Embedded Target for Motorola® MPC555 Release Notes

The "Embedded Target for Motorola MPC555 2.0.2 Release Notes" on page 1-1 describe the changes introduced in the latest version of the Embedded Target for Motorola MPC555. The following topics are discussed in these Release Notes:

- "New Features" on page 1-2
- "Major Bug Fixes" on page 1-3
- "Upgrading From An Earlier Release" on page 1-4
- "Known Software and Documentation Problems" on page 1-5

The Embedded Target for Motorola MPC555 Release Notes also provide information about recent versions of the product, in case you are upgrading from an earlier version.

- "Embedded Target for Motorola MPC555 2.0.1 Release Notes" on page 2-1
- "Embedded Target for Motorola MPC555 2.0 Release Notes" on page 3-1.
- "Embedded Target for Motorola MPC555 1.1 Release Notes" on page 4-1

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

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Embedded Target for Motorola MPC555 2.0.2 Release Notes

New Features

This section introduces the new features and enhancements added in the Embedded Target for Motorola MPC555 2.0.2.

Support for Latest Toolchains

Version 2.0.2 of the Embedded Target for Motorola MPC555 supports these toolchain versions:

- Wind River Systems, Wind River Compiler, version 5.2.1 (formerly known as Diab), and Wind River Systems SingleStep debugger of the following versions:
  - Version 7.7.3 (debug via Wind River visionPROBE) (for MPC5xx)
  - Version 7.6.2 (debug via Macraigor Systems Wiggler, Raven / Blackbird, On-board BDM) (for MPC555 only)
- Metrowerks CodeWarrior for Embedded PowerPC version 8.1 - EPPC_5XX

The full feature set (PIL, RT, and AE targets) is supported for both toolchains.

Switch Target Configuration Block

This new block runs a convenience function that configures your model and Target Preferences to one of a set of pre-defined hardware configurations. The function can also be used as a template for setting up your own customized configurations.

Major Bug Fixes

The Embedded Target for Motorola MPC555 2.0.2 includes several bug fixes made since Version 2.0.1. You can see a list of major V ersion 2.0.2 bug fixes on the MathWorks Web site.

If you are viewing these release notes in PDF form on the MathWorks Web site, please refer to the HTML form of the release notes on the MathWorks Web site and use the link provided.

If you are upgrading from a version earlier than Version 2.0.1, you should also see Version 2.0.1 "Major Bug Fixes" on page 2-3.

Upgrading From An Earlier Release

New Boot Code

You must install the latest version of the boot code. If you do not have the latest boot code version installed on your MPC555 processor then interrupts will not be handled correctly causing real-time standalone applications to fail at run-time.

If you try to use the Download Control Panel to download an application to a target running an out-of-date boot code, you will see a boot code mismatch error message. This message instructs you to use the boot code installation **Start** menu option to install new boot code. Alternatively a download via BDM will appear to succeed but the application will fail at run-time.

Use the **Start** menu boot code installer and follow the instructions in the dialog.

To upgrade from Version 1.0.1 (Release 13) or earlier boot code you are instructed to use the alternative install method via CAN. The following instructions describe the steps required if you have Release 13 or Release 12.1 boot code currently running on the target, and you do not have a BDM.

Upgrading from Release 13 or Release 12.1

If you have a BDM available you can download the new boot code over CAN or serial. Use the **Start** menu boot code installer.

If you have CAN but no BDM you cannot use the **Start** menu option to use the Download Control Panel. Instead you can use the upgrade model, can_bootcode_upgrade.

1 Enter can_bootcode_upgrade at the MATLAB command line.

2 Double-click the Download Protection block to unlock the model. It turns green.

3 Click Run in the toolbar.

There is no longer any need to change parameters in the model to avoid a block error. This was necessary for Release 14.

The model should run successfully to download new bootcode.

Known Software and Documentation Problems

The MathWorks Web site includes a list of known software and documentation problems in Version 2.0.2.

If you are viewing these release notes in PDF form on the MathWorks Web site, please refer to the HTML form of the release notes on the MathWorks Web site and use the link provided.

Embedded Target for Motorola MPC555 2.0.1 Release Notes

New Features

This section introduces the new features and enhancements added in the Embedded Target for Motorola MPC555 2.0.1

Real-Time Target Support for Model Reference

Model reference is now supported by the Real-Time (RT) target. Processor in the Loop (PIL) co-simulation and Algorithm Export (AE) do not yet support the use of model reference.

Download Control Panel Support for Vector Application Channels

The Download Control Panel is now integrated with the Vector CAN Driver Configuration Tool, and uses the Application Channel mechanism used by the Vector CAN Blocks. This means the Download Control Panel now provides support for all CAN devices supported by the Vector CAN Driver Library. Please see the documentation for details of how to use the Download Control Panel with Vector Application Channels. Note that we support the CAN Driver Library, and not the XL Driver Library; however, certain XL boards are supported for CAN (only) by the CAN Driver Library - see Vector Informatik for further details.

QADCE Support for more MPC56x Processors

There is now support for Enhanced Queued Analog-To-Digital Converter Module-64 (QADCE) for the processors MPC561, MPC562, MPC563, and MPC564, in addition to the existing support for MPC565 and MPC566. There is continued QADC support for the MPC555.

Technical Solution Support For External (Off-Chip) Flash Memory

A Solution note giving details on the configuration steps required to target External Flash memory has been published on The MathWorks web site. See this URL:

http://www.mathworks.com/support/solutions/data/1-O8EW4.html?solution=1-O8EW4

Major Bug Fixes

The Embedded Target for Motorola MPC555 2.0.1 includes several bug fixes made since Version 2.0. This section describes the particularly important Version 2.0.1 bug fixes.

If you are viewing these Release Notes in PDF form, please refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site and use the link provided.

If you are upgrading from a version earlier than Version 2.0, you should also see Version 2.0 "Major Bug Fixes" on page 3-6.

Embedded Target for Motorola MPC555 2.0 Release Notes

New Features

This section introduces the new features and enhancements added in the Embedded Target for Motorola MPC555 2.0.

Serial Download

You can now download applications to a suitably prepared MPC5xx board via a serial cable, even if you have no BDM or CAN connection to the target.

Support for MPC5xx

There is now support for more processor variants:

- MPC555
- MPC561 (no Flash features)
- MPC562 (no Flash features)
- MPC563
- MPC564
- MPC565
- MPC566

You can easily switch processors using the Target Preferences settings, and Model Resource Configuration settings.

There is new support for some additional capabilities of some processor variants, as follows.

Additional capabilities of MPC565 & 566:

- 3rd TouCAN module
- 3rd TPU module
- MIOS14 support providing 4 more PWM channels
- QADC Enhanced support - different module with different features to MPC555 version

Additional capabilities of MPC561, 562, 563 and 564:

- 3rd TouCAN module
- MIOS14 support providing 4 more PWM channels

QADC is not currently supported, but is planned on being supported in the future.

CAN Driver Enhancements

A number of enhancements have been incorporated into the TouCAN Transmit and TouCAN Receive blocks. These enhancements include the ability to select different modes of operation depending on the requirements for each message. The benefits include higher utilization of the available CAN bandwidth and reduced loading on the MPC555 microcontroller.

The default mode for transmission of CAN messages now uses 3 hardware buffers in conjunction with an interrupt driven priority queue; this mode of operation guarantees that messages will be transmitted in order of priority, with no inter-message delay.

A dedicated buffer transmission mode allows messages to be transmitted with no interrupt servicing overhead.

A FIFO buffer transmission mode, with very fast interrupt servicing is well suited for data acquisition purposes.

For receipt of CAN messages, an additional mode has been added that uses a FIFO buffer. This mode of operation is suitable if a number of messages with different CAN identifiers should be received via a single hardware buffer. This allows more efficient use of the limited number of hardware buffers on the MPC555 TouCAN module.

Task Execution Profiling

This is a new feature that allows execution profiling data to be recorded, uploaded and displayed in the form of a MATLAB graphic and as an HTML report. Execution profiling data can be collected over serial or CAN. See the demo model `mpc555rt_multitasking`.

Temporary Task Overruns Now Permitted by the Scheduler

It is now possible for task overruns in the base rate or one of the sub- rates to occur without causing a failure. The benefit is that if it occasionally takes longer than the normally allowed time to complete a task, this is now possible without having to increase the sample time. The overrun behavior is

configurable and is illustrated by the new demo model
`mpc555rt_multitasking`.

Program Prepare Downloads at Application Specific Bit Rates

Program prepare downloads now work with an application running CAN at
any of the bit rates supported by the Embedded Target Download tool. Also, the
application may be running at a non-default (20MHz) frequency - in this case,
you will see a warning if the chosen bit rate is not suitable for program prepare
downloading. This will occur if the boot code, running at 20MHz, cannot
achieve the CAN bit rate used by the application.

Support for Latest Toolchains

The Embedded Target for Motorola MPC555 now supports these
cross-development tools:

- Wind River Systems Diab cross-compiler (version 5.1.2), and Wind River
  Systems SingleStep debugger of the following versions:
  - Version 7.7.3 (debug via Wind River Vision Probe) (for MPC5xx)
  - Version 7.6.2 (debug via Macraigor Systems Wiggler, Raven / Blackbird,
    On-board BDM) (for MPC555 only)
- Metrowerks CodeWarrior for Embedded PowerPC (version 8.0 - EPPC_5XX)

Improved Resource Checking

There are enhancements to resource configuration to help you avoid device
driver conflicts — for example, if you choose the same PWM channel for two
different blocks you will be warned.

Replacement for the Pass Through Mechanism

There is a new demo which illustrates current best practices in deploying a
single algorithm for multiple execution applications including simulation, PIL
testing, and production deployment. See the demo model
`mpc555_fuelsys_project` for the new approach.

Previously, a pass through mechanism was used. This new approach reduces
code overhead and can be easily applied to any target. In general, it is not

advised to use the old pass through. In a future release the pass through feature will be completely removed. The old pass through mechanism still works but will generate a warning because it is being deprecated.

Stateflow No Longer Required

Stateflow and Stateflow Coder are no longer required products, although they are recommended. This was a previous requirement for use of the CAN Calibration Protocol block.

CANdb DBC File Support

You can now use CANdb DBC and DBF files to specify the packing and unpacking of CANdb messages.

Major Bug Fixes

The Embedded Target for Motorola MPC555 includes several bug fixes made since Version 1.1. This section describes these bug fixes.

Corrrect Number of Bytes Received by Serial Receive Block

When using Serial Receive block in previous versions, it was possible in some cases for extra data to be received. This problem was caused by the driver code calculating an incorrect value for the number of bytes in the receive buffer.

This problem is fixed in Release 14.

Upgrading From An Earlier Release

New Boot Code

You must install the latest version of the boot code. If you do not have the latest boot code version installed on your MPC555 processor then interrupts will not be handled correctly causing real-time standalone applications to fail at run-time.

If you try to use the Download Control Panel to download an application to a target running an out-of-date boot code, you will see a boot code mismatch error message. This message instructs you to use the boot code installation **Start** menu option to install new boot code. A download via BDM will appear to succeed but the application will fail at run-time.

If you have no bootcode or R13SP1 bootcode you can use the **Start** menu boot code installer.

The following instructions describe the steps required if you have Release 13 or Release 12.1 boot code currently running on the target, and you do not have a BDM.

Upgrading from Release 13 or Release 12.1

If you have a BDM available you can download the new boot code over CAN or serial. Use the **Start** menu boot code installer.

If you have CAN but no BDM you cannot use the **Start** menu option to use the Download Control Panel. Instead you can use the upgrade model, `can_bootcode_upgrade`.

1 Enter `can_bootcode_upgrade` at the MATLAB command line.

2 Double-click the Download Protection block to unlock the model. It turns green.

3 Click Run in the toolbar.

   You will see a dialog with details of a block error. Here is a workaround:

4 In the `can_bootcode_upgrade/CAN Download/RX_CRM` model window, double-click to open the Function-Call Subsystem, highlighted in yellow.

5 Double-click to open the yellow Function block.

6 In the block dialog, change the **States when enabling** parameter from reset to held, and click **OK**.

You should now be able to run the model successfully to download new bootcode.

Pass Through Mechanism Removed from TouCAN Receive Block

This feature was removed because of the inefficiency of the generated code, even when the pass through feature was disabled. In general, you should not use the pass through feature on any of the driver blocks and in a future release the pass through feature is planned to be completely removed (see "Replacement for the Pass Through Mechanism" on page 3-4.).

If the pass through feature of the TouCAN Receive block has been used in a model then an error indicating disconnected lines will occur in the proximity of the CAN Receive block. This error will occur during model compilation.

Oscillator Frequency Defaults to 20MHz

The oscillator frequency setting in the System Clocks Resource Configuration panel is now a drop-down box allowing the choice between 20 and 4 MHz. This setting used to be a numeric field - you could enter either 20e6 or 4e6.

Pre-R14 models will default to the 20 Mhz setting, regardless of any numerical setting that was specified in an old version.

A warning will be generated to tell you if there is a mismatch between the oscillator frequency setting in the model and that in the target preferences.

ASAP2.Signal and ASAP2.Param Replaced

The product now uses the Simulink.Signal, Simulink.Param, and canlib.Signal (now derived from Simulink.Signal instead of ASAP2.Signal) for ASAP2 / CCP.

Embedded Target for Motorola MPC555 1.1 Release Notes

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).

Note The Embedded Target for Motorola MPC555 Version 1.1 will be released as part of MathwWorks 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.

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.