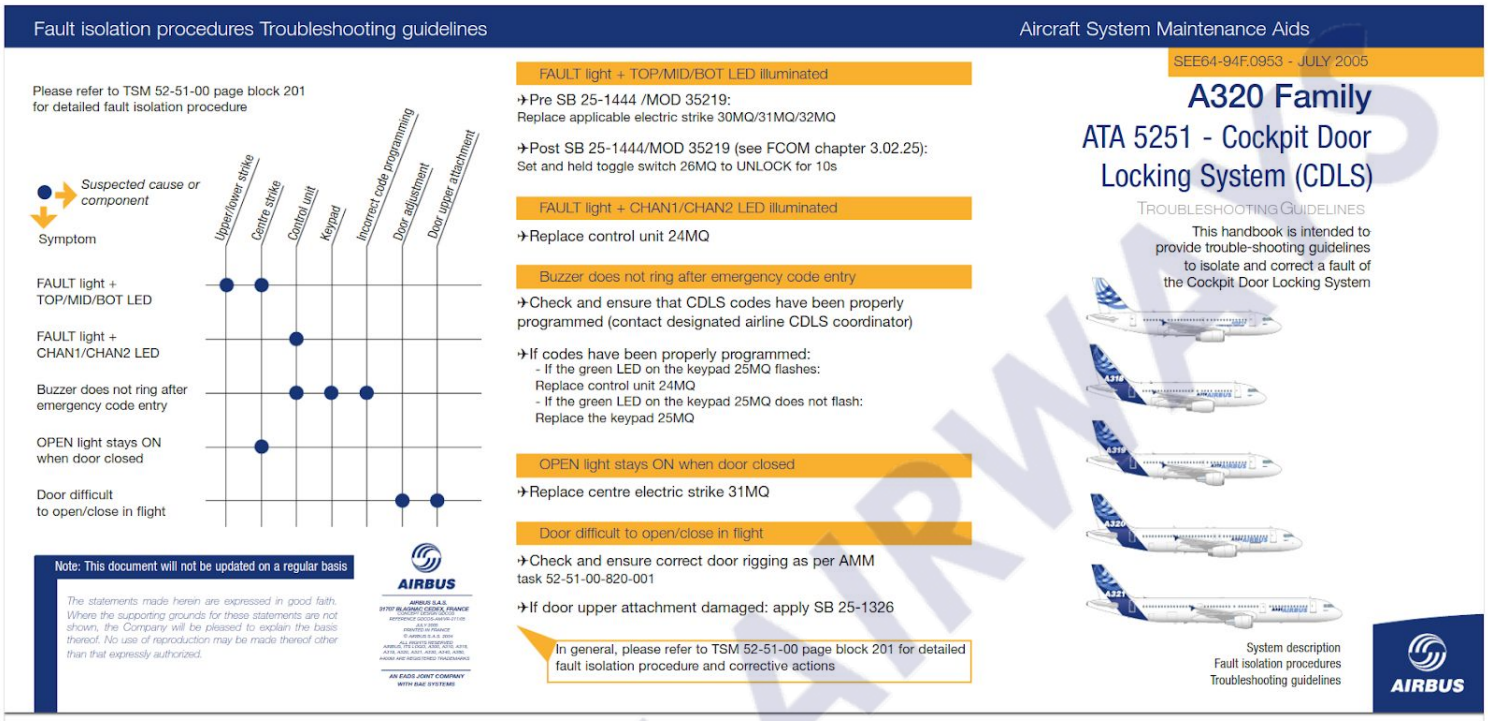
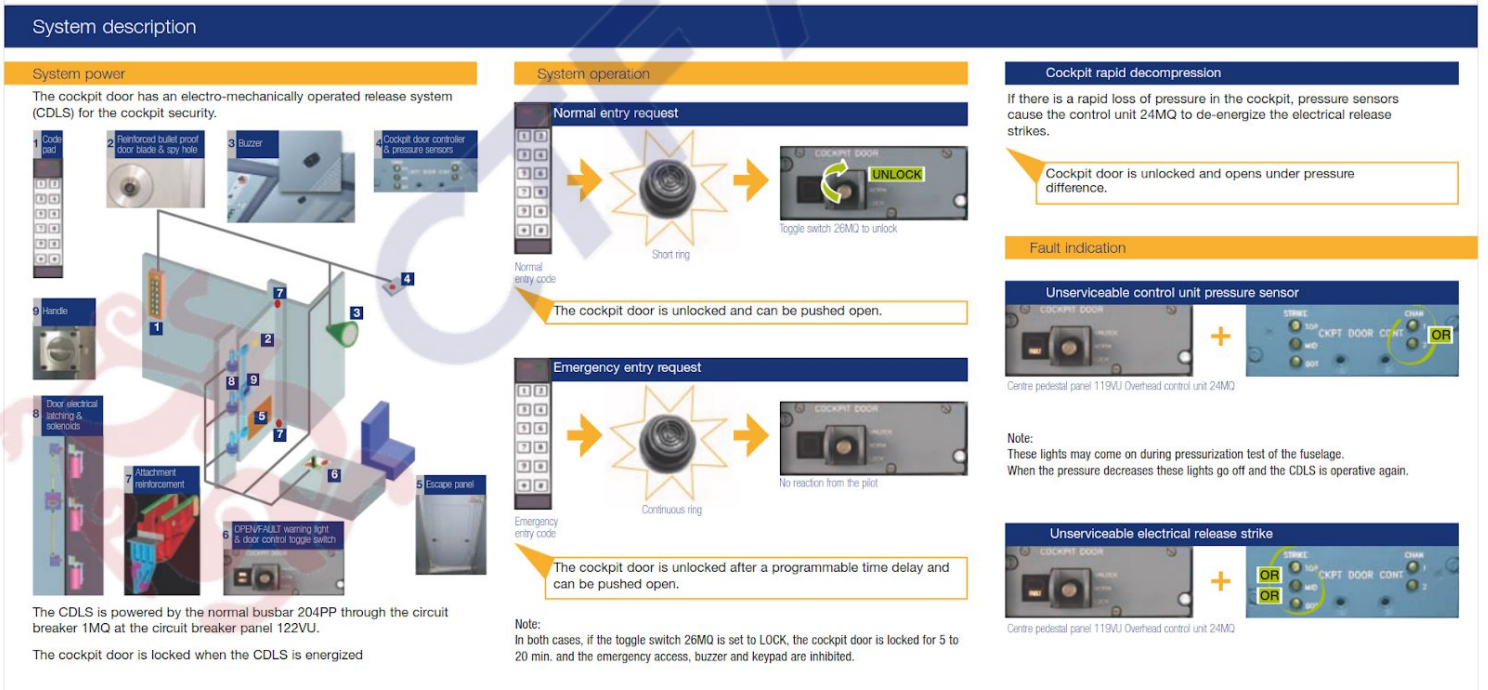
CDLS Simulator

The *CDLS Simulator* is meant as the last possible troubleshooting step in case of malfunction, or emergency. Please review the troubleshooting guidelines below before proceeding.





Additional help and training can be found on the TSM.

Installation

In order to set up the simulator, one must run two commands, and have docker-compose installed.

```
xhost + # needed to run XCT
docker-compose up
```

CAN Gateway

The CAN Gateway is meant to simulate the behavior of a single-channel XMC-A825-16. The simulator simply forwards sample traffic from a flight simulator to the network, and provides the necessary services to bootstrap the network.

The CAN Gateway bridges traditional systems that run over CAN to services that run over Ethernet/UDP on the plane's on-board AFDX network.

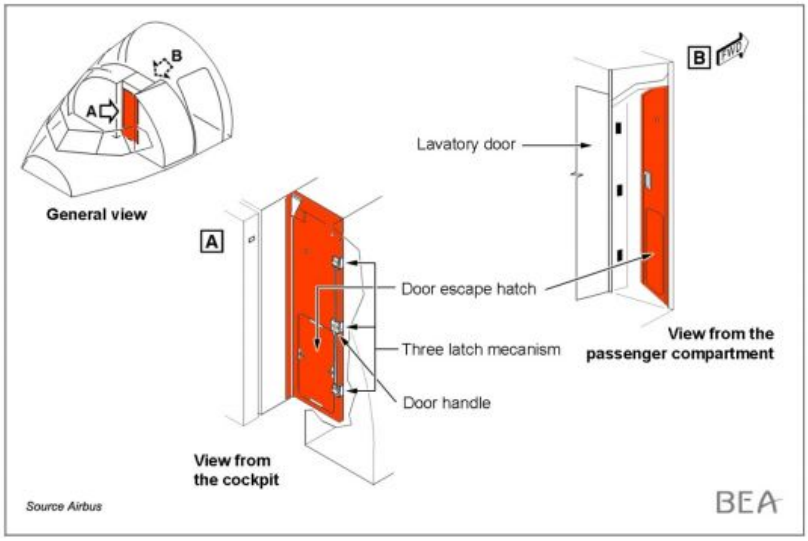
The CDLS simulator attempts to replicate accurately the network and traffic likely to be seen on a real aircraft, but due to technical limitations, some differences might apply in practice. Any differences will be noted in this document **in bold**.

Blackbox

The blackbox contains a Flight Data Recorder emulator and a simple cloud backup solution. It can be used for offline troubleshooting of the flight data. It will log and upload all CAN traffic it sees on the network.

For interactive debugging, it is advised to use the MCDU's built-in XCT toolbox.

The simulator only stores up to 3 minutes of data.



CDLS

The Cockpit Door Locking System contains all the logic used to lock and unlock the cockpit door. It receives information from the keypad over the CANbus, and communicates status indicators back to outside the cockpit.

The CDLS is meant to protect the cockpit, however in case of emergency, the crew is able to access the cockpit by typing a code in a specially designated keypad.

The new version of the keypad is alphabetic (A-Z) and allows for { and } characters.

It is recommended to use a long password (10 or more characters), and to use difficult to guess words.

In case the password is forgotten, it is possible to enable the lights on the keypad. The CDLS will instruct the keypad to illuminate keys depending on the status of the door. When the door is unlocked, all lights are green. When the door is locked, the lights are red, or orange. The CDLS will illuminate in orange some of the keys that are part of the password.

It is recommended to keep the lights disabled during the flight.

MCDU

The MCDU is one of the core computers onboard. It also serves as a multi-use

troubleshooting endpoint. The CDLS simulator does not include any of the avionics functions.

The MCDU in the simulator exposes a telnet interface, with two functions. First, it allows to inspect the CANBus traffic, by means of the XCT toolbox, and second, it allows to send commands to the CDLS.

In the simulator, one can connect to the MCDU telnet interface by typing:
`telnet 127.0.0.1 9923`

On board the plane, one can connect using the ethernet port located in the back of the unit. One might need to unscrew to be able to access it.

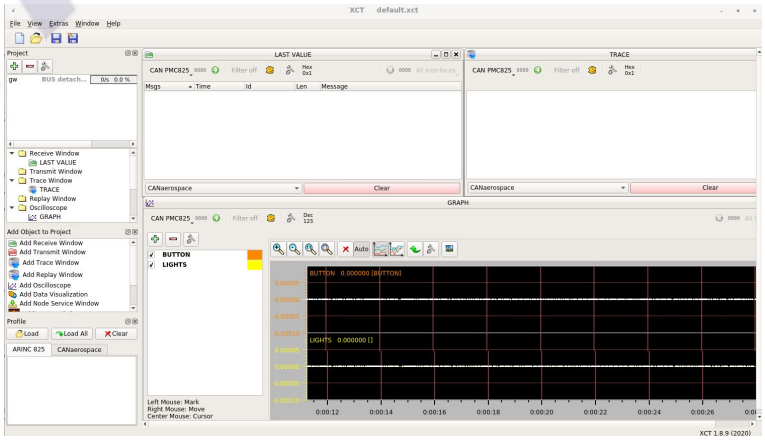
CDLS

The CDLS exposes a troubleshooting interface via telnet, directly on the MCDU. It allows the technician to troubleshoot the CDLS.

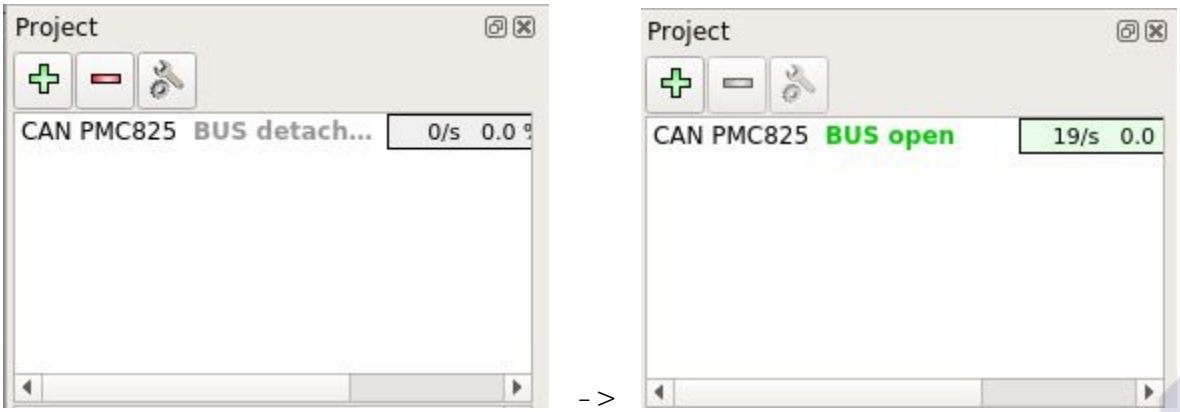
```
Cockpit Door Locking System (CDLS) debug interface

Available commands:
    cdls unlock $CODE: Tries to unlock the door with $CODE (range is [A-Z{}])
    cdls help:         Shows this message
```

XCT

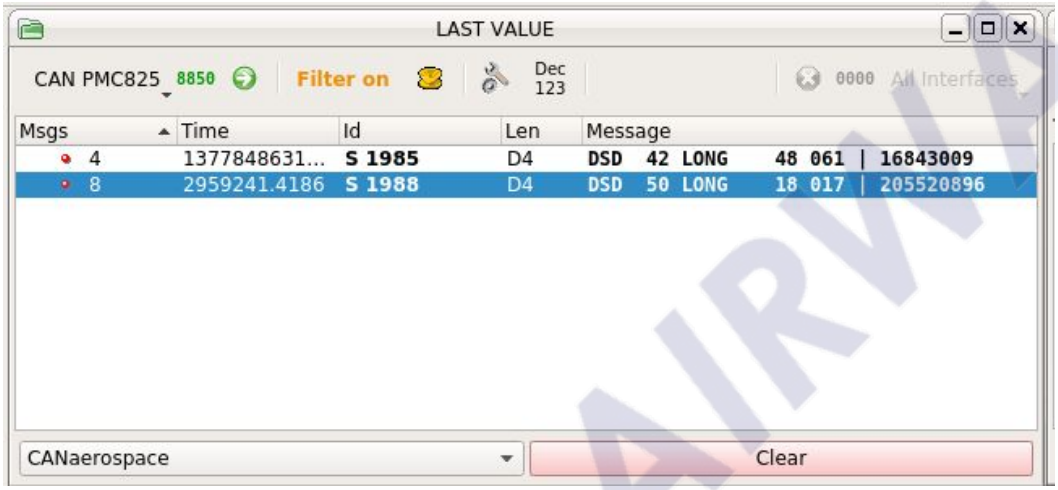
When typing xct on the simulator, the XCT toolbox will be opened on the host computer.



It is necessary to click on the BUS to enable it (by clicking on the word BUS)

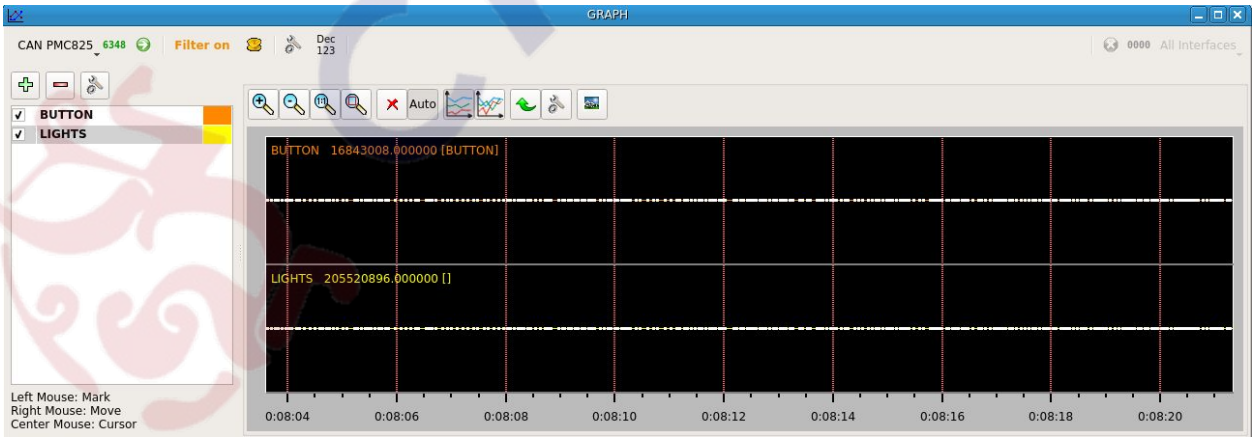


To filter the results, it is necessary to click on "Filter off":



This will limit the traffic to ids 1985 and 1988. Customizing the filter is possible.

The oscilloscope shows the value of different components over time.



Testing through the cdls unlock command on the MCDU is an easy way to generate traffic and inspect it using the XCT.

More information about XCT is available here.