Aerospace Blockset Release Notes

The "Aerospace Blockset 1.5 Release Notes" on page 1-1 describe the changes introduced in the latest version of the Aerospace Blockset. The following topics are discussed in these Release Notes:

- "New Features" on page 1-2
- "Known Software and Documentation Problems" on page 1-4

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

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Aerospace Blockset 1.5 Release Notes

New Features

> **Note** The Aerospace Blockset 1.5 is a version of the Aerospace Blockset that was made available after Release 13. It updates Version 1.0.1, which was distributed via Web download after Release 13.

New Aerospace Blocks

The following table contains the new Simulink blocks introduced in Aerospace Blockset 1.5:

Simple Variable Mass 3DoF (Body Axes)

Custom Variable Mass 3DoF (Body Axes)

Simple Variable Mass 6DoF (Euler Angles)

Simple Variable Mass 6DoF (Quaternion)

Custom Variable Mass 6DoF (Euler Angles)

Calculate Range

World Magnetic Model 2000

Dryden Wind Turbulence Model (Continuous (+q -r))

Dryden Wind Turbulence Model (Continuous (+q +r))

Dryden Wind Turbulence Model (Continuous (-q +r))

Von Kármán Wind Turbulence Model (Continuous (+q -r))

Von Kármán Wind Turbulence Model (Continuous (+q +r))

Von Kármán Wind Turbulence Model (Continuous (-q +r))

Dryden Wind Turbulence Model (Discrete (+q -r))

Dryden Wind Turbulence Model (Discrete (+q +r))

Dryden Wind Turbulence Model (Discrete (-q +r))

Horizontal Wind Model

Aerodynamic Forces and Moments

Moments about CG due to Forces

Symmetric Inertia Tensor

Estimate Center of Gravity

Estimate Inertia Tensor

Dynamic Pressure

Mach

Create 3x3 Matrix

Invert 3x3 Matrix

Adjoint of 3x3 Matrix

Determinant of 3x3 Matrix

SinCos

Relative Ratio

Pressure Altitude

Ideal Airspeed Correction

Incidence, Sideslip, & Airspeed

Lapse Rate Model

Non-Standard Day 310

Non-Standard Day 210C

Block Implementation Improvements

The following list contains improvements to the Aerospace Blockset since the previous release:

- 6DoF blocks now output translational accelerations.
- Out of Range actions (None, Warning, Error) are now available for WGS84 Gravity Model block and the COESA Atmosphere Model block.
- Where applicable, you can now select to output velocity for blocks in knots.

Known Software and Documentation Problems

Real-Time Workshop and Real-Time Workshop Embedded Coder Support

Most blocks in the Aerospace Blockset library support the Simulink Accelerator mode, as well as code generation with Real-Time Workshop and Real-Time Workshop Embedded Coder. The following blocks are exceptions.

Blocks Not Supported by Real-Time Workshop

Block	Library
3DoF Animation	Animation
6DoF Animation	Animation

Blocks Not Supported by Real-Time Workshop Embedded Coder

Block	Library
Second Order Linear Actuator	Actuator
Second Order Nonlinear Actuator	Actuator
3DoF Animation	Animation
6DoF Animation	Animation
COESA Atmosphere Model	Environment/Atmosphere
Non-Standard Day 210C	Environment/Atmosphere
Non-Standard Day 310	Environment/Atmosphere
Pressure Altitude	Environment/Atmosphere
WGS84 Gravity Model	Environment/Gravity
Discrete Wind Gust Model	Environment/Wind
Dryden Wind Turbulence Model (Continuous)	Environment/Wind

Blocks Not Supported by Real-Time Workshop Embedded Coder (Continued)

Von Kármán Wind Turbulence Model	Environment/Wind
3DoF (Body Axes)	Equations of Motion/3DoF
Simple Variable Mass (Euler Angles)	Equations of Motion/3DoF
Custom Variable Mass (Quaternions)	Equations of Motion/3DoF
6DoF (Euler Angles)	Equations of Motion/6DoF
6DoF (Quaternion)	Equations of Motion/6DoF
Simple Variable Mass (Euler Angles)	Equations of Motion/6DoF
Simple Variable Mass (Quaternions)	Equations of Motion/6DoF
Custom Variable Mass (Euler Angles)	Equations of Motion/6DoF
Custom Variable Mass (Quaternions)	Equations of Motion/6DoF
1D Controller [A(v),B(v),C(v),D(v)]	GNC
1D Controller Blend u=(1-L).K1.y+L.K2.y	GNC
1D Observer Form [A(v),B(v),C(v),F(v),H(v)]	GNC
1D Self-Conditioned [A(v),B(v),C(v),D(v)]	GNC
2D Controller [A(v),B(v),C(v),D(v)]	GNC
2D Controller Blend	GNC
2D Observer Form [A(v),B(v),C(v),F(v),H(v)]	GNC
2D Self-Conditioned [A(v),B(v),C(v),D(v)]	GNC
3D Controller [A(v),B(v),C(v),D(v)]	GNC
3D Observer Form [A(v),B(v),C(v),F(v),H(v)]	GNC
3D Self-Conditioned [A(v),B(v),C(v),D(v)]	GNC
Gain Scheduled Lead-Lag	GNC

Blocks Not Supported by Real-Time Workshop Embedded Coder (Continued)

Self-Conditioned [A,B,C,D]	GNC
Turbofan Engine System	Propulsion

Dryden Wind Turbulence Block

If DCM equals `eye(3)` (identity matrix) and wind direction equals 0° (from North), the output of the Dryden Wind Turbulence Model (Continuous +q -r) block yields the same results as past versions of the Dryden Wind Turbulence Model (Aerospace Blockset 1.0 and 1.0.1) with approximately $10e^{-7}$ error.

Also, for the Dryden Wind Turbulence Model (Continuous) block, the military specifications result in the same transfer function after evaluating the turbulence scale lengths, and the turbulence transfer functions balance each other out.

Wind Shear Block

When using metric units, values will differ from the previous version of the Aerospace Blockset at the second decimal place (0.0x) due to corrections in the metric altitude to measure wind speed. It has been changed from six meters to ~6.096 meters. The specification calls for 20 feet and the new metric altitude is the exact conversion.

COESA Atmosphere Block

When using English units, density units have changed from lbm/ft^3 to $slugs/ft^3$. Blocks will be forwarded, with automatic conversion, to continue to output density in lbm/ft^3. Users may wish to investigate updating their models to use $slugs/ft^3$.

Turbofan Engine System Block

Users might experience minor changes in output values due to unit conversion correction for relative ratios.

Save As Feature Not Available

The Save As feature in Simulink is not available for the Aerospace Blockset.