Configuring
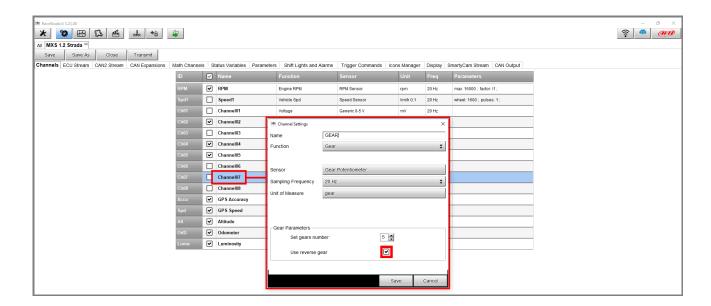
Gear configuration – MXx/EVOx systems

Question:
In which way can I display gear information on my MXx/EVOx device?

Answer:
Selected gear information can be sourced by **gear potentiometer**, **ECU stream message** or can be **calculated** real time by the AiM device, through speed and RPM. Each mode requires a specific configuration of the MXx/EVOx, which is detailed in the following pages.
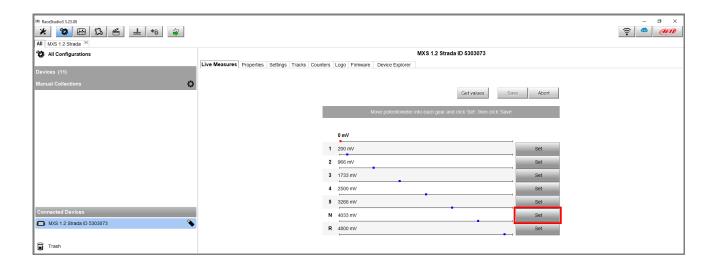
- **Gear potentiometer:** check the sensor's datasheet and connect its three wires (power, ground and signal) to one of the analog inputs of the AiM device, matching Vref (5V), ground and signal input. Refer to the relevant AiM datasheet for details on pin numbers and position.

  Configurations section – Channels tab (following image): the used channel function must be set as "gear", specifying the maximum number of gears (forward). To include reverse gear, tick the "Use reverse gear" box.
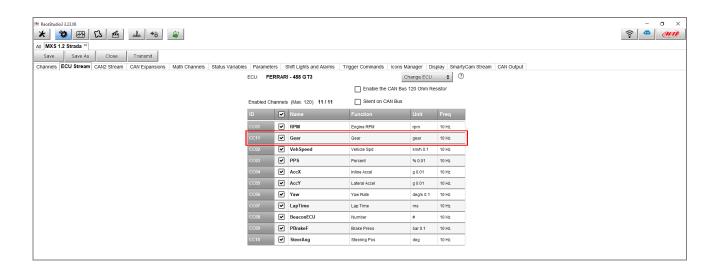
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Once the configuration has been transmitted, a gear calibration is required. Keep the AiM device connected to the PC, enter Live Measures tab, select Calibrate (following image), press Set for every engaged gear to save the corresponding potentiometer's voltage. Once this will be confirmed for each gear, the calibration is automatically saved into the AiM device.

Select the proper source (A/D Channels) and channel when setting the Gear field in the Display tab.

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- **ECU Stream message:** In order to work, gear information must be available in the ECU Stream used for the specific application. Check it in the Configuration section - ECU Stream tab (following image), select the compatible communication protocol with your vehicle ECU and scroll the list looking for the Gear function. If available, this can be selected in the Display tab – Gear field to be shown on the screen, double checking if the source (ECU) and the channel are correctly selected.
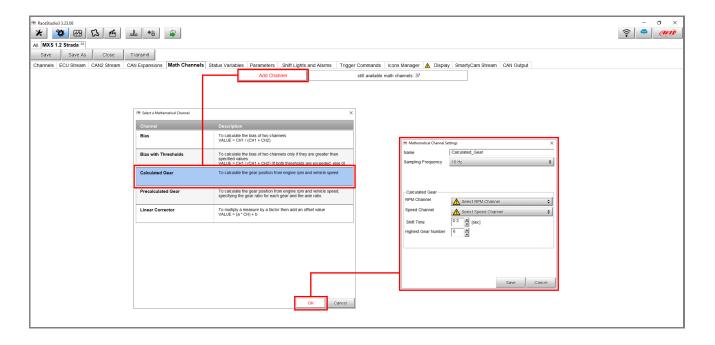
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- **Calculated Gear:** when gear potentiometer and ECU stream gear message are missing, the MXx/EVOx can perform a calculation starting from RPM and speed. A learning procedure is necessary to finalize the calculation. The AiM device has to be set as follow.

Configuration section - Math Channels tab – Calculated Gear (following image): create a math channel to calculate gear, select the reference RPM and speed channels, making sure these are both working flawlessly. Complete the remaining settings and check in the Display tab – Gear field if the source (Math Channels) and the channel (CalcGear) are correctly selected. Once the setup has been transmitted, it is necessary to perform a gear calibration lap, so that the system can calculate each gear ratio.

The procedure starts as soon as the speed is different from zero. Keep each selected gear for 2-5 seconds each and proceed up to the highest gear. In this phase gears are not correctly displayed. Once the last gear is reached and the indication becomes correct, check if lower speeds have been correctly computed and displayed on the screen, downshifting through all the gears.

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- **Precalculated Gear:** If gear ratios are available, they can be manually input in the software Race Studio 3 so to avoid the learning procedure and be ready to race. Set up the AiM device as follows.

Configuration section – Math Channels tab – Precalculated Gear (following image): create a math channel to Pre-calculate gear, select the reference RPM and speed channels, making sure these are both working flawlessly, complete the other settings, in particular define all gear ratio, wheel circumference and axle ratio. In case there is also a final transmission (i.e. motorbikes), multiply the primary and final transmission ratio together and type the result in the axle ratio box. Select the proper source (Math Channels) and channel (PreCalcGear) when setting the Gear field in the Display tab.