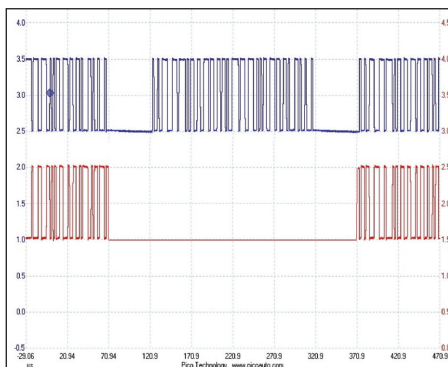


A needle in a haystack

eXponentia gets to grips with the Controller Area Network (CAN) Bus system and figures out an intermittent fault on a 2007 Citroen C8 climate control system.

I am sure we have all become aware of the complex nature of wiring used on vehicles over the last five years, and in particular, the Controller Area Network (CAN) Bus system. This month's troubleshooting guide looks at an interesting fault on a 2007 Citroen C8, when it was four years old, and was probably only worth a fraction of the original purchase price, and there lies a problem which we will discuss later on.

The fault with this vehicle was within the climate control system. For no apparent reason, the climate control system would shut down, resulting in no air being blown into the vehicle's cabin either hot or cold. At the same time the climate control instrument panel, although still illuminated, would not function. Occasionally the rear fans would work, but more often than not they wouldn't. This fault could last for just minutes or stretch out over a couple of hours, after which the system would function normally. The tri-zone climate control ECM was read by an approved repairer, who diagnosed a fault with the ECM module and the internal temperature sensor, which incorporated a small fan to pull air over the temperature sensor. These parts were replaced at a cost of £300, but within a few days the fault had returned and the car was returned to the repairer. Given the complex wiring of this particular vehicle, the garage replaced the new parts, with the original



The scope trace of the climate control circuit showed an intermittent fault, but only when the damaged wire was manipulated

old parts, refunded the customer's money, but explained that trying to track the exact cause of the problem would be prohibitively expensive, compared to what the customer had actually paid for this vehicle.



The cause of the intermittent fault: a partially cut wire that would only act up when the driver put their foot on a plate that covered the wiring loom

This is how we became involved with this vehicle. On reading the serial data from the climate control ECM, there were indeed several interesting faults, most of which seemed to indicate a CAN communication malfunction. As

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the fault was intermittent, our thoughts were that the CAN wires were either shorting together or to ground. We thought this was being caused either by movement within the vehicle chassis, or by movement of passengers within the vehicle, but where the break was and what caused it was going to take some tracking down.

After acquiring some specific wiring diagrams, we were able to trace the location and path of the particular pair of twisted wires which operated the climate control system. There were seven pairs of twisted wires on this car that were part of the climate control circuit. Once

we connected our scope, we could see our traditional CAN trace. We then started to gently move the wiring looms which contained our seven pairs of twisted wires.

Initially the scope trace remained the same, then from nowhere, we briefly saw a scope trace which indicated an open circuit on the CAN circuit. No sooner had we seen this, the scope trace returned to normal. For a further 10 minutes we could not replicate this fault, until I moved my foot and the fault returned momentarily.

On closer examination, under the rubber car mat there was a hard plastic removable plate covering the vehicle's car battery. Once the plate was removed, it could be seen that one of the wires had become trapped and was partially cut. Although the wire was not completely cut through, there was sufficient damage to the wire that caused an intermittent fault whenever the driver placed their foot on top of the cover.

I do expect we were somewhat fortunate in finding this fault relatively quickly. However, this type of fault it's going to become ever more common as these types of complex systems are now more commonly used on vehicles and will start to become even more commonplace within our workshops.