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How to call a TML function from a master

Application Note

Easy Motion Studio II

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1. Application description

This application note describes how to create a TML function with EasyMotion Studio II and call it from an RS232, a CANopen or an EtherCAT master.

2. TML function

The TML functions can be created and stored to the drive, using the EasyMotion Studio II software.

First, click on the “Functions” section to access the “Functions” list and, then, type the name of the function that needs to be created.

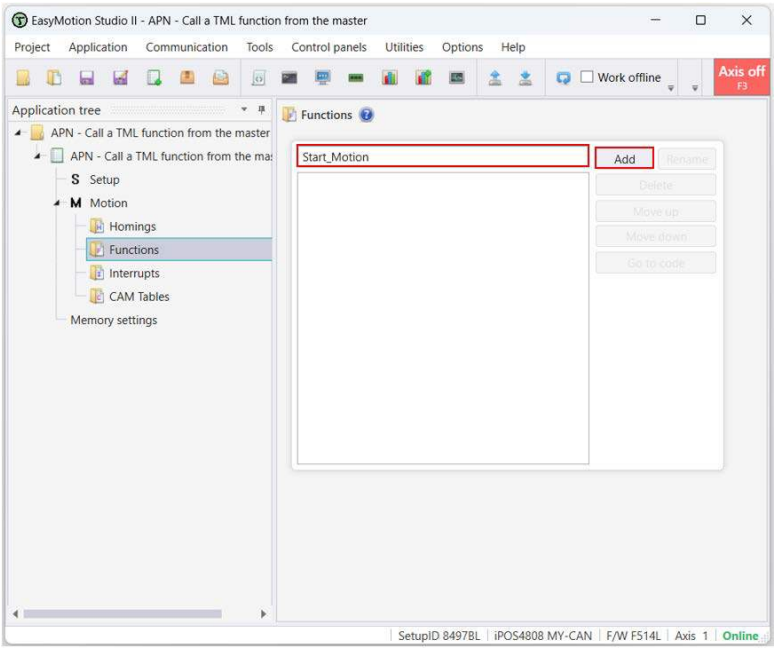

Figure 1 – *Creating a TML function*

Once added, the function will appear under the “Functions” tree item.

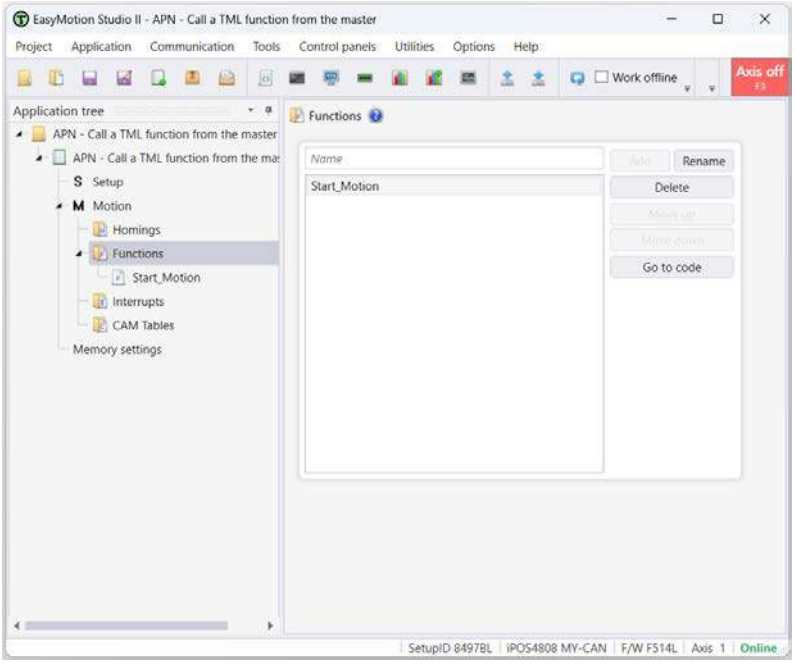

Figure 2 – *Add the “Start_Motion” function*

To write the TML code into the function, select the function's name on and insert the TML instructions to the function body.

In this example, the "Start_Motion" function contains a trapezoidal position profile that turns the motor 150 rot, in the positive direction.

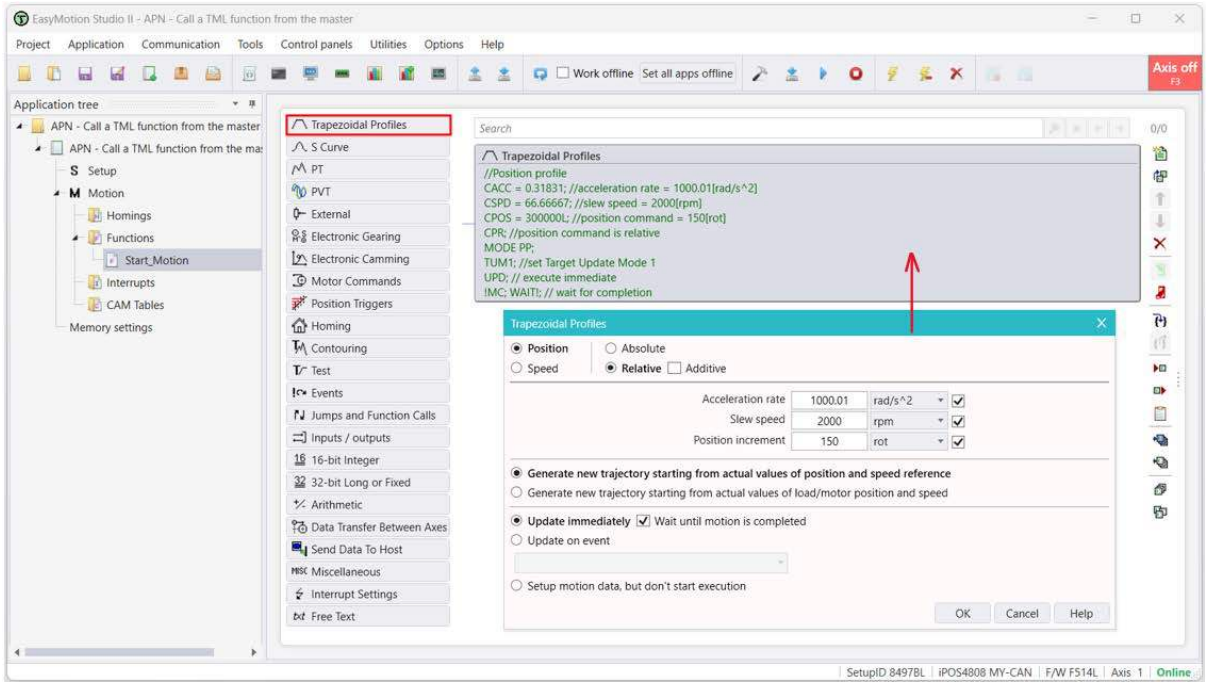

Figure 3 – ***The "Start_Motion" function body***

The TML function can be downloaded with the ***Application | Motion | Download Program*** menu command. The Download Program becomes active once the motion is built with ***Application | Motion | Build***. Alternatively, the TML functions will be downloaded when the TML application is launched with ***Application | Run*** menu command.

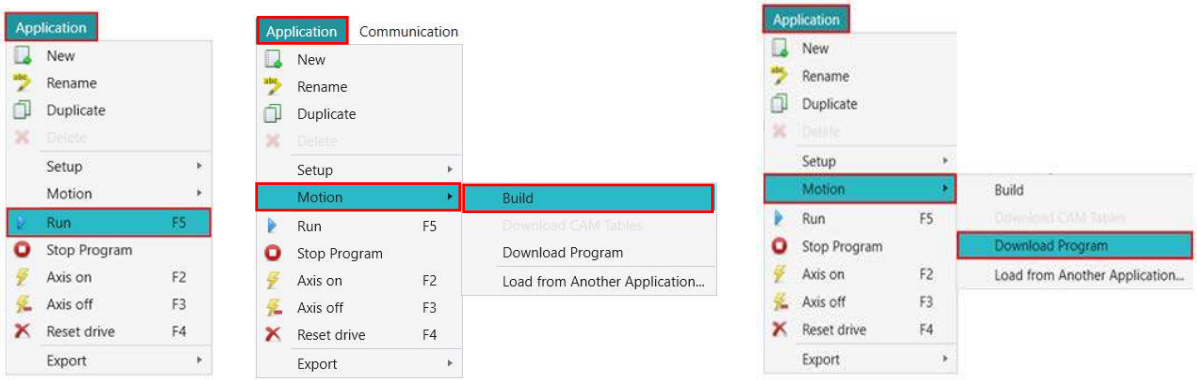

Figure 4 – *How to download the function to the drive*

3. Calling a TML function from the master

3.1 Calling a TML function from the RS232 master

To reduce the traffic on the communication line, the repetitive tasks (e.g. homing procedures, predefined movements, emergency procedures etc.) can be implemented directly at the drive level, as TML functions. The master will trigger the execution of the respective functions instead of sending all the TML commands.

A function can be called by its address or for the first 10 functions in the list by using the “Function x” TML instruction, where “x” represents the function number, first function being 1 (the order in which they are listed in EasyMotion Studio II).

The function address can be retrieve in the “Command Interpreter” window from EasyMotion Studio II, by typing the “***?function_name***” TML instruction.

Once the address of the function is known, it can be called using the “CALL address_in_hex” TML instruction.

Figure 5 – *Retrieve the address of a function and call it using the address and its number*

Remark: If the program is modified, the function address may change, so it is recommended to check the function addresses after the TML application is completed.

The “Function x” instruction is independent from program changes as EasyMotion Studio II updates the addresses of the functions when it builds the program.

The binary code of the “CALL” instruction can be generated using the “Binary Code Viewer” tool from EasyMotion Studio II (***Tools | Binary Code Viewer***).

The options for “Protocol”, “Sender”, and “Destination” from the bottom of the "Binary Code Viewer" window should be selected. In the case above, the information will be sent through the “RS232” protocol from “Host” with ID = 255 to the destination “Axis” with ID = 1 (Axis 1).

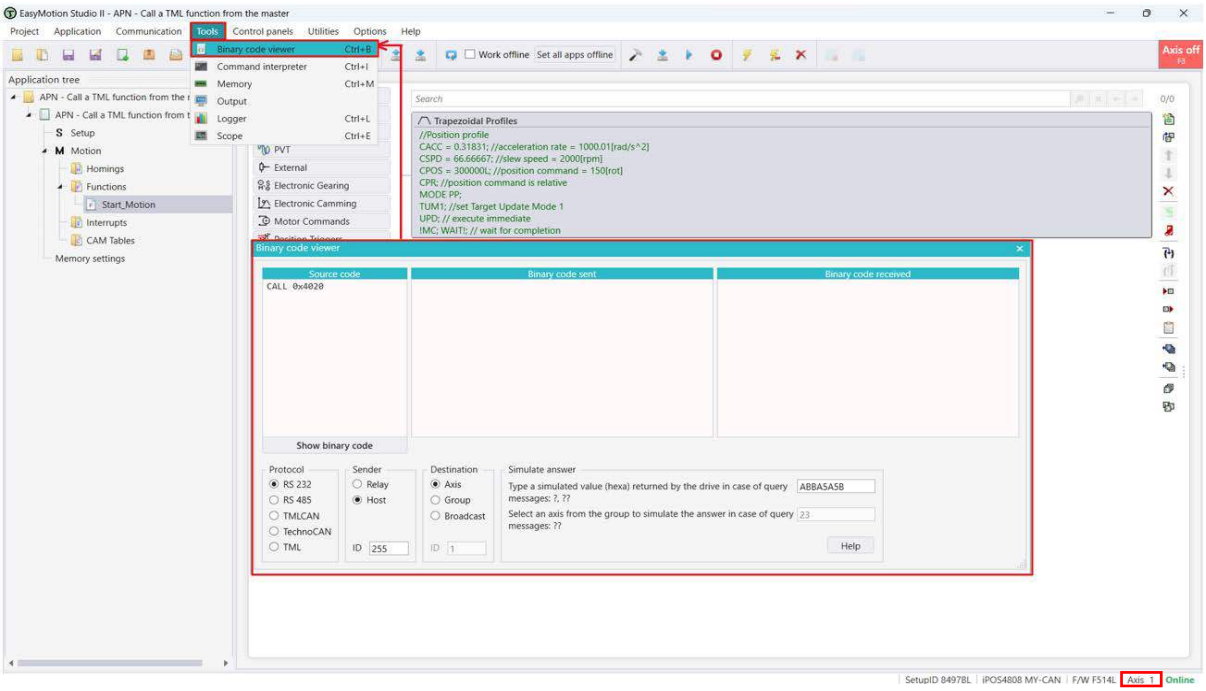

Figure 6 – *Conversion of TML code to RS232 message using “Binary Code Viewer” tool*

In the "Source code" box of the “Binary Code Viewer” tool enter the memory address displayed by the "Command interpreter" in the previous step, as shown below. After clicking on "Show binary code," the "Binary code sent" and "Binary code received" will be displayed.

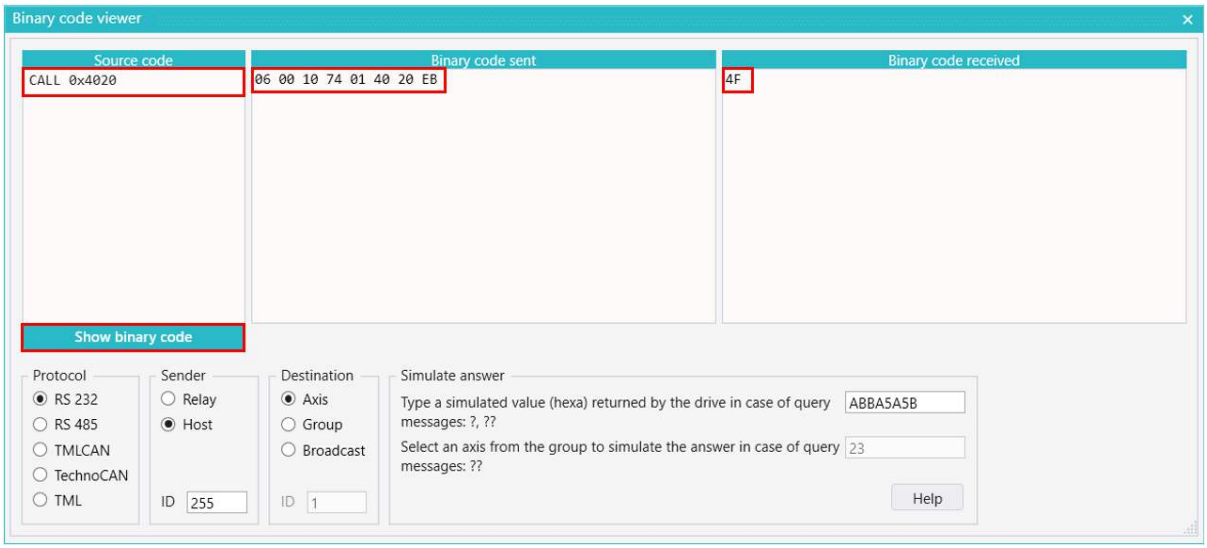

Figure 7 - *"Binary Code Viewer" tool with detailed information*

A detailed description of the Technosoft serial protocol can be found in the EasyMotion Studio II help topics, ***Help | Help Topics | Communication | Protocols*** menu command.

3.2 Calling a TML function from the CANOpen / EtherCAT master

In CANopen / EtherCAT, a previously downloaded TML function can be triggered with **2006h** object.

When a write is performed to the object 2006h, the TML function with the index specified in the provided value is called.

The first 10 TML functions defined in the EasyMotion Studio project can be called through this mechanism.

Remarks:

- the functions can be triggered only when the drive is switched to Operation Enable state.

- any attempt to call another function is signaled by the drive with an SDO abort code (0609 0030h - Value range of parameter exceeded).

- if a valid value is entered but no TML function is defined in that index, an SDO abort code will be issued (0800 0020h - Data cannot be transferred or stored to the application).

- it is not possible to call a TML function, while another one is running. If a TML function is triggered while another is running then the drive will set bits 7 (warning) in the StatusWord (6041h) and bit 14 (command error) in Motion Error Register (2000h) and the function call will be ignored.