HORNER
IRELAND

OCS Training Workshop
LAB3
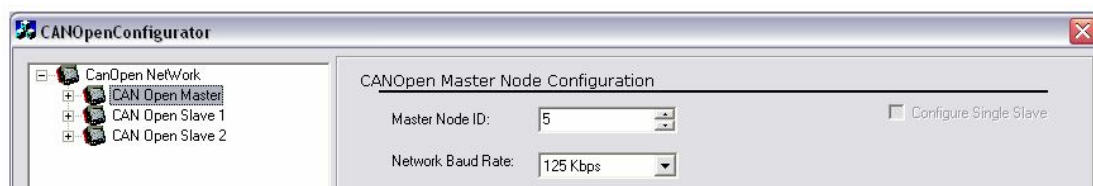
CANopen Sample Applications

Introduction

The purpose of this lab is to demonstrate the CANopen functionality in the new Cscape 8.70.

Overview

CANopen Configurator
Can be found in the Cscape menu: Program -> Network Configuration… but only if the CANopen hardware is selected.

Communication Object (COB) Types:
(from the Slave perspective)

COB Type	Bits 8 - 11 of COB-ID	ID Range
NMT	0000	0
SYNC	0001	128 (80h)
Time Stamp	0010	256 (100h)
Emergency	0001	129…255 (81h…ffh)
PDO1 - Transmit	0011	385…511 (181h…1ffh)
PDO1 - Receive	0100	513…639 (201h…27fh)
PDO2 - Transmit	0101	641…767 (281h…2ffh)
PDO2 - Receive	0110	769…895 (301h…37fh)
PDO3 - Transmit	0111	897…1023 (381h…3ffh)
PDO3 - Receive	1000	1025…1151 (401h…47fh)
PDO4 - Transmit	1001	1153…1279 (481h…4ffh)
PDO4 - Receive	1010	1281…1407 (501h…57fh)
SDO - Transmit	1011	1409…1535 (581h…5ffh)
SDO - Receive	1100	1537…1663 (601h…67fh)
Error control (node guarding)	1110	1793…1919 (701h…77fh)

CANopen Help file – helps to get you started, describes configurator tool and covers CANopen basics.

Applications

PART 1 – Elmo Drive   +   Motor Power Company
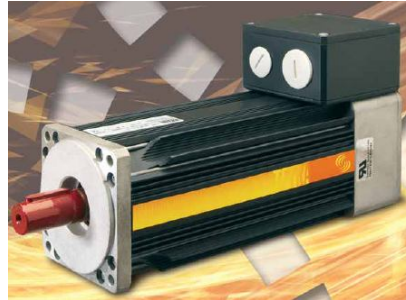
<u>Step 1</u> - Wiring

Same as for standard CsCAN network.

<u>Step 2</u> – Cscape CANopen Configurator

a) Initial Master configuration

We have to load Horner EDS file first (right click on the CANopen Master node -> Load from EDS) and then configure the Master.
Device Type, Special Function, Error Control and SDO were left as default.

b) Slave Configuration

In this case that's all we need to set up on the Slave side (no EDS loading, no SDO/PDO configuration needed)

c) Master Transmit PDO configuration

> ➤ The Object Index (1800) is assigned automatically when we click the 'Add Entry' button.

> ➤ COB-ID = 0x301 means that we deal with the standard PDO2, node 1
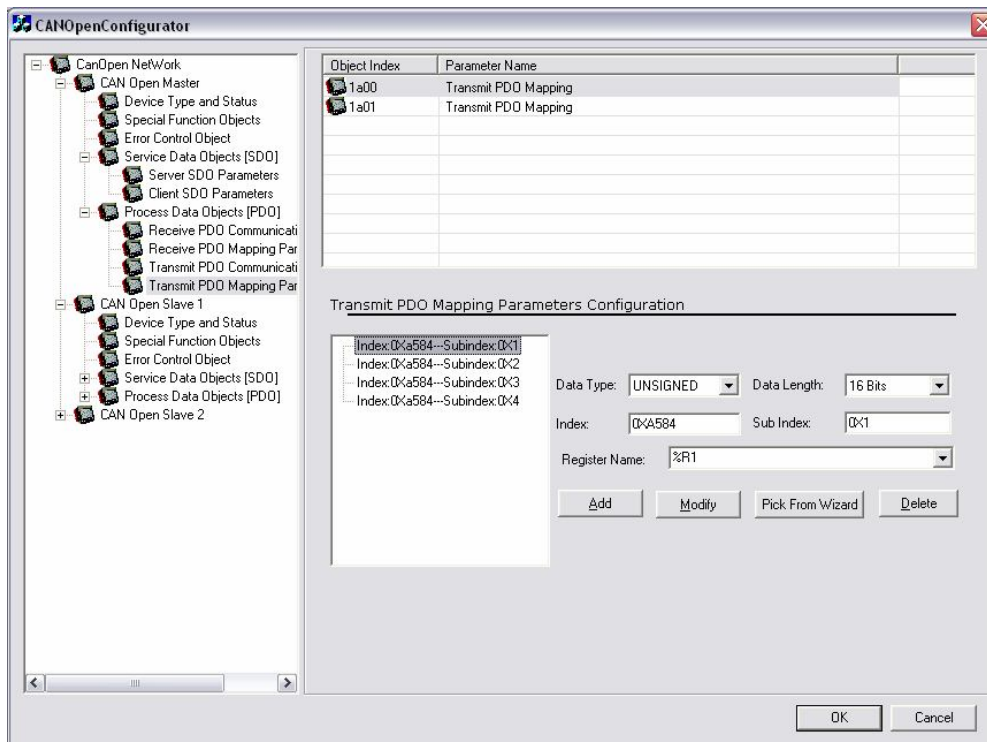
> In the Mapping section we should select the first object (1a00) and then configure the necessary set of Registers (%R1 to %R4 in this case). We should pick them using Wizard tool

Step 3 – Cscape Application
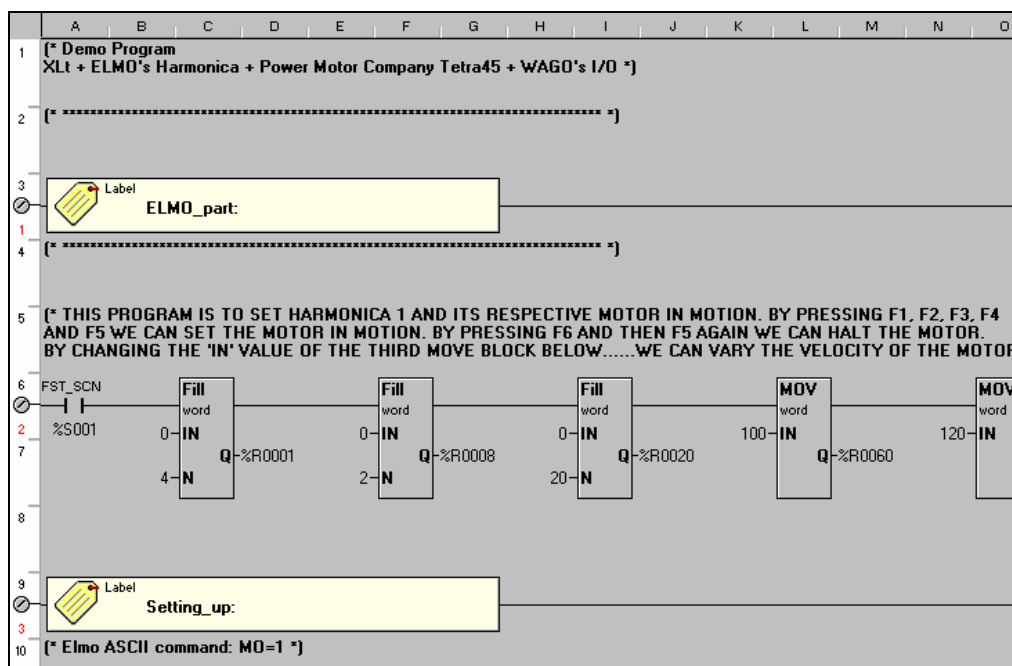
PART 2 – WAGO I/O

Step 1 - Wiring

Same as for standard CsCAN network.

Step 2 – Cscape CANopen Configurator

a) Initial Master configuration – Same as before
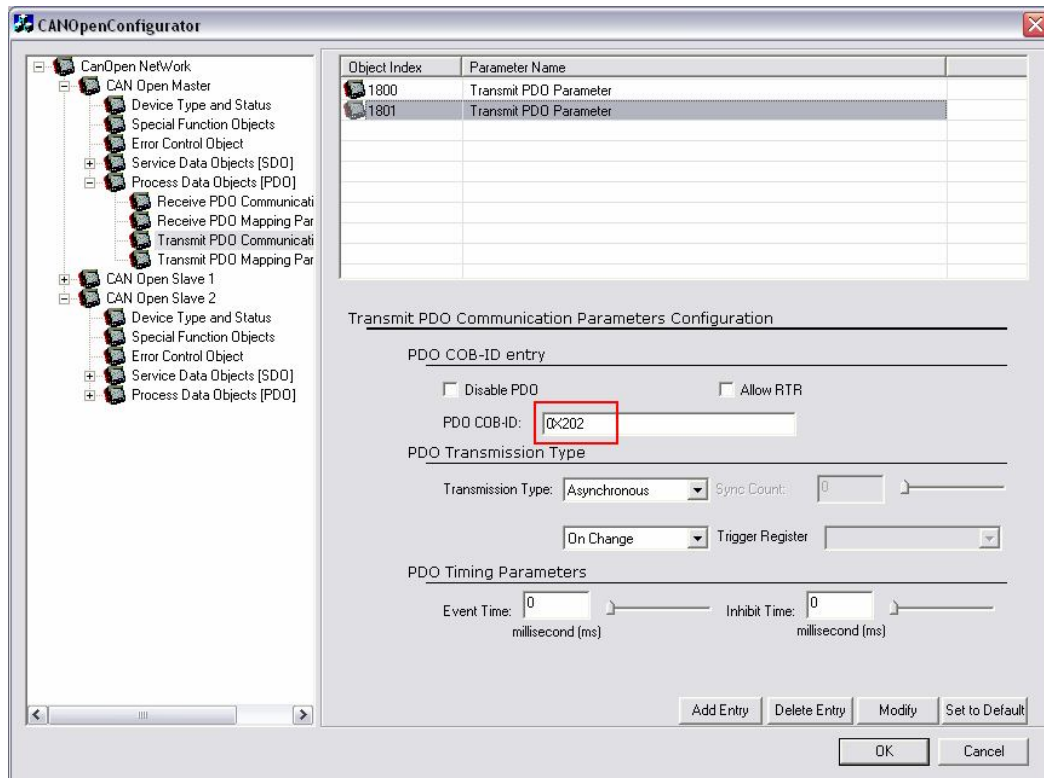b) Initial Slave Configuration

c) Loading the Wago EDS file
(right click on the CANopen Slave 2 node -> Load from EDS)

d) Master Transmit / Slave Receive PDO configuration

➢ The Object Index (1801) is assigned automatically when we click the 'Add Entry' button.

➢ COB-ID = 0x202 means that we deal with the standard PDO1, node 2
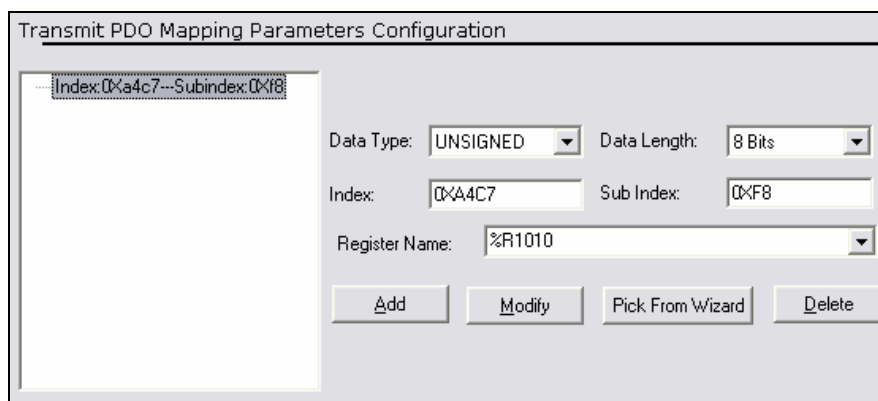
➢ In the Mapping section we should select the second object (1a01) and configure the necessary Register: %R1010 will set the Outputs on WAGO IO module
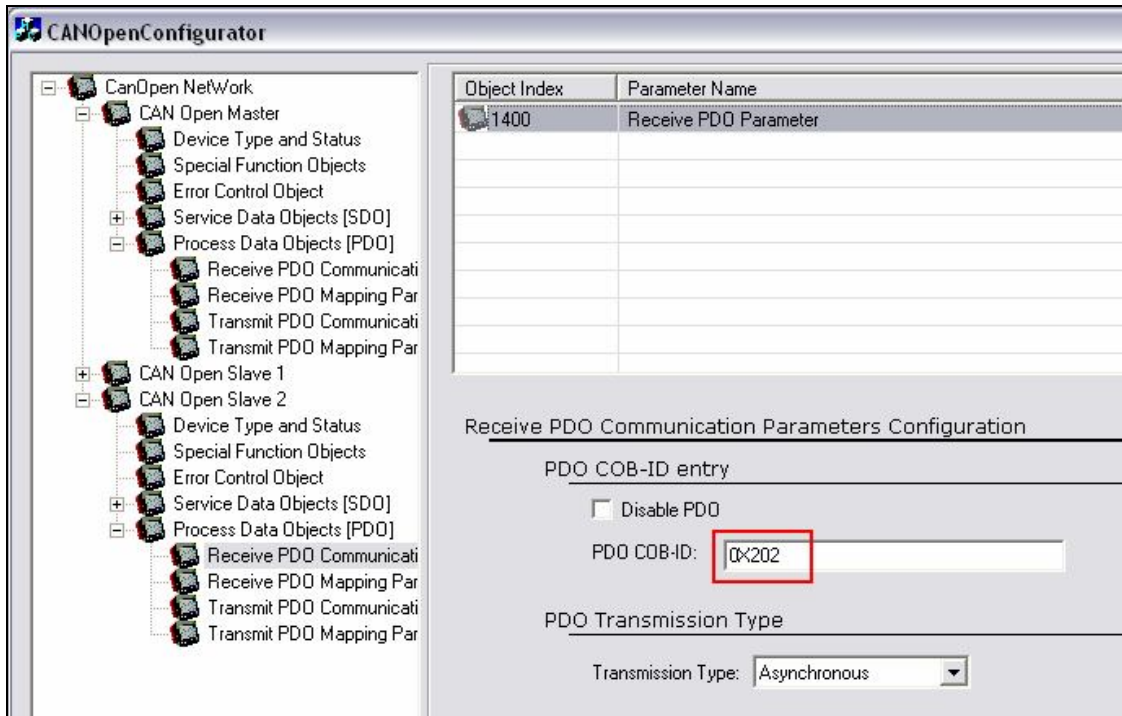
> The same COB-ID should be used on the Slave side in Receive section

> In the Mapping section we should select the first object (1600) and then by using a Wizard pick the right Index (0x6200 represents WAGO's Output Block 1)

e) Master Receive / Slave Transmit PDO configuration

> The Object Index (1401) is assigned automatically when we click the 'Add Entry' button.

> COB-ID = 0x182 means that we deal with the standard PDO1, node 2

> In the Mapping section we should select the second object (1a01) and configure the necessary Register: %R1020 will hold the Inputs from WAGO IO module
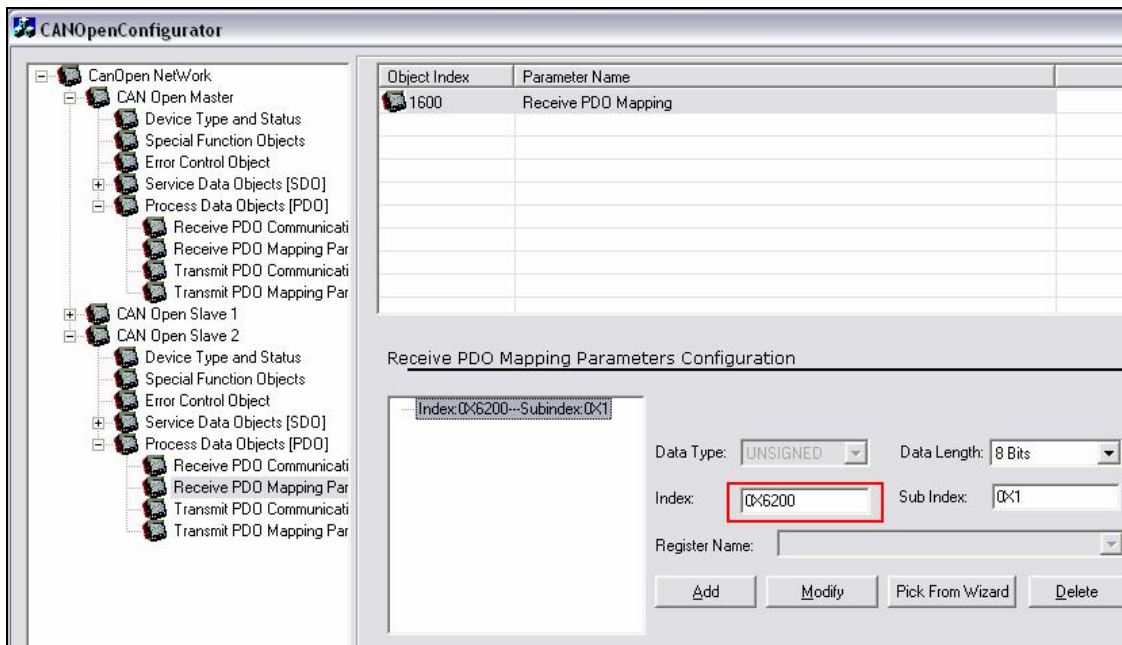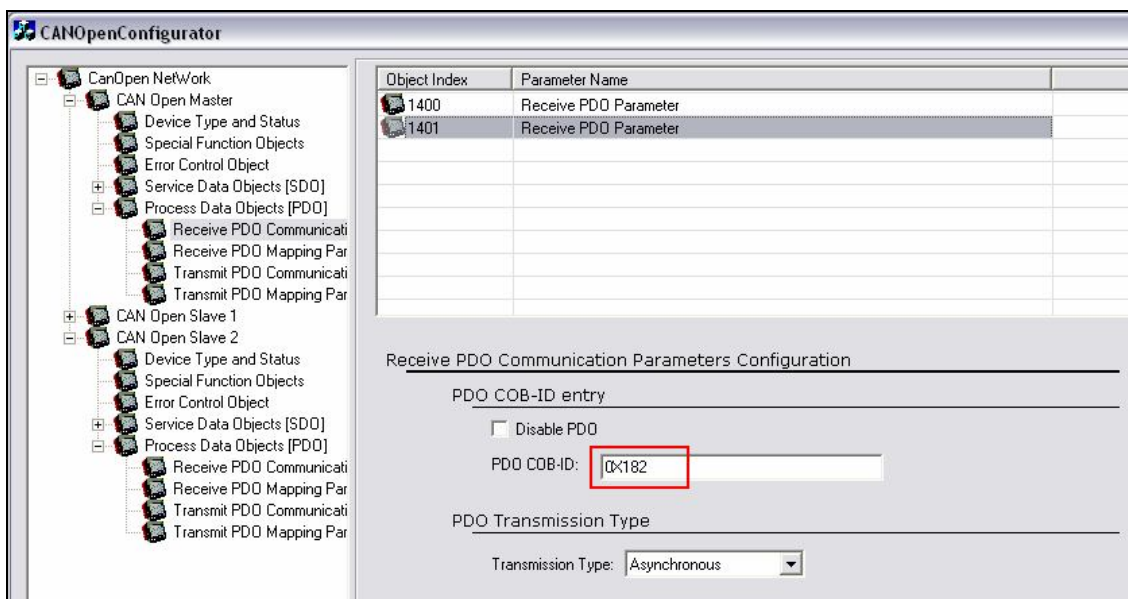
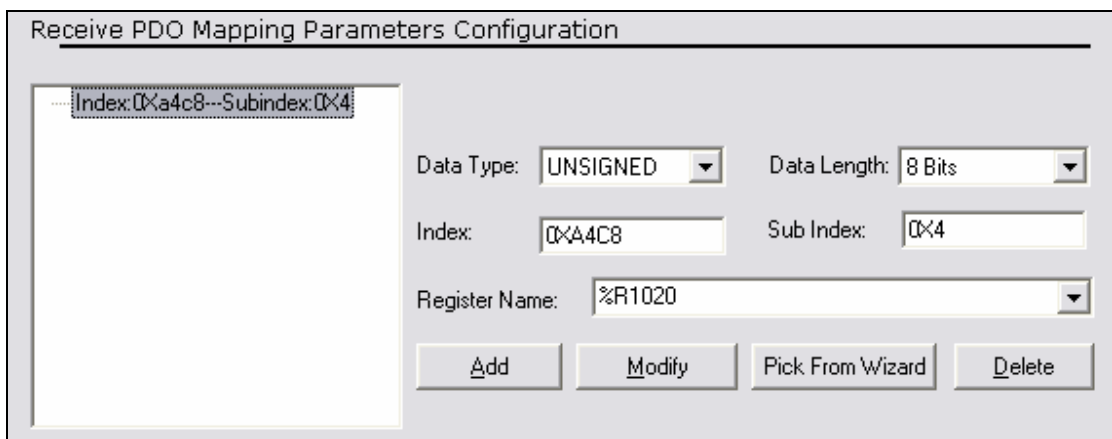- ➢ The same COB-ID should be used on the Slave side in Transmit section
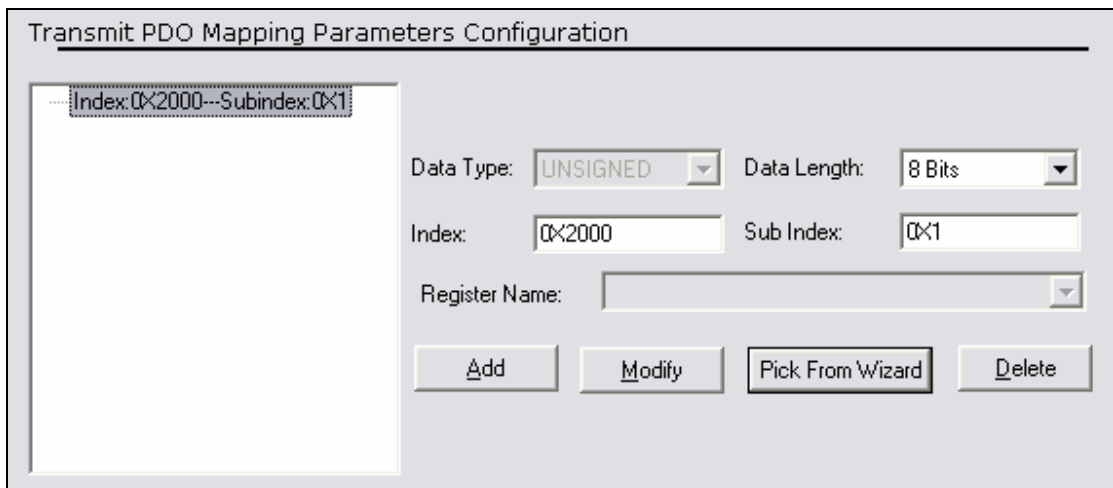
- ➢ In the Mapping section we should select the first object (1a00) and then by using a Wizard pick the right Index (0x2000 represents WAGO's Input Block 1)
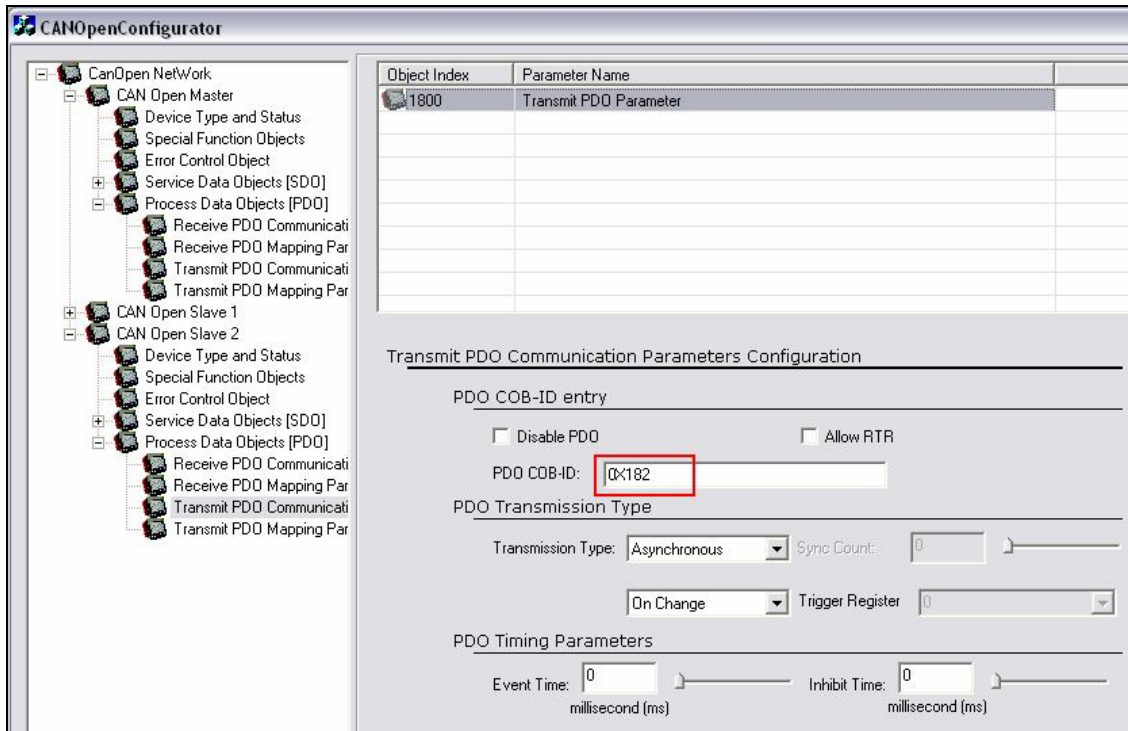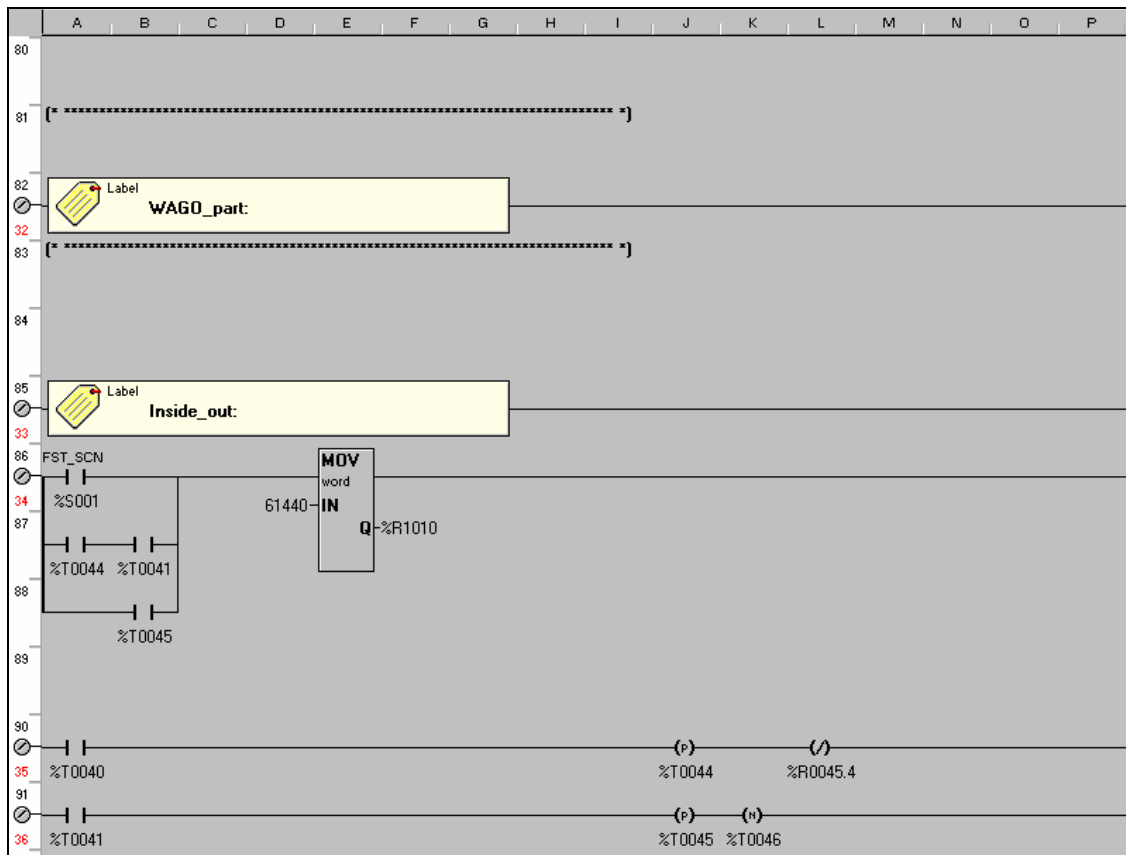
Step 3 – Cscape Application

End of LAB3

Glossary:

CAN: Controller Area Network is a standardized serial bus system.

COB (Communication Object): A unit of transportation in a CAN network. Data must be sent across a CAN Network inside a COB. There are 2048 different COB's in a CAN network. A COB can contain at most 8 bytes of data.

COB-ID: Each COB is uniquely identified in a CAN network by a number called the COB Identifier (COB-ID). The COB-ID determines the priority of that COB for the MAC sub-layer.

MAC (Medium Access Control): One of the sub-layers of the Data Link Layer in the CAN Reference Model that controls who gets access to the medium to send a message.

Device Profile: A device profile defines the device-specific communication services including the configuration services in all details.

EDS (Electronic Data Sheet): Electronic data sheets describe the functionality of a device in a standardized manner. CANopen and DeviceNet use different EDS formats.

NMT (Network Management): One of the service elements of the application layer in the CAN Reference Model. The NMT serves to configure, initialize, and handle errors in a CAN network

Node ID: The Node-ID of the NMT Slave has to be assigned uniquely.

PDO (Process Data Object): Process Data Object protocol is used to process real time data among various nodes. It can transfer up to 8 bytes (64bits) data in one PDO either from or to the device

RPDO (Receive PDO): RPDO is used for sending data to a device.

SDO (Service Data Object): The SDO protocol is used to set and read values from the object directory of a remote device. The device whose object directory is accessed is the SDO server and the device accessing the remote device is the SDO client.

Sub Index: 8-bit sub-address to access the sub-objects of arrays and records.

SYNC (Synchronization Object): The Sync Object is broadcast periodically by the Sync Producer. The Sync-Producer provides the synchronization-signal for the Sync-Consumer. When the Sync-Consumer receives the signal they start carrying out their synchronous tasks.

TPDO (Transmit PDO): TPDO is used for reading data from a device.