

AUTOMOTIVE TEST EQUIPMENT FOR ELECTRONIC CONTROL UNITS

ADWIN SYSTEMS PERFORM WITH MICROSECOND ACCURACY



In the automotive industry, the development of [Electronic Control Units](#)—ECUs—is critical in the design of new vehicle models. This includes ECUs used in ABS, airbags, powertrains, suspension, drivers and other systems. Safety, comfort, and increased market competitiveness are the major factors driving new ECU developments. In this brief example, CAS DataLoggers shows how automotive test equipment for ECU test development can significantly benefit from ADwin data acquisition and control systems.

ECU TEST REQUIREMENTS

Comprehensive ECU tests are important to verify the units' functionality. Because of the complexity of today's ECU software, engineers and technicians must perform real-life test drives. Endurance tests in combination with environmental tests in terms of vibration, temperature, humidity, etc. give proof of the ECU's functional stability. As a result, an ECU can only go into production if it can handle all desired situations and stresses.

For these automotive test applications, the [ADwin product family](#) offers several automotive test equipment systems for functional ECU testing and for other devices like CAN-based units, sensors, actuators, etc. These tests are performed in the development of such devices as well as in production for quality assurance.

Using an ADwin system, analog/digital signals and inputs/outputs of the ECU under test can be acquired and the timing of all signals and messages can be evaluated online with sub-microsecond accuracy. ADwin's Input/Output response time is on the order of 300 nanoseconds. In this way users can completely test the control device.

Example of an Automatic Test for ECUs:

EXAMPLE OF AN AUTOMATIC TEST FOR ECUS



The ADwin system tests the control units by generating multi-channel test signals by stimulating the control unit's inputs with analog or digital signals. These test signals can be periodic or non-periodic and based on design criteria or measured values from real test drives. In parallel to that, the outputs of the tested control unit are monitored

simultaneously to the stimulation and evaluated online in order to verify whether the stimulation and the control device's produces the designed response. In this way, a single device stimulates the ECU test unit, measures the response and makes an online evaluation.

If the control unit has additional interfaces like CAN-bus, SPI, RS-232/xx or others, signals on these lines can also be included into the ECU test run. Test scenarios can be developed in Simulink with direct generation of the operating program for the ADwin hardware.

A variety of communications options are available with ADwin. Typically, in R&D applications, the ADwin measurement system is connected to a PC via Ethernet or USB to exchange results and start a test run. Meanwhile for production line applications, operators often use an Ethernet or fieldbus interface like Profibus. As mentioned above, ADwin can also interface with CANbus.

If standalone operation is desired, an available boot loader option allows for fully functional operation independent of any PC or external computer.

SENSOR & ACTUATOR TESTING

Tests for sensors or actuators follow the same procedure described above. With ADwin it is possible to make test runs for a wide variety of different automotive devices.

THE ADWIN ADVANTAGE

ADwin Real-Time data acquisition and control systems offer many competitive advantages stemming from their faster sampling and real-time processing:

- Very fast response time of under 300 nanoseconds
- Sample rate of 20MHz aggregate, to 4 MHz per channel
- High speed PID loops—up to 300 kHz or more advanced control functions
- Operation independent of the PC—the system will continue to run even if the PC stops
- Tightly-coupled analog in/out and digital in/out

Unique ADwin features include:

- Local processor with real-time operating system that runs independently from Windows CPU
- Easy to use program development tools with support for up to 10 processes
- Interface library for all of the most common GUI and development packages (VB, VC, Labview)

SOFTWARE

ADwin provides all the benefits of direct software connection with Windows without the risk of OS lockups and crashes.

The ADwin software environment can be used under all Windows versions and LINUX or as a stand-alone data acquisition system. ADwin also has drivers for many of the popular programming environments including VB, VC/C++, MATLAB, Simulink and others.

Users are free to develop their test stand application with a full set of available drivers providing for full integration with other applications and programming languages.



For more information on [ADwin data acquisition and control systems](#), automotive test equipment or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at (800) 956-4437 or www.DataLoggerInc.com.