



Automated test solutions for the entire product lifecycle



# eVTOL Integrated HIL Test System

## *Real-time hardware in-the-loop (HIL) test of flight control systems and energy management for eVTOL aircraft*

The eVTOL HIL Test System provides an integrated, closed-loop test environment for dynamic testing of flight control systems and battery management systems for electric aircraft. The system simulates both batteries as well as any control surface activities which may occur during forward flight as well as during transitional flight. The eVTOL HIL Test System delivers repeatable, cost-effective testing in a fraction of the time needed to create bespoke, custom in-house simulation systems.

In a first-of-its kind commercial application, Bloomy's premier battery simulator, the 12-cell Bloomy BS1200, is used in conjunction with industry-standard components from National Instruments, The MathWorks, Virginia Panel Corporation, Bloomy and others. Control of the simulations of the aircraft, control surfaces, and the batteries is performed using one common test executive to simplify implementation of System Integration Labs (SILs). Scripted tests created using COTS scripting languages ensure that testing is repeatable and efficient.

## APPLICATIONS

- System Integration Labs (SILs)
- Development of control laws prior to physical test
- Development, production, or maintenance test
- Environmental Stress Screening (ESS)/Highly Accelerated Life Testing (HALT)

## FEATURES

- World-class battery simulation for battery management system test
- Simulation environment for comprehensive flight control system test
- Analog I/O including thermistors, RTDs, strain gages
- Actuator loads including inductive solenoids, torque motors, and indicators
- Discrete switch signals such as open/ground, open/Vcc, open/closed
- Digital communications including ARINC-429, MIL-STD-1553B, FireWire, AFDX, serial
- Simulation-controlled variable DC power supplies and 1Ø/3Ø AC supplies
- ThroughPoint™ Interface Panels with integrated breakout box functionality

# SPECIFICATIONS

AVAILABLE SIGNAL CONDITIONING AND COMMUNICATION I/O	
<b>Interface Type</b>	
VDT/Resolver simulation (4W, 5W, 6W)**	RS-422
Thermocouple simulation**	ARINC-429
RTD simulation**	AFDX/ARINC-664
Thermistor simulation*	MIL-STD-1553B
Strain Gauge simulation*	IRIG B
Loads (torque motors, solenoid, lamp, etc.)**	Ethernet Test Bus
Discretives (one-wire and two-wire)*	DC Power
Differential analog outputs to UUT*	AC Power
Potentiometer/variable resistor simulation	
<b>FAULT INSERTION</b>	
*Open circuit fault included.	
Other fault conditions (short to ground, pin to pin short, etc.) optional for all signal types	
<b>SELF-TEST</b>	
*Self-test standard, calibration optional	



## BATTERY SIMULATION

CELL CHANNEL SIMULATION	
Simulator Type	Bloomy BS1200
Number of Channels	12
Channel Type	Sink and Source
Voltage Range	0.0 to 5.0V
Voltage Resolution	0.1 mV
Voltage Accuracy (requires remote sense)	±3 mV
Current Range	±500.0 mA (output derates linearly under 2V)
Current Resolution	0.1 mA
Current Accuracy	±4 mA
Current Limiting Accuracy	±10 mA
Isolation	1000V *
<b>CHANNEL READBACK</b>	
Voltage Resolution	0.1 mV
Voltage Accuracy	±3 mV
Current Resolution	0.1 mA
Current Accuracy	±4 mA
<b>DIGITAL I/O</b>	
Channels	8 (bidirectional)
Logic Level	3.3V

\* Precautions are required for voltages exceeding 140V. Please refer to Application Note 8700-00038: Using the Battery Simulator 1200 in High-Voltage Applications.

## GENERAL

COMPUTING RESOURCES	
Real-Time Simulation Host	PXle-based, RTOS, up to 8-Core Xeon
Instrumentation and System Management	PXle-based, Windows, up to 8-Core Xeon
<b>SOFTWARE ENVIRONMENTS</b>	
Real-time Framework	NI VeriStand
Test Executive	NI TestStand, Python
Data Acquisition and Programming	NI LabVIEW, C/C++
Data Management and Analysis	NI DIAdem
Software Models	23 model types, including LabVIEW, Simulink, Matrix, C/C++, MapleSim
<b>SYSTEM DIMENSIONS AND POWER</b>	
System Chassis	1- or 2-bay 40U equipment racks
	1-bay: approx. 78"H (w/locking castors) x 23"W x 36"D
	2-bay: approx. 78"H (w/locking castors) x 46"W x 36"D
Weight	Configuration dependent
Power Requirements	Power requirements vary with selected AC and DC power supply options
Emergency Power Off	Standard
Uninterruptible Power Source	Standard for all computing resources
<b>WARRANTY</b>	
1-year warranty on all hardware components, optional extended warranties available	
3-year software service plan on all National Instruments software products	

Call 860-298-9925 or visit  
[www.bloomy.com](http://www.bloomy.com)