

# ACAS-X

***FOR MAXXECU***  
***BY DRAGDYNAMICS.COM***



## **INSTALLATION AND CONFIGURATION**

## ***DISCLAIMERS, TRADEMARKS, WARRANTY***

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*Drag Dynamics is not affiliated with MaxxECU – we just like using their products and developing complementary parts for their Engine Control Systems.*

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## Parts Included

1 – ACAS-X Sensor Module

1 – 4' Wire Harness, DTP Connector assembled – Flying Leads

## Operation:

*For use with MaxxECU systems only. See “Requirements” section for minimum supported firmware versions.*

## Chassis Angle

The ACAS-X channel 1 output shows Chassis Angle – also known as Pitch. This is the absolute angle of the chassis, unaffected by acceleration or roll (up to 30\* roll angle). It uses “fusion data” to give the most accurate position

## Pitch Velocity

Pitch Velocity is the Chassis Angle RATE OF CHANGE – If your car is optimized for tracks where a wheelie is a potential problem, Pitch Velocity lets you see the problem long before the chassis angle is too high to do anything about it – potentially saving both a pass, and thousands of dollars of damages from hard landings. This is output on Channel 2.

## Linear Acceleration

Channel 3 transmits Linear Acceleration. This is the typical “X-Axis” raw data, from the onboard G-Meter. It will be affected by the vehicle’s pitch angle during a pass, but it’s what most are used to seeing, therefore we included it in the ACAS-X.

## Corrected Linear Acceleration

Channel 4 reports a Corrected Linear Acceleration value. This channel is similar to X-Axis on a typical G-Meter, minus the effects of chassis tilt, gravity, and vibration that causes normal X-Axis accelerometer data to become inaccurate or unusable. This helps with pass-to-pass repeatability regardless of chassis angle, surface preparation, etc. This is very useful to measure true acceleration values in cars that require large chassis angles for best performance.

## General Information and Use:

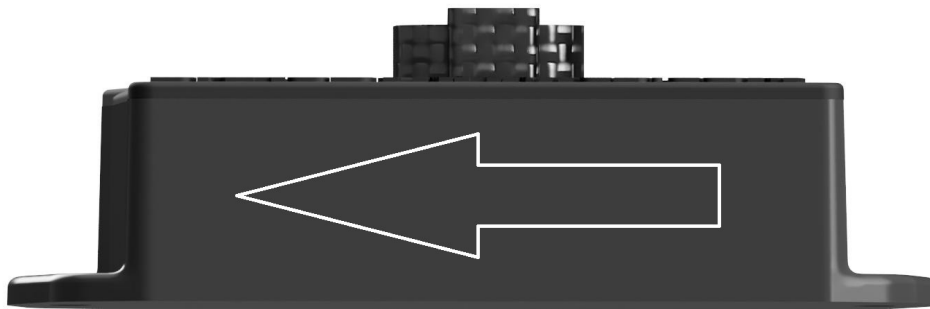
**Power Consumption:** The ACAS-X uses 5 volt power and sensor ground directly from your MaxxECU, just like any other 5v sensors. This unit consumes no more than .003 amps (30 milliamps) during use.

**Performance:** The ACAS-X samples chassis orientation and movement at 400khz, and generates CAN data packets at 100 samples per second, the fastest a Holley can receive and store CAN data. This results in a time of .008 seconds between sensor measurement and delivery to your ECU.

## Wiring and Installation

**Mounting:** Mount the ACAS-X module on a horizontal surface in your vehicle chassis. The arrow on the top of the module must point in the forward direction the car travels during racing. The unit can be mounted just about anywhere relatively flat and level, but best performance comes from mounting near the chassis pivot (rear axle) as low as possible.

The ACAS-X needs to be “zero'd” before use. There are 2 options for zeroing the system: (1) Each time power is applied (ECU power up), and (2) whenever the system detects a trigger from the Holley Outputs that is easily configured in your I/O (Outputs) ICF. The closer you have it mounted level in your chassis, the better. The mount can be rigid – unlike other inertia measurement systems, this one will filter high frequency noise from chassis vibrations. The unit can be mounted anywhere temperatures won't exceed 170\* F continuous. The unit operates reliably in temperatures as low as 45\* F continuous, and uses internal temperature compensation.



## Wiring:

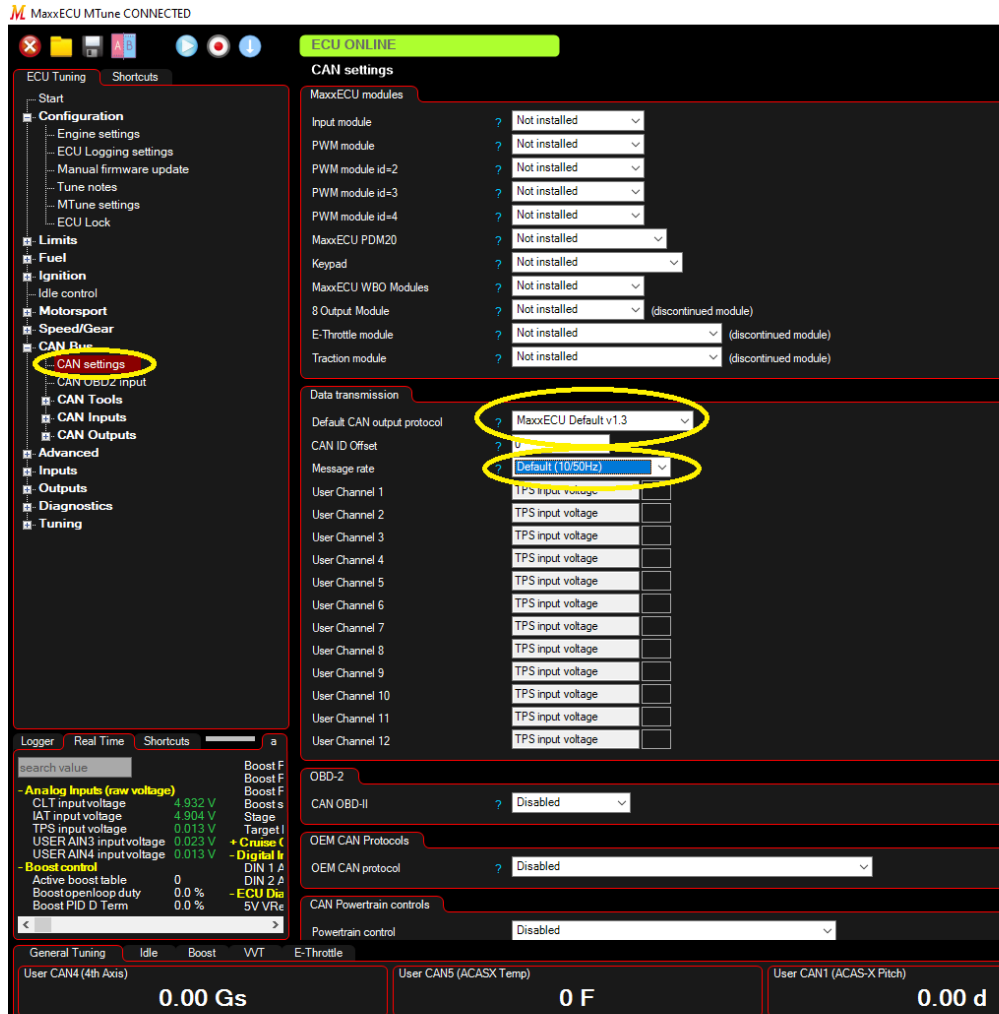
Pin:	Color:	Function:
1	YELLOW	+5v Power from MaxxECU VREF +5v circuit. <b>DO NOT CONNECT TO +12v IGNITION POWER</b>
2	Black	Ground – attach to MaxxECU Sensor Ground circuit. <b>DO NOT CONNECT TO CHASSIS OR BATTERY GROUND</b>
3	Orange	CAN Bus Low. Connect to MaxxECU CAN Low
4	Orange/Blk	CAN Bus High. Connect to MaxxECU CAN High



# MTune Configuration:

## CAN Bus Configuration:

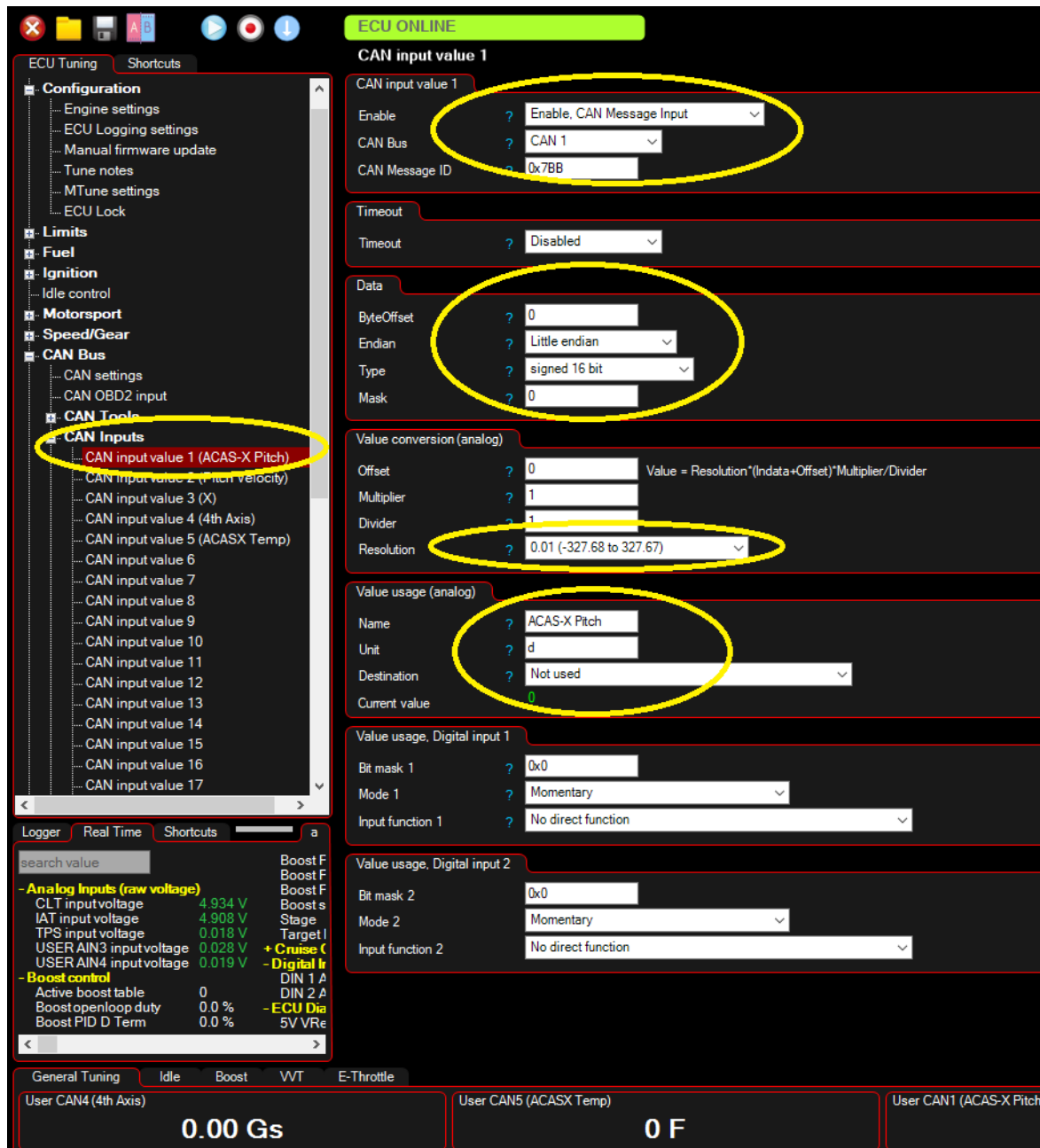
Open the calibration (from file, or from the ECU itself) that you want to configure for ACAS, and select CAN Bus, CAN settings and set Default CAN output protocol to MaxxECU Default v1.3. Set the Message rate to Default (1050hz). See image below





# Chassis Angle Channel Configuration

Next, select from CAN Inputs, your first available CAN input value and configure the Message ID, Data, Value Conversion and Value Usage categories as seen in the next image:



# Pitch Velocity Channel Configuration

Using the next available CAN input value (left column), configure the Pitch Velocity channel as follows:

The screenshot displays the ECU Tuning software interface. The left sidebar shows a tree view under 'CAN Inputs' where 'CAN input value 2 (Pitch Velocity)' is selected and highlighted with a yellow circle. The main panel is titled 'CAN input value 2' and contains several configuration sections, all of which are circled in yellow:

- Enable:** Set to 'Enable, CAN Message Input'.
- CAN Bus:** Set to 'CAN 1'.
- CAN Message ID:** Set to '0x7BB'.
- Timeout:** Set to 'Disabled'.
- Data:**
  - ByteOffset: 2
  - Endian: Little endian
  - Type: signed 16 bit
  - Mask: 0
- Value conversion (analog):**
  - Offset: 0
  - Multiplier: 1
  - Divider: 1
  - Resolution: 0.01 (-327.68 to 327.67)
- Value usage (analog):**
  - Name: Pitch Velocity
  - Unit: d/s
  - Destination: Not used
  - Current value: 0
- Value usage, Digital input 1:**
  - Bit mask 1: 0x0
  - Mode 1: Momentary
  - Input function 1: No direct function
- Value usage, Digital input 2:**
  - Bit mask 2: 0x0
  - Mode 2: Momentary
  - Input function 2: No direct function

At the bottom of the screen, a 'Real Time' logger shows various engine parameters. The status bar at the very bottom displays 'User CAN4 (4th Axis)' with a value of '0.00 Gs', 'User CAN5 (ACASX Temp)' with a value of '0 F', and 'User CAN1 (ACASX Temp)'.

# X-Accel Channel Configuration

Using the next available CAN input value (left column), configure the X-Accel channel as follows:

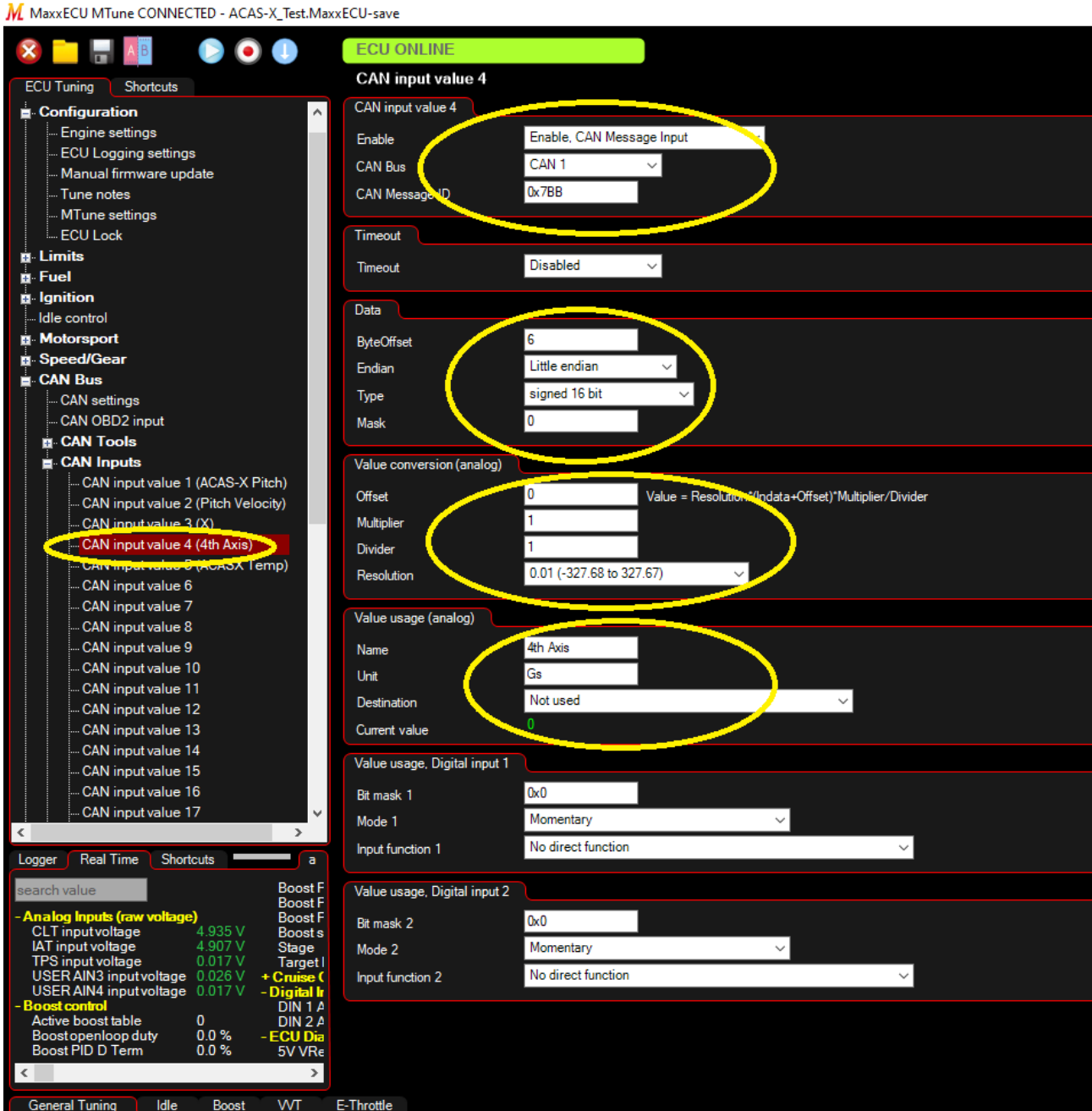
The screenshot displays the ECU Tuning software interface. On the left, a tree view under 'CAN Bus' shows 'CAN input value 3 (X)' selected and highlighted with a yellow circle. The main panel is titled 'CAN input value 3' and contains several configuration sections, all of which are circled in yellow:

- Enable:** Set to 'Enable, CAN Message Input'.
- CAN Bus:** Set to 'CAN 1'.
- CAN Message ID:** Set to '0x7BB'.
- Timeout:** Set to 'Disabled'.
- Data:** 'ByteOffset' is 4, 'Endian' is 'Little endian', and 'Type' is 'signed 16 bit'.
- Value conversion (analog):** 'Offset' is 0, 'Multiplier' is 1, 'Divider' is 1, and 'Resolution' is '0.01 (-327.68 to 327.67)'. The formula is  $Value = Resolution * (InData + Offset) * Multiplier / Divider$ .
- Value usage (analog):** 'Name' is 'X', 'Unit' is 'Gs', and 'Destination' is 'Not used'.
- Value usage, Digital input 1:** 'Bit mask 1' is '0x0', 'Mode 1' is 'Momentary', and 'Input function 1' is 'No direct function'.
- Value usage, Digital input 2:** 'Bit mask 2' is '0x0', 'Mode 2' is 'Momentary', and 'Input function 2' is 'No direct function'.

At the bottom, the 'Real Time' tab shows a live data stream. The 'User CAN4 (4th Axis)' is displayed as '0.00 Gs' and 'User CAN5 (ACASX Temp)' is displayed as '0 F'. The 'General Tuning' tab at the very bottom shows 'Idle', 'Boost', 'WT', and 'E-Throttle' sub-tabs.

# Corrected X-Accel Channel Configuration:

Using the next available CAN input value (left column), configure the X-Accel channel (4<sup>th</sup> Axis) as follows:



## OPTIONAL: ACAS Temperature Channel

Although it's not necessary, we've included an ACAS temperature channel in the ACAS CAN broadcast data in case you'd like to monitor it. Using your next available CAN Input Value (left column), set up your ACAS Temperature Channel as follows:

The screenshot shows the ECU Tuning software interface. The left sidebar contains a tree view of settings, with 'CAN input value 5 (ACASX Temp)' highlighted in red. The main configuration panel is titled 'CAN input value 5' and contains several sections:

- CAN input value 5**: Enable (Enable, CAN Message Input), CAN Bus (CAN 1), CAN Message ID (0x7BC).
- Timeout**: Timeout (Disabled).
- Data**: ByteOffset (0), Endian (Little endian), Type (signed 16 bit), Mask (0).
- Value conversion (analog)**: Offset (0), Multiplier (1), Divider (1), Resolution (1 (-32768 to 32767)).
- Value usage (analog)**: Name (ACASX Temp), Unit (F), Destination (Not used), Current value (0).
- Value usage, Digital input 1**: Bit mask 1 (0x0), Mode 1 (Momentary), Input function 1 (No direct function).
- Value usage, Digital input 2**: Bit mask 2 (0x0), Mode 2 (Momentary), Input function 2 (No direct function).

The bottom of the interface shows a real-time data display with three channels: 'User CAN4 (4th Axis)' showing '0.00 Gs', 'User CAN5 (ACASX Temp)' showing '0 F', and 'User CAN1 (ACASX Pitch)' showing '0.000000'. The 'ACASX Temp' channel is highlighted in red.

## **Zeroing the Sensor, and the Zero Modes**

Your ACAS-X sensor automatically zeros itself when powered up. However, you may want it to zero just before launching the car (using a trans brake input, or clutch switch, for example).

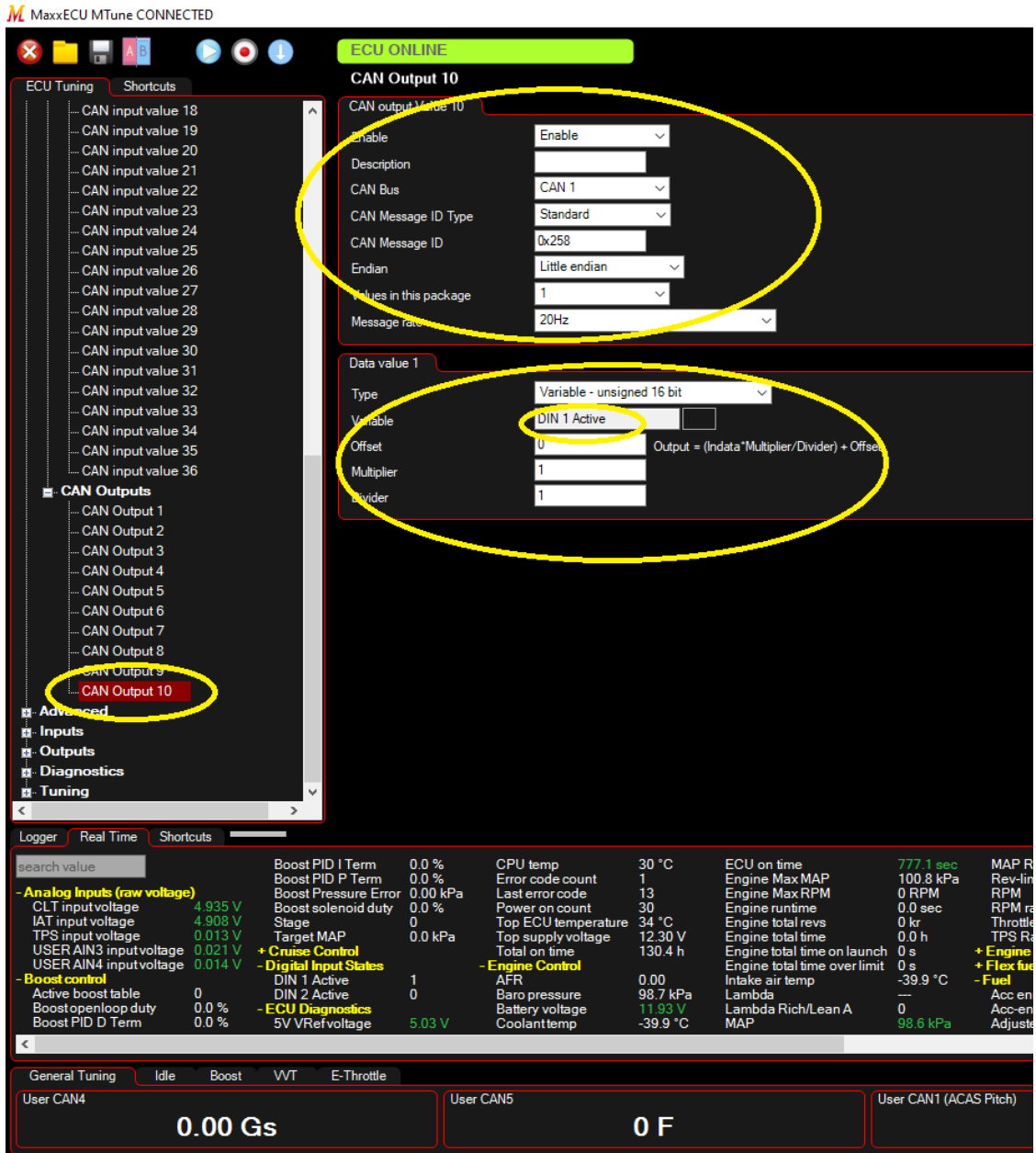
By default, the ACAS-X automatically every time the Holley ECU powers up. Optionally, it can be zero'd whenever the ACAS-X detects an event triggered by the Holley ECU over CAN Bus.

### **AutoZero**

ACAS-X will automatically zero the chassis angle every time power is applied (ignition on) to the Holley ECU. This works great for cars with changing ride heights, BUT it can be a problem if the car is started in staging lanes that are on an incline.

# Triggered Zero

This method will read a “trigger” via CAN Bus from the MaxxECU, preferably when a trans brake or clutch switch is depressed (but it can be triggered off any event available in the Holley ECU). How this works is by configuring a CAN Output as shown in the next image. We chose CAN Output 10. This will send a “Zero” command to the ACAS whenever your DIN1 input becomes Active. Most drag racers will tie this to their Launch button, triggering a zero when the button is pressed.



## Testing Triggered Zero mode

To see if the Triggered Zero mode is functioning, watch the Blue LED light on the ACAS: it will go dark for 1 second every time it receives a “Triggered Zero” packet.

If you have difficulty setting this up or troubleshooting, email us at [support@dragdynamics.com](mailto:support@dragdynamics.com) and we'll get on the phone/remote with you and help you get it working.



## CAN Bus Tuning and Performance

Its a good idea to make sure your CAN bus networks are performing their best, so here are some things to consider:

CAN Bus Termination: measure the **resistance** (the Ohms option on your meter) of the CAN bus wires while all sensors are installed and wired, but NOT powered on. The ideal resistance for a CAN network, is 60 ohms. Measure this by probing both CAN bus wires and observing the resistance figure. If the bus measures 120 ohms or higher, it's time to install another terminating resistor. Holley sells them, or you can just install a 120-ohm, ¼ watt resistor across the two CAN wires yourself. Usually, a terminating resistor is not needed but it's a good idea to check if you're having data dropouts in your logs.

## Dragdynamics.com Product Warranty

### Limited 3-Year Warranty

*Congratulations on your purchase of an ACAS-X! We stand behind the quality of our products and are pleased to offer you a limited warranty against manufacturer defects and problems. Please read the following terms carefully.*

**Warranty Coverage:** Drag Dynamics, LLC ("the Company") warrants that your ACAS-X (the "Product") is free from defects in materials and workmanship for a period of three (3) years from the date of purchase, provided that the Product is used under normal conditions and for its intended purpose.

**Scope of Warranty:** This warranty covers any defects or malfunctions arising from the manufacturing process or materials used in the Product. The Company will, at its discretion, repair or replace the defective Product or parts, or provide a refund, within the warranty period.

**Original Purchaser Coverage:** This warranty is applicable only to the original purchaser of the Product and is non-transferable. To be eligible for warranty service, the original proof of purchase must be presented.

**Exclusions:** This warranty does not cover damage resulting from:

- Accidents, misuse, or abuse
- Unauthorized modifications or repairs
- Acts of nature, such as lightning, floods, earthquakes, etc.
- Normal wear and tear

**Obtaining Warranty Service:** If you believe your Product is defective and covered by this warranty, please email [support@dragdynamics.com](mailto:support@dragdynamics.com) for instructions on how to proceed with the warranty claim. The Company reserves the right to require proof of purchase and may ask for the defective Product to be returned for inspection.

**Limitation of Liability:** To the extent permitted by law, the Company's liability under this warranty is limited to the repair, replacement, or refund of the Product, and shall not exceed the purchase price paid for the Product.

**No Other Warranties:** This warranty is the sole and exclusive warranty for the Product, and no other warranties, express or implied, are made, including any warranty of merchantability or fitness for a particular purpose.

**Effective Date:** This warranty is effective as of the date of purchase and is valid for three (3) years.

Thank you for choosing Drag Dynamics, LLC. We appreciate your trust in our products.