



EFFECTIVE SOLUTIONS FOR CONTROL SYSTEMS AND AUTOMATED TEST EQUIPMENT

## Alternator Durability Stand

**Category**  
**Automotive**

**Products Used**  
LabVIEW™ Software  
SCXI 1000 chassis  
SCXI 1120 modules  
PCI-MIO-16E card  
SCXI-1328 terminal block  
SCXI-1327 terminal block  
PC-DIO-24 digital I/O card  
GPIB card

**Challenge**  
Develop a flexible but easy to use alternator durability stand. The stand was to be designed to take the place of one of the customer's manually run test stands.

**Solution**  
We modified the design of one the customer's alternator performance test stands. The stand was originally developed by Wright-K Technology, Inc. of Saginaw, MI. This gave the customer a test system standardized to other test stands in their facility and offered much more accuracy and repeatability then could be achieved on their manual alternator durability test stand.

**Abstract/Introduction**  
One of the big three automobile makers wanted a stand to test alternator durability during the research and development phase of production. Each test had to have the potential of lasting up to 800 hours. The stand also had to be easy to use and very flexible.

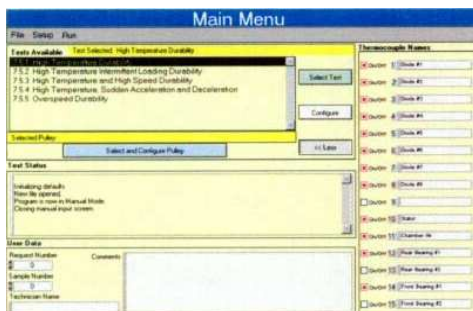


Figure 1: The operator enters basic test information in the **Main Menu**.

**Hardware**  
A National Instruments' SCXI data acquisition system was chosen for its superior signal conditioning capabilities. The SCXI hardware includes only eight different components. A National Instruments' SCXI 1000 chassis with three National Instruments' SCXI 1120 modules to collect data are connected to the computer by National Instruments' PCI-MIO-16E card. Two of the SCXI 1120 modules connect to a National Instruments' SCXI 1328 terminal block for collecting data from the fourteen thermocouples. The other SCXI 1120 module is connected to a National Instruments' SCXI 1327 terminal block for collecting the two analog

inputs. For the three digital inputs and six digital outputs, a PC-DIO-24 card from National Instruments is used. The device control part of the software uses standard communication protocols. A National



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Instruments' GPIB card communicates with the stand's load bank. The GPIB card utilizes the IEEE 488.2 communication standard. The drive motor and the temperature controller are serially controlled.

### Software

National Instruments' LabVIEW™ software was used to develop the program because of its flexibility and power. All of the drivers for the stand's hardware devices were also developed. The appearance and functionality of the software was made to be as similar as possible to the customer's current stand to help reduce development time, training time, and costs. Figure 2 illustrates one such software test screen. The

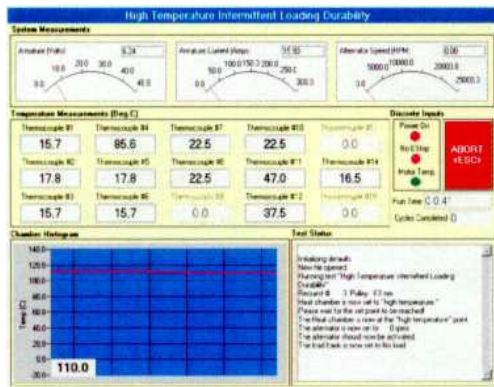


Figure 2: Test Screen

program gives the user the option to select one of the five standard tests. It also allows for choosing the alternator pulley type. From here the user can enter the required test information for the product and run the test. If desired, the operator can also choose to change any of the variables for the selected test. The thermocouple's labels can be edited to allow for changes in their position. The thermocouples On/off State can also be changed. The "new" test setup then can be saved and selected in the future to help avoid lengthy startup procedures.

The stand uses several different communication standards to talk to its Allen Bradley drive, load bank, and temperature controller.

### Conclusion

This system offers the customer a fine balance between three opposing goals. It is easy to use, flexible, and cost effective. This is accomplished by adapting similar system architecture for the customer's current stands and utilizing the expertise of the engineers involved in the project. WTI provided a cost effective product that will stand up to the customer's changing needs, now and in the future.