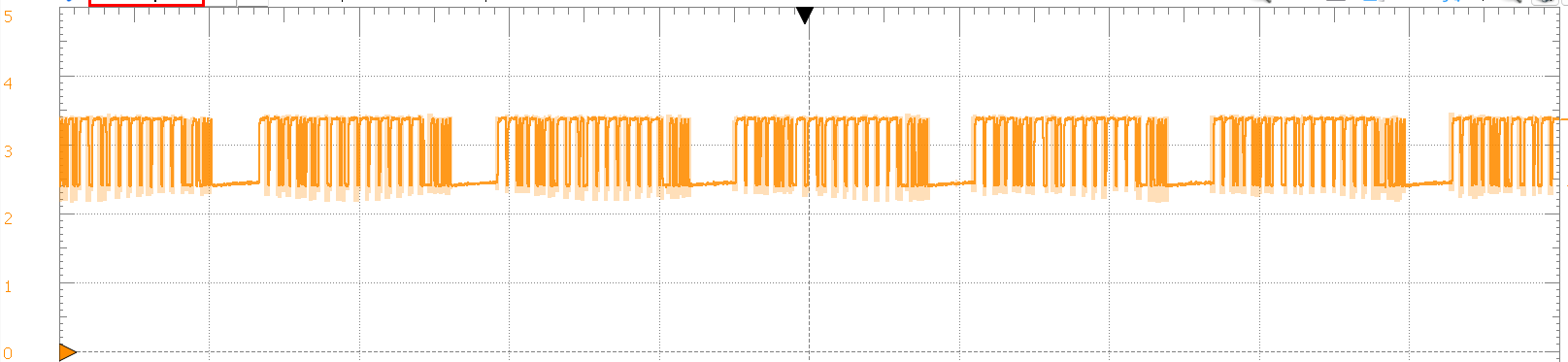
# Strelka CAN Testing Notes

**Strelka V2:**

It appears that Strelka V2 is transmitting CAN messages correctly. It should be noted however that they ONLY work when 5v is connected. They do not work at all if only the STLink is connected, this is because the 5v bus is not powered.

CANH



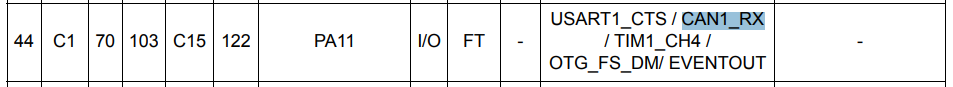
CANL

A bar code on a white background

Description automatically generated

I made an interesting discovery being that the MCP2551 CAN transceiver pulls the RX pin high to ~5V. Initially, I thought this would fry the pin of the STM32H743 and STM32F407 (Strelka motor controller) however, after further inspection, it appears that these pins are 5v tolerant according to the datasheet.

STM32F407:



STM32H743:

A group of black text

Description automatically generated

Note the FT means 5v tolerant:

A white and black text on a table

Description automatically generated

**Strelka in loopback mode:**

Strelka works in loopback mode. The transmitter can transmit from the tx fifo without errors and the rx callback occurs straight after.

**Testing with CANable transceiver:**

Testing with the CANable transceiver showed that the CAN bus on Strelka is working correctly. I learned that for the filter configuration, setting sFilterConfig.FilterType to FDCAN\_FILTER\_RANGE means that the filter will accept all incoming packets addressed between sFilterConfig.FilterID1and sFilterConfig.FilterID2.

Likewise, the TxHeader1.Identifier field defines the address of the transmitting device.

**Strelka Motor Controller:**

With a scope on the TXD line, the voltage sits constant at 3.3V and does not change at all. No packets seem to be transmitted. On Strelka, both the TXD and RXD lines periodically transmit data. What is super odd is that data is received on Strelka as if it were being transmitted from the motor controller. I’m not sure how this data has appeared on the RXD line on Strelka if it wasn’t transmitted by the motor controller.

A screenshot of a graph

Description automatically generated  
Orange is RXD on motor controller and blue is RXD on Strelka. This strongly suggests that one of them is wired backwards… nope, switching the RXD and TXD lines on the motor controller using the UART switch did not work.

Motor controller TXD pin:  
A screen shot of a graph

Description automatically generated

Motor controller TXD pin when STM32 is reset is at ~4.7V. It seems be pulled up by the transceiver and pulled down a bit by the stm32.

Motor controller RXD pin. It periodically goes flat:

A screen shot of a graph

Description automatically generated

Strelka TXD pin. It goes flat periodically:

A graph with lines and dots

Description automatically generated with medium confidence

Strelka RXD pin. Goes flat periodically:

A screenshot of a computer

Description automatically generated

Crazily, powering down the motor controller does not stop signals on the RXD and TXD pins of Strelka.

RXD and TXD of Strelka with motor controller powered off:

Orange is TXD blue is RXD.

A graph of lines with different colors

Description automatically generated with medium confidence

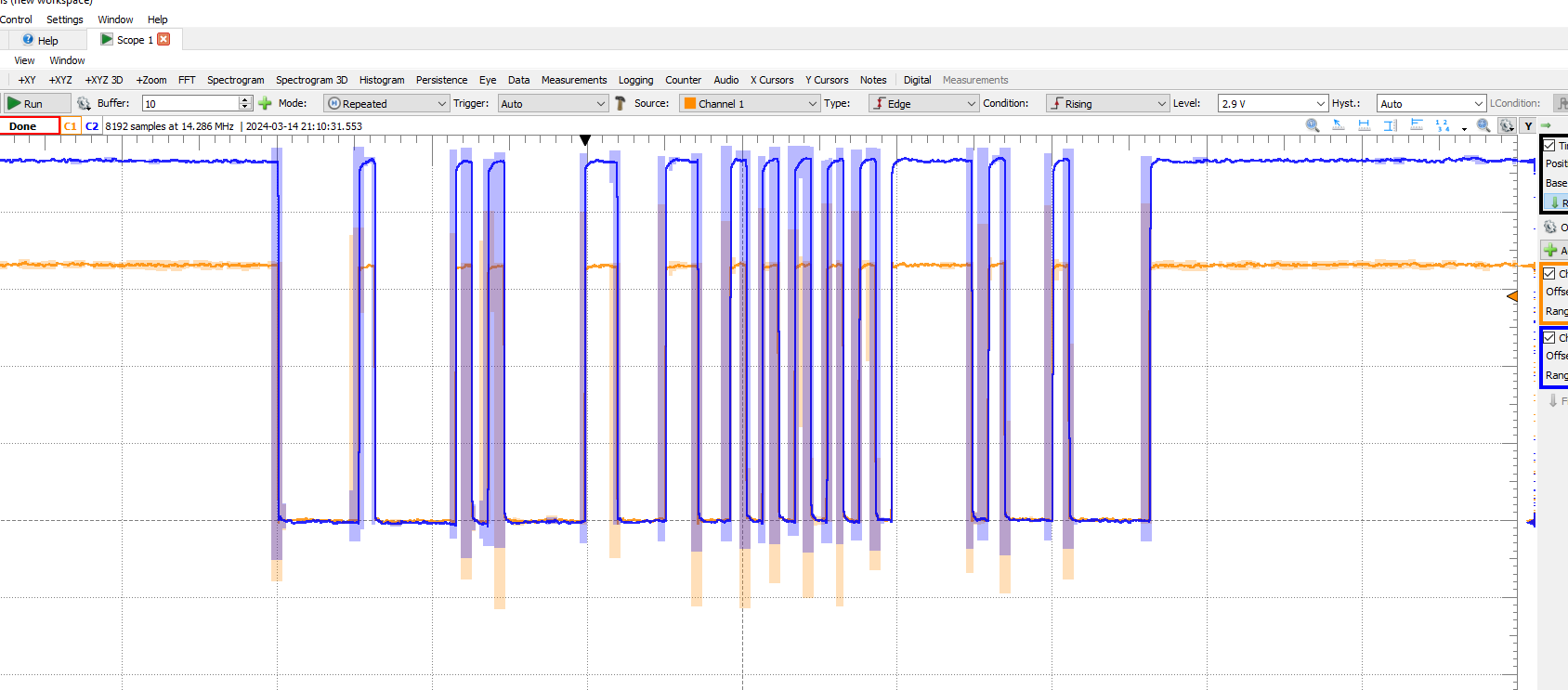
RXD and TXD of Strelka connected to CANable device and working correctly:

Orange is TXD blue is RXD.

A screenshot of a computer

Description automatically generated

Strelka motor controller with nothing connected on the other side:

Orange is TXD blue is RXD.  


Streka motor controller with CANable connected:

Orange is TXD blue is RXD.  
A screenshot of a graph

Description automatically generated

Differential signals with motor controller connected to CANable. Centre voltage is 2.5V:  
A screen shot of a graph

Description automatically generated

A screen shot of a graph

Description automatically generated

Strelka connected to CANable. Centre voltage is 2.5V:  
A screen shot of a graph

Description automatically generated

The cause of the ringing on the CAN lines could be due to no capacitor. This is the Strelka schematic:

A computer screen shot of a diagram

Description automatically generated

This is the motor controller schematic:

A diagram of a circuit

Description automatically generated

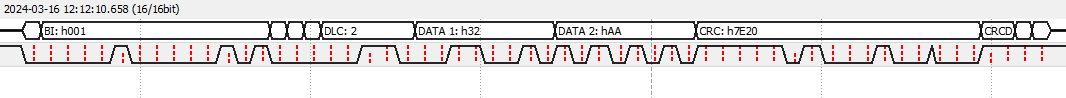
**Reading CAN messages from Motor Controller using logic analyser:**

This is the format of the sent data:  
A screen shot of a computer program

Description automatically generated

This is what the logic analyser read:

*Motor controller:*



This shows correct ID, DLC, byte 0 and byte 1.

\*Note, the signal edges are a bit flatter than Strelka’s. I tried shorting the RS pin and it appeared to steepen the edges dramatically. *This didn’t cause an ACK however*.

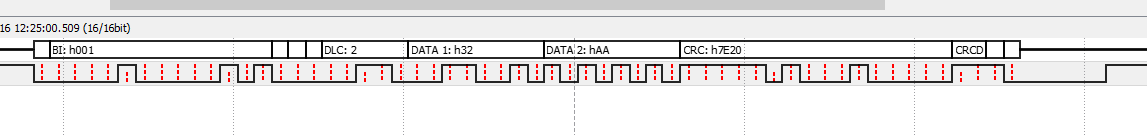
Settings used to read this on the logic analyser:

A screenshot of a computer

Description automatically generated

Strelka transmitting an identical frame with no CANable device on the other end (nothing to ACK the packets):

*Strelka:*

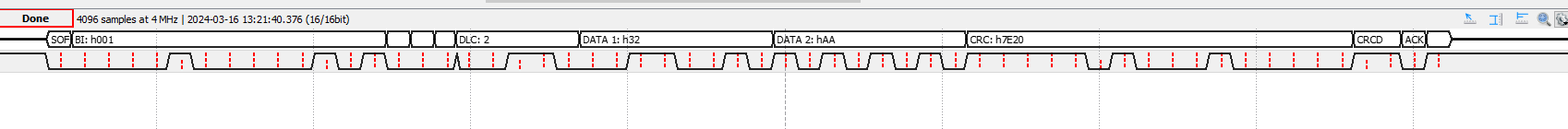


With the CANable device connected:  
A screenshot of a computer

Description automatically generated

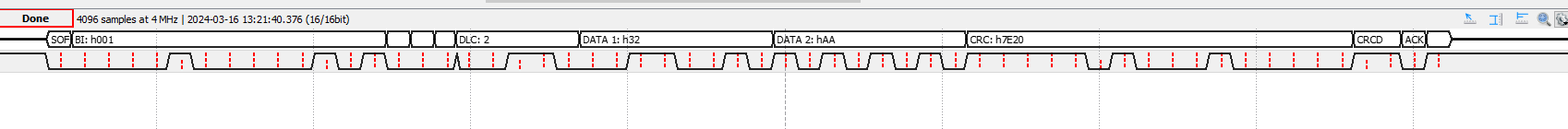
You can see the ACK bit has been set (low).

Here’s a whole Strelka frame with ACK:

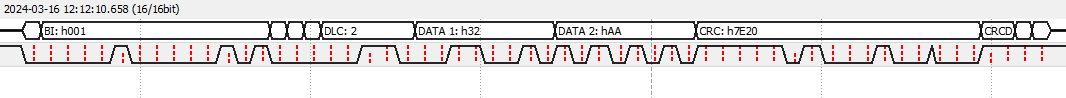


**Bus rate decreased to 125kbps due to large number of errors on Motor Controller Bus**

Strelka with ACK



Motor controller with no ACK



*Strelka connected to CANable with correct ACK:*

Pink is Tx, Green is Rx

A screenshot of a computer

Description automatically generated

This shows what a correct packet should look like on the RX TX pins. You can see that the ACK is returned on the Rx pin (but not the Tx as expected).

*Motor controller with CANable without ACK:*

Pink is Tx, Green is Rx

A screenshot of a computer

Description automatically generated

This does not show an ACK on the Rx line.