



*EFFECTIVE SOLUTIONS FOR CONTROL SYSTEMS AND AUTOMATED TEST EQUIPMENT*

## **Providing a Window Regulator and Windshield Wiper Test Stand Solution**

**The Challenge:** Running endurance, motor and sound characterization tests on windshield wiper motors and window regulators while increasing productivity for reporting, logging and analyzing.

**The Solution:** Using a PC-based solution with National Instruments' plug-in DAQ boards and SCXI signal conditioning hardware to design and build a PC-based, fully-automated, five station system.

### **Introduction**

Engineers added new system features by switching out the existing equipment for National Instruments' hardware and software. The customer, who supplies a variety of electric motors for automotive applications, needed to run endurance, motor and sound characterization tests on windshield wiper motors and window regulators. The engineers also wanted to increase the test equipment reporting, data logging and analyzing capabilities by adding computer-based data logging and report generation to the system. The test system collects specific data, including torque, voltage, current and speed and cycle count information on each of five stations. The fifth station is mobile and can conduct sound measurement in a semi-anechoic chamber and environmental testing in an environmental cell. This station requires high-speed input of sound signals.

### **System Design**

The test system is designed to run on a single PC using National Instruments' LabVIEW™ software. This design reduced the system costs and gave users the ability to control all of the tests from a single terminal. To achieve the necessary high-speed control for this system, a Pentium 166 MMX with 32 MB of RAM was selected. The I/O subsystem is a combination of SCXI and standard plug-in DAQ boards.

The SCXI system consists of a 12-slot SCXI chassis with two SCXI-1120 isolated analog input modules and two SCXI-1163R digital output boards. The SCXI-1163R boards control high-voltage relays. These relays control station on/off, voltage polarity and motor type (wiper or window regulator). When testing a wiper motor, the system must also determine high/low speed, run/auto stop, and normal/intermittent mode.

A PC-TIO-10 collects RPM and rotary position data from each of the five stations. The digital I/O on this board monitors an emergency stop and other safety parameters. An AT-AO-10 outputs voltage setpoints and torque output.

### **Advantages**

Before upgrading the system, two separate test stands were maintained, each running one characteristic test. The other five test stands conducted performance tests. Neither test station had built-in data logging. Now, the customer operates four "connected" test stands and one freestanding mobile station. All aspects of control and data collection are organized through one tightly integrated control station.



*This five-station system runs a variety of tests on windshield wiper motors and window regulators, while increasing reporting, logging and analyzing opportunities.*

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In addition, engineers previously had to run the same test on all endurance stations – they could not mix and match different tests and different motors. With the new system, they can simultaneously run different run different tests on each station.

Because it is computer-controlled, the new system also includes data acquisition and analysis capabilities that were unavailable in the previous system, such as collecting data throughout the test and generating reports at the end of a test. Users can also export the data to Excel for further analysis.

Finally, the new system provides full integration of high-speed sound acquisition and analysis with motor testing on the fifth station.