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UNDER THE HOOD OF THE 2006 LEXUS RX400H

This month, WAE's Under the Hood focuses on the human-machine interfaces (HMIs) in the passenger compartment of one of the newest vehicles, the 2006 Lexus RX400h, which was introduced for sale in the United States on April 15. The SUV hybrid has a multi-information display for monitoring energy and fuel consumption as well as other HMI functions.

The display for engine vs. motor operation is not the only new HMI on the RX400h but it is perhaps the most unique. The full hybrid operates in electric-only, gas engine-only or combined mode. To cope with frequent off modes of the engine and provide improved fuel consumption, the power steering pump (a 42 V system), water pump, and AC compressor are electric and not engine belt-driven. The alternator function is provided by one of the hybrid's three motor generators.

MG1, MG2 and MGR, each have specific functions and the driver's understanding of the hybrid's operation can impact his/her driving and the resulting fuel economy.

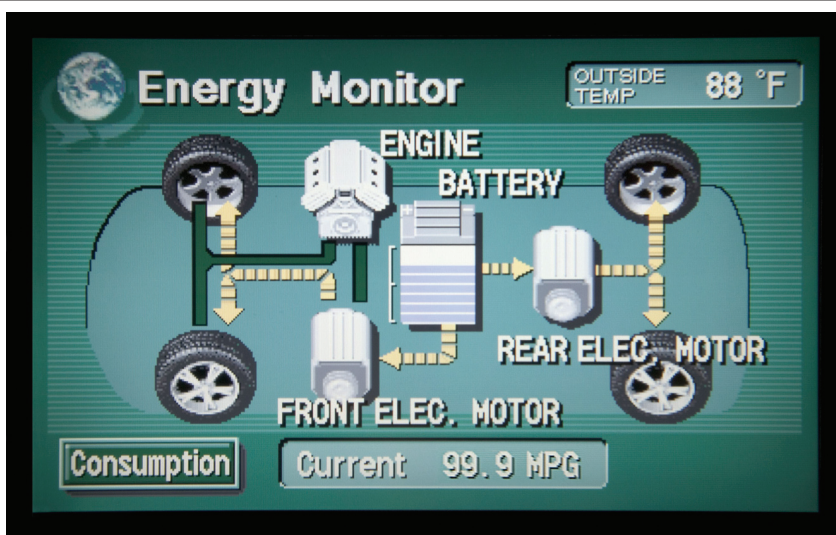
Directly interfacing with the engine, MG1 charges the battery pack or powers the other electric motors as needed. MG2 provides the front wheel drive. A 50 kW electric motor for the rear wheels, MGR, completes an electric all-wheel drive system and provides additional drive torque. During coasting or braking, the

electric motors function as generators and recover the kinetic energy that would normally be lost as heat and transform it into electricity to recharge the batteries. The driver can monitor the various operating modes on a multi-information display or on an optional navigation system display. The display includes the operation of the engine, flow of power to the wheels and to and from the battery, and real-time fuel economy. In addition, an illuminated power meter to the left of the speedometer, normally a tachometer location, also displays the level of power generated by the hybrid powertrain.

OTHER HMIS

The DVD navigation system has a seven-inch touch-screen display and includes Bluetooth and voice activation. The navigation display also shows the image from a rear back-up camera. Six buttons on the steering wheel engage or disconnect a phone and provide volume, channel, mode, display and voice activation control. The buttons along with the display and voice-activated input allow the driver to maintain eyes on the road and hands on the wheel. For passengers in the rear seat, the built-in DVD entertainment system with 110 V accessory power outlet provides options after they get tired of viewing the hybrid display operation.

The final HMI is the vehicle's electronic throttle control (ETC) system. The driver does not directly interface with the throttle, but relies on wires and electronic control to provide that function, just like the motor. This means that driver interfaces for control include either full or partial throttle-by-wire, steer-by-wire, brake-by-wire, and, of course, drive-by-wire. ■



The RX400h engine monitor displays engine vs. motor operation to help drivers optimize fuel economy.