28-October-2016

performance real-time target machine

SN3410
Technical Reference Information and Full System Test

Prepared by Speedgoat for:

Technische Universiteit Eindhoven

Content

1 Warranty declaration 5
2 Technical specification 7
2.1 Real-time target machine (hardware) 7
2.1.1 Main board 7
2.1.2 CPU 7
2.1.3 Drives 7
2.1.4 Random Access Memory 7
2.1.5 Chassis / enclosure 7
2.1.6 Physical and power 7
2.1.7 Accessible and enabled components 8
2.2 Simulink Real-Time I/O connectivity 9
2.2.1 Installed Speedgoat I/O modules 9
2.2.2 Ethernet controllers 9
2.2.3 Super I/O 9
2.3 Real-time target machine (software) 10
2.3.1 Operating System (OS) 10
2.3.2 DOS Drivers 10
2.3.3 Installed DOS tools 10
2.3.4 Simulink Real-Time kernel 10
3 Test model 11
3.1 Terminal boards test wiring 11
3.2 Simulink test model and results 12
4 I/O driver block library 14

1 Warranty declaration

for Speedgoat real-time target machines, I/O modules, and accessories

STANDARD WARRANTY TERMS

Speedgoat warrants that the products delivered hereunder shall be free from defects in workmanship and material for a period of twenty-four (24) months from date of delivery to the buyer, including component parts of products sold as spare, replacement, maintenance or storage parts, which are also warranted for twenty-four (24) months from date of delivery, provided, however, in either case, that notice of any such defect is provided to Speedgoat within thirty (30) days of its discovery by the buyer. Speedgoat does not make any other warranty of any kind to buyer, and hereby expressly disclaims any such other warranty, whether express or implied, in fact or by law, including without limitation any warranty of merchantability, fitness for a particular purpose, non-infringement or warranty of any kind incorporated or referenced in buyer's specifications or purchase order, or any other warranty arising by statute, or otherwise in law, or from a course of dealings or use of trade, all of which are hereby disclaimed.

EXCLUSIVE REMEDY: In any event, the buyer's exclusive remedy hereunder is limited to the furnishing of replacement parts on an exchange basis, or, at the option of Speedgoat, to the repair or replacement of defective products or replacement parts at one of Speedgoat's office locations, but in neither case only so long as an examination within the period of warranty reveals the parts to be defective. Speedgoat shall not incur any obligation hereunder with respect to products which are modified in any way by the buyer without the prior written consent of Speedgoat. The buyer accepts and acknowledges that the foregoing allocation of risk is reflected in the purchase price.

THE WARRANTY SET FORTH ABOVE DOES NOT EXTEND TO:

(a) any systems which have been damaged or rendered defective as a result of accident, misuse, or abuse;
(b) by the use of parts not manufactured, authorized or sold by Speedgoat;
(c) by modification or as a result of service by anyone other than Speedgoat;
(d) systems not containing original components or original replacement of components;
(e) damage during shipment, unless due to incorrect packaging by Speedgoat;
(f) systems which fail or are damaged after delivery due to shipment, handling, storage, operation, use or maintenance in a manner or environment not conforming to any published instructions or specifications issued by Speedgoat.

LIMITATION OF LIABILITY: In no event shall Speedgoat be liable for special, exemplary, indirect, consequential or incidental damages arising under contract, tort (including negligence), strict liability, warranty or any other theory of liability.

SHIPPING COSTS: All shipping costs from the buyer to Speedgoat associated with repair or replacement of systems under warranty shall be borne by the buyer. All shipping costs from Speedgoat to the buyer associated with repair or replacement of systems under warranty shall be borne by Speedgoat.

LEVEL ONE HARDWARE MAINTENANCE SERVICE

The Level One Hardware Maintenance Service is available as an option and has to be purchased at the time the products are purchased for which the warranty shall be extended. The Level One Hardware Maintenance Service extends the standard 24 months warranty period by 12 months resulting in a 36-months warranty period.

Speedgoat guarantees stock of all hardware components*, and immediately sends out replacement loaner hardware, in case of any technical failure of the hardware. While you are working with the loaner, your original hardware will be repaired by Speedgoat. After the standard repair service is completed, the loaner hardware is being swapped and replaced with the original, repaired hardware.

Besides, Level One Hardware Maintenance Service terms and conditions are identical with the standard Warranty terms and conditions (see above).

* Some of our I/O modules are available in many different variations and Speedgoat does not stock all options. Replacement for a small subset of I/O modules (e.g. IO42X, IO67X, IO68X, IO9XX I/O modules) is not guaranteed or may not be available at all.

LEVEL TWO HARDWARE MAINTENANCE SERVICE

The Level Two Hardware Maintenance Service is available as an option and has to be purchased at the time the products are purchased for which the warranty shall be extended. The Level Two Hardware Maintenance Service extends the standard 24 months warranty period by 36 months resulting in a 60-months warranty period.

Besides, Level Two Hardware Maintenance Service terms and conditions are identical with the Level One Hardware Maintenance Service terms and conditions (see above).

SYSTEMS SOFTWARE MAINTENANCE AND SUPPORT SERVICES

Delivery of Speedgoat systems and hardware/software components by default includes 12 months (1 year) of Systems Software Maintenance and Support Services.

Subscription includes access to Speedgoat tools and driver software compatible with future releases of MathWorks software and professional technical support by phone an e-mail.

You can continue uninterrupted service in subsequent years by renewing your Systems Software Maintenance and Support Services subscription annually to maintain your investment. Reinstatement if elapsed is possible, but you incur back maintenance charges plus a reinstatement fee. Staying subscribed is the most cost-effective way to access latest advances and technical support. The annual subscription fee is calculated based on the current list price of the products installed in your hardware system configuration.

LEGAL INFORMATION ABOUT THE USE OF SPEEDGOAT TOOLS AND DRIVERS

Speedgoat tools and drivers are optimized for hardware purchased at Speedgoat and may be used only in conjunction with the hardware (serial no.) for which the tools and drivers were purchased for.

2 Technical specification

2.1 Real-time target machine (hardware)

2.1.1 Main board

Manufacturer	DFI-ACP
Product	CL630-CRM
Form factor	ATX
Chipset	Intel C216 Express
Bus	PCI 2.3, 32-bit/33MHz
Memory type	DDR3
Video	Intel HD Graphics
USB	4 x USB 3.0/2.0/1.1 2x USB 2.0/1.1
Ethernet ports	1 x WG82579LM (GbE Phy) 1 x WG82574L (PCIe GbE)
Serial ports	1 x RS232/422/485
Parallel port	None
Keyboard & Mouse	1 x PS/2 connector
BIOS	AMI BIOS
PCI(e) slots	3 x PCI, 2 x PCIe (x16), 2 x PCIe (x4)
SATA connectors	4 x SATA2, 2 x SATA3

2.1.2 CPU

Processor	Intel Core i7-3770K 3.5 GHz

2.1.3 Drives

Main drive	60GB Solid State Drive

2.1.4 Random Access Memory

Installed RAM	4096 MB

2.1.5 Chassis / enclosure

Manufacturer	ELMA/Speedgoat
Product	19“ 4U aluminium chassis
Color / Description	Silver powder-coated, natural aluminium

2.1.6 Physical and power

Temperature range	0° to 50°C
Dimensions	Height: 178mm, Width: 440mm, Depth: 360mm
Weight	6.5 kg
Fans	2 at rear (outtake)

2.1.7 Accessible and enabled components

Each target machine is optimized to achieve highest real-time testing performance using Simulink and Simulink Real-Time. Therefore we strongly recommend to not change any of the below BIOS configurable settings. Doing so might reduce real-time performance and can change IRQ assignments.

Power

Power inlet	400W, AC 100-240V, 50-60Hz, fan-less, zero-noise, at rear
Power switch	At rear
Secondary power switch	At front
Reset button	None, use Secondary power switch
Power LED	At front (combined with Secondary power switch)

Audio/Video

Video connector	2 x DVI-I (1 supports DVI-D signal only)
Audio connectors	Disabled (Realtek ALC886)

Networking

Ethernet port ETH 1	Enabled	Intel WG82579LM	00-01-29-E4-BD-E5
Ethernet port ETH 2	Enabled	Intel WG82574L	00-01-29-E4-BD-E4

For Host / Target communication use the Ethernet port labeled "Host link"

Super I/O

Serial port COM 1	Enabled
Serial port COM 2	Disabled
Serial port COM 3	Disabled
Serial port COM 4	Disabled

USB support

USB ports	5 x at front (1x for kernel transfer only)

PS/2 connector

Keyboard & Mouse	1 x PS/2

2.2 Simulink Real-Time I/O connectivity

2.2.1 Installed Speedgoat I/O modules

Module	PCI [Bus, Slot]	IRQ line	Additional info
IO601	[6,4]	10	

2.2.2 Ethernet controllers

Component	PCI [Bus, Slot]	IRQ line	Supported
1. Ethernet port ETH 1	[0,25]	2	Host-target communication (Host link)
2. Ethernet port ETH 2	[5,0]	10	Real-Time UDP, EtherCAT Master

2.2.3 Super I/O

Component	Address	IRQ line
1. Serial port COM 1	0x3F8	4

2.3 Real-time target machine (software)

2.3.1 Operating System (OS)

Free DOS	Version 1.0

2.3.2 DOS Drivers

USB driver	DOSUSB 2.0

2.3.3 Installed DOS tools

Simulink Real-Time kernel USB transfer tool	prepared by Speedgoat

2.3.4 Simulink Real-Time kernel

By default Speedgoat already preinstalls the latest Simulink Real-Time kernel version on your target machine. However to work with Simulink Real-Time a valid Simulink Real-Time license from The MathWorks is required.

Further information on how to transfer Simulink Real-Time kernel version for the respective MathWorks software release to your target machine and to change IP settings of your target machine is available in the Quick Start Guide and the User's Manual provided together with your target machine.

3 Test model

To test the provided I/O connectivity but also as an example on how to configure the provided driver blocks each target machine delivery includes a test model exercising various channels and ports of the installed I/O modules.

The test model uses the loopback method: the model generates outputs for the output pins of the I/O modules which are then routed back to the input pins of the I/O modules via simple wires wired to the terminals of the provided terminal boards or using loopback test cables such as for the IO601 (CAN).

You can monitor the transferred data on scopes of type target either by attaching a TFT screen to your target machine, or take a screenshot by typing `xpctargetspy` at the MATLAB command prompt.

Note

Prior to executing the test model please ensure that you have properly configured and setup your target machine as explained in the Quick Start Guide and/or in the User's Manual provided with your target machine.

3.1 Terminal boards test wiring

To allow you to run the provided test model right away Speedgoat pre-wires the terminal-board(s) as described below. In case you want to run the unchanged test model again at a later time and you've removed the wires you will need to wire the terminal boards again.

IO601

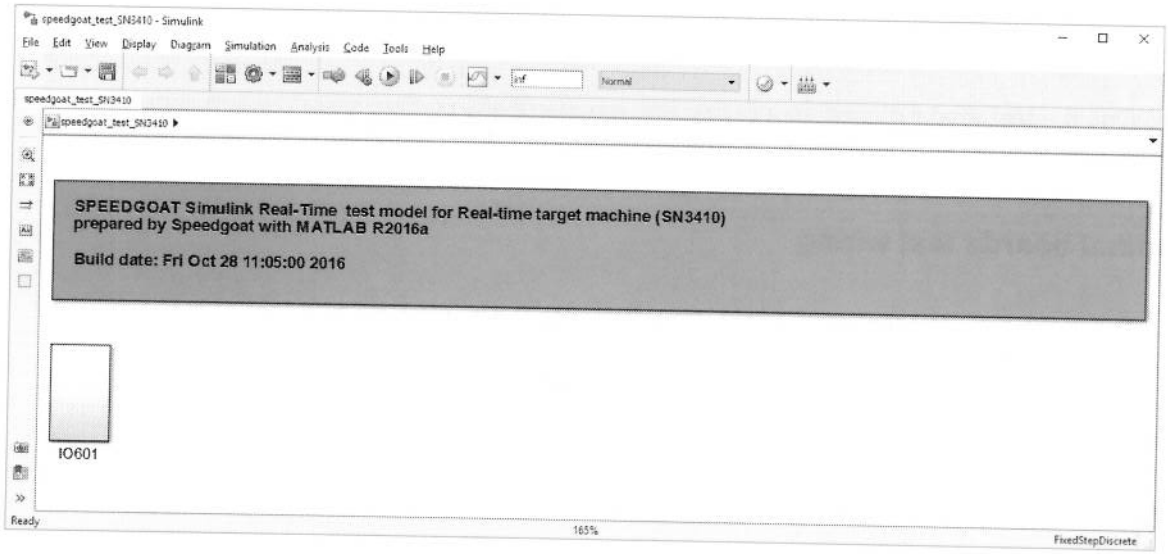
Connect CAN port 1 with CAN port 2 using the provided CAN loopback test cable.

3.2 Simulink test model and results

As soon as you have connected the installed I/O modules either with the pre-wired terminal boards using the provided cables or with loopback test cables (such as with DSUB 9 connectors in case you have an IO601 installed or a crossed Ethernet cable in case you have an IO702 installed) you are ready to work with the provided test model(s).

By default Speedgoat prepares test models for the current release of MathWorks software. These test models were copied to your MATLAB working directory at the time you were installing the Speedgoat Tools and Drivers. The test models are also available on the provided USB drive in folder "Driver software\TestModels\".

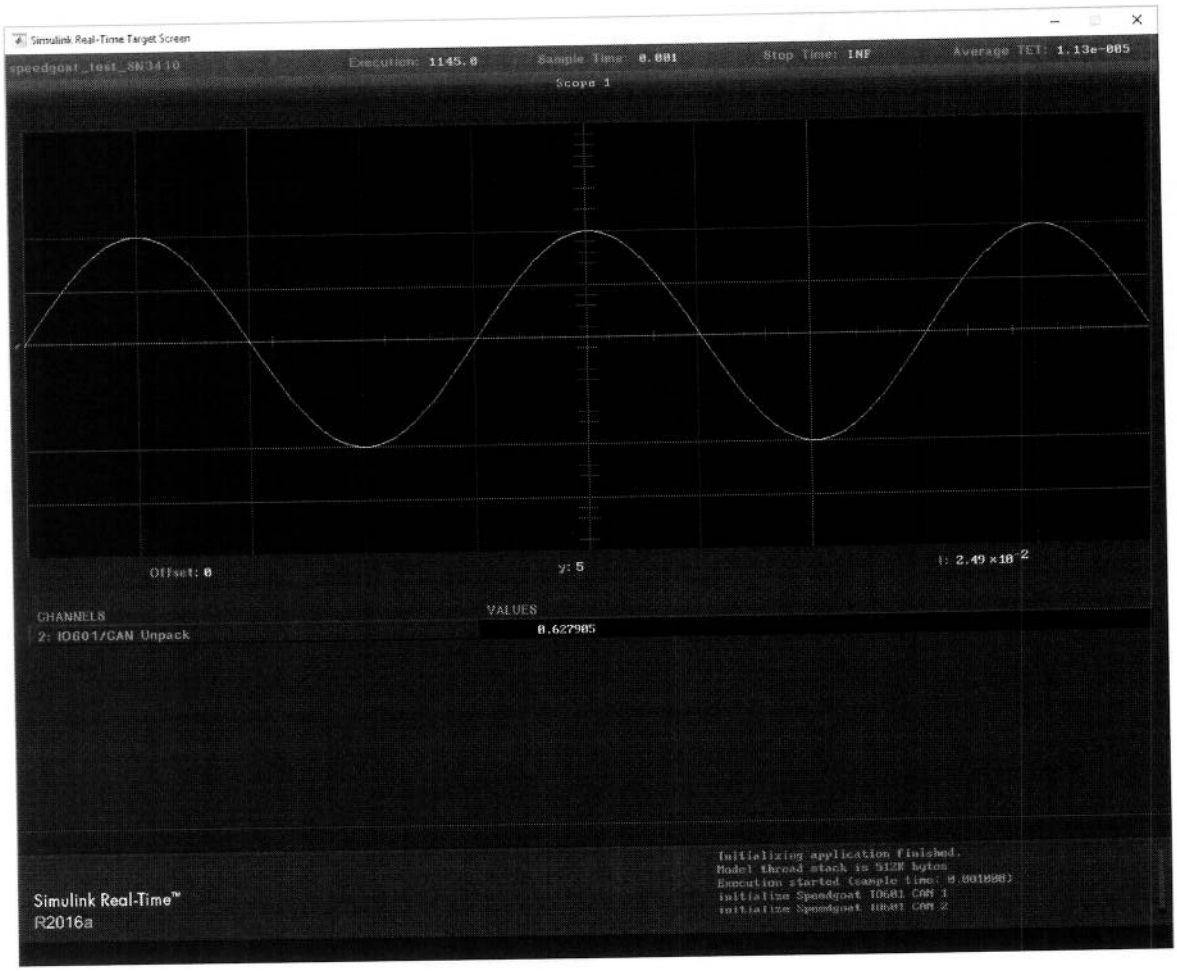
Example: speedgoat_test_SN3410.slx



To get a better understanding about the structure of the test model you can open the top-level subsystems.

Before building the target application by selecting menu item "Tools/Code Generation/Build model" ("Tools/Real-TimeWorkshop/Build model" for R2010b and older) please ensure that you have defined a C-compiler compatible with Simulink Real-Time to compile and link the target application within the Simulink Real-Time Explorer, and that the Simulink Real-Time kernel has been selected and transferred to the target. For further information please refer to the Quick Start Guide and/or the User's Manual. Additionally, the target machine must be powered-up and the screen attached to the target machine must show the initialization screen of the loaded Simulink Real-Time kernel.

The target application generation process should take approximately 20-40 seconds. After the target application has been successfully downloaded, start the application by either typing `start(tg)` at the MATLAB command prompt or by using Simulink Real-Time Explorer. After a run-time of approximately 5 second the target scopes are updated for the first time and should look as follows.



If the target screen looks different please contact Speedgoat.

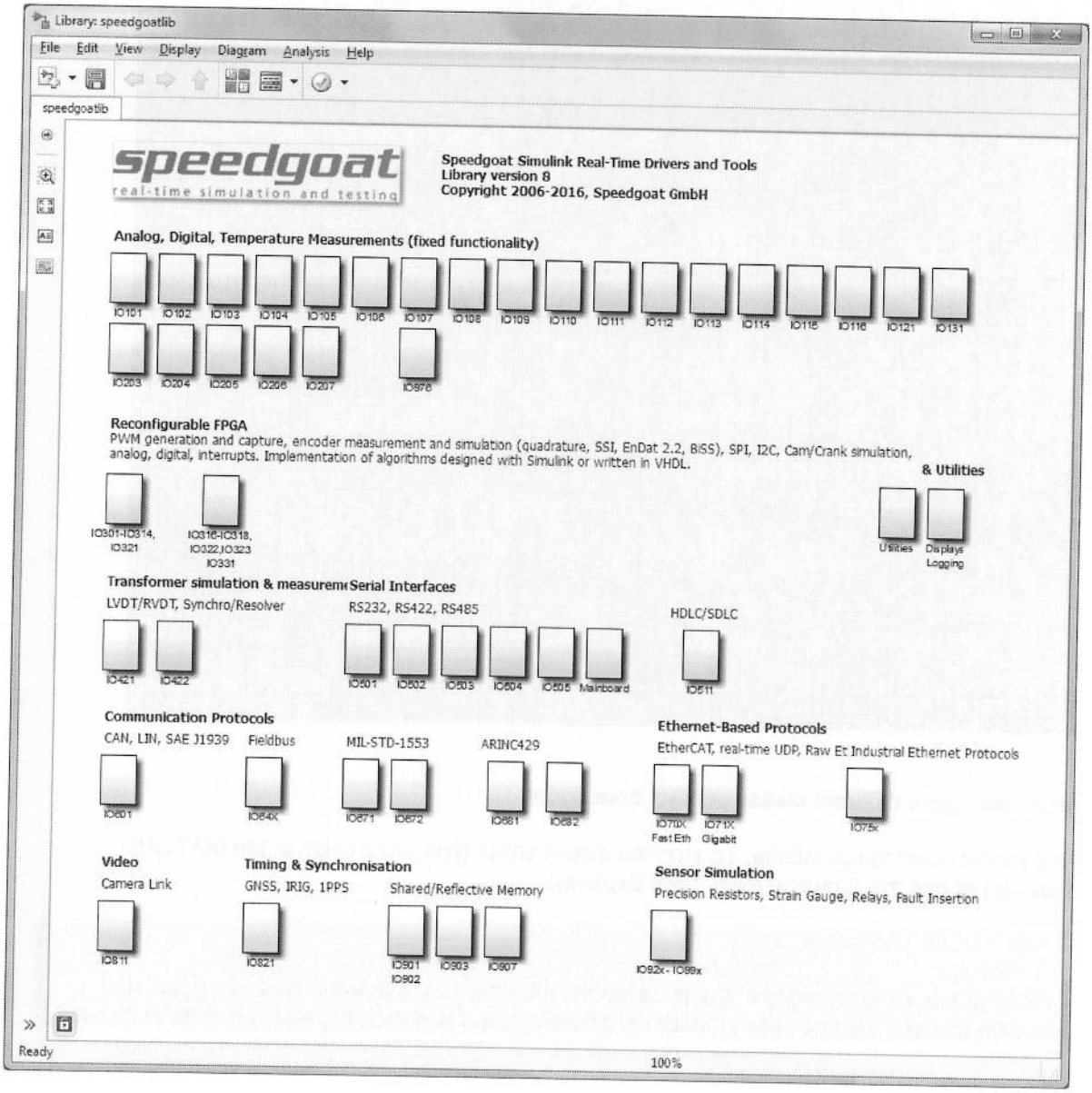
Note that the model is set to run infinite. To stop the model either type `stop(tg)` at the MATLAB command prompt or use the Simulink Real-Time Explorer.

Note

Besides testing the proper functioning of the installed I/O modules the test mode is also a good starting point for your own models. You can save it under a different name and then change whatever is needed.

4 I/O driver block library

Enter `speedgoatlib` at the MATLAB command prompt to open the Speedgoat driver block library.



It is important to not alter this library. It is a reference library. Drag and drop the driver blocks corresponding to the I/O modules installed in your target machine into your own Simulink models.

Information on how to configure and use the driver blocks is provided in the Speedgoat User's Manuals for the installed I/O modules.