

RT-LAB

TestDrive™

Fully Programmable
Powertrain and Vehicle Simulation
for ECU Development & ECU-in-the-Loop Testing

FPGA-Based TestDrive Modules

BASE MODULE

Digital Controller for the Simulator

- Power moding circuitry that drives the power bus
- Communications hub between target PC and all other modules
- Serial interface to support the connection of serial tools to the ECU
- Signals can be monitored through faceplate connections (Jack, D-type and BNC connections)
- SignalWire interface

PULSE DRIVE LOAD (PDL) MODULE

ECU command capture

- 40 standard channels connecting with IGN 1 or GND as rail and loads ranging from 330 to 10.0kohm
- 10 flexible channels with selectable rail voltage sources including external bias
- 4 bipolar channels with selectable rail voltage sources including external bias
- SignalWire interface

SWITCH MODULE

Sensor simulation

- 30 standard channels connecting with IGN1 or GND as rail voltage
- 5 flexible channels with selectable rail voltage sources including Vbatt, ECU 5V, IGN or external bias
- 8 rotary switch channels with selectable rail voltage sources including Vbatt, ECU 5V, IGN or external bias
- Each switch configurable as Active High, Active Low, Open Source, Open Drain
- SignalWire interface

REAL-TIME CURRENT MEASUREMENT MODULE

- Analyze various currents and voltages found in a vehicle.
- Capture data from a fault trigger, or a forced fault trigger as required, in simulator applications for the automotive industry.



REFERENCE PULSE GENERATION (RPG) MODULE

Sensor simulation and ECU command capture

- 5 pattern output channels (0-5V) for angular position references
- 8 user defined generators with configurable output stage: open drain, +/-12V, 0-IGN1, 0-5V
- 4 variable CAM signals for variable valve timing applications
- 24 engine synchronous signal capture channels for spark and fuel
- Integrated knock simulation with selectable internal waveform generator or external knock source
- SignalWire interface

PULSED OUTPUT MODULE (POM)

Sensor simulation

- 24 channels with varying frequency range and output stages
- Adjustable AC output stage for speed sensor simulation
- True 0% and 100% PWM capable
- SignalWire interface

RESISTIVE SENSOR MODULE

Sensor simulation

- 12 channels with resistance ranging from 0.5 to 200kohm
- Software selectable termination voltage: open, ground, external bias
- SignalWire interface

ANALOG SENSOR MODULE

Sensor simulation

- 16 voltage output channels, 12-bit D/A resolution
- Linear output range between high and low references supplied through external bias input pins
- SignalWire interface

Additional Options

- Assignable Tactile Interface Module (TIM)
- Programmable DC Power Supply
- NEXUS Module for ECU Data Access
- CAN Network Simulation Module
- IEEE 1394 Simulator Expansion Module
- IEEE-488 GPIB-based Instrument Control Module
- Fault Insertion Communication Module
- Dynamic Simulation Module (Single CPU)
- Multi-CPU Support Module
- GUI and Scripting Development Software Module
- Simulation Development Software Module
- SPI Communication Module
- Resolver Simulation Module

Note: Information throughout brochure is subject to change



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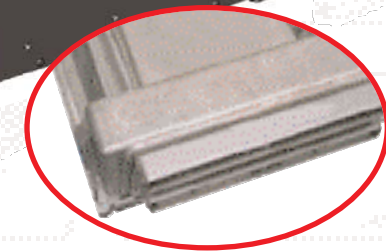
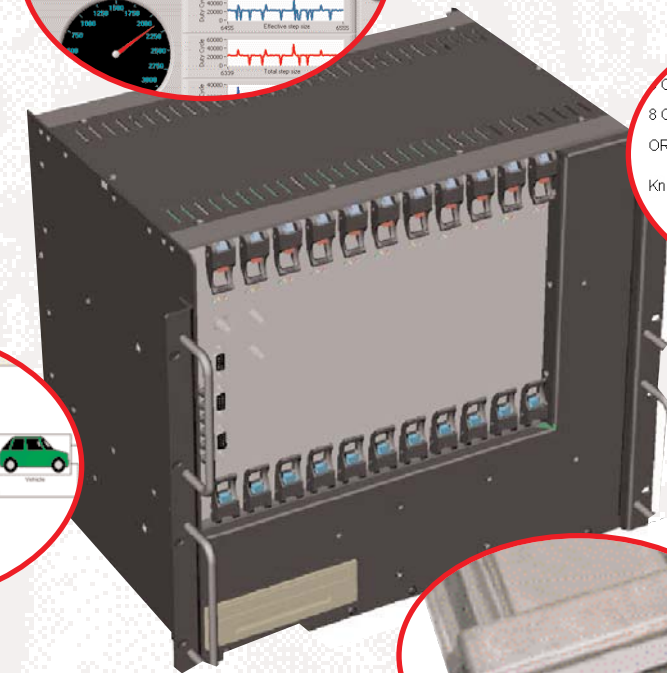
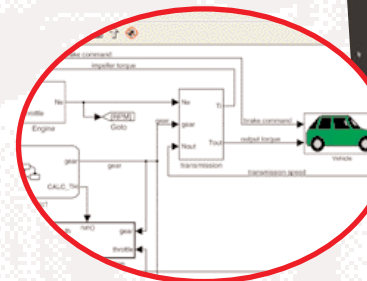
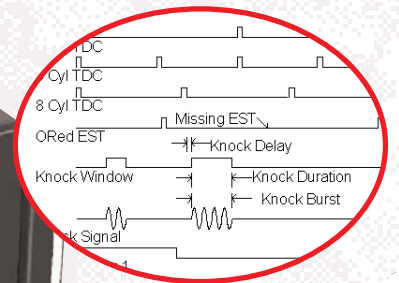
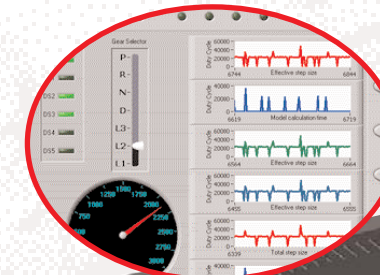
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Automated ECU Testing, Data Analysis and Report Generation
Cost-Effective Replacement of Static Simulators
Scalable Solution for Open and Closed Loop Testing



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As the number of ECUs, and the amount of software, continues to multiply in a vehicle, the need to streamline ECU development & testing processes has increased. New requirements have emerged, including test repeatability, inter-related dynamic signals, higher number of I/O signals in new ECU designs, and the ability to configure a simulator for multiple ECU programs and to fully test each ECU and the ECU-ECU interface.

RT-LAB TestDrive is a modular hardware-in-the-loop (HIL) system designed to meet these challenges for next generation ECUs and beyond. An ideal replacement for static simulators and the current generation programmable simulators, it achieves low unit cost through off-the-shelf hardware technologies and a common I/O modular design.

For expansion, TestDrive easily accommodates new I/O types and additional channels. For testing higher levels of integration, such as a chassis/powertrain combination, multiple TestDrive units can be brought together through a built-in SignalWire™ real-time serial link. TestDrive also takes advantage of today's multi-core CPUs, providing greater scalability of both hardware and software and enabling TestDrive to handle the ever-increasing complexity involved in the testing of multiple high-fidelity models in realistic test scenarios.

RT-LAB TestDrive is based on the Opal-RT's RT-LAB Distributed Real-Time Simulation platform and uses off-the-shelf PC technology. TestDrive can serve as an I/O processor when combined with Opal-RT's eDRIVESim simulator for closed-loop real-time simulation using high fidelity plant models. This flexibility enables you to integrate your TestDrive with, or upgrade directly to, the more powerful RT-LAB eDRIVESim Real-Time Simulator, when you need it.

KEY FEATURES

I/O FEATURES

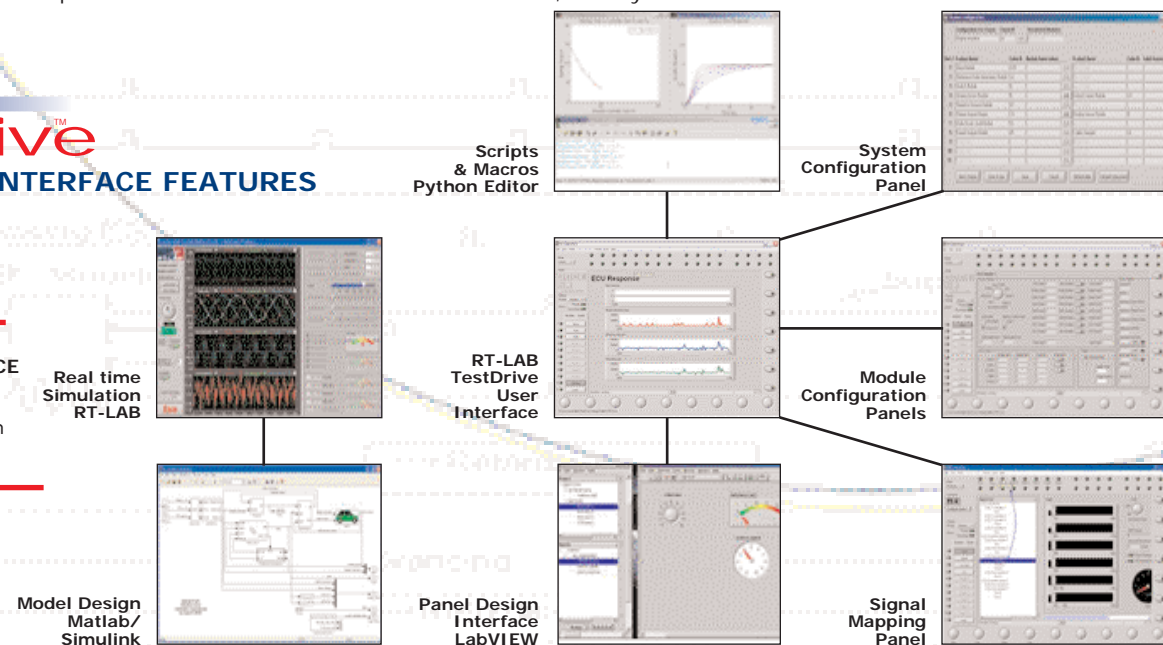
- Base configuration with sufficient I/O for engine, transmission, powertrain, and vehicle simulation
- I/O expansion through plug-and-play modules
- All I/O channels equipped integrated and configurable conditioning stage and protection
- Software selection of output stage type, channel configuration, signal range and scaling
- Resistive loads included with ECU output channels. Use of custom loads or actuator loads supported

REAL-TIME SIMULATION FEATURES

- Fully compatible with Matlab/Simulink.
- Add computing power through integration with RT-LAB eDRIVESim Real-Time Simulator

RT-LAB TestDrive™ USER INTERFACE FEATURES

GRAPHICAL USER INTERFACE
software for test set up and simulation control running from Windows host PC



TestDrive™

CHASSIS UNIT SPECIFICATIONS

10 6U slots for I/O modules with signal conditioning and monitoring

Real-time target computer with Intel Dual-Core CPU

Moded power lines & connections including battery voltage, ignition, accessories & radio. Up to 25A current



front

back

8U desktop simulator, external dimension: 17"W x 16"H x 12"D

TCP/IP connection to host PC

Rear high-density ELCO connectors for direct ECU connection

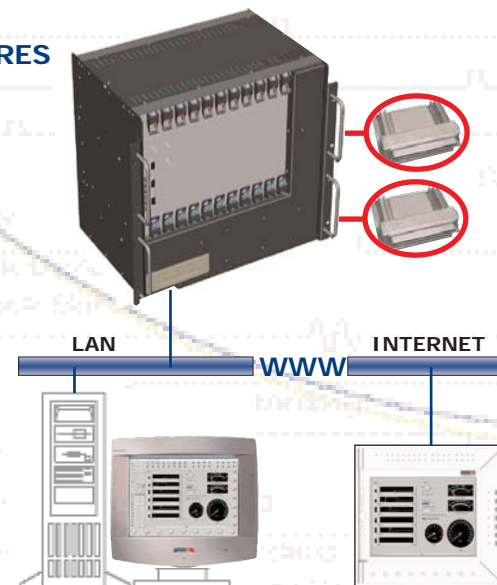
PCI slots for optional modules such as CAN bus, GPIB and IEEE 1394

TestDrive™

NETWORKING FEATURES

NETWORKED SIMULATION

Whether you are sitting next to it in the lab or accessing it from your office through the network, the same user interface software allows you to configure and run a simulation. System configuration along with test scripts can be stored on a networked server or a configuration management system for enhanced test repeatability.



REMOTE ECU TESTING

As your workday ends, someone somewhere else in the world is just getting to work.

Use TestDrive for real-time testing 24 hours a day, whether your unit is located on the other side of your lab or the other side of the world. TestDrive guarantees real-time performance by allowing test automation scripts to be downloaded and run directly on the real-time processor.

Outputs from a running simulation can be channeled to data files for post-processing, which makes TestDrive a perfect fit for lights-out testing.