Investigations on a BMW X5 CAN Bus system

Most technicians grimace at the thought of a CAN Bus fault on a modern vehicle, and rightly so, as there can be many control units connected to the system which may have caused the fault. This can make it quite overwhelming for a technician as to where to start in the diagnosis. Here we explain how to break down the system to make it more manageable in a real-life situation.

This 2008 BMW X5 E70 3.0D came into the workshop with complaints of lots of lights on the dash and “central electronics failure” being displayed on the centre console. Also, the dash intermittently shut down completely and reactivated itself within seconds.

The first step was to plug in the Autoland iSCAN II wt and perform a control unit quick test. We found the scanner was only connecting to roughly half of the control units on the car. My first instinct was that the problem was a CAN Bus fault. To get more history on the vehicle, a quick call was made to the customer who explained that is was a sales reps car that had been lying up for a year.This problem started about a week after putting the car back on the road.

The first thing with any CAN Bus system is to do your homework. A browse through the information guru Alldata Europe will show you that there are 4 networks systems on this model BMW:

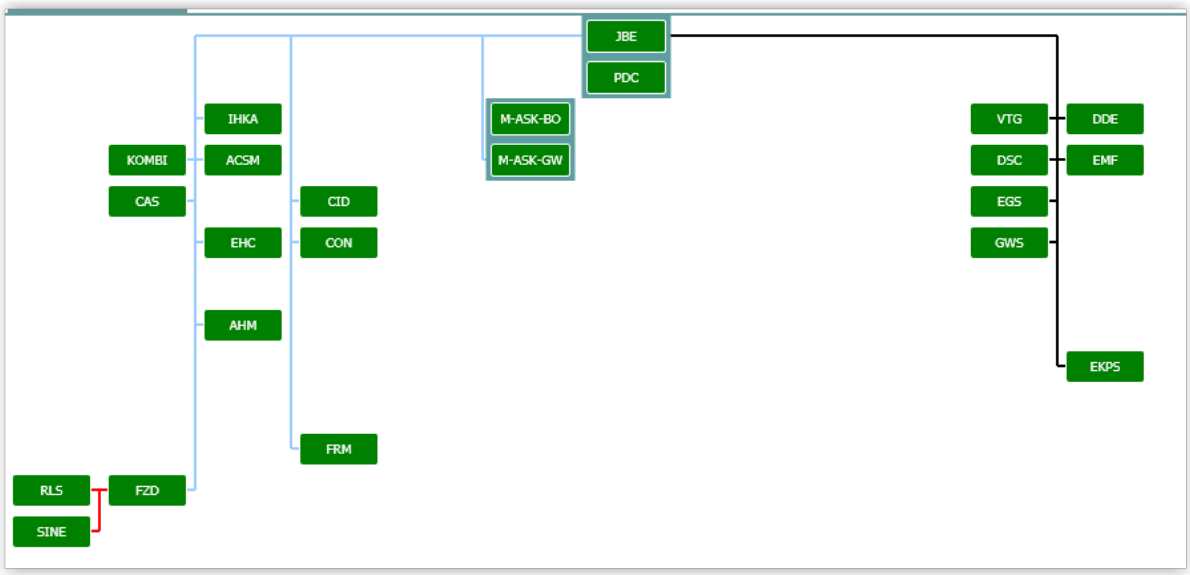
DT – CAN (powertrain CAN)

F-CAN (suspension CAN)

K-CAN (body CAN)

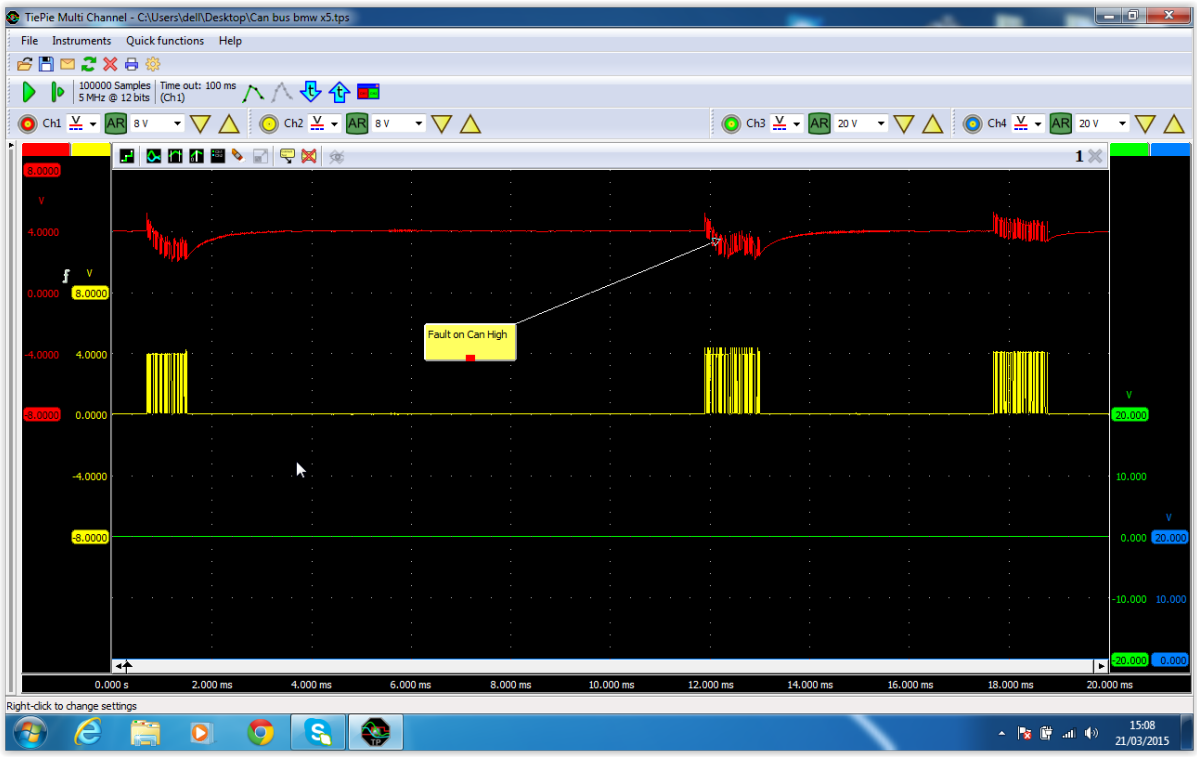
MOST (Media Oriented System Transport)

The latter, MOST, is a fibre optic communication system that controls the media devices on the vehicle. By checking which control units we had no communications with, I could easily see that our problem was on the K-Can. I have listed here the control units on this X5’s K-Can. Also see figure 2 with the blue lines



JBE (Junction box Electronics)
FRM(Football Module)
CAS (Car Access System)
CON (iDrive controller)
CID (Central Information Display)
EHC (Electronic Height Control)
KOMBI (Instruments Cluster)
PDC (Park Distance Control)
FZD (Roof Control Panel)
MASK (Radio Head Unit)
IHKA (Air Conditioning Control Unit)

The next step was to get a look at the K-CAN signal on the oscilloscope. The easiest point to connect our scope is at the PDC control unit in the rear right of the boot. As you can see from the picture (Figure1 below) there was not a complete loss of CAN signal but instead a distorted CAN low signal to this control unit.



My first thought was that one of the control units was causing interference to the signal, which of course was affecting the complete network. The next was the painstaking job of disconnecting each control unit in turn, with the scope still connected to see if the signal improved with that particular unit disconnected.

Unfortunately, in this case the signal was still distorted no matter what unit was disconnected, leaving only a wiring fault as the root cause of the problem. I started to conduct continuity tests on the CAN wires between each control unit. A high resistance was found on the CAN Low wire going from the CAS Unit (under the dashboard) to the EHC (in the boot). When the floor mat was lifted,

there was a dampness on the underneath of the mat and a corroded wire as found in the loom. It turned out that a leaking wiper washer pipe that travels underneath the mat had been the cause of the entire problem. Because the car had been dormant for a year the loom was in a damp environment for an extended period and eventually caused corrosion in the loom.

This was as difficult a CAN-Bus fault as you will get, but by using the right equipment and having access to the right information, CAN-Bus can easily be broken down and succesfully repaired.