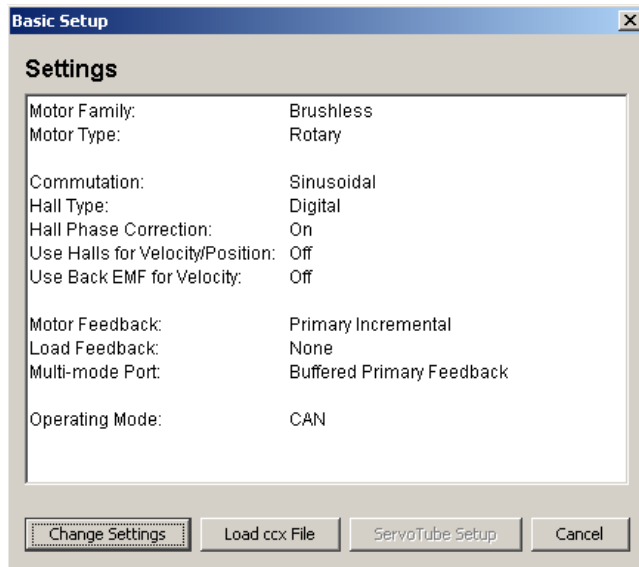


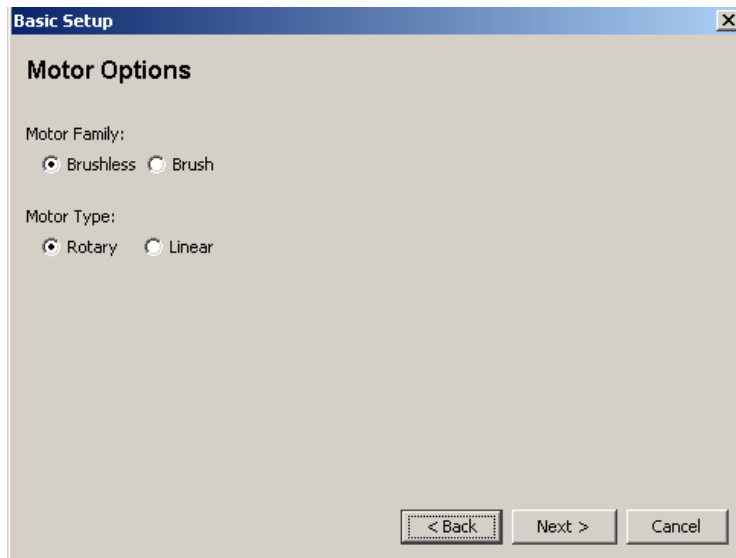
Brushed motor setup – Copley Basic Instructions

Basic Instructions for setting up a Copley Drive.

First Enter the Basic Setup

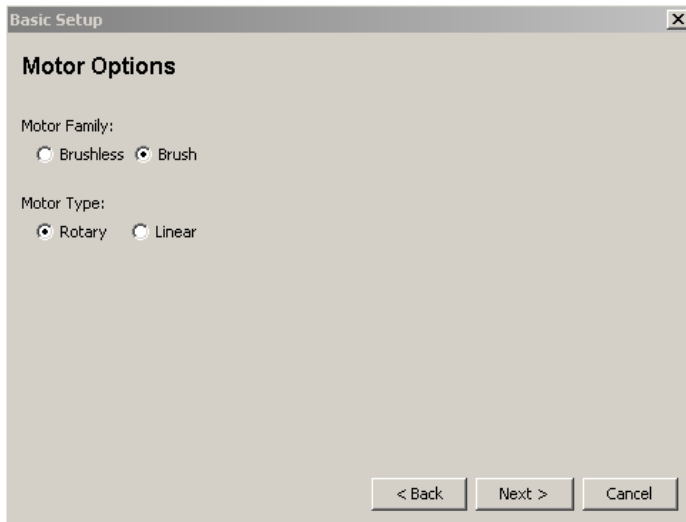


Change Settings as required...

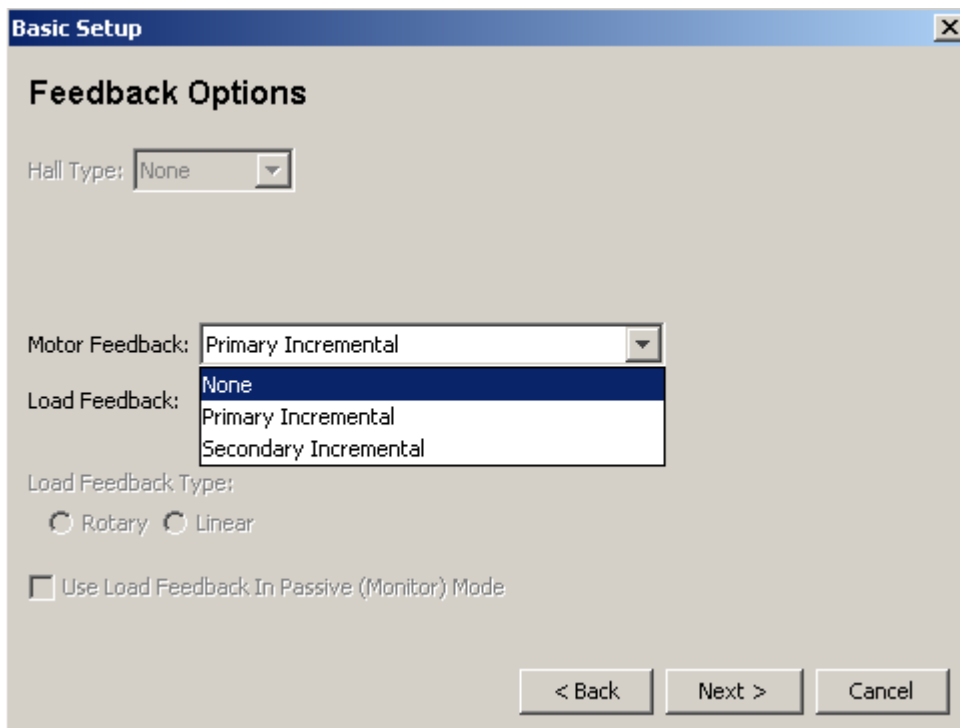


This shows selecting Brushed DC motors.

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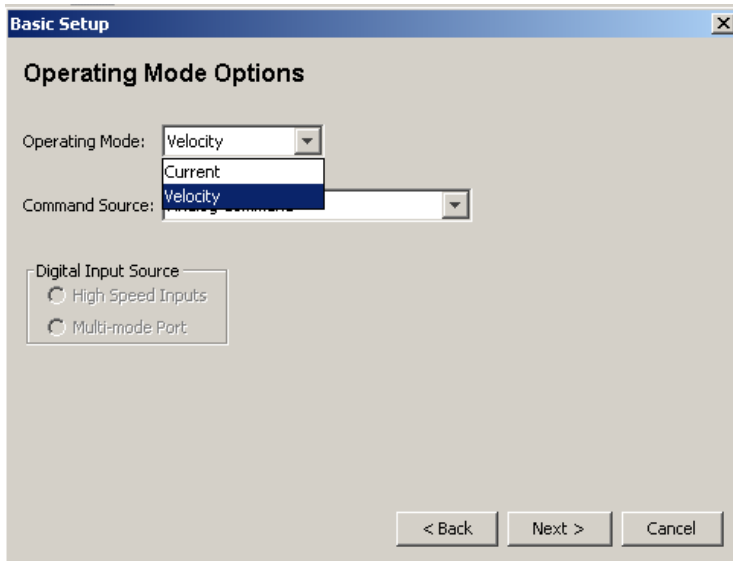
If brushed motor selected then the halls will be grayed out since these are optional for brushless motor only.



If the motor is used in a Velocity loop only, then we can either select an encoder as a feedback device or None. Selecting none will prompt further questions later. However, no encoder will mean that positioning will not be available from the drive only.

Here we can select the operating mode. Select either Velocity or Current, together with the Command Source.

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If no feedback device is selected, the next step ticks the “Use Back EMF for Velocity” box.

Back electromotive force (back EMF) is a voltage that appears in the opposite direction to current flow as a result of the motor’s coils moving relative to a magnetic field. It is this voltage that serves as the principle of operation for a generator.

The back EMF is directly related to the speed of the motor, so knowing the value of back EMF allows us to calculate the speed of that motor.

In a stall condition, the coil inductance has much less influence on current than the coil resistance.

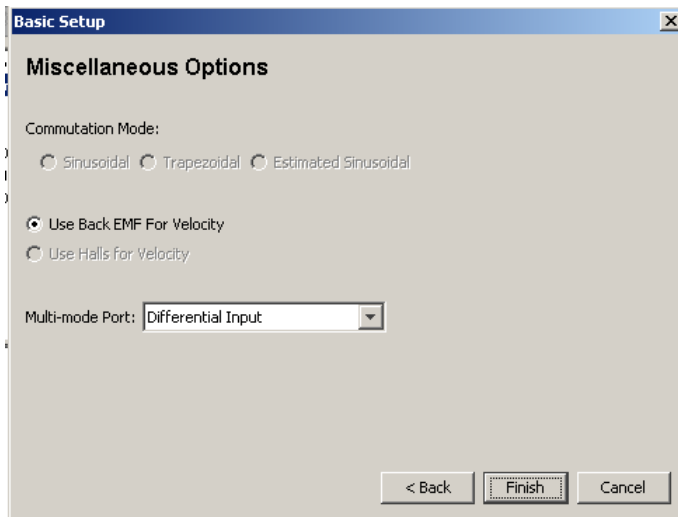
When the motor is spinning the back EMF has a much bigger influence on current than resistance and inductance.

As the back EMF is generated from the rotor is moving through the magnetic field generated by the permanent magnets, the back EMF is directly proportional to the motor speed, and the motor voltage constant. The motor voltage constant includes parameters like magnetic field strength which are also constant.

$$\text{Back EMF} = \text{RPM} / K_e$$

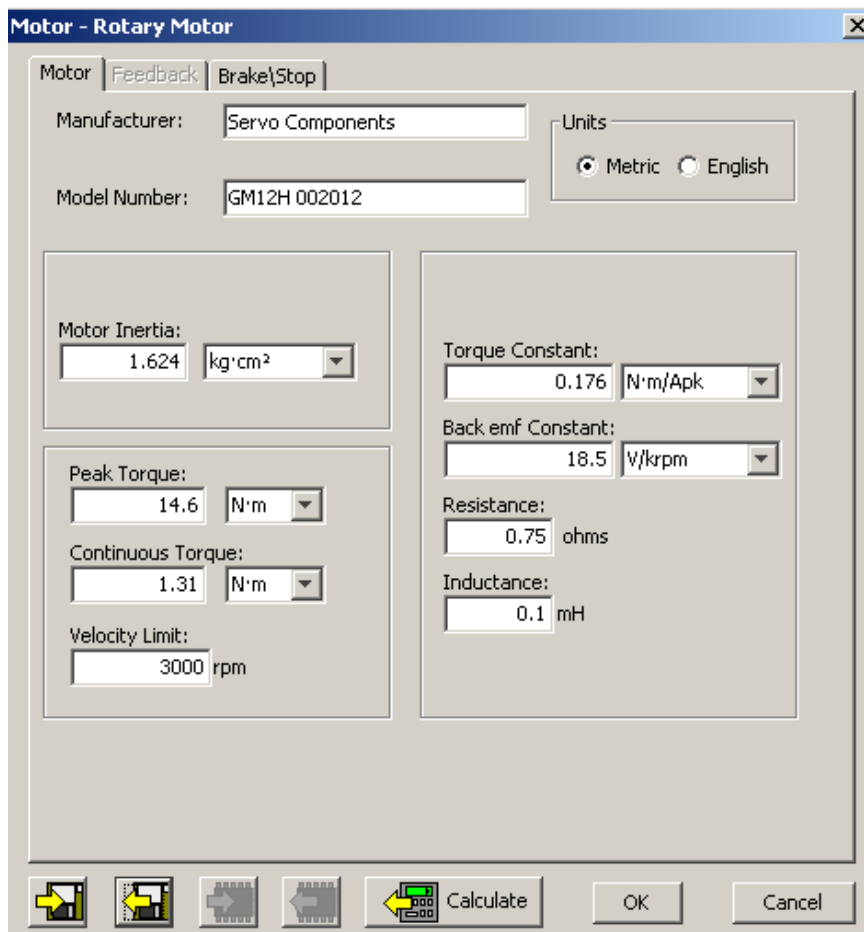
Back EMF always acts to reduce the changing magnetic field through the coils. It does so by generating a voltage which opposes the supply voltage, thus reducing the current.

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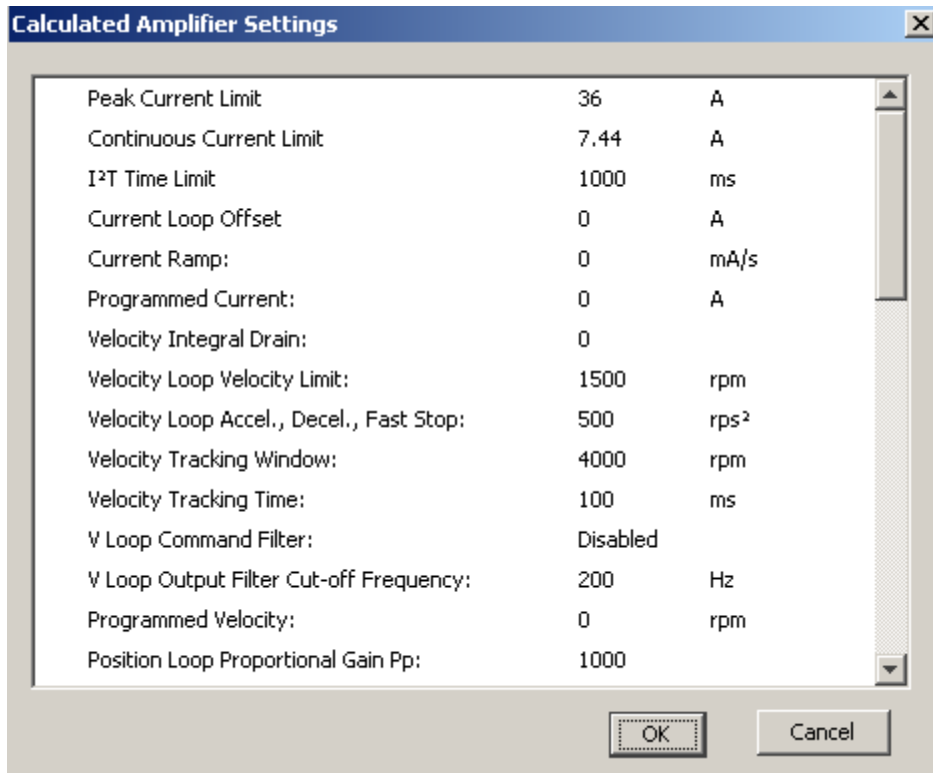
The next step is to enter the motor parameters. This is used to calculate the initial Tuning parameters, which in many cases is very accurate. One particular parameter of importance is the K_e . With Brushed motors using Armature feedback this is used to scale the velocity feedback for the velocity loop.

Either Enter the data manually, or input a given motor file, with the extension .cmm

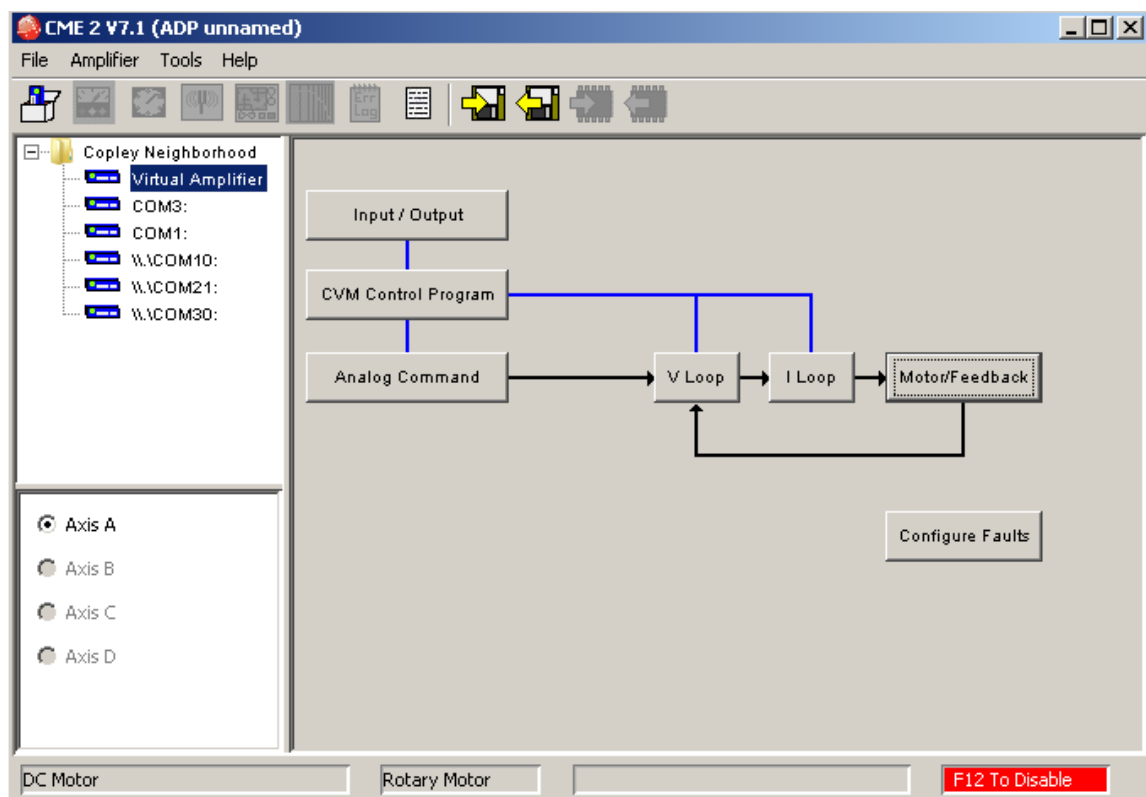


Press the Calculate button to calculate the internal values.

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Click OK and return to the main block diagram, All relevant boxes should now be enabled.

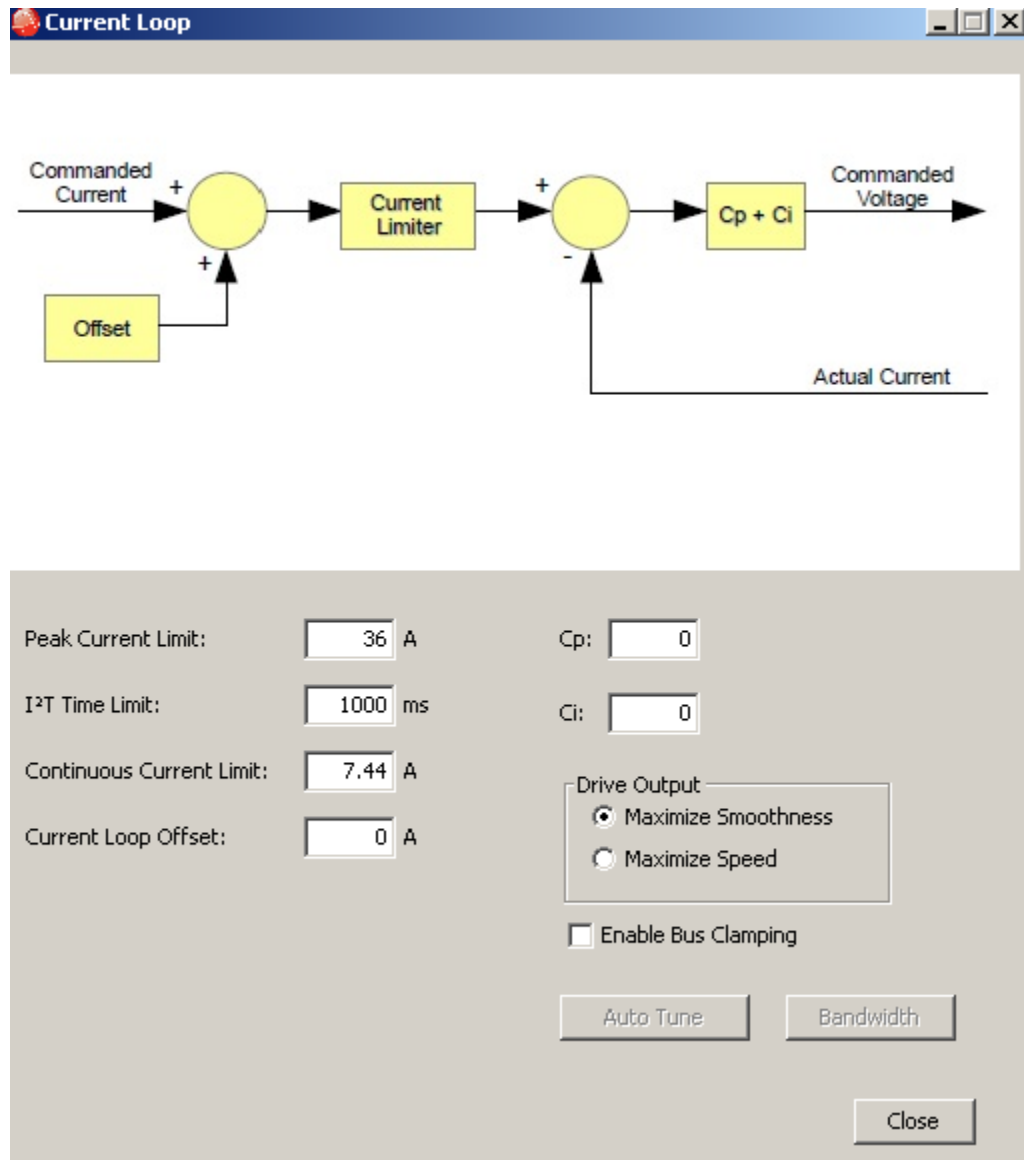


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Tuning.

Tune the Current loop, before tuning the Velocity Loop...

In most cases it is possible to Autotune....

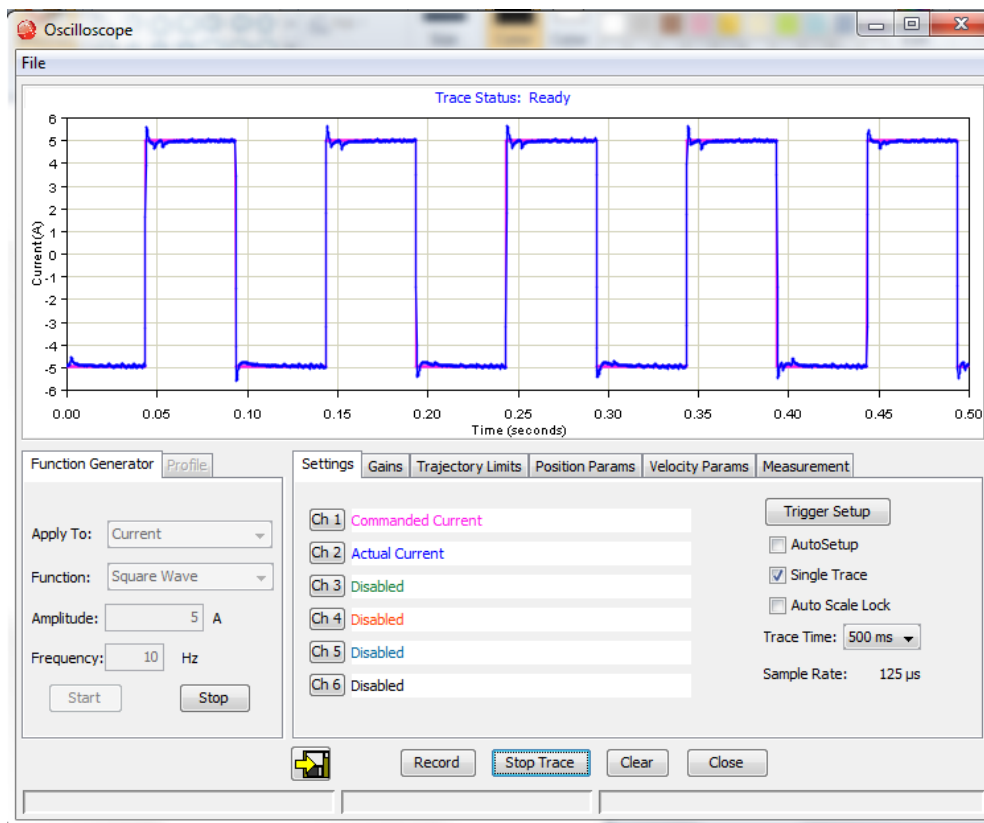
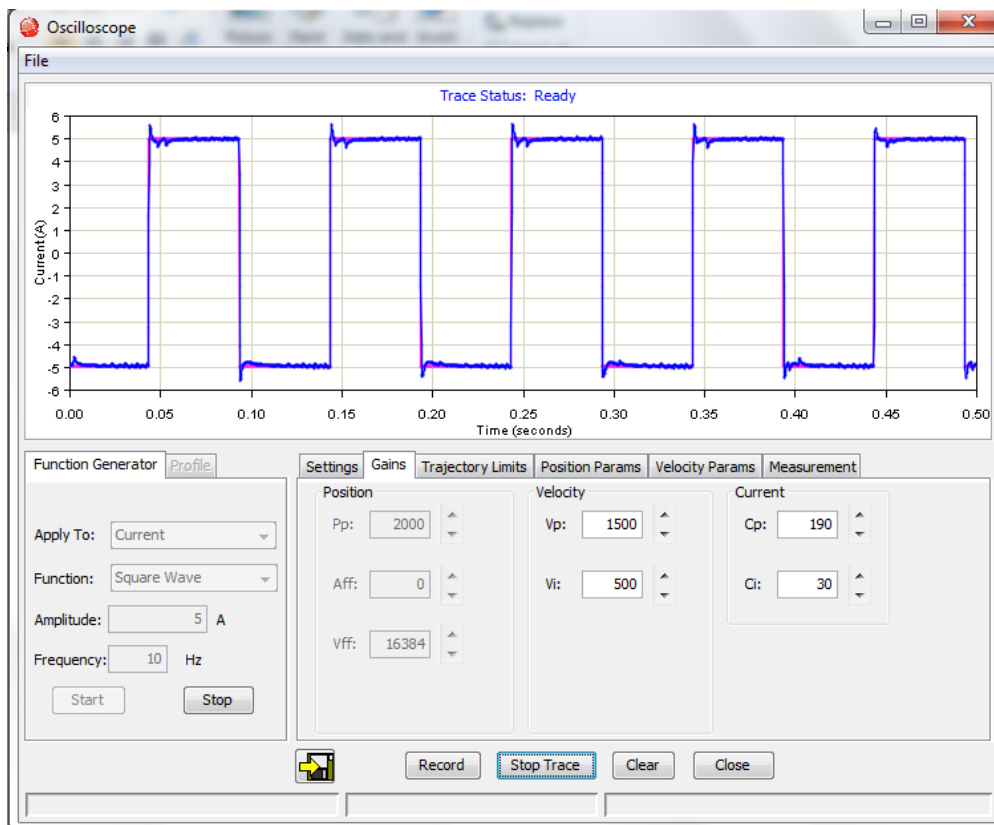


Press Autotune.

This takes approximately 2 minutes and sets different Cp and Ci values to obtain the best response to pulses of current. It completes with a frequency sweep to determine the bandwidth.

Checking the response we can use the Oscilloscope, and built-in function generator.

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Once we are happy with the Current response we can tune the Velocity loop...

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