FLYBOX
INNOVATIVE AVIONICS

CAN BUS

Overview and Installation Guidelines

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This booklet is suitable for printing in A5 format.

1. CAN Bus Overview

CAN architecture
The CAN bus (Controller Area Network) is a robust serial communication system designed to allow multiple electronic devices to communicate over the same two-wire bus. Each device connected to the network can exchange information with all other nodes without requiring dedicated point-to-point wiring. This architecture reduces the number of electrical connections, simplifies the installation and improves the overall reliability of the system.

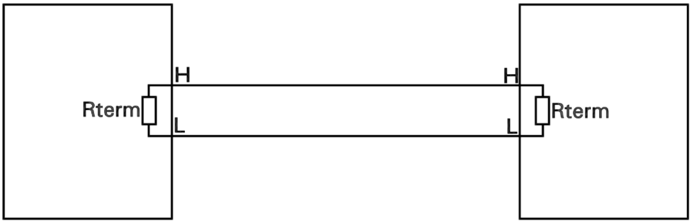
Differential signalling
CAN communication is based on differential signalling, using two dedicated lines named CAN-H and CAN-L. The transmitted data is determined by the voltage difference between these two lines rather than their absolute voltage level. This significantly improves immunity to electromagnetic interference and allows reliable communication even in electrically noisy environments.

2. Bus Topology

Bus architecture
The basic electrical architecture of a CAN bus consists of a single twisted or shielded wire pair with a device connected at each end.

Bus termination
Each end must be terminated with a 120 Ω resistor, which are required to match the characteristic impedance of the communication cable and prevent signal reflections along

the bus. Only the two devices located at the physical ends of the CAN network must provide bus termination. Additional termination resistors installed elsewhere on the network may degrade communication integrity.



Basic CAN bus architecture

3. Bus Length and Stub Connection

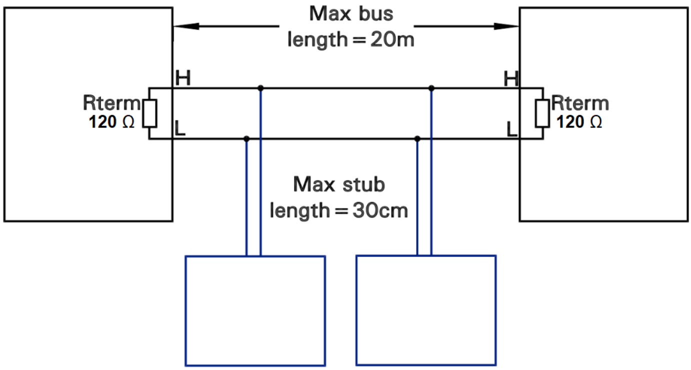
Maximum bus length
The maximum length from end to end of the CAN bus is 20 meters.

Nodes
Additional devices, referred to as *nodes*, are connected to the main CAN bus through short branch cables called *stubs*.

Stubs
Each stub should connect only one device, should not exceed 30 cm in length and must not be terminated with the resistor.

The maximum bus and stub lengths shall always be respected to ensure reliable communication. Excessive bus length increases signal propagation delay, while excessively long stub connections may generate signal reflections that can affect data transmission, particularly at higher communication speeds.

Daisy-chain topology
Multiple devices must be connected to the bus in a daisy-chain configuration as shown in the example below:



CAN bus node connections

4. Bus Communication

Shared bus
All nodes are connected to the same shared communication bus and can exchange data without requiring dedicated communication links between individual devices.

Arbitration
If two or more nodes attempt to transmit at the same time, the CAN protocol automatically manages bus access through a built-in arbitration mechanism. This ensures that

communication occurs without data collisions or message corruption while reducing wiring complexity and improving overall system stability. Each message is broadcast over the shared bus and is accepted only by the nodes configured to process it.

5. Wiring recommendations

Cable selection
CAN bus wiring may consist of twisted-pair or shielded twisted-pair cable. We strongly recommend the use of shielded wires for better performance, connecting the shield to the ground of both devices on the terminated ends of the bus.

Ground reference
It is also important that all the devices connected to a CAN bus share the same power ground reference. This means that the power ground of the various devices must be connected to a single ground point (do not use aircraft structure as a power ground).

6. Communication Reliability

Error detection and retrasmission
The CAN protocol includes built-in error detection mechanisms to verify the integrity of transmitted messages. If a transmission error is detected, the message is automatically retransmitted without requiring intervention from the application software. These features reduce the likelihood of data corruption, contributing to the robustness of the overall system.

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