TMCL/PC
Quick Start

Version: 1.00
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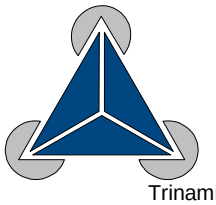

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Version	Date	Author	Comment
1.00	19-Dec-2005	OK	Initial version

Contents

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1 Introduction

TMCL/PC is a dialect of TMCL that is executed on a PC or any other host computer and is capable of controlling multiple Trinamic motion control modules that are equipped with TMCL. Many commands are just put through to the modules, while other commands (e.g. branch commands) are executed directly on the host computer.
There is a special integrated development environment (IDE) called TMCL/PC-IDE for developing TMCL/PC programs. This IDE is quite similar to the normal TMCL-IDE.
This quick start guide describes the main differences between TMCL and TMCL/PC and how to use the TMCL/PC IDE. Readers of this manual should therefore already be familiar with TMCL.

2 Differences between TMCL/PC and TMCL

2.1 Address Parameter

All commands that are directly put through to the modules have an additional address parameter. This is to specify on which of the modules the command shall be executed. The address parameter is the last parameter of the command. It is the same as the “module address” of the module. The following commands have the additional address parameter:
ROL <motor>,<velocity>,<address>
ROR <motor>,<velocity>,<address>
MST <motor>, <address>
MVP <ABS|REL|COORD>, <motor>, <position>, <address>
SAP <type>, <motor>,<value>, <address>
GAP <type>, <motor>,<address>
STAP <type>, <motor>, <address>
RSAP <type>, <motor>, <address>
SGP <type>, <bank>, <value>, <address>
GGP <type>, <bank>, <address>
STGP <type>, <bank>, <address>
RSGP <type>, <bank>, <address>
RFS <START|STOP|STATUS>, <motor>, <address>
SIO <type>, <bank>, <value>, <address>
GIO <type>, <bank>, <address>
SCO <type>, <motor>, <value>, <address>
GCO <type>, <motor>, <address>
CCO <type>, <motor>, <address>
SAC <type>, <bank>, <value>, <address>
UF0 <type>, <motor>, <value>, <address>
UF1 <type>, <motor>, <value>, <address>
UF2 <type>, <motor>, <value>, <address>
UF3 <type>, <motor>, <value>, <address>
UF4 <type>, <motor>, <value>, <address>
UF5 <type>, <motor>, <value>, <address>
UF6 <type>, <motor>, <value>, <address>
UF7 <type>, <motor>, <value>, <address>
WAIT <POS|RFS|REFSW|LIMSW>, <motor>, <timeout>, <address>

2.2 Local Commands

All other TMCL commands are executed locally in the TMCL/PC interpreter. The TMCL/PC interpreter also has a local accumulator register, a local X register and local TMCL flags. The results of the GAP, GGP, GIO, GCO and SAC commands are copied into the local accumulator register.
The following TMCL commands are executed locally and and work with the contents of the local accumulator register or local X register or local TMCL flags:
COMP <value>
CALC <type>, <value>
CALCX <type>
JC <condition>, <label>
JA <label>
CSUB <label>
RSUB
WAIT TICKS, 0, <time>
STOP
CLE <flags>

AAP <type>, <axis>, <address>: copies the contents of the local accumulator to an axis parameter of a module.
AGP <type>, <axis>, <address>: copies the contents of the local accumulator to a global parameter of a module.

2.3 Local Variables

The TMCL/PC interpreter provides an array of local variables for storing values locally. There are 256 banks of local variables, and in each bank there are 256 local variables. For using these local variables, some special commands are provided:

- STOA <index>, <bank>: stores the contents of the local accumulator to the local variable specified by <index> and <bank>.
- STOX <index>, <bank>: stores the contents of the local X register to the local variable specified by <index> and <bank>.
- RCLA <index>, <bank>: copies the contents of the local variable specified by <index> and <bank> to the local accumulator.
- RCLX <index>, <bank>: copies the contents of the local variable specified by <index> and <bank> to the local X register.
- SETV <index>, <bank>, <value>: Initializes the local variable specified by <index> and <bank> with the value specified by <value>.

The range of the <index> and <bank> parameters is 0..255.

3 Using the IDE for TMCL/PC

The TMCL/PC-IDE looks very much like the TMCL-IDE. It mainly provides an integrated editor and a TMCL/PC assembler. It also provides an integrated TMCL/PC interpreter that executes a program that has been assembled by the TMCL/PC assembler. There are also some powerful debugging facilities (setting breakpoints, inspecting local variables).

3.1 Functions of the “TMCL/PC” menu

3.1.1 Assemble

This function starts the integrated assembler. The TMCL/PC programm in the editor will be assembled. If there is an error the assembler will stop and the error will be reported.

3.1.2 Main file

This is only needed when include files are used, to specifiy which is the main file of the project. If only one file is used this is not needed.

3.1.3 Run

After a program has been succesfully assembled it can be executed. Before executing a program please make sure that all motion control modules that are used by the program are connected and powerd. If a module does not respond to a command the program will be aborted with an error.
This function is also used to continue the program after a breakpoint or after single stepping.

3.1.4 Single step

The “Single Step” function executes only the next command of a program. During single stepping, the next command to be executed is indicated by a green arrow on the left side of the editor. The contents of the local accumulator and the local X register are displayed on the status line at the bottom of the main window.

3.1.5 Pause

The “Pause” function stops the execution of a running program, but the execution of the program can be continued by the “Run” or the “Single Step” function.

3.1.6 Stop & Reset

This functions stops the excution of a running program and resets the TMCL/PC interpreter. In this case the program can not be continued, but it can be started again from the beginning by using the “Run” or “Single Step” function.

3.2 Debugging facilities

3.2.1 Breakpoints

For debugging purposes, breakpoints can be set. After a program has been successfully assembled, every line where a breakpoint can be set is indicated by a blue bullet on the left side of the editor. A breakpoint can be set by clicking on a blue bullet and is then indicated by a red bullet. A breakpoint can be removed by clicking on the red bullet again.
When the program execution reaches a breakpoint the program will be stop. It can then be continued by using the “Run” or the “Single Step” funcion.

3.2.2 Inspecting local variables

Local variables can be inspecting using the “Local Variables” dialogue. This dialogue can be opened by selecting the “Local Variables” function in the “TMCL/PC” menu. The “Local Variables” dialogue is a non modal dialogue, so it it not needed to close this dialogue while using other functions of the IDE. Local variables can be inspected and changed by using the buttons in the “Show & Change” section of this dialogue.
In a future version of the TMCL/PC-IDE it will also be possible to uses watches.

3.3 The “Options” dialogue

The “Options” dialogue is mainly used to select the interface that is to be used and is nearly the same as in the TMCL IDE. The only difference is that no module address can be specified here, because this must be specified using the address parameter of those TMCL/PC commands that are executed on the connected modules.