

**dSPACE Release**

# **New Features and Migration**

**Release 4.0 – August 2003**



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## Software Updates and Patches

dSPACE strongly recommends that you download and install the most recent patches for your current dSPACE installation. Visit <http://www.dspace.de/goto?support> for software updates and patches.

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# About This Document

This document provides you with a brief overview of the major new features of dSPACE Release 4.0 since dSPACE Release 3.5.

## **About dSPACE Releases**

For information on how dSPACE software products are released, refer to *About dSPACE Releases* on page 7.

## **New features and enhancements**

For a description of the key features, and a summary of the major enhancements made since dSPACE Release 3.5, refer to *Key Features of dSPACE Release 4.0* on page 9.

## **Migration**

In addition, this document provides you with information on the changes you may have to perform when you migrate from previous releases to dSPACE Release 4.0. Refer to *Migrating to dSPACE Release 4.0* on page 19.

### Legend

The following symbols are used in this document.



Warnings provide indispensable information to avoid severe damage to your system and/or your work.



Notes provide important information that should be kept in mind.



Tips show alternative and/or easier work methods.



Examples illustrate work methods and basic concepts, or provide ready-to-use templates.

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# About dSPACE Releases

dSPACE products that form a seamlessly integrated tool chain and require the same set of third-party products are assembled in a dSPACE Release.

## **dSPACE Release number**

A dSPACE Release number consists of two digits to identify major and minor releases (major.minor, for example, dSPACE Release 4.0).

For patches, a patch number is appended to the dSPACE Release number (major.minor patch, for example, dSPACE Release 3.4p1). Patches are free of charge and can be downloaded from the dSPACE Web site.

## **Product Releases**

Product Releases provide new products or new features for the current dSPACE Release.

### **MATLAB Compatibility Updates**

MATLAB Compatibility Updates ensure that a dSPACE Release operates with a new MATLAB version until the availability of the next dSPACE Release (for example, MATLAB R13 Compatibility Update for dSPACE Release 3.4). They generally do not support new features of a new MATLAB version.

MATLAB Compatibility Updates are free of charge and can be downloaded from the dSPACE Web site.

### **Dependencies on third-party products**

A compatibility matrix provided in the `CompList.txt` file (see the root directory of the dSPACE CD) describes the dependencies of a dSPACE Release on the products of other vendors (MATLAB, compilers, Windows, etc.).

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# Key Features of dSPACE Release 4.0

dSPACE Release 4.0 comes with the following key features:

- The software of dSPACE Release 4.0 offers full compatibility with MATLAB from The MathWorks in the following releases:
  - MATLAB® Release 13.0.1 or
  - MATLAB Release 13 with the additional updates Simulink® 5.0.2 and Real-Time Workshop® 5.0.1 (this requires also updating the MATLAB product itself, see *General Implementation Features, Enhancements and Changes* on page 12).

It does not support MATLAB R12.1 or earlier.

- The software of dSPACE Release 4.0 supports Windows 98, Windows Me, Windows NT 4.0, Windows 2000, and Windows XP.
- Starting with dSPACE Release 4.0, the software support for the following platforms was dropped:
  - DS1102 DSP Controller Boards

- DS1003 DSP Boards
- DS1004 Alpha Boards

### Implementation: key feature summary

The new key features concerning the implementation software are:

- The new RTI FlexRay Blockset provides access to the FlexRay communications protocol for easy configuration of time-triggered bus communication and task execution.
- MicroAutoBox can be connected to a LIN and a FlexRay bus.
- Real-Time Interface provides new blocks for implementation of time-triggered tasks and timetables.

For details on the key features and a list of more new features of dSPACE Release 4.0, refer to *New Implementation Features* on page 12.

### Experiment and test: key feature summary

The new key features of the experiment and test software are:

- AutomationDesk is a new tool that facilitates automated, model-based testing in every development phase. Its major features include the graphical Sequence Builder for describing tests and the Project Manager for managing large test projects. AutomationDesk also provides a function library, which you can easily extend and adapt to your requirements.



AutomationDesk replaces ControlDesk Test Automation. Existing test automation scripts can continue to be used. To facilitate script maintenance, the ControlDesk Test Automation documents are installed with the AutomationDesk installation. For further information, refer to *How to Migrate from dSPACE Release 3.5* on page 20.

- ControlDesk has a graphical user interface to control the Failure Insertion Units in hardware-in-the-loop simulators.
- ControlDesk supports sound generation. The new SoundController instrument can generate various sounds, for example, engine sound or screeching tires. The MultiStateLED instrument can output sounds when displayed LEDs change their state.
- MotionDesk can generate high-quality video files from its motion data to replay an animation on PCs without MotionDesk.

- MotionDesk can simulate different visual fog and light situations in 3-D visualization, for example, sunny, foggy, sunset.

For details on the key features and a list of more new features of the experiment and test software, refer to *New Experiment and Test Features* on page 16.

# New Implementation Features

dSPACE Release 4.0 comes with several new implementation features, enhancements and changes that apply to all dSPACE boards, see below.

In addition, there are changes that apply to specific dSPACE boards and blocksets:

- *New Implementation Features for MicroAutoBox* on page 13
- *New Implementation Features for Modular Hardware* on page 14
- *New Implementation Features for the RTI LIN Blockset* on page 14
- *New Implementation Features for the RTI CAN Blockset* on page 14
- *New RTI FlexRay Blockset* on page 15

## General Implementation Features, Enhancements and Changes

RTLib, RTI and RTI-MP of dSPACE Release 4.0 provide the following hardware-independent new features and enhancements. Unless stated otherwise, these features can be implemented on all dSPACE systems.

### Compatibility to MATLAB

- The software of dSPACE Release 4.0 offers full compatibility with MATLAB from The MathWorks in the following releases:
  - MATLAB® Release 13.0.1 or
  - MATLAB Release 13 with the additional updates Simulink® 5.0.2 and Real-Time Workshop® 5.0.1.

It does not support MATLAB R12.1 or earlier.



If you update an existing MATLAB Release 13 installation with the Simulink 5.0.2 and Real-Time Workshop 5.0.1 updates (Web download), take care to also update the MATLAB product itself. Otherwise your installation will run MATLAB, Simulink and Real-Time Workshop as a mix of Release 13 and Release 13.0.1 products, which is known to lead to various problems. It is important that MATLAB, Simulink and Real-Time Workshop all come from the same release. You can verify this by inspecting the (Rxx) version numbers output by the MATLAB `ver` command.

### Time-triggered tasks and timetables

RTI now supports time-triggered tasks and timetables. These allow you to implement tasks and groups of tasks with variable or predefined delay times in relation to an associated trigger event. This makes task handling in your model very flexible. One possible application is to sample combustion engine sensor signal inputs with a computed time shift after ignition. Refer to *Basics of Time-Triggered Tasks and Timetables* in the *RTI and RTI-MP Implementation Guide*.

### Subsystem read/write permissions support

The new **Apply subsystem read/write permissions** option lets you apply Simulink's `ReadOnly` and `NoReadOrWrite` permissions for subsystems to the TRC file. As a result, all the block parameters of `ReadOnly` subsystems are read-only in ControlDesk, and the content of `NoReadOrWrite` subsystems is hidden in ControlDesk. Refer to *How to Apply Subsystem Permissions to the TRC File* in the *RTI and RTI-MP Implementation Guide*.

## New Implementation Features for MicroAutoBox

dSPACE Release 4.0 provides the following new implementation features and enhancements for the new MicroAutoBox variants:

### LIN support

All new MicroAutoBox variants (with DS1501-09 or DS1504-03 I/O-board version) can be connected to a LIN bus using the RTI LIN Blockset. Refer to *New Implementation Features for the RTI LIN Blockset* on page 14.

### FlexRay support

MicroAutoBox 1401/1505/1506 can be connected to a FlexRay bus using the RTI FlexRay Blockset. Refer to *New RTI FlexRay Blockset* on page 15.

- IP module support** MicroAutoBox 1401/1505/1506 allows connection of standard IP modules. Access is granted via RTLib functions.
- CAN support** All MicroAutoBox variants are supported which are equipped with a new CAN microcontroller supporting two clockrates, 24 and 36 MHz. Refer to *New Implementation Features for the RTI CAN Blockset* on page 14.
- SPI support** The RTLib for MicroAutoBox supports connecting devices via a serial peripheral interface.

### **New Implementation Features for Modular Hardware**

dSPACE Release 4.0 provides the following new implementation features and enhancements for modular hardware:

- FlexRay support** A modular system can be connected to a FlexRay bus. Refer to *New RTI FlexRay Blockset* on page 15.

### **New Implementation Features for the RTI LIN Blockset**

dSPACE Release 4.0 provides the following new implementation features and enhancements for the RTI LIN Blockset:

- MicroAutoBox support** The RTI LIN blockset supports the connection of MicroAutoBox to a LIN bus in master or slave mode.

### **New Implementation Features for the RTI CAN Blockset**

dSPACE Release 4.0 provides the following new implementation features and enhancements for the RTI CAN Blockset:

- MicroAutoBox support** The RTI CAN Blockset of MicroAutoBox supports MicroAutoBox revisions equipped with the new CAN microcontroller with two selectable clockrates (24 and 36 MHz) and previous MicroAutoBox revisions. Refer to *Selecting the Slave MC Frequency* in the *MicroAutoBox Features*.

### New RTI FlexRay Blockset

dSPACE Release 4.0 provides the RTI FlexRay Blockset with the following implementation features:

- Access to a FlexRay communication system for Rapid Control Prototyping
- Interaction with DECOMSYS communication planning tools for access to network configuration and message scheduling data
- Simulink blocks for specification of time-triggered tasks and mapping of tasks to RCP nodes
- Code generation of application tasks for FlexRay systems
- Integration of code generated by DECOMSYS tools for communication tasks and controller configuration
- Time-triggered execution of tasks following basic principles of the OSEKtime standard
- Synchronization of the local time base of the RCP node with the global time of the FlexRay communication system
- Support for several dSPACE RCP nodes within one FlexRay network with internode synchronization for task execution
- Support for different simulation and task execution scenarios

### Supported hardware

The RTI FlexRay Blockset supports the following dSPACE hardware:

- DS1005 Processor Board with a DS4501 containing a FlexRay IP module
- MicroAutoBox 1401/1505/1506

# New Experiment and Test Features

On dSPACE Release 4.0, many new features and enhancements have been implemented for dSPACE's experiment and test software. See:

- *New Product AutomationDesk* on page 16
- *New Features for ControlDesk* on page 17
- *New Features for MotionDesk* on page 17

## New Product AutomationDesk

The new product AutomationDesk on dSPACE Release 4.0 comes with the following features:

- Project management to keep automation sequences, data and results clearly arranged
- Graphical development of automation sequences using standard automation blocks or custom automation blocks
- AutomationDesk library containing automation elements for typical, reusable automation tasks:
  - Main Library  
including elements for control flows, standard automation functions and data objects
  - Platform Access  
including elements for accessing dSPACE simulation platforms
  - ControlDesk Access  
including elements for accessing ControlDesk
  - Failure Simulation Access  
including elements for accessing Failure Insertion Units
  - RS232  
including elements for connection to the serial interface of the host PC
  - Remote Calibration  
including elements for accessing measurement and calibration systems based on the ASAP3 standard

- DTS6
  - including elements for accessing the diagnosis line of an ECU
- Custom library, which you can easily extend and adapt to your requirements
- Seamless integration into the dSPACE tool chain

### New Features for ControlDesk

ControlDesk on dSPACE Release 4.0 comes with the following new features and enhancements:

- The Failure Simulation Component to control failure insertion units in a dSPACE Simulator. Refer to *Failure Simulation* in the *ControlDesk Experiment Guide*.
- The SoundController instrument can generate various sounds (for example, engine sound) in relation to measured signals to make your experiment more realistic. Your host PC must be equipped with a sound card which supports sound fonts.
- The MultiStateLED instrument with sound related to the displayed LED state via a standard sound card of the host PC.
- The Template instrument has been renamed PlotterArray instrument. The functionality remains the same.

### New Features for MotionDesk

MotionDesk on dSPACE Release 4.0 comes with the following new features and enhancements:

#### AVI file generation

To present an animation on a PC without MotionDesk, you can generate high-quality video files from MotionDesk's motion data. The video files are created offline with high resolution and smooth animation. Refer to *Generating a Video of an Animation* in the *MotionDesk 3-D Visualization Guide*.

#### Atmospherics settings

To get a more realistic view, atmospherics can be set in MotionDesk. You can select a predefined atmospheric setting, for example, sunset, sunny or foggy, or you can define your own atmospheric settings. Refer to *Atmospheric Settings* in the *MotionDesk 3-D Visualization Guide*.

## Key Features of dSPACE Release 4.0

### **Ethernet connection to real-time system**

Now the MotionDesk PC can be connected to a real-time system in an expansion box via an Ethernet connection.

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# Migrating to dSPACE Release 4.0

After you install dSPACE Release 4.0, it may be necessary to carry out additional steps.

## **Migrating from dSPACE Release 3.5**

To migrate from dSPACE Release 3.5 to dSPACE Release 4.0, see *How to Migrate from dSPACE Release 3.5* on page 20.

## **Migrating from dSPACE Release 3.4 or Earlier**

To migrate from dSPACE Release 3.4 or earlier to dSPACE Release 4.0, see *How to Migrate from dSPACE Release 3.4 or Earlier* on page 21.

## How to Migrate from dSPACE Release 3.5

Note the following points when migrating from dSPACE Release 3.5 to dSPACE Release 4.0:

### **Migrating Test Automation**

If you want to use your Python scripts developed for Test Automation, you have to install AutomationDesk. The test automation scripts run with the built-in ControlDesk interpreter and also with external Python interpreters.

## How to Migrate from dSPACE Release 3.4 or Earlier

To migrate from dSPACE Release 3.4 or earlier to dSPACE Release 4.0, you have to migrate step by step via the intervening dSPACE Releases.



For example, if you want to migrate from dSPACE Release 3.3 to dSPACE Release 4.0, you have to follow the migration steps given in

1. New Features and Migration of dSPACE Release 3.4
2. New Features and Migration of dSPACE Release 3.5
3. Finally, the migration steps given in *How to Migrate from dSPACE Release 3.5* on page 20.



You can find the PDF files of the New Features and Migration documents for previous releases in the \Doc\Print folder on the dSPACE CD or download them from <http://www.dspace.de/goto?migration>.

The PDF files are named `NewFeaturesAndMigrationxx.pdf`, where `xx` stands for the version or release number.

