

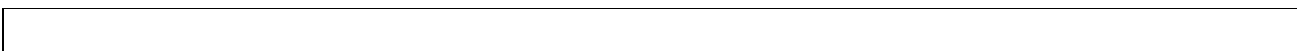
Embedded Target for Motorola MPC555 Release Notes

See the “Embedded Target for Motorola MPC555 1.1 Release Notes” on page 1-1 for a description of the changes included in the latest version of the Embedded Target for Motorola MPC555. The Release Notes include the following sections:

- “Introduction to the Embedded Target for Motorola MPC555” on page 1-2
- “New Features” on page 1-6
- “Limitations and Warnings” on page 1-10

Printing the Release Notes

If you would like to print the Release Notes, you can link to a PDF version.



Embedded Target for Motorola MPC555 1.1 Release Notes

1

Introduction to the Embedded Target for Motorola MPC555	1-2
Feature Summary	1-3
New Features	1-6
Full CodeWarrior Support	1-6
Time Processor Unit (TPU3) Support	1-6
Serial I/O Support	1-6
Automatic Boot Code Loading	1-6
Upgrade Existing Boot Code via CAN or BDM	1-6
Automatic CAN Download	1-7
Target Preferences Dialog	1-7
Automatic ASAP2 Generation	1-7
More CAN Message IDs in Vector CAN Receive	1-7
Automatic ODBC Data Source Configuration	1-8
New Test Program	1-8
Two New Demos	1-8
Accelerator Mode	1-8
Improved Compiler Support for CCP	1-8
Streamlined SingleStep Configuration	1-8
CANdb Limitation Lifted	1-9
Limitations and Warnings	1-10
CodeWarrior Version 6.5	1-10
Windows 98 Not Supported	1-10
Driver Blocks in PIL and AE Mode	1-10
CAN Blocks and CAN Download Control Panel	1-10
DSP Block Limitation	1-11
MPC555 Resource Configuration Block and Model Callbacks	1-12
Documentation For Downloading Boot Code Via CAN	1-12
Harmless Simulink Warnings	1-12

Embedded Target for Motorola MPC555 1.1 Release Notes

Introduction to the Embedded Target for Motorola MPC555	1-2
Feature Summary	1-3
New Features	1-6
Full CodeWarrior Support	1-6
Time Processor Unit (TPU3) Support	1-6
Serial I/O Support	1-6
Automatic Boot Code Loading	1-6
Upgrade Existing Boot Code via CAN or BDM	1-6
Automatic CAN Download	1-7
Target Preferences Dialog	1-7
Automatic ASAP2 Generation	1-7
More CAN Message IDs in Vector CAN Receive	1-7
Automatic ODBC Data Source Configuration	1-8
New Test Program	1-8
Two New Demos	1-8
Accelerator Mode	1-8
Improved Compiler Support for CCP	1-8
Streamlined SingleStep Configuration	1-8
CANdb Limitation Lifted	1-9
Limitations and Warnings	1-10
CodeWarrior Version 6.5	1-10
Windows 98 Not Supported	1-10
Driver Blocks in PIL and AE Mode	1-10
CAN Blocks and CAN Download Control Panel	1-10
DSP Block Limitation	1-11
MPC555 Resource Configuration Block and Model Callbacks	1-12
Documentation For Downloading Boot Code Via CAN	1-12
Harmless Simulink Warnings	1-12

Introduction to the Embedded Target for Motorola MPC555

Note The Embedded Target for Motorola MPC555 Version 1.1 will be released as part of MathWorks Service Pack CD. Version 1.0.1 was the first release of this product as part of a MathWorks release CD. Version 1.0 of this product was initially released in Web-downloadable form after Release 12.1 was released, but before Release 13.

Following is an overview of the product.

For new features in Version 1.1 see “New Features” on page 1–6.

The Embedded Target for Motorola MPC555 is an add-on product for use with the Real-Time Workshop Embedded Coder. It provides a complete and unified set of tools for developing embedded applications for the Motorola MPC555 processor.

Used in conjunction with Simulink, Stateflow, and the Real-Time Workshop Embedded Coder, the Embedded Target for Motorola MPC555 lets you

- Design and model your system and algorithms.
- Compile, download, run and debug generated code on the target hardware, seamlessly integrating with industry-standard compilers and development tools for the MPC555.
- Use co-simulation and rapid prototyping techniques to evaluate performance and validate results obtained from generated code running on the target hardware.
- Deploy production code on the target hardware.

Feature Summary

Production Code Generation

- Generates production code for use on the target MPC555 microcontroller.
- Generates project or make files for popular cross-development systems:
 - Diab C cross-compiler
 - Metrowerks CodeWarrior
- Debugger support:
 - Wind River Systems Single Step debugger
 - Metrowerks CodeWarrior debugger

Device Driver Support

- The Embedded Target for Motorola MPC555 Library provides device driver blocks that let your applications access on-chip resources. The I/O blocks support the following features of the MPC555:
 - Pulse width modulation (PWM) generation via the Modular Input/Output Subsystem (MIOS) PWM unit or the Time Processor Unit 3 (TPU) modules.
 - Analog input via the Queued Analog-to-Digital Converter (QADC64).
 - Digital input and output via the MIOS or TPU.
 - Digital input via the QADC64.
 - Frequency and pulse width measurement via the MIOS Double Action Submodule (MDASM).
 - Transmit or receive Controller Area Network (CAN) messages via the MPC555 TouCAN modules.
 - Driver blocks to support other functions of the TPU modules – Fast Quadrature Decode, New Input Capture/Input Transition Counter, and Programmable Time Accumulator
 - Serial transmit and receive
 - Utility blocks such as a watchdog timer.
- Device driver blocks support a *pass - through* option. The pass-through option lets you leave your device driver blocks in your model during

simulation. You can then provide a Simulink signal to use in place of the actual device driver signal.

Code and Performance Analysis

Web-viewable code generation report includes:

- Analysis of RAM/ROM usage and other variables.
- Analysis of code generation options used, with optimization suggestions.
- Hyperlinks to generated code files.
- Hyperlinks from generated code to source model in Simulink.

Application Development and Rapid Prototyping

- Generation of real-time, standalone code for MPC555
- Scheduler for single- rate or multirate real-time operation
- CAN-based loader for download of generated code to RAM or flash memory
- CAN-based host-target communications for real-time retrieval of data on host computer

Simulation and Co-Simulation

- Automatic S-function generation lets you validate your generated code in software-in-the-loop (SIL) simulation.
- Processor-in-the-loop (PIL) co-simulation lets you integrate generated code, running on target processor, into your simulation.
- SIL and PIL code components are generated by the Real-Time Workshop Embedded Coder. These simulation components are in the same compact and efficient format as the production code generated for final deployment.

CAN Support

- Transmit or receive CAN messages via the MPC555 TouCAN modules.
- CAN Drivers (Vector) library provides blocks for configuring and connecting to Vector-Informatik CAN hardware and drivers.
- The CAN Message Blocks library includes blocks for transmitting, receiving, decoding, and formatting CAN messages. The CAN Message Blocks library

also supports message specification via the Vector-Informatik CANdb standard.

Code Validation and Performance Analysis

Code Validation. Since signal data is available to Simulink during each sample interval in a PIL simulation, you can observe signal data on Scopes or other Simulink signal viewing blocks. You can also store signal data to MAT-files via To File blocks. To validate the results obtained by the generated code running on the target processor, you can compare these files to results obtained using a normal Simulink plant/controller simulation.

Determining Code Size. In control design it is critical to ensure that the size of the generated code does not exceed physical limitations of RAM and ROM. The Embedded Target for Motorola MPC555 automatically produces a code generation report that displays the RAM usage and ROM size of the generated code.

This capability is useful when selecting which code generation optimizations will be used. After determining the size of the required RAM and ROM, you can consider which code generation optimizations to use, and consider modifications to the model design.

New Features

This section introduces the new features and enhancements added to the Embedded Target for Motorola MPC555 since Version 1.0.1 (Release 13).

Full CodeWarrior Support

Version 1.1 adds Full CodeWarrior support for Real Time Target mode, in addition to the existing processor-in-the-loop (PIL) target support.

Time Processor Unit (TPU3) Support

Six new Time Processor Unit (TPU3) blocks have been added to support the use of the MPC555 TPU submodules:

- TPU Digital In
- TPU Digital Out
- TPU Fast Quadrature Decode
- TPU New Input Capture/Input Transition Counter
- TPU Programmable Time Accumulator
- TPU Pulse Width Modulation Out

Serial I/O Support

Serial transmit and receive blocks.

Automatic Boot Code Loading

Version 1.1 adds automatic boot code loading, with SingleStep or CodeWarrior, accessible from the MATLAB Start menu.

Upgrade Existing Boot Code via CAN or BDM

Note Both new users and previous users of the product must download the new bootcode provided with the latest release.

To install the new bootcode into flash memory on the target via BDM, follow the instructions under “Downloading Boot Code” in the chapter on Generating Stand-Alone Real-Time Applications in the *Embedded Target for Motorola MPC555 User’s Guide*.

You can also upgrade the bootcode over CAN (removing the need for a BDM connector). It is not possible to upgrade from a previous bootcode using the regular `candownload` utility, so if you wish to download via CAN then follow these instructions:

- 1 Open the model `can_bootcode_upgrade`.
- 2 Follow the instructions contained inside the model to download the new bootcode to the MPC555 via CAN.

Note: Once you have initially downloaded the new bootcode using the upgrade model, it will be possible to use the standard `candownload` program to download application code to RAM or flash, and bootcode to flash.

Automatic CAN Download

You can now reach the CAN Download Control Panel using the MATLAB **Start** menu, or you can open it automatically at the end of the build process.

Target Preferences Dialog

Version 1.1 includes a new Target Preferences dialog, accessible from the **Start** menu.

Automatic ASAP2 Generation

Version 1.1 provides automatic set up of correct settings for ASAP2 file generation. There is no longer any need to run the `mpc555dk_asap2` utility.

More CAN Message IDs in Vector CAN Receive

You can now specify a vector of CAN message IDs in a Vector CAN Receive block, so you can receive messages with different IDs from the same Vector Receive Block.

Automatic ODBC Data Source Configuration

Configuration of the ODBC Data Source is now automatic; previously you had to configure this manually. The ODBC Data Source is used for importing data from CANdb.

New Test Program

Version 1.1 includes a new test program, accessible from the **Start** menu, which downloads and runs on your MPC555 target hardware to verify your installation.

Two New Demos

Two new demos have been added to demonstrate the use of CANdb Message Packing and Unpacking blocks. You can generate code from `mpc555rt_candb.mdl` for real-time execution on an MPC555. If you have Vector-Informatik CAN hardware and drivers installed, you can use the companion model `mpc555rt_candbhost.mdl` to exchange CAN messages with the `mpc555rt_candb.mdl` model (running either in Simulink simulation or on hardware).

Accelerator Mode

Simulink Accelerator mode is now fully supported. Previous restrictions on models that contain CAN blocks and QADC blocks from the Embedded Target for Motorola MPC555 libraries have been removed.

Improved Compiler Support for CCP

The CAN Calibration Protocol (CCP) block is now compatible with any MEX compiler that you may choose (use the `mex -setup` command to choose your default MEX compiler). Stateflow will use the default MEX compiler at Simulation time to process the Stateflow charts that implement the CCP block. This block has been tested with LCC and MSVC 6.0.

Streamlined SingleStep Configuration

There is no longer any need for shortcuts to SingleStep. Setup is now considerably simpler. You can remove any existing shortcuts to SingleStep.

CANdb Limitation Lifted

You no longer need to place your DBASE (.dbf) files in your working directory. You can use the CAN Message Packing (CANdb) block mask to browse to DBASE files in any directory.

Limitations and Warnings

CodeWarrior Version 6.5

The Embedded Target for Motorola MPC555 1.1 supports version 6.5 of CodeWarrior only, not version 6.0 and 6.5 as described in the User's Guide.

Windows 98 Not Supported

The Embedded Target for Motorola MPC555 1.1 is not supported on Microsoft Windows 98 platforms.

Driver Blocks in PIL and AE Mode

Note that the PIL and AE targets are not intended to support code generation from device driver blocks from the Embedded Target for Motorola MPC555 block libraries. Processor-in-the-Loop (PIL) and Algorithm Export (AE) are not intended to function in this way. If your model includes any such blocks, they will not function.

Device driver blocks do not behave in the way they do in Real Time mode. You can use them in pass-through mode during simulation or cosimulation only. If pass-through is disabled on the blocks, then no code will be generated for them. If you enable pass-through on these blocks, code will be generated for the pass-through inputs/outputs. In PIL mode the state of the input/output pins will not be driven by the model. For Algorithm Export, do not include device driver blocks in your model.

CAN Blocks and CAN Download Control Panel

The blocks in the CAN Drivers (Vector) blockset, and the candownload utility, require correct installation of a CAN card and drivers from Vector-Informatik. See "CAN Hardware and Drivers" in the Toolchains and Hardware Appendix for information about configuring supported CAN cards and drivers.

Please note that previously known problems with the older drivers have been removed, so you should make sure you update your drivers to the latest versions.

The TouCAN Interrupt Generator block does not work with Processor-in-the-Loop (PIL) builds.

DSP Block Limitation

When using DSP blocks in your Embedded Target for Motorola MPC555 model you may experience the problems below.

- When using the WindRiver Diab compiler, many of the C files in the DSP library may fail to compile (depending on the version of your compiler). An example error message is below.

```
"d:\r13\toolbox\rtw\dspblks\c\dspburg/bug_a_c_rt.c", line 55:  
error (dcc:1552): initializer type  creal32_T  incompatible with  
object type  float
```

It is possible to modify these files so that they compile with the WindRiver Diab compiler (remove the “const” keyword from the lines causing failures). If you are using the Metrowerks CodeWarrior compiler these files should compile without any problem.

- The compilation process fails providing no error message. This error is related to the large number of files (the DSP library) being compiled. The workaround is to repeat the build of the model – the DSP library objects created during the first build will still be present, and should not be re-made since the two builds are identical. This means that during the second build, gmake will have to compile fewer files (just the remaining DSP library files), which leads to a successful build.

MPC555 Resource Configuration Block and Model Callbacks

When the MPC555 Resource Configuration block (see “MPC555 Resource Configuration” in the Embedded Target for Motorola MPC555 User’s Guide), is placed into a model, it modifies the `preloadfcn` callback of the model. If you wish to add a command to the `preloadfcn` callback of a model that already has an MPC555 Resource Configuration block, do not remove the commands that are already installed.

Instead, copy the installed `preloadfcn` callback and append your commands. Then set the `preloadfcn` to the merged command. If you corrupt the `preloadfcn`, you can retrieve the command from any model that has an MPC555 Resource Configuration block, as the `preloadfcn` will be the same for all models. You can retrieve the `preloadfcn` with the following command:

```
plf = get_param(bdroot,'preloadfcn')
```

Documentation For Downloading Boot Code Via CAN

To download boot code via CAN you must select Flash Application Code in the **Download Type** drop-down menu of the **Download Control Panel**. This option is incorrectly named Flash Boot Code in step 2 of the instructions for “Downloading Boot Code Via CAN”, in Chapter 3 of the documentation, “Generating Stand-Alone Real-Time Applications”.

Harmless Simulink Warnings

Warnings similar to the following may appear when some of the Embedded Target for Motorola MPC555 demos are opened. You can ignore these warnings; the demo models will operate correctly.

```
Warning: Loading model 'mpc555pil_fuelsys' generated with a newer  
version(4.10) of Simulink.  
Loaded Stateflow module Version 4.1 (R12.1) dated May 21 2001,  
01:15:03
```