CAN Transmitter User Guide

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# Overview

This CAN transmitter sends cyclic CAN messages required by DECUs undergoing testing. This CAN transmitter is intended to be easy to create, easy to program, and easy to configure. The user can configure the following parameters:

* Baud rate
* CAN ID type (11/29 bit)
* Number of CAN messages
  + CAN message IDs
  + CAN message DLCs
  + CAN message data
  + CAN message period

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All files and future updates for this project can be found in the following repository:

<https://github.com/JonathanXLin/CAN_Transmitter>

# Required Files and BOM

## BOM

The CAN transmitter is based off the *Arduino Uno* development board and the *Seeed Technology CAN BUS shield*. Minor and optional materials, such as solder and heat shrink tubing, are not included.

Table 1: CAN Transmitter BOM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Description** | **Manufacturer Part #** | **Qty** | **Price** | **Extended Price** | **In-House** |
| ARDUINO UNO SMD R3 ATMEGA328 | A000073 | 1 | $ 20.90 | $ 20.90 |  |
| CANBUS SHIELD V2 | 103030215 | 1 | $ 24.50 | $ 24.50 |  |
| LED Panel Mount Indicators 5mm Grn | PM5GT | 1 | $ 0.69 | $ 0.69 |  |
| LED Panel Mount Indicators Blue 430nm | PM5BWC | 1 | $ 1.40 | $ 1.40 |  |
| SWITCH ROCKER DPDT 16A 125V | GRS-4022-1600 | 1 | $ 1.38 | $ 1.38 |  |
| CONN RCPT HSG 3POS | DT04-3P-L012 | 1 | $ 4.35 | $ 4.35 | Yes |
| CONN PIN 14AWG NICKEL CRIMP | 0460-215-16141 | 1 | $ 0.63 | $ 0.63 | Yes |
| 18-8 Stainless Steel Socket Cap Screw | 73412 | 4 | - | - | Yes |
| #4 F/W S/S .125x.312 | 71004 | 4 | - | - | Yes |
| 4-40 S/S MS Nut | 1170704 | 4 | - | - | Yes |
| RES 100 OHM 1/4W 5% AXIAL | CF14JT100R | 1 | $ 0.10 | $ 0.10 | Yes |
| AC/DC WALL MOUNT ADAPTER 9V 5W | VEL05US090-US-JA | 1 | $ 6.50 | $ 6.50 |  |
| FLEX RLTF 7 BLK w/3165 NUT | 3464 | 1 | $ 1.17 | $ 1.17 |  |
| Mounting Hardware 0.5x.14" Rubber Feet | 1421T2GY | 1 | $ 6.48 | $ 6.48 |  |
| USB CABLE TYPE A TO B 30CM BLACK | Seeed Technology | 1 | $ 1.99 | $ 1.99 | Yes |
|  |  |  | **Total:** | $ 70.09 |  |

## Enclosure Models

The CAN transmitter requires a box and lid. These two *.stl* files are to be 3D printed.

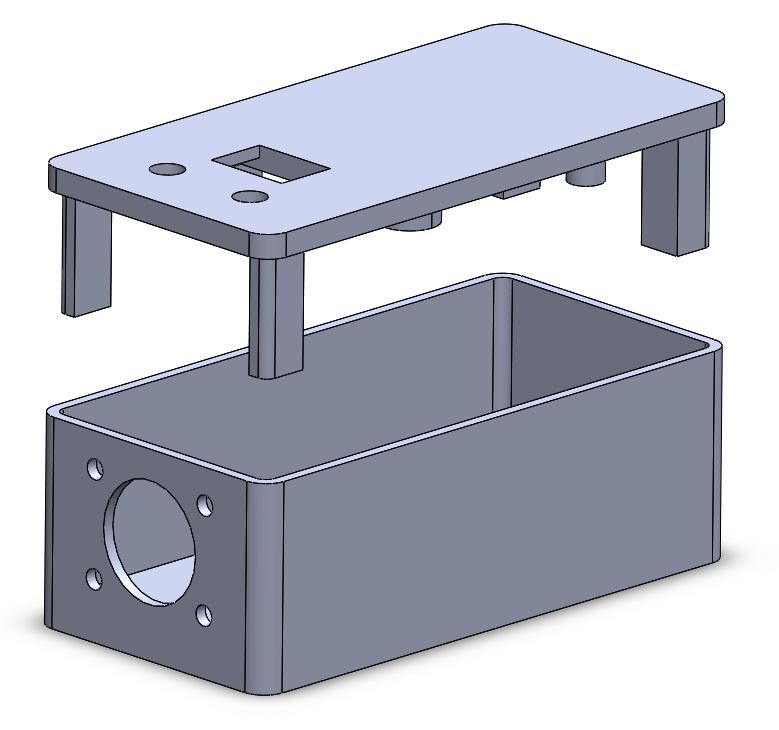


Figure 1: Enclosure Exploded View

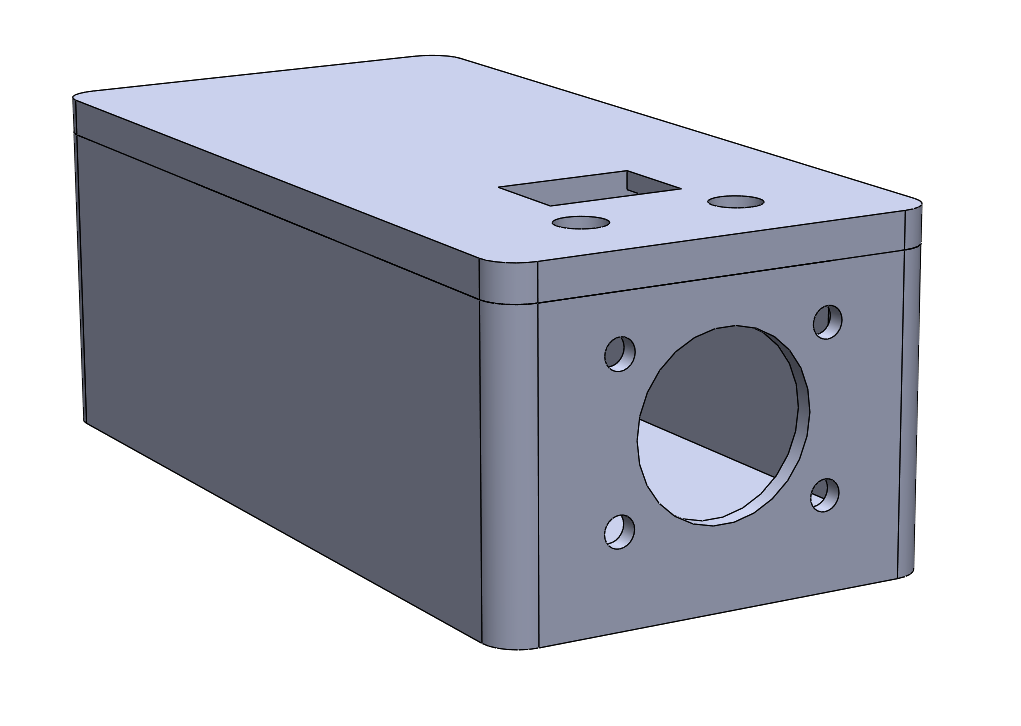


Figure 2: Enclosure Assembled View

## Arduino Sketch

The CAN transmitter uses the Arduino sketch *CAN\_Transmitter.ino* and the *mcp\_can* library.

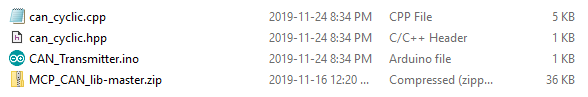


Figure 3: Required Files

# Construction

## Panel Mount Components

The Deutsch 3 pin connector is mounted on the front face using the bolt, washer, and nut as shown.

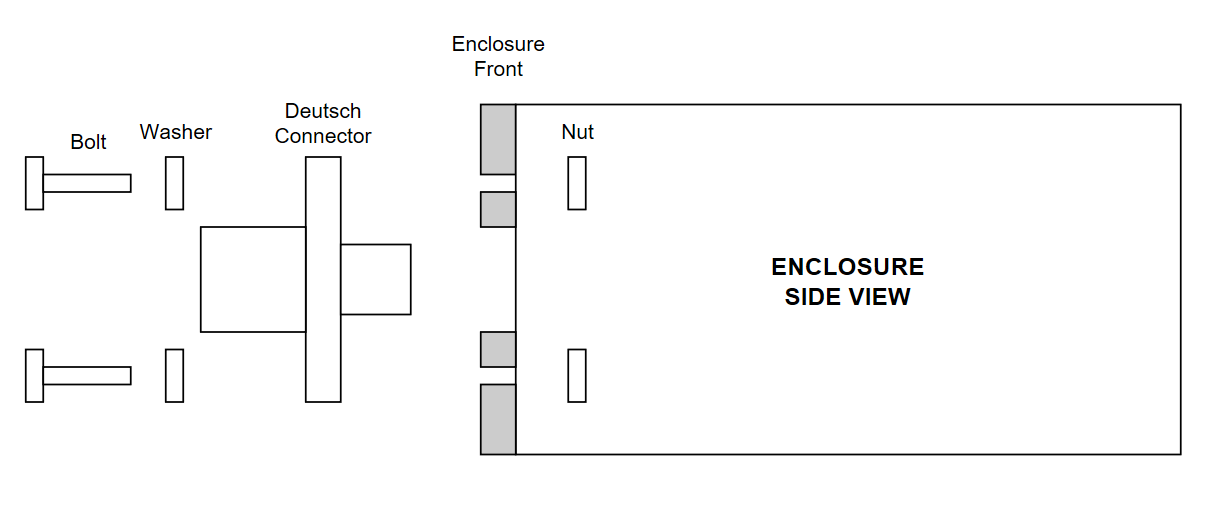


Figure 4: Enclosure Panel Mounted Components Side View

The indicator LEDs and switch are snap fitted into the lid cutouts. Pin 1 of the switch is farthest back from the orientation shown below. the LED arrangement does not matter. The CAN shield is attached to the Arduino, and the electronics assembly is screwed into the lid as shown below. It is recommended to label the switch “250kbs” and “500kbs”.

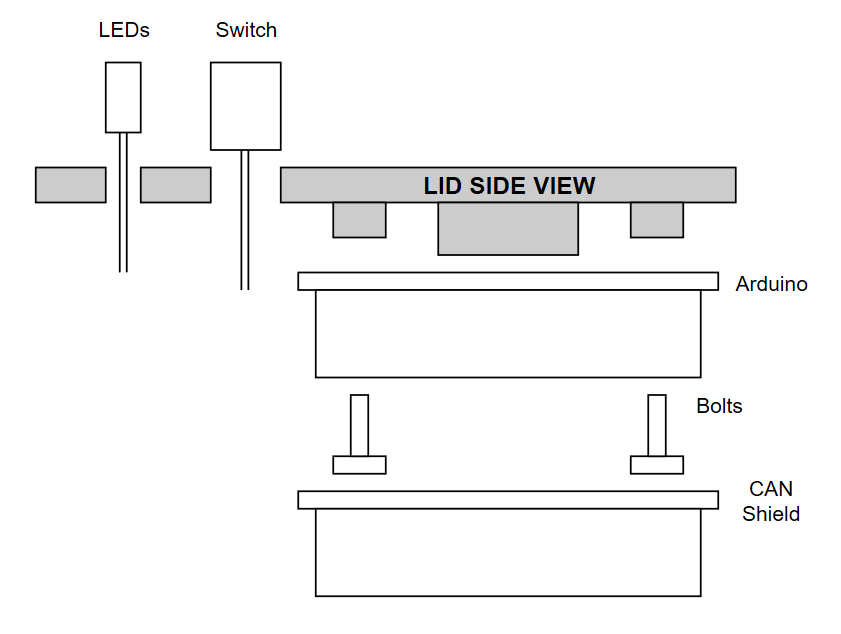


Figure 5: Lid Panel Mounted Components Side View

The power supply cable is cut to bare wire and pushed through the small hole at the back of the enclosure. Optionally, a ¼” grommet can be used. It is recommended to tightly knot the wire or use another form of strain relief to protect the solder joints from mechanical stress.

## Electrical Connections

The following electrical connections are made. All connections are soldered except for the Deutsch pins, which are crimped.

|  |  |  |
| --- | --- | --- |
| **Components to be Joined** | | **Notes** |
| Deutsch Pin A | CAN Shield CAN H | Deutsch pin crimped and snap fit into connector |
| Deutsch Pin B | CAN Shield CAN L | Deutsch pin crimped and snap fit into connector |
| Power VIN | Arduino VIN |  |
| Power GND | Arduino GND |  |
| LED Green Cathode | Arduino Pin D7 | Add 100 Ω resistor in series |
| LED Green Anode | Arduino GND |  |
| LED Yellow Cathode | Arduino Pin D6 | Add 100 Ω resistor in series |
| LED Yellow Anode | Arduino GND |  |
| Switch Pin 1 | Arduino Pin D8 |  |
| Switch Pin 2 | Arduino +5V | Optionally add 100 Ω resistor in series |
| Switch Pin 3 | Arduino Pin D9 |  |

## Photos



Figure 6: Complete CAN Transmitter

# Environment Setup

## Install Arduino IDE

Download and run the *Windows Installer* from the link below.

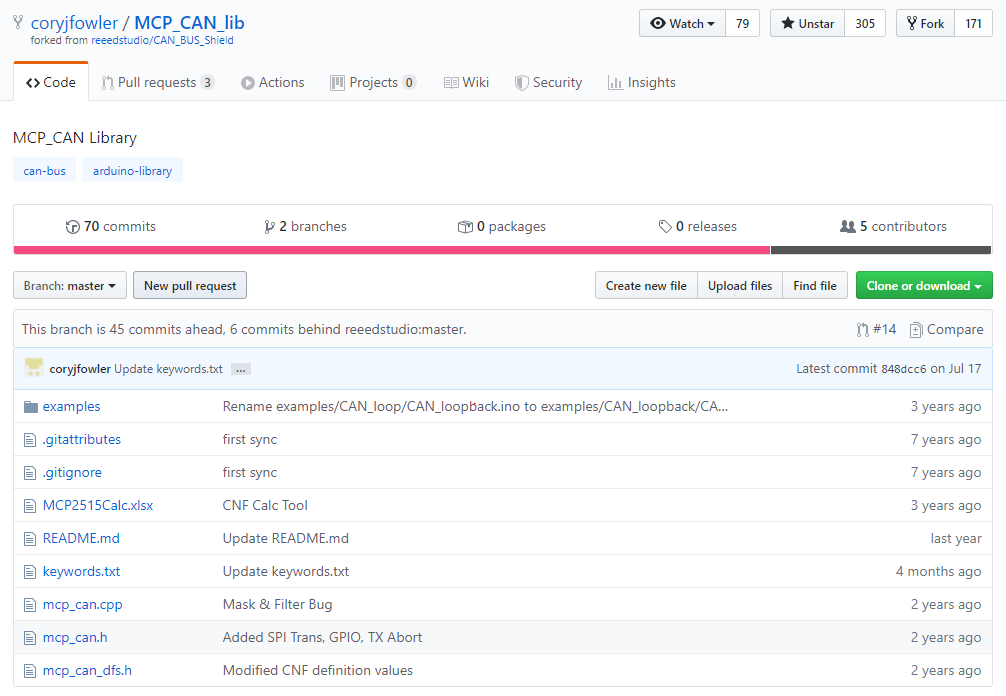
<https://www.arduino.cc/en/Main/Software>



## Install mcp\_can Library

Download the *mcp\_can* library by clicking *Clone or Download*, and *Download ZIP* from the link below.

<https://github.com/coryjfowler/MCP_CAN_lib>



To install, open *CAN\_Transmitter.ino*, navigate to *Sketch » Include Library » Add .ZIP Library…*, and add the downloaded *.zip* files.

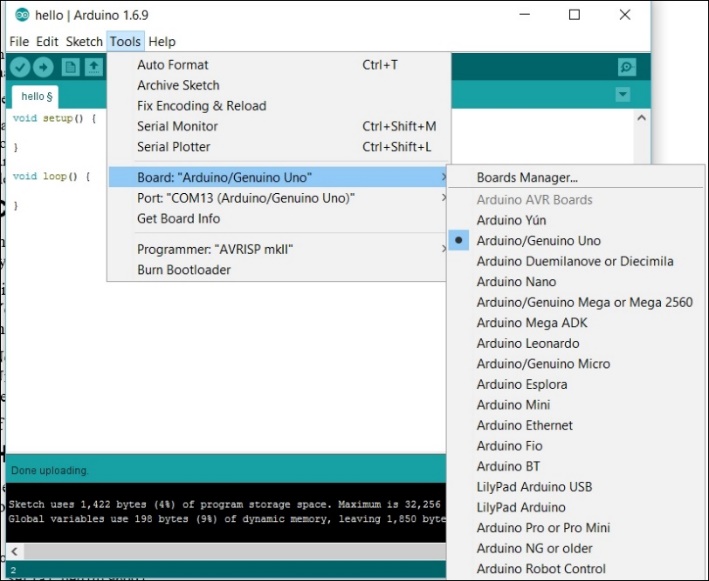
# Configuration and Programming

Open *CAN\_Transmitter.ino*, ensuring it is in the folder with “can\_cyclic.cpp” and “can\_cyclic.hpp”.

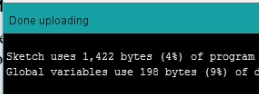
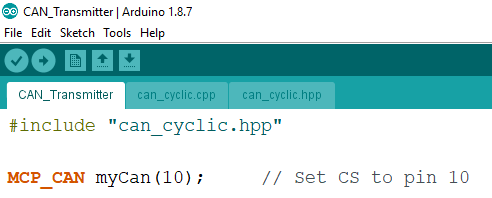


The example above sends the CCVS1 and EBC2 messages with a period of 100ms each. To add a new cyclic CAN message, follow the same format with a new *byte* name and *CAN\_message\_cyclic* name.

To program, connect your PC to the Arduino with a USB A Male to USB B Male connector. Under *Tools*, ensure *Board* is selected as *“Arduino/Genuino Uno”*, and *Port* is selected as *“(Arduino/Genuino Uno)”*.



In the top left corner, click the *“Upload”* button, and wait for the *“Done Uploading”* message to appear.



# Use

Plug in the wall adapter. Both LEDs will blink, the *Power* LED will light, and CAN messages will be sent. The *Signal* LED will blink every time a sent message is acknowledged.

To switch baud rate, flip the switch. The change will immediately take into effect.

If there is an error initializing the CAN transceiver, both LEDs will continue blinking.

# Licensing and Disclaimer

## CAN Transmitter

The MIT License (MIT)

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## mcp\_can Library

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