Using Team Plus TELELOGGER with External Inputs

From Version 3.7 of the Team Plus TELELOGGER firmware, there are configuration options and support for using external sensors connected to the TELELOGGER 1+B.
External inputs for TELELOGGER are connected through the 4 pin micro-fit MOLEX connector on the device.   The connector allows for either:
   - 2 x analog or digital connections, each using one signal wire and the common ground wire.
   - OR.. 1x UART connection, using 2 signal wires (TX and RX) and the common ground and 5V supply.

As at version 3.7 of Team Plus TELELOGGER software, there is simplified connection and configuration options for the analog or digital sensors   . We will add UART options at a later date for specific purposes.
Each of the connections can be either a digital (on/off) sensor or an Analog(variable voltage) sensor.
The External input sensor configuration is set through the TELELOGGER Config Tool, which is available from the support pages at: https://teamplus.cloud/support
External input cables are available from our website at http://teamplus.cloud/telelogger

This document can help you configure specific external input options for use with your TELELOGGER and TELEHUB:

Input connector on the Team Plus TELELOGGER 1+B
The Team Plus TELELOGGER 1+B has a 4 port micro-fit MOLEX style socket on the back of the device that can be used to connect external sensors.
The 4 port connector pins are as follows (looking at the port)
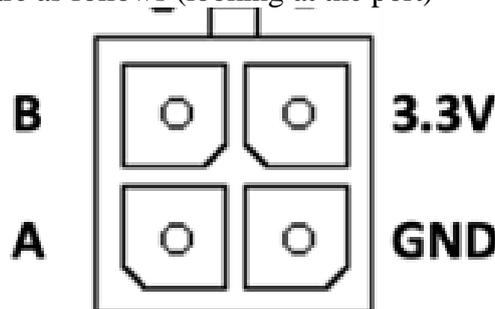
In general terms, a sensor connected to Input A should have 0 to 3.3V signal wire to A and sensor ground be connected to GND. And a sensor connected to input B should have 0-3.3V signal wire to B and sensor ground connected to GND.
3.3V supply can be used to power a sensor if needed.
IMPORTANT WARNING: inputs can only accept up to 3.3V. Higher voltages will damage the TELELOGGER and will not be covered by warranty.   For higher voltage input needs, use a voltage divider cable which will reduce the voltage by up to 5x which means up to 16V inputs could be used.
On the Team Plus Websites, you can purchase an input cable, which has the MOLEX connector to plug into the TELELOGGER and easy to connect pins at the other end.   We

also have a Voltage Divider cable for higher voltage input sensors, where the voltage divider is already linked to the cable, and is ready to accept a ground and signal wire for sensor A.

TELELOGGER External Input Cable

TELELOGGER Voltage Divider Cable

ADDING A DIGITAL SENSOR

As an example of how to add a digital sensor, let's go through the process of adding a brake pedal digital on/off sensor, that switches on if brake pedal is pressed and off when not. We will connect and configure it for Sensor A and the Brake channel in TELEHUB.

This can be useful additional data for the TELELOGGER and TELEHUB, helping refine the data on how the car is being driven and brake pedal usage, but is not a standard available channel in OBD.

Step 1: Sensor Configuration

- Connect your TELELOGGER to the PC via a USB cable. You should hear the PC chime as it recognises a new device.
- On a PC, run the TELELOGGER Config Tool.   If you don't have this tool, you can download it from our support pages at: https://teamplus.cloud/support
- On the Config Tool, select the latest firmware/software version (3.7 or later for serial inputs)
- Select the TELELOGGER device version (in this case the Team Plus TELELOGGER 1+B)
- Ensure all your configuration setting match the networking model you are using (4G SIM or Wi-Fi with passwords etc)
- Set the External Sensor A parameters to be:
  - o Digital Sensor
  - o Channel Name: Brakes
  - o Scale value 1(default)
  - o Offset value 0 (default)

- The available Serial COM ports will show as buttons, and one of those will be the TELELOGGER. Press that COM button to start reconfiguration, which will recompile the software for the telelogger and then upload it to the device.
- The status window will tell you when configuration is complete, and you can exit the config tool and disconnect TELELOGGER from PC.

Step 2:   Sensor connection

- Securely connect the sensor wires to the Sensor cable input A wire (white wire on our cables) and the +3.3V wire (red wire) which will supply to power for the signal when turned on. The GND wire (black) should be connected to vehicle ground.
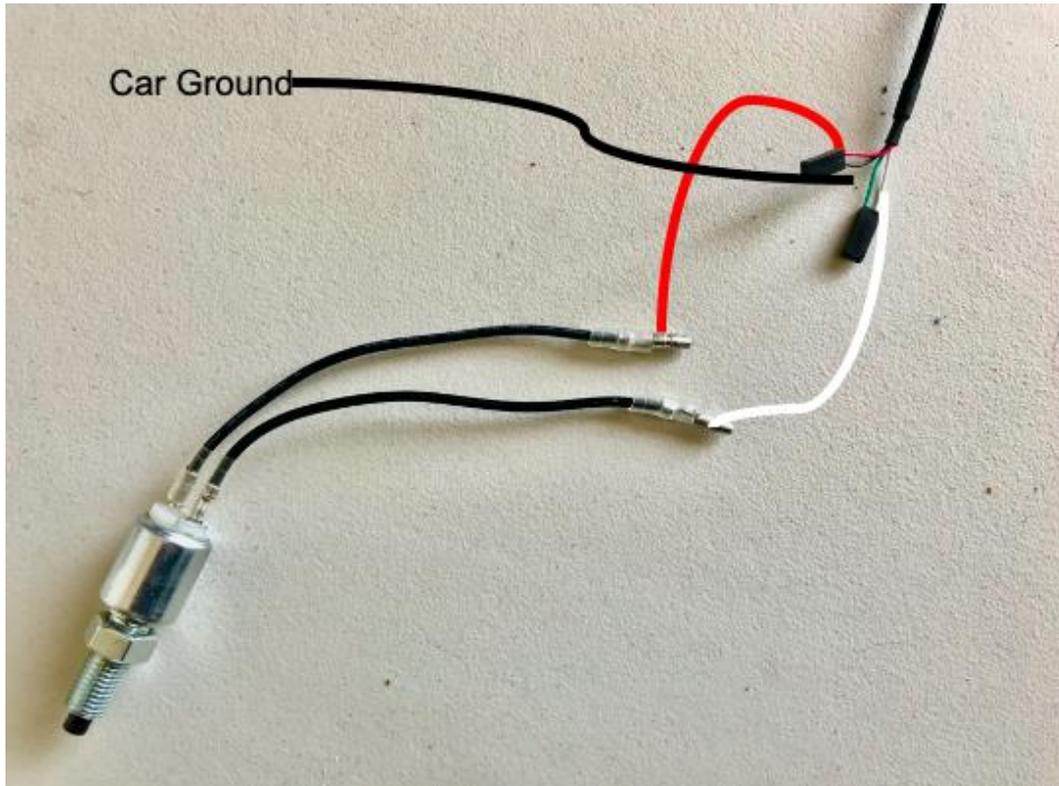
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Place the sensor on brake pedal assembly so that the button is activated when brake not in use, and releases when brake pedal just slightly pressed.
- Connect the input sensor cable to the TELELOGGER by plugging in the Molex micro-fit 4 pin connector.

- Plug the Telelogger into the car as normal via the OBD port or powered by USB if you don't have a compatible OBD port and ensure all cables are well secured to prevent any disruption to driving the car.
- The sensor should now be ready.

NOTE: If you wanted to connect this to Sensor B, use the green wire instead of the white, and use 'External Sensor B' parameters in the config tool instead of Sensor A.

Step 3: TELEHUB

Now that the sensor is connected and configured the TELELOGGER will transmit it with other data to the TELEHUB and log it to the SD card data files.

The Channel name you chose in the Config Tool determined which channel the sensor data will show in. We chose Brakes in this case, so in TELEHUB there will now be a brakes channel that you can select in live views or select for graphs in the drive history views.

To get a Gauge indicating brake position, click on one of the 2 channel selectors at the bottom of the live feed screen, until you get to the brake channel, and the matching gauge will now show the brake position. As we have implemented a digital brake sensor, it will show on or off.

ADDING A PRE-CONFIGURED SENSOR

As an example of how to add a pre-configured sensor, let's go through the process of adding a AEG X Series Boost Gauge. We will connect and configure it for Sensor A and the Boost channel in TELEHUB.

This can be useful additional data for the TELELOGGER and TELEHUB, as many OBD pressure reading can be impacted by piggyback ECU systems that are fooling the ECU into thinking the pressure is different than it really is. Knowing the Real pressure can be valuable.

Step 1: Sensor Configuration

- Connect your TELELOGGER to the PC via a USB cable. You should hear the PC chime as it recognises a new device.
- On a PC, run the TELELOGGER Config Tool. If you don't have this tool, you can download it from our support pages at: https://teamplus.cloud/support
- On the Config Tool, select the latest firmware/software version (3.7 or later for serial inputs)
- Select the TELELOGGER device version (in this case the Team Plus TELELOGGER 1+B)
- Ensure all your configuration setting match the networking model you are using (4G SIM or Wi-Fi with passwords etc)
- Set the External Sensor A parameters to be:
  - o AEM X Series Boost Gauge (which is a pre-configured solution for TELELOGGER)
  - o Channel Name: Boost (this will always set to Boost channel when this gauge is selected)
  - o Boost Gauge 0 adjustment to 0. (try 0 first, but if you find your gauge is off at no boost, you can adjust the 0 point with this parameter)
  - o Scale value 1(default)
  - o Offset value 0 (default)

- The available Serial COM ports will show as buttons, and one of those will be the TELELOGGER. Press that COM button to start reconfiguration, which will recompile the software for the telelogger and then upload it to the device.
- The status window will tell you when configuration is complete, and you can exit the config tool and disconnect TELELOGGER from PC.

Step 2:   Sensor connection

- The AEM X Series boost gauges have a built in 0-5V analog output designed for data loggers. However, as the TELELOGGER can only accept 3.3V maximum, **it is critical that we use a Voltage Divider** to lower that signal level.   The TELELOGGER Voltage Divider cable is designed for this purpose and is ready to accept up to 15V of input.   You can choose to implement your own voltage divider but be aware that over voltage input to the telelogger will void warranty and is likely to permanently damage the device.
- The AEM X Series boost gauges have a pre-supplied wiring loom, which has 4 wires to connect to car and data loggers.   You need to wire it up as:
    - Black wire from Gauge (Ground) needs to be securely connected to both car ground, and to the GND connection on the Voltage Divider cable for TELELOGGER.
    - Red wire from Gauge needs to be securely connected to vehicle 12V accessory power supply to power the main gauge.
    - The White (analog signal) cable from the Boost Gauge needs to securely connect to the signal connection on the Voltage Divider cable for TELELOGGER.
    - The Blue cable from the Boost Gauge (CAN signal) is not used for this configuration and should be isolated.
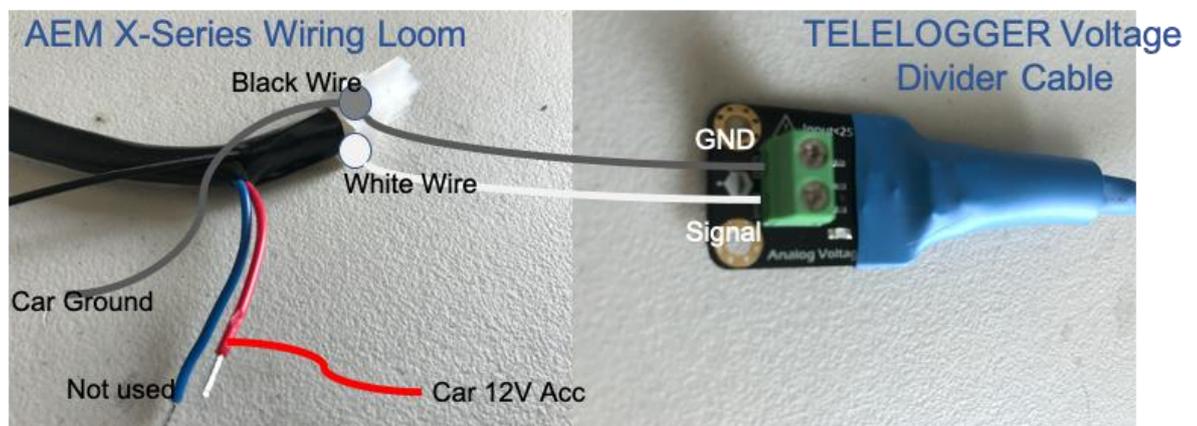
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Connect the input sensor cable to the TELELOGGER by plugging in the Molex micro-fit 4 pin connector.

- Plug the Telelogger into the car as normal via the OBD port or powered by USB if you don't have a compatible OBD port and ensure all cables are well secured to prevent any disruption to driving the car.
- The sensor should now be ready.

NOTE: The Voltage Divider cable is setup to connect to Sensor A. If you wanted to connect this to Sensor B, you would need to build your own cable with voltage divider and use the green wire instead of the white, and use 'External Sensor B' parameters in the config tool instead of Sensor A.

Step 3: TELEHUB

Now that the sensor is connected and configured the TELELOGGER will transmit it with other data to the TELEHUB and log it to the SD card data files.

The Channel name for pre-configured solutions like the AEM X Series Boost gauge is pre-determined.   In this case TELEHUB there will now have a Boost channel that you can select in live views or select for graphs in the drive history views.

To get a Gauge indicating Boost level, click on one of the 2 channel selectors at the bottom of the live feed screen, until you get to the Boost channel, and the matching gauge will now show the Boost pressure in psi.
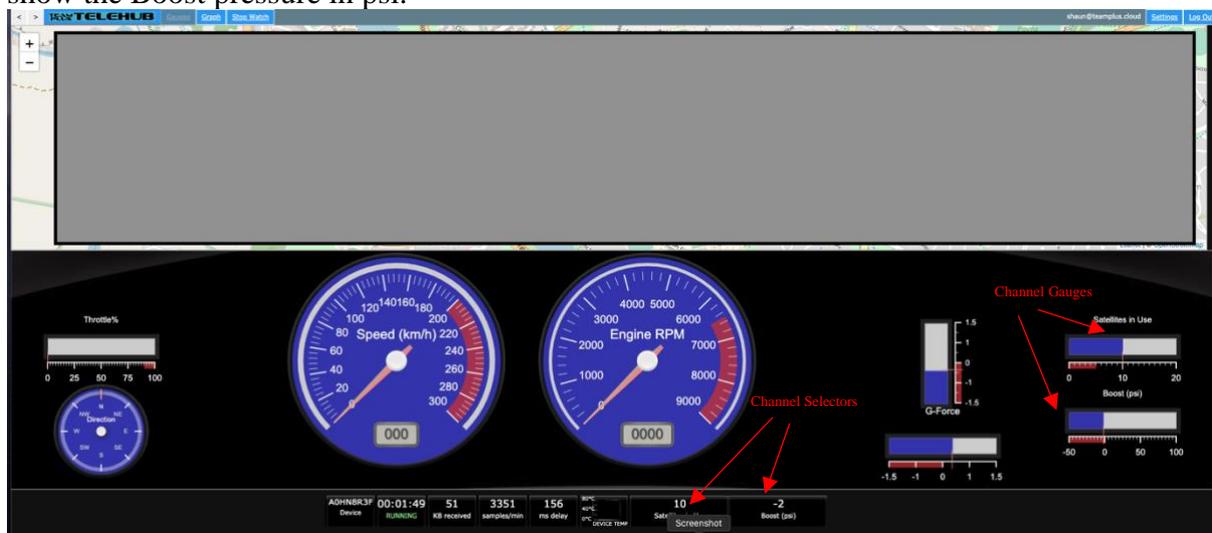
ADDING AN ANALOG SENSOR

As an example of how to add an analog sensor, let's go through the process of adding a temperature sensor that provides a 0-3V signal level. We will connect and configure it for Sensor A and the Other Temp channel in TELEHUB.

Any sensor that can provide a variable voltage signal could be connected to the TELELOGGER. The Telelogger itself can only accept up to 3.3V input signal, so a Voltage Divider will often need to be used to scale that input down. Our Voltage divider cable incorporates a 5x voltage divider making it easy to connect inputs with up to 15V.

In this case, we are assuming a device that has a maximum of 3V signal, so we will not use the voltage divider cable.

Step 1: Sensor Configuration

- Connect your TELELOGGER to the PC via a USB cable. You should hear the PC chime as it recognises a new device.
- On a PC, run the TELELOGGER Config Tool. If you don't have this tool, you can download it from our support pages at: https://teamplus.cloud/support
- On the Config Tool, select the latest firmware/software version (3.7 or later for serial inputs)
- Select the TELELOGGER device version (in this case the Team Plus TELELOGGER 1+B)
- Ensure all your configuration setting match the networking model you are using (4G SIM or Wi-Fi with passwords etc)
- Set the External Sensor A parameters to be:
    - o Other Analog Sensor
    - o Channel Name: Other Temp
    - o Analog Voltage Divider Connected : No (not selected in this case.. but check this if you do have it connected. It will rescale the results based on this parameter)
- The resulting value of the channel will be set to the voltage measured on the input. So you need to determine the scale and offset needed to convert the voltage into the desired result value. (Temperature in Degrees C in this case). In my sensor, it measures from -80C to +80C where -80C is 0.5V and 80C is 3V on the output. So the formula is:
    - DegreesC = (Volts * 64) – 112
    - So Scale = 64 and offset = -112
    - o Scale value : 64
    - o Offset value :-112
- You may find you need to adjust these setting once the device is tested to calibrate for variances in specific devices.

- The available Serial COM ports will show as buttons, and one of those will be the TELELOGGER. Press that COM button to start reconfiguration, which will recompile the software for the telelogger and then upload it to the device.
- The status window will tell you when configuration is complete, and you can exit the config tool and disconnect TELELOGGER from PC.

Step 2: Sensor connection

- The temperature gauge is USB powered in this case and provides 2 wires for its analog output. You need to wire it up as:
  - o Ground wire from sensor needs to be securely connected to the GND connection (black wire) on the TELELOGGER input cable or Voltage divider cable.
  - o The Signal cable from the Sensor needs to securely connect to the Sensor cable input A wire (white wire on our cables) or to the signal wire connector of the voltage divider cable if you are using one for a higher voltage input.
  - o The other wires in the Telelogger input cable are not required in this case and should be isolated.

- Connect the input sensor cable to the TELELOGGER by plugging in the Molex micro-fit 4 pin connector.

- Plug the Telelogger into the car as normal via the OBD port or powered by USB if you don't have a compatible OBD port and ensure all cables are well secured to prevent any disruption to driving the car.
- The sensor should now be ready.

NOTE: If you wanted to connect this to Sensor B, use the green wire instead of the white, and use 'External Sensor B' parameters in the config tool instead of Sensor A.

Step 3: TELEHUB

Now that the sensor is connected and configured the TELELOGGER will transmit it with other data to the TELEHUB and log it to the SD card data files.

The Channel name you chose in the Config Tool determined which channel the sensor data will show in. We chose Other Temp in this case, so in TELEHUB there will now be an Other Temp channel that you can select in live views or select for graphs in the drive history views.

To get a Gauge indicating Other Temp click on one of the 2 channel selectors at the bottom of the live feed screen, until you get to the Other Temp channel, and the matching gauge will now show the Other Temp in Degrees C.
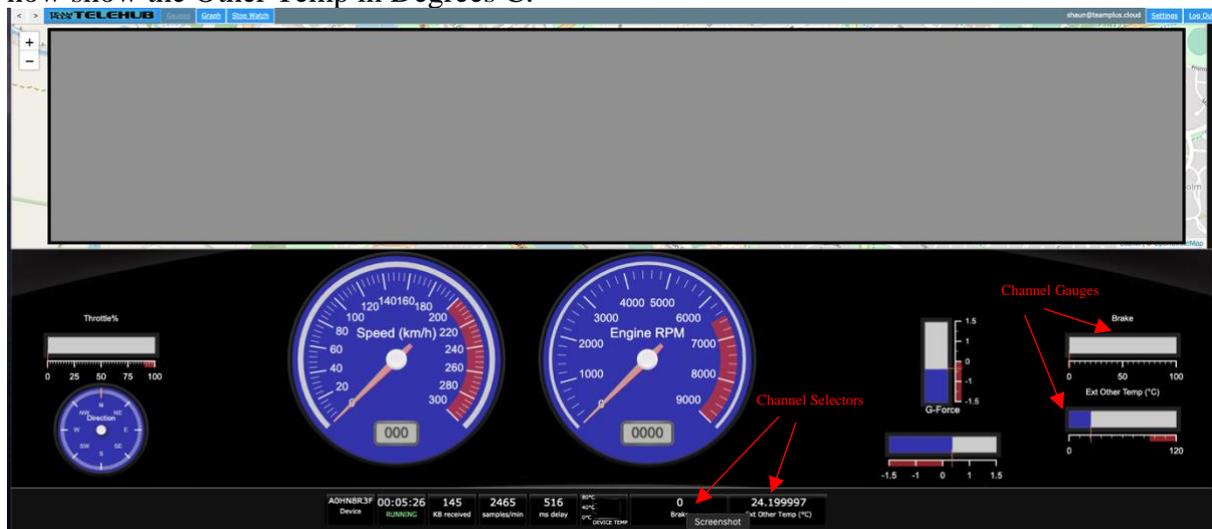
CONNECTING 2 SENSORS

In example above we have only connected a single sensor to the TELELOGGER. You can connect 2 sensors to the TELELOGGER by one of 2 methods:

1) Using the External Input Cable, connect one input to Ground and White wire and the other to Ground and Green wire.

2) Build yourself a cable to create 2 input sockets using Molex micro-fit connectors. One output socket should be wired as per input and swap the A and B input wires on the other socket. This way you can use standard input and/or voltage divider cables from us to plus into either socket.

We hope to add a product on our website shortly for a short input splitter cable. Keep an eye out on https://teamplus.cloud/telelogger/

PID NUMBERS FOR EXTERNAL SENSORS

External sensor data is logged in SD card output and sent in the telemetry data to TELEHUB and if you are using Bluetooth phone connection for a lap timing app or similar it is also sent to those. In each case, the channel chosen for the external sensor in the TELELOGGER config tool determined which PID (packet ID) the external sensor is transmitted as. This is the current list of PID's used for external Sensors:

Channel Name	TELEHUB PID (hex)	Team Plus PID format BLE (hex)	RaceChrono PID -BLE (hex)
Input A (not specified)	90	90	0xC390
Input B (not specified)	91	91	0xC391
Boost Pressure	D0	D0	0xC3D0
Brakes	D1	D1	0xC3D1
Oil Pressure	D2	D2	0xC3D2
Other Pressure	D3	D3	0xC3D3
Oil Temp	D4	D4	0xC3D4
Other Temp	D5	D5	0xC3D5
Fuel Pressure	0A (overrides OBD)	10A	0x010A
Coolant Temp	05 (overrides OBD)	105	0x0105

For more information on Bluetooth connections see the TELELOGGER Bluetooth connection guide on our support pages: https://teamplus.cloud/support

GETTING SUPPORT

Team Plus TELEHUB has support options listed on the page:
https://teamplus.cloud/support
This includes:

- A Community Forum for discussion, best ideas sharing, and logging of faults or ideas for improvement
- A list of reference guides (including this one)
- The TELELOGGER CONFIG TOOL installer download to get latest firmware or adjust network settings
- An email help request link for situations where none of the above helps.