



## Sensor inputs/outputs for diagnostics in hybrid electric vehicles

*“Sensors provided over 50 inputs and outputs to allow a stock interface between the driver and the vehicle,”*  
David Holloway, Professor of Mechanical Engineering,  
University of Maryland, and 1997 SAE President

### Application:

The on-board computer is a 133 MHz, 80586 processor, ROM DOS, a flash EPROM, and battery-backed RAM. Working in conjunction with this processor are several digital and analog I/O cards as well as a multifunction card, which provides a total of four serial communication ports.

Two serial communication ports are used to transfer data between the Northrop Grumman motor controllers. An additional serial port is used for diagnostics and testing purposes. One digital card handles both the digital inputs and outputs. Two cards receive analog data, and two cards send analog data. Interfacing circuitry is mounted in the same enclosure, which is located within the vehicle controls module. It provides the signal conditioning between the microprocessor and the sensors or devices. The figures above represent the control system hardware layout.

### Key factors in selecting an embedded controller for the “Future Car” system included:

- Rugged, wide temperature range and high shock and vibration
- Mounting options
- Variety of off-the-shelf I/O capabilities
- On-board serial communications for motor control

### Solution:

A total solution from Octagon Systems includes:

- ISA Bus card cage
- 5066 CPU
- Specialized digital and analog I/O ISA Bus cards