

# CAMERONTECH **Offroad CPU**

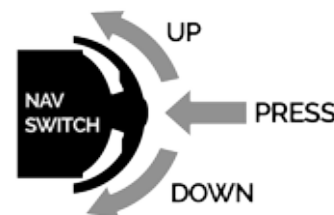
Thanks for purchasing a Cameron Tech Offroad CPU! This unit gives you an inclinometer and altimeter in one compact unit. Track the height of your favorite climb, the highest and lowest point you reached or keep track of just how close you came to riding on two wheels (or the roof).

If you purchased a pre-assembled unit then continue reading. If you purchased a parts kit you'll need to assemble everything first. Browse through these instructions before you start to keep a couple of things to keep in mind (mainly sensor positioning and power hookup) and then head to <http://camte.ch/cpu-build> to read assembly instructions.

## Terminology

Throughout this document I will refer to several parts of the Offroad CPU and the navigation switch:

- **Unit:** the main Offroad CPU display, circuit board and sensor.
- **Display:** the actual character display that shows text and sensor readings.
- **Sensor:** the small board behind the display that is set at a right angle to the rest of the unit.
- **Nav switch:** the small black and silver rocker switched attached to the unit via wires. The nav switch has three motions: rocking up, rocking down and pressing in. When you see "press the nav switch" it means to press the black rocker knob into the body of the switch. This selects a menu item and saves calibration and brightness settings.



## Mounting & Installation Considerations

Mount your unit wherever you'd like, but keep one thing in mind: the sensor should be kept as parallel to the ground as possible. The sensors give very precise measurements for incline but work best when they are level to the ground. You can zero out the inclinometer so even if the sensor is not perfectly level you can still register ground at 0° (see the **Inclinometer Zero** section later).

If you are mounting your display at an angle greater than 10° to vertical then you can gently bend the pins that attach the sensor to the rest of the unit until the sensor is approximately level. The best way to do this would be to take needle nose pliers and grasp the pins themselves (not the sensor board) and gently twist your wrist to bend them. See <http://camte.ch/sensor-level>

The Offroad CPU measures altitude via a barometric pressure sensor. If you plan to mount the unit inside of a sealed container make sure to leave at least a pinhole opening so that the pressure on the inside and outside of the enclosure can be equalized, otherwise your altitude settings will be extremely inaccurate.



Before mounting make sure to calibrate your inclinometer! See the **Inclinometer Sensor Calibration** section later.

## Power Options

**If you power on your unit and the backlight comes on but no characters can be seen on the display DON'T PANIC!** Adjust the Contrast knob on the back until the display is clear and bright.

Ideally you should power your unit with 12v from your vehicle's interior. Find a power and ground line and splice into them. See <http://camte.ch/splice> for a video introduction of splicing into wiring. If you are mounting the unit near the radio you will have problem finding power and ground to tap into (search online for documentation on changing out the stock radio and you'll find which color coded wires you need).

If you use a wire pulled directly from the battery then your unit will be powered at all times—even when the ignition is off. This is probably not what you want since it would drain your battery given enough time. In this case you will want to add a switch to manually power your unit on and off. Mount the switch alongside other interior switches for a nice

OEM look. Check <http://camte.ch/switches> for links to all kinds of switches suitable to the task.

If you tap into an ignition line then you will only get power when the vehicle is on. This is ideal. You could also adapt a 12v cigarette lighter power adapter. Most cigarette lighters are only powered when the ignition is on.



Cutting into wires in your car can lead to severe shocks (and yes, death) and/or permanent damage to your truck. If you haven't done this kind of thing before you should seek help from a friend who has or ask advice on online forums dedicated to your vehicle.

A third option is to use the included 9v battery cap and simply power your unit with a battery. You will need to disconnect the battery to turn the unit off, or add a switch between the battery and the display unit. A typical alkaline 9v battery will power your unit for 5-6 hours of continuous usage. You can expect almost double this with a lithium battery, or half with a rechargeable.

## Calibration & Zeroing

The Offroad CPU should be calibrated before you use it in order to get the most accurate reading. If you're going to permanently install the unit then be sure to perform the **Inclinometer Sensor Calibration** before installation.

### Inclinometer Sensor Calibration

Each sensor arrives from the factory with slightly different tolerances. Performing the accelerometer calibration will find the maximum extents that the accelerometer will measure and makes incline readings more accurate. To watch a video of calibration, go to <http://camte.ch/incline-calibrate>

You will need to power your unit but keep it free to rotate in several directions. It may be simpler to provide power via a 9v battery at this point so that the unit will be free to move in all directions.

Power on your unit and press the navigation switch up or down until you find the **Inclinometer Calibrate** menu item. Select it by pressing the nav switch. You will now see a series of numbers. Slowly and gently rotate the unit 360° towards you. Then rotate it 360° in a clockwise motion. While you are rotating you'll see the top row of numbers decrease (become more negative) and the bottom row of numbers increase (become more positive).



It's important to rotate the unit slowly and gently. Since the accelerometer measures acceleration, the numbers will be throw off if you suddenly shake the unit or jerk it around as you rotate it. If in doubt of your technique watch the video at <http://camte.ch/incline-calibrate>

Perform a second rotation in each direction. Once you're done click the navigation wheel to save the calibration values. The unit should return to the **Incline** view. Calibration settings saved and remembered the next time you turn the unit on. If for some reason you need to perform calibration again (after a Factory Reset, for example) just power the on again and then repeat the procedure above.

### Altimeter Calibration

The altimeter is driven by a barometric sensor. This sensor measures air pressure and is extremely accurate to relative changes in pressure (to within about 3 feet). This means that traveling vertically 1000' will register as a change of 1000' plus or minus 3' on the Offroad CPU.

However: air pressure changes based on the weather. Therefore you cannot assume that the initial altitude displayed when you power on your unit will be your actual altitude. To get an accurate starting altitude you should calibrate the altimeter based on a reading from a GPS unit (assuming that the GPS unit can acquire altitude from satellite and that it, too, doesn't just use a barometer) or from a known altitude at a known point via a topographic map (Google Earth provides the altitude under the mouse cursor as you move around the 3D map).

Navigate to the **Calibrate Altimeter** menu item and select it. Move the navigation switch up and down to change the altitude until it matches your reference altitude. Press the nav switch to set the altitude. You will return to the Altitude display and it should display the newly calibrated altitude.

Note that the reference altitude will be saved when you power off the unit. The value stored is the difference between the altitude that was measured at the time you calibrated and the reference altitude you saved. For example if the altitude was 1000' and you calibrated it for 980' then the unit will store -20 feet in memory. If the weather changes significantly the next time you power on the unit then you will see the altitude displayed on your unit to be incorrect

again: it will simply subtract 20 feet from whatever the current altitude measurement is, which may not be the same as it was when you last calibrated the unit.

## Inclinometer Zero

Every effort should be taken to mount the sensor as close to level with the ground as possible (see the **Mounting & Installation Considerations** section above). In the case that it's not mounted perfectly level (and it probably won't be) you can zero out the sensor to reset 0° pitch and 0° roll to whatever the current orientation of the sensor is.

Move your vehicle to a spot that feels reasonably flat. Find the **Incline** menu option and select it. While viewing the Pitch and Roll display, click the navigation switch. The Pitch and Roll should read 0° (plus or minus a degree).

## Track Altitude Zero

Tracking your altitude will measure the total altitude change since the unit was last powered on or since the tracking altitude was last zeroed.

To reset the tracking altitude select the **Track Altitude** menu item. While viewing the Track Altitude display press the nav switch. The tracking altitude should be reset back to 0'. Tracking altitude will be recorded in the background so you do not need to stay in that mode to perform tracking.

## Min/Max Altitude Zero

The Min/Max Altitude feature will record the minimum and maximum altitude that was recorded since the last time the unit was powered off or the values were zeroed.

To zero the min/max altitude select the **Min/Max Altitude** menu item. While viewing the Min/Max Altitude display press the nav switch. The two altitudes displayed should reset to the current altitude. Your min/max altitude will be recorded in the background so you do not have to stay in that mode in order to properly track min/max values.

## Factory Reset

Performing a factory reset will remove the inclinometer sensor calibration, altimeter calibration, inclinometer zero, imperial/metric unit preference (defaults to imperial), and brightness settings from memory and return your unit to the same state it was in when you first received it.

To perform a factory reset, select the **Factory Reset** menu item and press the nav switch.

## Unit Display

The Offroad CPU can display altitude in either feet or meters. To switch from one to the other, select either the **Altimeter** or **Temperature** option in the menu. Press the nav button while viewing the altitude or temperature. Any display of altitude (tracking, min/max, etc.) will all display in your unit of choice. Likewise changing between imperial and metric will also change the unit on the temperature display from Fahrenheit to Celsius.

## Brightness

Unless you have an OLED display you can use the **Brightness** menu item to change the backlight intensity of the display. Once you have selected the Brightness option you can move the nav switch up and down to increase and decrease the brightness and press to save it.

## Navigating the Menu

Finally, here are every menu screen and display mode in the Offroad CPU:

