

# **Embedded Target for Motorola<sup>®</sup> MPC555 Release Notes**

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## Summary by Version

This table provides quick access to what's new in each version. For clarification, see About Release Notes, below.

<b>Version (Release)</b>	<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
<b>Latest Version V2.0.4 (R2006a)</b>	Yes Details	Yes Summary	Bug Reports at Web site	Printable Release Notes: PDF  V2.0.4 product documentation
Version 2.0.3 (R14SP3)	No	Yes Summary	Bug Reports at Web site	No
Version 2.0.2 (R14SP2)	Yes Details	Yes Summary	Fixed bugs	No
Version 2.0.1 (R14SP1)	Yes Details	Yes Summary	Fixed bugs	No
Version 2.0 (R14)	Yes Details	Yes Summary	Fixed bugs	No
Version 1.1(R13SP2)	Yes Details	Yes Summary	No bug fixes	V1.1 product documentation

### About Release Notes

Use release notes when upgrading to a newer version to learn about new features and changes, and the potential impact on your existing files and practices. Release notes are also beneficial if you use or support multiple versions.

If you are not upgrading from the most recent previous version, review release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the New Features and Changes, Version Compatibility Considerations, and Bug Reports for V1.1 and V1.2.

## **New Features and Changes**

These include

- New functionality
- Changes to existing functionality
- Changes to system requirements (complete system requirements for the current version are at the MathWorks Web site)
- Any version compatibility considerations associated with each new feature or change

## **Version Compatibility Considerations**

When a new feature or change introduces a known incompatibility with the previous version, its description includes a **Compatibility Considerations** subsection that details the impact. For a list of all new features and changes that have compatibility impact, see the Compatibility Summary for Embedded Target for Motorola MPC555.

Compatibility issues that become known after the product has been released are added to Bug Reports at the MathWorks Web site. Because bug fixes can sometimes result in incompatibilities, also review fixed bugs in Bug Reports for any compatibility impact.

## **Fixed Bugs and Known Problems**

MathWorks Bug Reports is a user-searchable database of known problems, workarounds, and fixes. The MathWorks updates the Bug Reports database as new problems and resolutions become known, so check it as needed for the latest information.

Access Bug Reports at the MathWorks Web site using your MathWorks Account. If you are not logged in to your MathWorks Account when you link to Bug Reports, you are prompted to log in or create an account. You then can view bug fixes and known problems for R14SP2 and more recent releases.

The Bug Reports database was introduced for R14SP2 and does not include information for prior releases. You can access a list of bug fixes made in prior versions via the links in the summary table.

### **Related Documentation at Web Site**

**Printable Release Notes (PDF).** You can print release notes from the PDF version, located at the MathWorks Web site. The PDF version does not support links to other documents or to the Web site, such as to Bug Reports. Use the browser-based version of release notes for access to all information.

**Product Documentation.** At the MathWorks Web site, you can access complete product documentation for the current version and some previous versions, as noted in the summary table.

## Version 2.0.4 (R2006a) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 2.0.4 (R142006a):

<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	Bug Reports at Web site	Printable Release Notes: PDF  V2.0.4 product documentation

New features and changes introduced in this version are described here.

### TPU Emulation Mode

TPU emulation mode allows you to download functions to DPTRAM that are not part of the standard ROM mask of TPU functions. A new demo with two simple blocks are provided to illustrate the process.

### New Boot Code

You must install the latest version of the boot code.

### Compatibility Considerations

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.

## Version 2.0.3 (R14SP3) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 2.0.3 (R14SP3):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	Bug Reports at Web site	No

New features and changes introduced in this version are described here.

### New Boot Code

You must install the latest version of the boot code.

#### Compatibility Considerations

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.



## Version 2.0.2 (R14SP2) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 2.0.2 (R14SP2):

<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	Fixed bugs	No

New features and changes introduced in this version are described here.

### 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.

## New Boot Code

You must install the latest version of the boot code.

### Compatibility Considerations

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.

## Version 2.0.1 (R14SP1) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 2.0.1 (R14SP1):

<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	Fixed bugs	No

New features and changes introduced in this version are described here.

### 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>

## **New Boot Code**

You must install the latest version of the boot code.

## **Compatibility Considerations**

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.

## Version 2.0 (R14) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 2.0 (R14):

<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	Fixed bugs	No

New features and changes introduced in this version are

- Serial Download
- Support for MPC5xx
- CAN Driver Enhancements
- Task Execution Profiling
- Temporary Task Overruns Now Permitted by the Scheduler
- Program Prepare Downloads at Application Specific Bit Rates
- Support for Latest Toolchains
- Improved Resource Checking
- Replacement for the Pass Through Mechanism
- Stateflow No Longer Required
- CANdb DBC File Support

### 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 support is planned 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.

## **Fixed Bugs**

### **Correct 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.

## **New Boot Code**

You must install the latest version of the boot code.

## **Compatibility Considerations**

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.

## Version 1.1 (R13SP2) Embedded Target for Motorola MPC555

This table summarizes what's new in Version 1.1 (R13SP2):

<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> within descriptions of new features and changes, below. See also Summary.	No bug fixes	V1.1 product documentation

New features and changes introduced in this version are

- Full CodeWarrior Support
- Time Processor Unit (TPU3) Support
- Serial I/O Support
- Automatic Boot Code Loading
- Target Preferences Dialog
- Automatic ASAP2 Generation
- More CAN Message IDs in Vector CAN Receive
- Automatic ODBC Data Source Configuration
- New Test Program
- Two New Demos
- Improved Compiler Support for CCP
- Streamlined SingleStep Configuration
- CANdb Limitation Lifted
- Upgrade Existing Boot Code via CAN or BDM

## **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.

## **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.

## Upgrade Existing Boot Code via CAN or BDM

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.

## Compatibility Considerations

You must download the new bootcode provided with the latest release. 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.

## Compatibility Summary for Embedded Target for Motorola MPC555

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided with the description of the new feature or change.

<b>Version (Release)</b>	<b>New Features and Changes with Version Compatibility Impact</b>
<b>Latest Version V2.0.4 (R2006a)</b>	See the <b>Compatibility Considerations</b> subheading for this new feature or change: New Boot Code
Version 2.0.3 (R14SP3)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: New Boot Code
Version 2.0.2 (R14SP2)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: New Boot Code
Version 2.0.1 (R14SP1)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: New Boot Code
Version 2.0 (R14)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: New Boot Code
Version 1.1(R13SP2)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: Upgrade Existing Boot Code via CAN or BDM

