

Joral CAN Customer Interface

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Introduction

The Joral CAN Customer Interface is a custom-programmed general GUI intended for use with our various J1939 and CANopen sensors. The program contains interfaces for our rotary, linear and incline sensors, as well as a bootloader and general CAN analyzer tool.

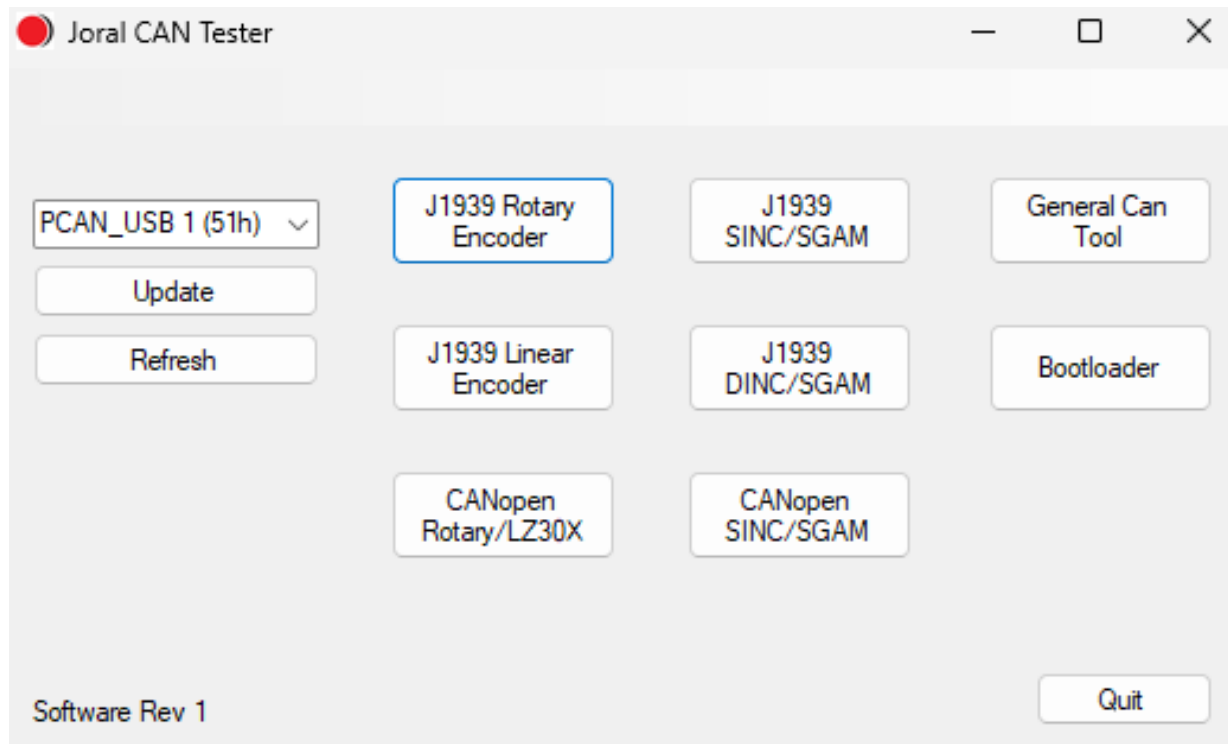
This program uses the PCAN-USB Adapter made by PEAK-System Technik. The adapter can be purchased from the following link on the Phytools website, where you can also download the necessary device drivers:

https://phytools.com/products/pcan-usb-adapter?srsId=AfmBOoq8HAqEhqjUNWY8cU0iN54U27RbF2IEeBnKvuPWX_4Xcb_5WBiB

Required Operating System: Windows 7 or later

Additional Required Software: PCAN-USB Drivers, Microsoft .NET Framework

Main Screen



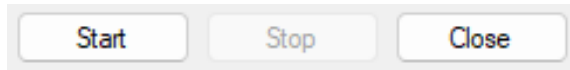
This is the first screen that will appear in the GUI when the program is started. Clicking any of the buttons will open the specified device interface. Clicking “Quit” in the lower-right will exit the program.

PCAN Connectivity

The dropdown box in the upper-left will contain all currently available PCAN-USB connections. If any PCAN-USB devices are connected or removed while the program is running, clicking “Refresh” will update the dropdown with the available connections. Clicking “Update” will set the program to use the currently selected PCAN-USB device for communication.

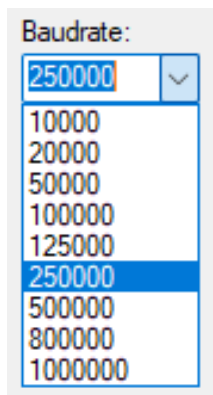
Common Controls

This section details various controls that are used in most or all of the specific device interfaces.



These three buttons will appear at the top-left of each interface:

- **Start** – Clicking this button will cause the program to begin communication over the PCAN-USB adapter.
- **Stop** – Clicking this button will cause the program to halt communication over the PCAN-USB adapter.
- **Close** – Clicking this button will close the specific interface without exiting the entire program.



The majority of our CAN products run at a fixed baudrate of 250kbps. However, we have specific products that either run at an alternate baudrate (500kbps is also common) or allow for the end user to send a command to change the current baudrate. For this reason, each interface allows the user to change the current baudrate of the connection.

NOTE: For all interfaces, communication must be halted in order to change the baudrate.

Source Address

Tag

DEC

HEX

0 (No Tag) ▾

210

D2

Node ID:

12

Update Address

0 ▾

Each of our CAN sensors has a default source address or node ID that it transmits from. For sensors that use a DE6 or M12 connector, customers also have the option to attach an address tag resistor to change the source address on J1939 sensors or the node ID on CANopen sensors. Additionally, all CANopen sensors and select J1939 sensors have the option to update the node ID or source address via command. Each interface has a field like the ones above to account for these changes to the address.

RX

10FFAAD2 B8 12 00 10 AD 00 00 00

TX

18FFAB27 F1 FF FF FF 00 00 00 00

Messages: 458

Each of the J1939 interfaces has two boxes containing the raw hexadecimal data of messages sent from the sensor to the interface (RX) and from the interface to the sensor (TX).

SDO Messages:

TX

602 23 11 20 01 00 00 00 00

RX

582 60 11 20 01 00 00 00 00

TPDO Raw Message:

182 00 00 DD 01 1A 09 00 00

The CANopen interfaces have similar boxes containing the raw hexadecimal data for SDO and TPDO messages.

Additionally, each interface has a counter that displays the total number of incoming messages that have been received from the start of communication.

Rotary Encoder Interface

Standard Rotary Encoder

Start Stop Close

RX: 10FFAAD2 B8 12 00 10 AD 00 00 00

TX: 18FFAB27 F1 FF FF FF 00 00 00 00

Counts Per Revolution: 1000 (typical) B

Baudrate: 250000

Source Address: Tag: 0 (No Tag) DEC: 210 HEX: D2

Update Address: 0

Reset Counter Reset Position

Software Rev 20

Messages: 458

Count: 173

Position (In Degrees): 250.56

Position (Raw Value): 696

RPM: 0

Set Count: 0

RPM Rate: Slow (3 sec)

RPM Resolution: 2 RPM Per Bit

Direction: CW

On Power Up: Clear

Save On 0 RPM: Off

Error Code: 11

EE Bank: 54

EE Write Count: 5

Setup

RPM Settings

Update Rate: Slow (3 sec)

Resolution: 1 RPM per bit

Direction: ☒ CW ☐ CCW

Save Count to Memory

☐ Save Counter Now and Restore Count on Power Up

☐ Auto-Save if RPM is 0

☐ Clear Counter on Power Up

Update Settings Show Settings Turn Off Settings Message

Position

RPM:

This is the interface for the J1939 Rotary Encoder.

- A.** Encoder Data. Fields for the accumulated count, position (both the raw value and 360-degree angle conversion), RPM and current movement direction.
- B.** Counts Per Revolution (CPR). While the standard version of the J1939 rotary encoder outputs 1000 CPR, we also sell encoders that output at different CPR values (e.g. 1024, 2048, 8192). This dropdown allows you to switch the CPR for compatibility with these other encoders.
- C.** Reset Counter and Reset Position. These buttons send commands to the encoder that zero the accumulated count and position respectively.
- D.** Setup Block. This contains fields for the various settings for the encoder as well as a button for updating these settings. There are also buttons for enabling and disabling the Settings Status message from the encoder. Please view the J1939 Encoder Manual for more in-depth information.
- E.** Encoder Status. When the interface receives a Settings Status message from the encoder, these fields will be filled with the appropriate information.
- F.** Set Count. This sends a command to the encoder setting the count value to the specified count. NOTE: This feature is customer specified and may not be available on your encoder.
- G.** Position Gauge. Visual representation of the 360-degree position of the encoder.
- H.** Position and RPM Graphs. Visual representation of the raw position and RPM values from the encoder. For each graph, the current maximum value is specified in the upper-left corner.

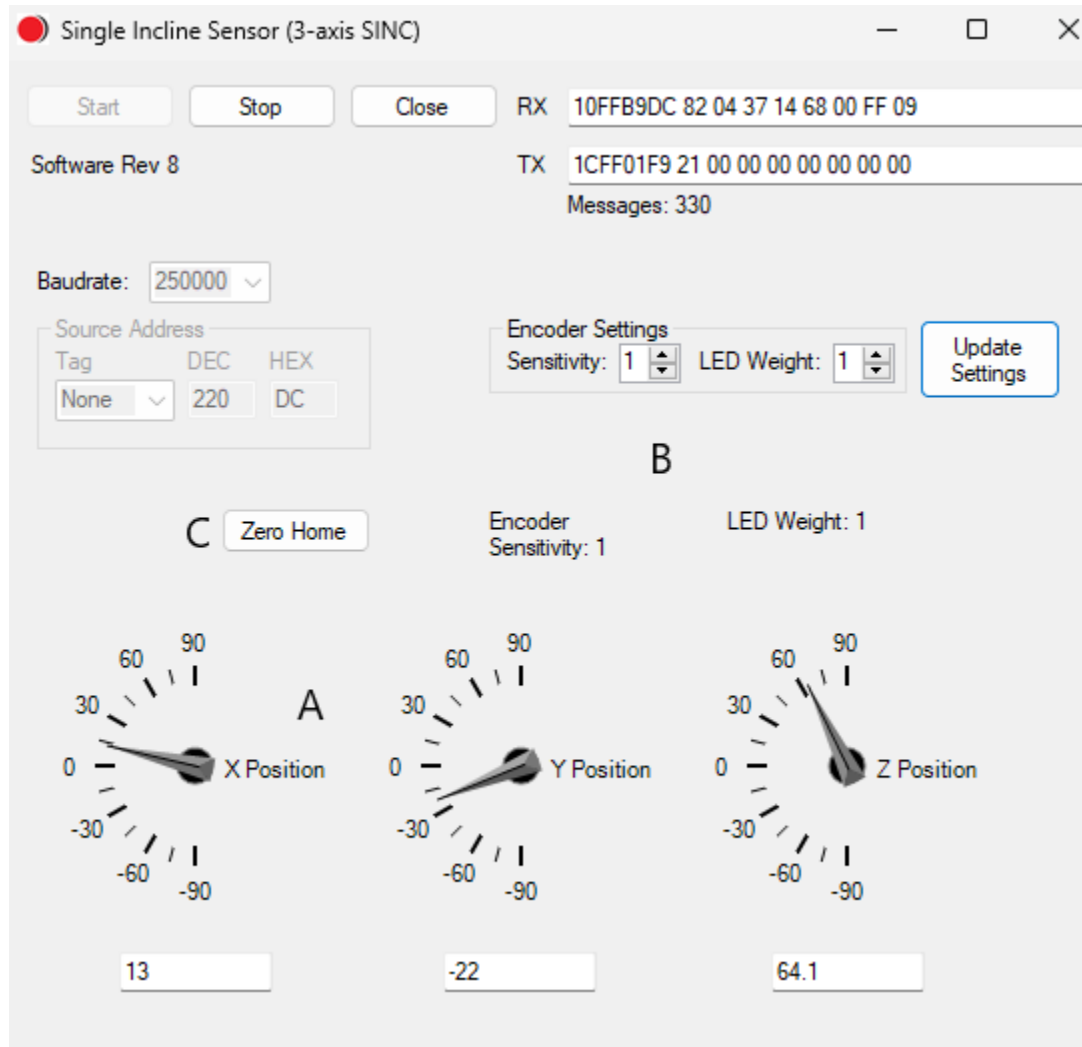
Linear Sensor Interface

The screenshot shows a software window titled "Linear Position Sensor". It contains several control elements: "Start", "Stop", and "Close" buttons on the left; RX and TX hexadecimal address fields; "Messages: 860" and "Software Rev 6" status text; a "Baudrate: 250000" dropdown; and a "Source Address" section with "Tag" (None), "DEC" (214), and "HEX" (D6) fields. A central "Setup" block includes "RPM Speed" (Slow), "Direction" (Forward selected), and "Save/Clear Count" checkboxes. On the bottom left, "Count: -18" and "RPM: 1" are displayed, along with a "Default Direction: FWD" label and an "LZ30X" checkbox which is checked. Labels A, B, and C are placed near the Count/RPM fields, the Setup block, and the LZ30X checkbox respectively.

This is the interface for the J1939 Linear Sensor.

- A.** Sensor Data. Fields for the accumulated count, RPM and sensor settings.
- B.** Setup Block. This contains fields for the various settings for the sensor as well as a button for updating these settings. There is also a button for zeroing the accumulated count. Please view the J1939 Linear Sensor Datasheets for more in-depth information.
- C.** LZ30X Setting. The message structure for the zero-power LZ30X is slightly different from that of the non-zero-power LP30. Checking this box will set the interface to look for the LZ30X message structure and thus display the data more accurately.

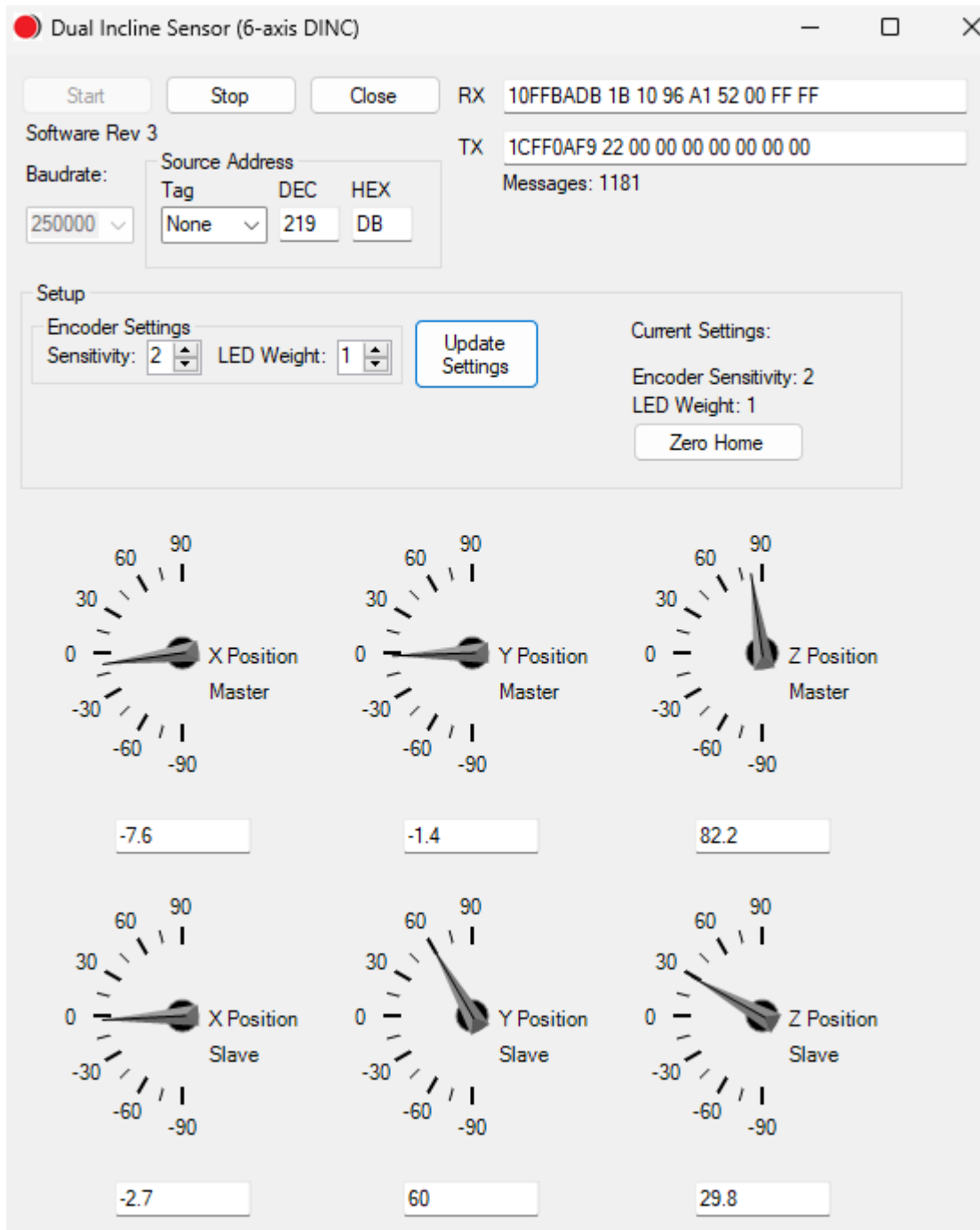
Single Incline Sensor Interface



This is the interface for the J1939 SINC and SGAM incline sensors.

- A.** Angle Gauges. Visual representations of the X, Y and Z axes, with the respective values also displayed in the text boxes below.
- B.** Sensor Settings. The Update Settings button allows you to update the LED Weight and Sensitivity of the sensor, which is reflected in the labels below.
- C.** Zero Home. This button sends a command to the sensor that homes it 0/0/90 degrees.

Dual Incline Sensor Interface



Dual Incline Sensor (6-axis DINC)

Start Stop Close

Software Rev 3

Baudrate: 250000

Source Address

Tag: None DEC: 219 HEX: DB

RX: 10FFBADB 1B 10 96 A1 52 00 FF FF

TX: 1CFF0AF9 22 00 00 00 00 00 00 00

Messages: 1181

Setup

Encoder Settings

Sensitivity: 2 LED Weight: 1

Update Settings

Current Settings:

Encoder Sensitivity: 2

LED Weight: 1

Zero Home

X Position Master

-7.6

Y Position Master

-1.4

Z Position Master

82.2

X Position Slave

-2.7

Y Position Slave

60

Z Position Slave

29.8

This is the interface for the J1939 DINC and DGAM incline sensors. These sensors have alternate PGN values than the SINC and SGAM, and output additional slave angles, hence the alternate interface.

CANopen Rotary/Linear Sensor Interface

This is the interface for the CANopen Rotary and Linear Sensors.

- A.** TPDO Data. The TPDO message for the Rotary and Linear Sensors contains data for the accumulated count, position and RPM. The interface displays this information in the boxes here, with the position again being shown both as a raw value and a converted 360-degree value.
- B.** Set Count and Set Position. These buttons send commands to the sensor to set the count and position fields to the values specified. NOTE: These values will be automatically saved to the sensors without needing to send a Save Changed Parameters command.
- C.** Position Gauge. Visual representation of the 360-degree position of the sensor.
- D.** NMT Commands. This button sends an NMT command to the sensor based on the selection below it.

- E.** Heartbeat Count. This label keeps count of every heartbeat message that is received from the sensor. If Allow Global Messages is checked, it will also display the Node ID of the heartbeat message.
- F.** Allow Global Messages. If this box is checked, the Send NMT Command button will send NMT commands with the global address, rather than the Node ID specified in the interface. Additionally, the Heartbeat Count label will process all received heartbeat messages, rather than just ones with a matching Node ID.
- G.** SDO Commands. At the bottom of the interface are various buttons that send SDO Download commands for different fields of the Object Dictionary, such as the RPM averaging rate, Node ID and baudrate. Please view the CANopen Sensor Manual for more in-depth information.
- H.** Timers. These buttons update the intervals for each of the specified timers based on the interval value given below. The interval field is in multiples of 10 milliseconds; for example, clicking Update Inhibit Timer with a 3 in this field will set the inhibit timer to 30ms.
- I.** Auto-Start. These buttons send commands to enable or disable the Auto-Start feature, which determines if the sensor starts in the Operational or Pre-Operational state on power-up.
- J.** Save Changed Parameters. This button sends a command to save all changes to the values in the Object Dictionary.

CANopen Single Incline Sensor Interface

CANopen SINC Tester

Start Stop Close Messages: 9729 Baudrate: 250000 Node ID: 12

Software Rev 4 Heartbeat Count: 473 (0x05 - Operational)

Setup

RX 58C 60 10 20 01 00 00 00 TX 60C 2F 10 20 01 03 00 00

Set Node ID 1

Update Heartbeat Timer

Update Inhibit Timer

Update Event Timer

Turn On Auto-Start

Turn Off Auto-Start

Save Changed Parameters

Encoder Settings

Sensitivity: 1 LED Weight: 3

Update Sensitivity Update LED Weight

Interval (x10ms): 0

TPDO Raw Message: 18C E7 00 77 82 82 C0 03 01 Encoder Sensitivity: 1 LED Weight: 3

X Position Y Position Z Position

23.1 -63.1 -13

Zero Home

☐ Allow Global Messages

Send NMT Command

☒ Start ☐ Stop

☐ Enter Pre-operational

☐ Reset Node

☐ Reset Comms

This is the interface for the CANopen SINC and SGAM sensors.

Like the CANopen Rotary and Linear interface, this interface contains command buttons for updating the timer intervals, setting the Node ID, enabling/disabling Auto-Start, saving changed parameters, and sending NMT commands. It also contains fields for updating the LED weight and sensitivity, as well as sending a Zero Home command, like the J1939 incline interfaces.

General CAN Analyzer Tool

The screenshot shows the 'General Can Tool' window. On the left, there are buttons for 'Start', 'Stop', and 'Close', along with a 'Baudrate' dropdown set to '250000' and 'Software Rev 6'. The main area contains a table of CAN messages:

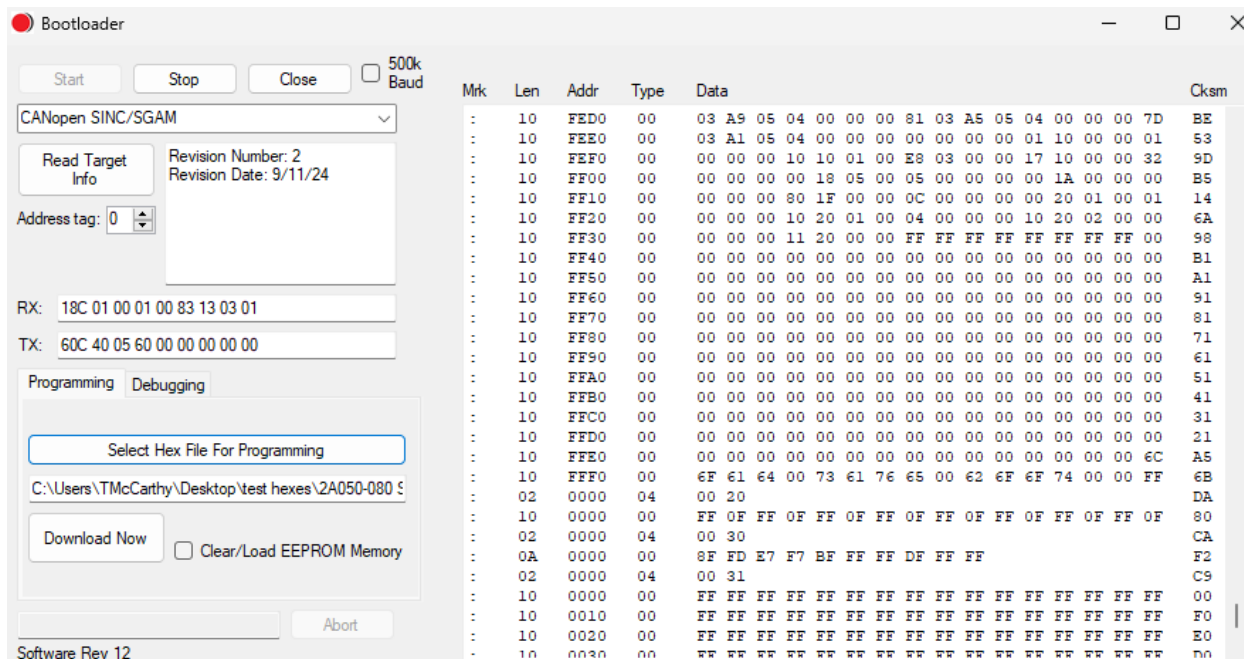
ID	Bytes	Data (B0 B1 B6 B7)	Messages	R/T
18C	8	F8 00 C6 81 57 C1 03 01	918	R
70C	1	05	61	R
0	8	01 0C 00 00 00 00 00 00	2	T
60C	8	40 10 20 01 00 00 00 00	2	T
58C	8	4F 10 20 01 03 00 00 00	2	R

At the bottom, there is a section for sending custom messages with four rows, each starting with a 'Send Message' button and followed by input fields for ID, B0-B7, and Bytes.

	ID	B0	B1	B2	B3	B4	B5	B6	B7	Bytes
Send Message	60C	40	10	20	1	0	0	0	0	8
Send Message	0	2	0	0	0	0	0	0	0	8
Send Message	0	1	C	0	0	0	0	0	0	8
Send Message	0	0	0	0	0	0	0	0	0	8

This is an interface that acts as a general CAN analyzer. The white box will display the raw hexadecimal data for all incoming and outgoing J1939 and CANopen messages. The interface separates messages by J1939/CANopen Node ID, and displays the data, length, number of messages with a given ID, and whether the message was transmitted or received. At the bottom of the interface are four fields for user-defined messages that can be transmitted to any sensor that is connected.

Bootloader



This interface allows the user to bootload our sensors with updated firmware.

After selecting the correct device from the dropdown menu and clicking Select Hex File For Programming to select a hex file (which will be printed in the box on the right), the user can click Download Now to begin updating the sensor with the new firmware.

After updating begins, the text box in the lower left will display the bootloader progress. The update time will vary depending on the device, but it should typically take less than a minute. While not recommended, the user can also click Abort to halt the bootloader process before it finishes.

The bootloader is intended to update only the program memory while leaving the EEPROM as it was before, allowing for specific device settings (RPM resolution, sensitivity, etc.) to avoid being overwritten. If it is desired to return these settings to the factory default, click Clear/Load EEPROM Memory before clicking Download Now.

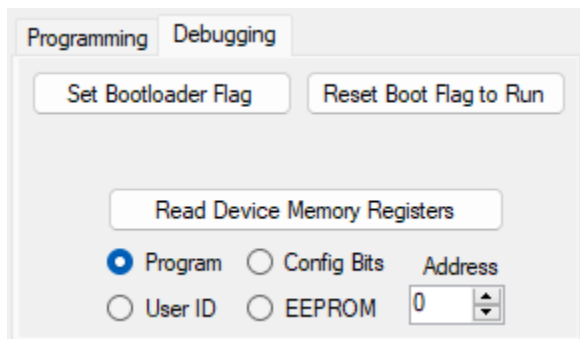
The user may also view the firmware revision info by clicking Read Target Info.

Bootloading at 500k Baud

For sensors that are hard-coded to 500k baud, check the box labeled 500k Baud **before** clicking Start.

When Download Now is clicked, the interface will send the Bootload Start command to the sensor. Then a popup will appear, and the interface will halt communication instead of proceeding to upload the new firmware to the sensor. At this point, the user must click Start **without** checking 500k Baud, and then click Download Now again. At this point, the interface should start uploading the new firmware. This is done because the bootloader firmware operates at 250k baud for all sensors, even those hard-coded to 500k during normal operation.

Debugging Menu



The bootloader interface also contains a debugging menu that can be used to manually force the sensor in and out of bootload mode, as well as read specific areas of program memory in the sensor's firmware.

Troubleshooting

The PCAN-USB device is not appearing in the main dropdown menu.

- Ensure that the device is connected to the computer running this software, then click the button labeled Refresh.
- Ensure that the PCAN-USB driver has been installed (see **Introduction** for the link to the Phyttools website).

The software will not connect to the PCAN-USB device.

- The PCAN-USB adapter can only have one connection open at a time. Ensure that no other interfaces are currently connected to the specified PCAN-USB device.
- The software may halt communication if connection is attempted at the incorrect baudrate. Ensure that the baudrate selected in the interface matches the baudrate of the sensor.

The bootloader will not start uploading the new firmware to the sensor.

- Ensure that the correct device is selected from the dropdown menu at the top.
- For CANopen sensors, make sure the sensor is set to the correct Node ID (2 for Rotary Encoder, 6 for LZ30X, 12 for SINC/SGAM) and 250k baud.
- For sensors that are hard-coded to 500k baud, click 500k Baud **before** clicking Start. After the Bootload Start command is sent and the popup appears, make sure 500k Baud is **not** checked when clicking Start and Download Now again.

Contact

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