OCS Training Workshop
Lab 30

Motion Control (CANopen)

Introduction

Objective:

The objective of this lab is to give you the knowledge to configure a CANopen motion control system using a Horner OCS, a Servotonix Servo Motion drive and motor..
This training exercise deals with a single axis connection to one Servotronix Servo Motion slave drive.

Overview:

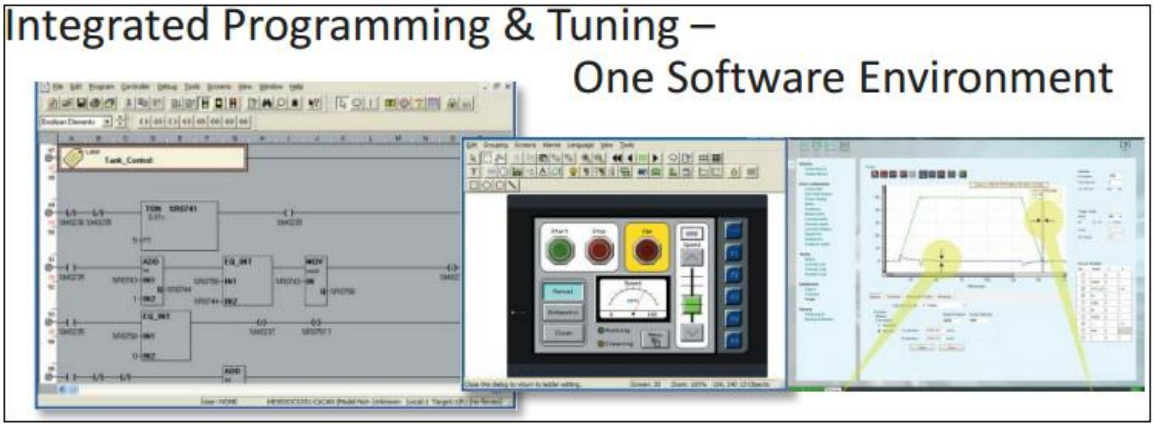
The Horner APG complete CANopen motion solution consists of a number of parts:

- Cscape with incorporated ladder logic function blocks for motion and a built-in motion configuration tool for adding and configuring slave drives.
- ServoStudio configuration software tool for configuring a Servotronix Servo Motion drive.
- CANopen OCS master controller.
- CANopen Servotronix Servo Motion drives (fully cabled). Below is the list of drives available and their specifications.
- Servo Motor (MTHD and PRO types).

Servotronix Servo Motion Drive Models and Specifications:

Ratings				
Model	Input Power Main Circuit 120/240 VAC	Input Power Main Circuit 400/480 VAC	Continuous Current (Arms)	Peak Current (Arms)
CDHD-1D5	1 Phase	-	1.5	4.5
CDHD-003	1 Phase	3 Phase	3	9
CDHD-4D5	1/3 Phase	-	4.5	18
CDHD-006	1/3 Phase	3 Phase	6	18
CDHD-008	1/3 Phase	-	8	28
CDHD-010	1/3 Phase	-	10	28
CDHD-012	-	3 Phase	12	24
CDHD-013	3 Phase	-	13	28
CDHD-020	3 Phase	-	20	48
CDHD-024	3 Phase	3 Phase	24	48

SOFTWARE:



CONTROLLER:

DRIVES:

MOTORS:

Lab 30: Motion Control (CANopen)

Hardware and Software Requirements for application development:

- *OCS Controller with CANopen firmware 12.94 and above.*
- *Servotronix Servo Motion drive.*
- *Cscape 9.30 SP6 and above. Cscape now comes with the ServoStudio drive configuration software tool as standard in the installation file.*
- *Demo CAN ServoStudio (.cssv) configuration profile for use with the ServoStudio software tool.*

Cscape Configuration Procedure

Step 1

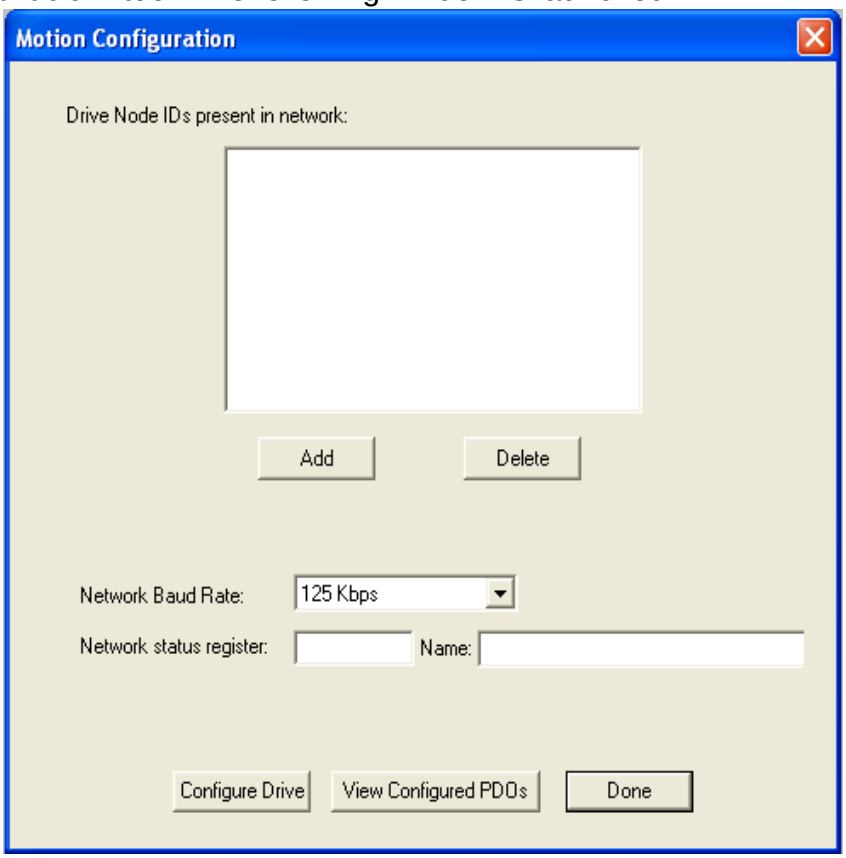
Configure the OCS as a CANopen controller

With the OCS connected to the PC/Laptop and the Servo Motion drive connected to the OCS CANopen master, power up both devices.
In Cscape, click on the **'Controller'** drop down menu and select **'Hardware Configuration'.** Click **'Auto-Config System'** button to quickly detect/configure your connected OCS. Close the hardware configuration tool when finished.

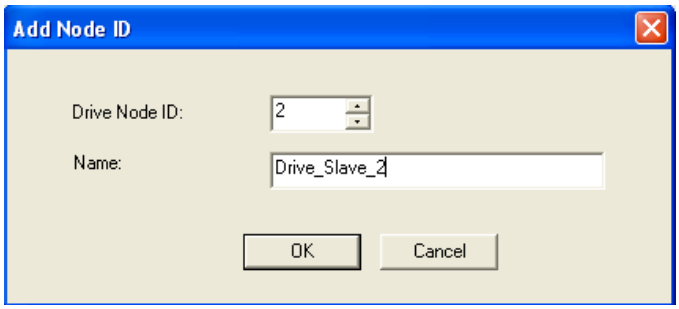
Step 2

Launch the Motion Configuration Tool

Click the **'Program'** drop down menu in Cscape and select the **'Motion Configuration'** tool. The following window is launched.



Click the 'Add' button in the Motion Configuration tool above to add a CANopen slave drive Node ID. Click the OK button when correct Node ID is selected.
The physical Node ID of the slave is set by the dials on the front panel of the Servo Motion drive.



Step 3

Configuring the drive details in the Motion Configuration tool

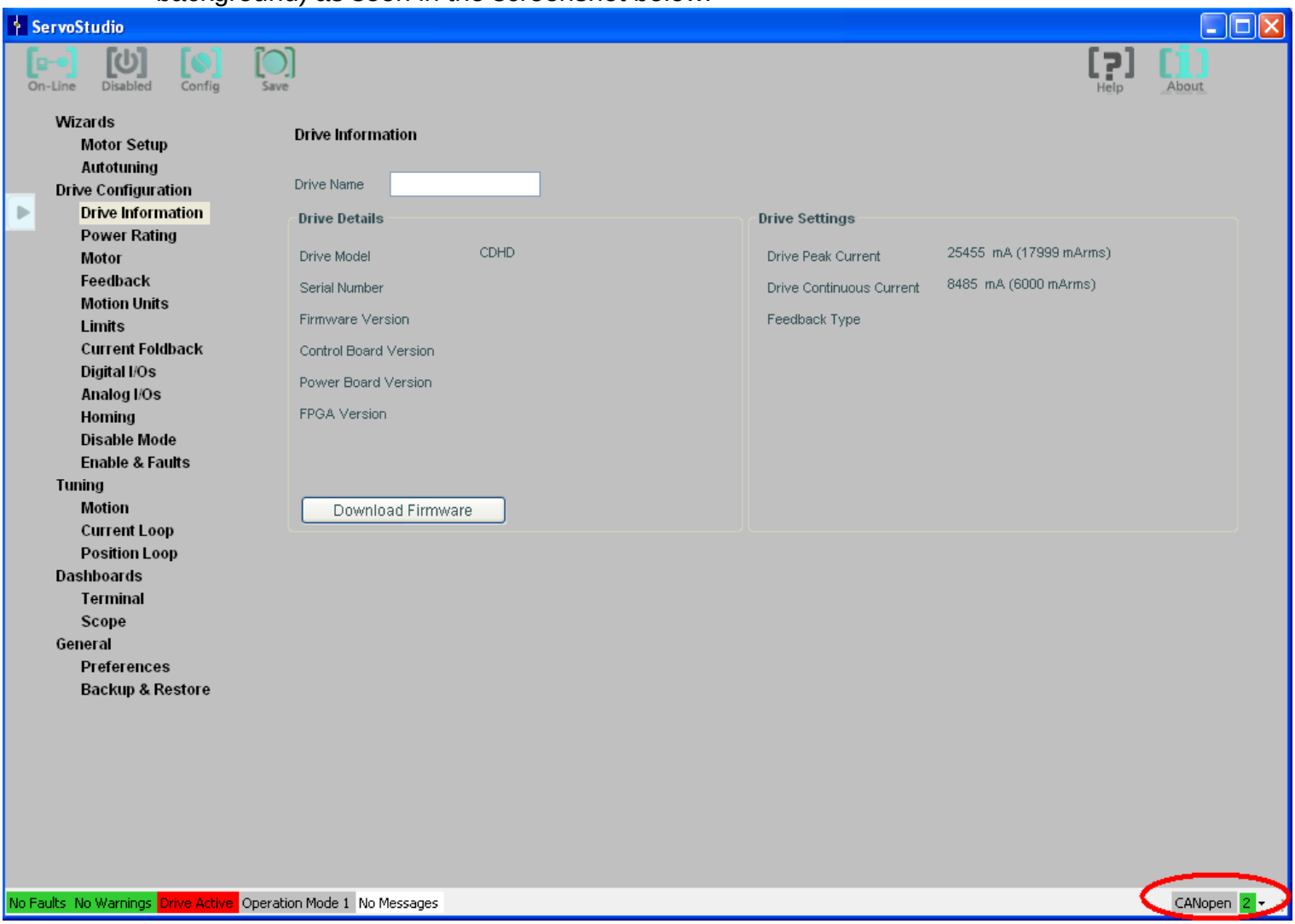
Enter the correct Network Baud rate and a Network status register in the fields provided. The drive baud rate is set to 500kbps by default.
Next, click the '**Configure Drive'** button. This will display a pop-up window prompting the user to enter a starting register for use with PDO (Process Data Objects)

When the starting register is entered, click the 'OK' button and ServoStudio will launch. The PDO mapping starting register is used to map PDO objects associated with the EDS file of the Servo Motion drives into the Cscape CANopen configurator tool automatically. This feature prevents the user from having to browse to the CANopen configurator tool to configure any network settings. The registers are assigned to various CANopen objects/parameters associated with motion (ie) Read Actual Position, Target Position, Target Velocity per slave node.

Step 4

Configuring the drive in the ServoStudio software

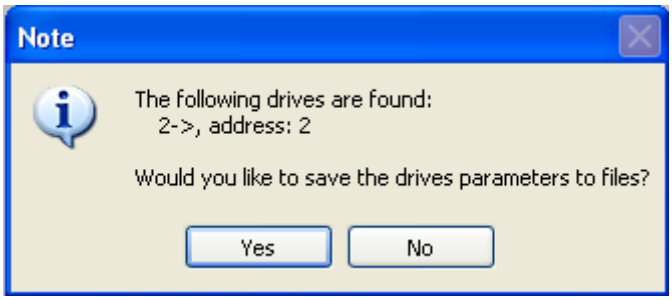
The ServoStudio software tool launches (with Cscape still open in the background) as seen in the screenshot below.

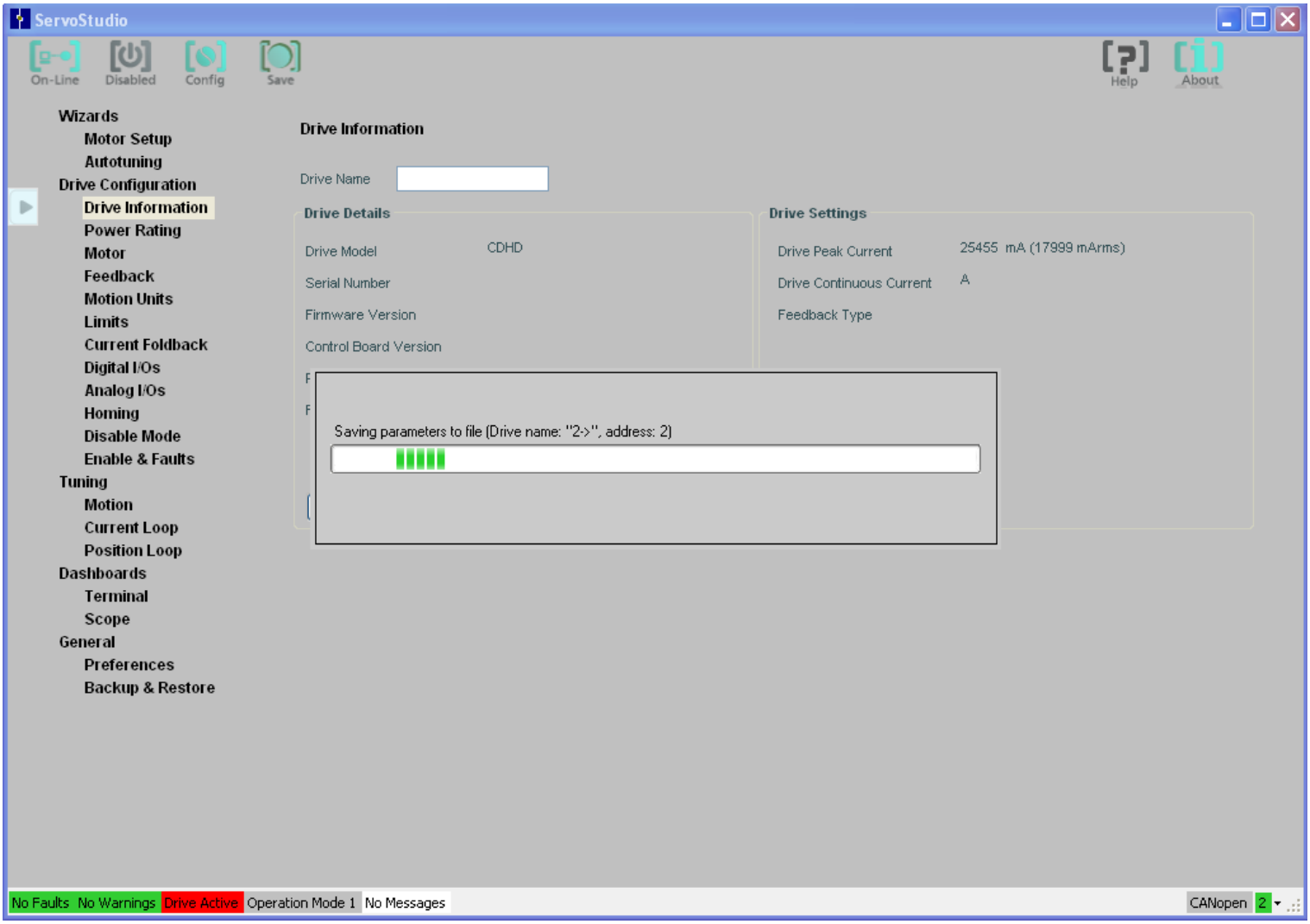


Looking at the indicator in the bottom right hand corner of the software, you can see the exact drive you are connected to. By clicking the drop down arrow you can choose between all the configured slaves as per the Motion Configuration details.

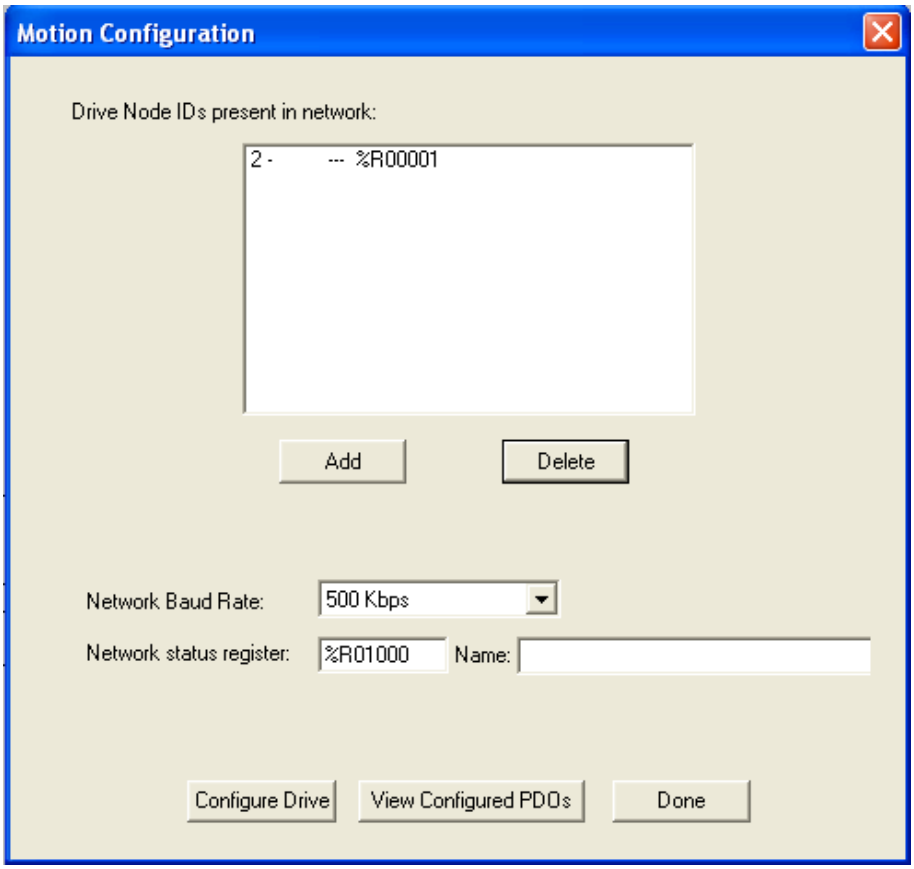
When connected to the drive, you can now configure your drive settings as per the application requirements. For example, by browsing through the menu options on the left hand side of the software, you can configure your particular servo motor setup. You can auto-tune your drive for the particular application. You can upload previously save motion profiles via the ‘Backup &Restore’ option. You can Enable/Disable the drive for testing purposes, set the limits of the drive (ie) Current limits. You can configure the drive I/O states plus many more options.

Experience in servo motion control is an advantage in helping to configure the drive with a suitable profile. For this lab exercise, we will go to the 'Backup & Restore' menu option and load the Demo ServoStudio (.cssv) file.
When configuration for all drives is complete in ServoStudio, you can simply close the tool by clicking the 'X' close button in the top right hand corner of the software window.
When this is done, the software works with Cscape to configure CANopen PDO object data. You will see the following pop up message confirming if you would like to continue and a progress bar indicating the settings being written to the background files.

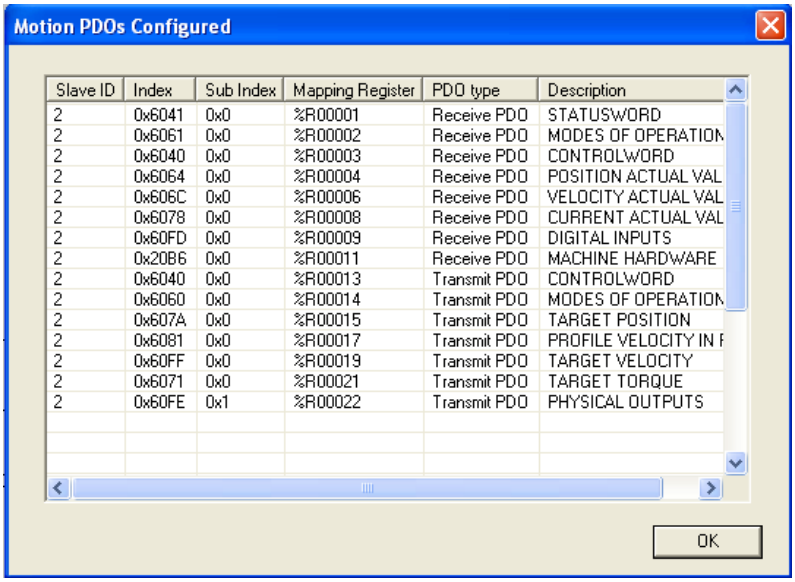




The ServoStudio software closes and you are returned to the Motion Configuration tool in Cscape. You can then see the details of the entered node, now updated with the relevant configuration.



You can now click on the 'View Configured PDOs' button to review the mapped OCS registers used for each CANopen PDO object. These objects are automatically mapped into the Cscape CANopen configurator tool so there is no other programmer input needed to configure these PDOs.

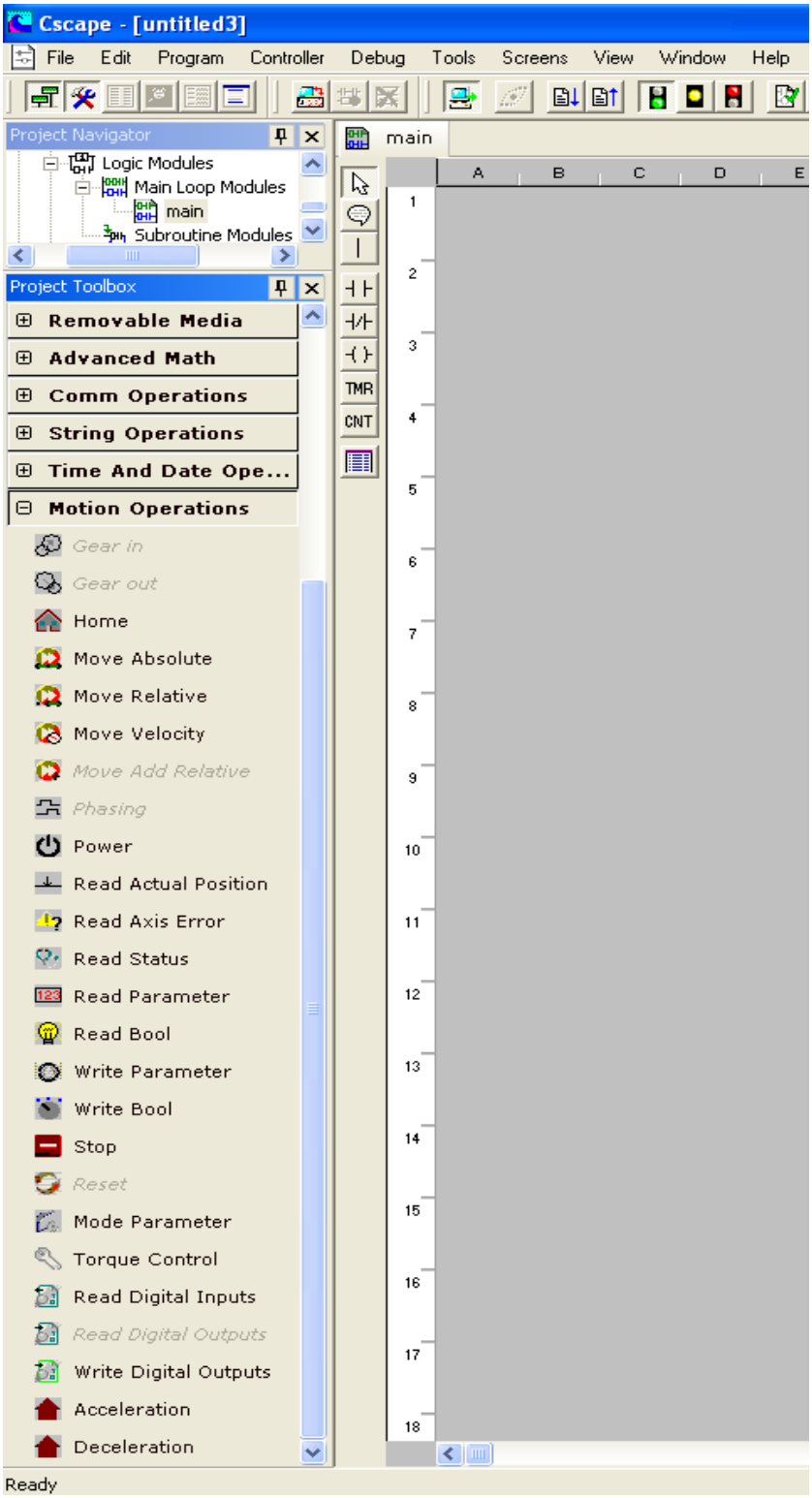


Click the OK button and then the DONE button in the Motion Configuration tool when finished and you will be returned to Cscape to start programming via ladder function blocks.

Step 5

Ladder Logic Motion Blocks in Cscape

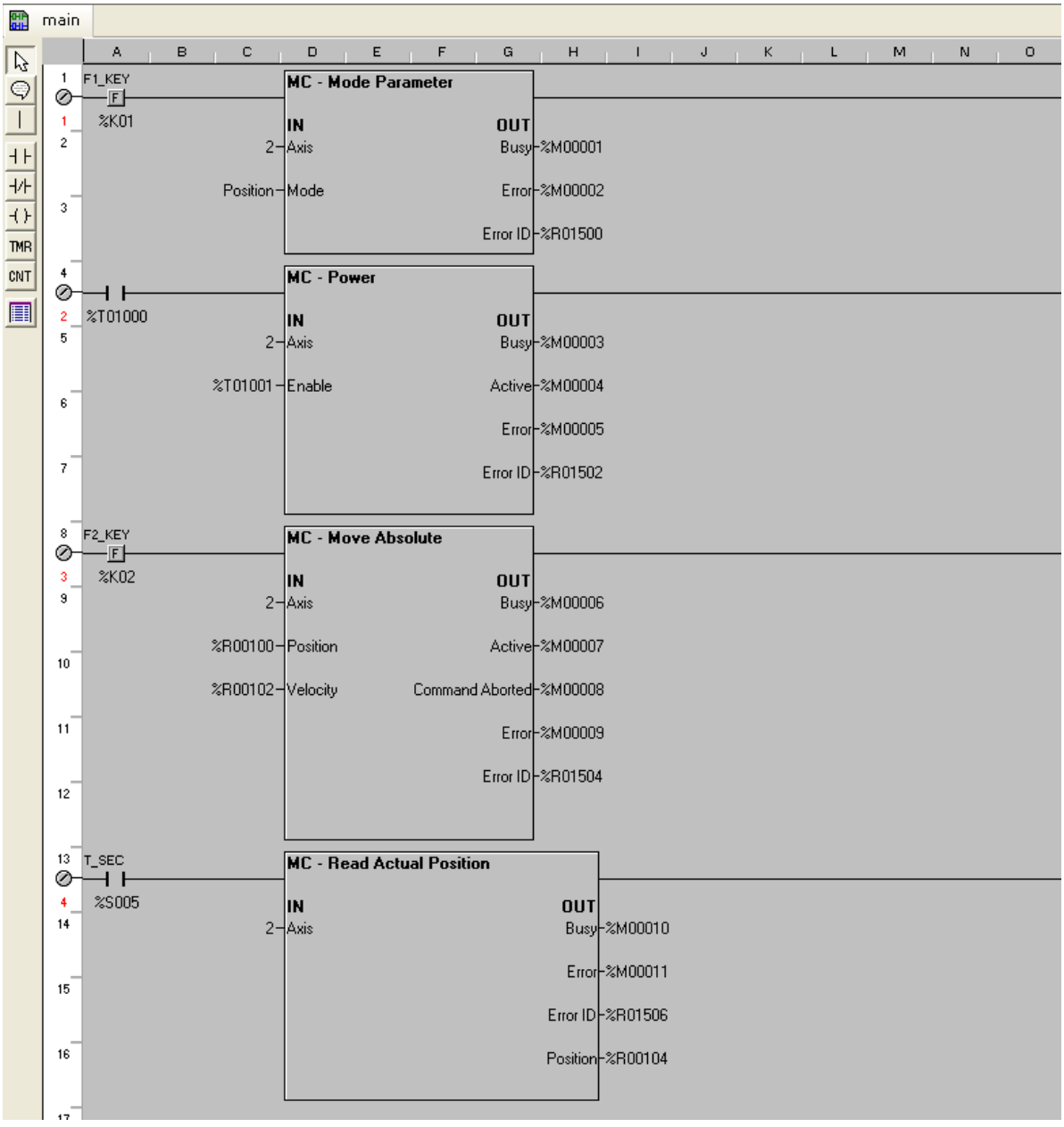
Cscape now comes with a collection of motion control function blocks. To view these, enable and open the 'Project Toolbox' in Cscape. You will see the list of available motion blocks as seen below under the Motion Operations heading:



Simply click on a logic block and bring it onto the main logic window using the cursor.

Example:

Here is a simple example program that will execute a Move Absolute command.



For this example, download the ladder logic code to the master OCS and put the OCS into RUN mode. Power cycle the OCS when download has completed.
Power cycling the OCS allows the master to send its entire NMT (Network Management) configuration and send the CANopen system into Operational Mode.

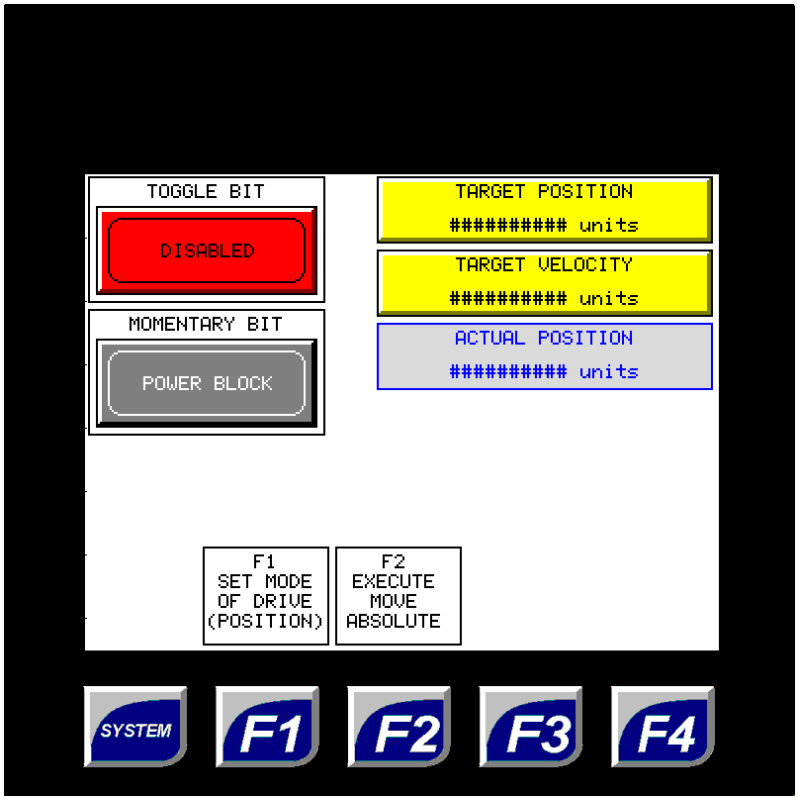
To execute move commands, do the following:
1 – Press the F1-Key on the OCS panel to set the drive into Position Mode. The drive must be disabled to change between different modes.

2 – Toggle the toggle bit on the screen to the ENABLED position.

3 – Press and hold the momentary bit to execute the POWER motion block. This will enable the drive. Release the button when the drive enables.
To disable the drive, revert the toggle bit back to the DISABLED position and press the momentary key again.

4 – Enter a valid Target Position. Enter a valid Target Velocity. Press the F2-Key to execute the Move Absolute function.

5 – You will see the Actual Position change in the value field



End of LAB 30