or the welding construction of the bodywork, this can already result in a low resistance, through which a current can start flowing between the two separate ground contacts. Depending on the resistance this can lead to voltage surges of about a few volts! An undesirable situation that can be prevented by using only one ground point for all units.

External factors

If all upper conditions for a correct installation of the BCI are met, and the system still does not work properly, then check if the next *external factors* might play a role.

Step 6 | Is there CAN-activity?

Without CAN-activity in the car, a BCI will never be able to work. To determine if CAN-activity is present, a few conditions have to be met first.

Is the ignition of the car switched on, or is the car in READY mode (EV)? Is the car roadworthy, with other words: is it not still in a possible Transport mode? The Transport mode is a status with new

cars that prevents the odometer to increase if the car has not been delivered to a customer yet. Cars in which the Transport mode is still active, could possibly not generate or not generate the right CAN-data.

Please note: this situation can only occur if the car is still located at the brand dealer, so when in doubt contact the specialists of the workshop. If the car is not in Transport mode anymore and the ignition is switched on there has to be CAN-activity.

If the CAN-bus generates enough data, it is possible to measure CAN-activity. This is possible with simple CAN-testers that are being offered for sale online, but also an oscilloscope or a simple voltmeter can give us a decisive answer. In the table below, the nominal values that you could measure with a voltmeter are shown.

	Hightspeed-bus	Lowspeed-bus
Value between CAN High and ground	$\pm 2.9V$	$\pm 0.4V$
Value between CAN Low and ground	$\pm 2.3V$	$\pm 4.5V$

Please note: these are average values; variation is only measurable if sufficient CAN-data is present on the bus!

Step 7 | Are all the wheels turning?

To assure that one is measuring in the right way, it is important that the engine is running and that the car is really driving, with four wheels on the ground. If the car is for example on a vehicle lift with only the driven wheels being free, it could occur that the speed value on the CAN-bus keeps on displaying zero. In that case, the system will not receive a speed. Despite the speedometer of the car maybe showing a speed. So just in case, always measure when *driving* on the road with four wheels on the ground.

Step 8 | Is the measuring speed high enough?

Thereafter, it is important that the speed of the car is high enough when measuring. The speed signal that is being placed on the CAN-bus is namely a digital, calculated signal. This requires, in contrast to an analogue signal that is being delivered directly by a wheel sensor if a wheel starts to turn, some time to appear on the CAN-bus. So, it could be possible that the system does not receive a speed signal, if the car is being pushed back and forth.

Tip: at least drive fast enough (with four wheels on the ground!) so that the speedometer of the car is increasing. If that is the case, also the system receives a speed signal from the BCI.

Step 9 | Unloaded measuring

To exclude all external influences, it is best to measure without anything being connected to the outputs of the BCI. In this way, one can measure unloaded and objectively assess whether the BCI does its job. If one thereafter measures a speed signal, the BCI will thus work properly.

If all the upper mentioned *BCI conditions* and all *external factors* are met, and the system is still not working properly, we would like to request you to contact the helpdesk of your supplier.