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Hemi Meets Hybrid In a Plug-In Pickup

By Chuck Squatriglia , May 27, 2011 | http://www.wired.com/autopia/2011/05/chrysler-plug-in-hybrid-pickup/

Chrysler's dipping a toe into the plug-in pool, dispatching 10 plug-in hybrid pickups to bake in Arizona to see how the truck tech does in the real world.

The Dodge Ram 1500 plug-in hybrids dispatched to Yuma, Arizona, are among 140 headed to 12 cities nationwide. Chrysler wants municipal fleets to beat the snot out of the trucks for three years to see how they fare in tough conditions.

"Cities have been carefully selected to help the Chrysler Group collect a wide range of data," said Abdullah Bazzi, head of the automaker's advanced hybrid vehicle project. "Temperature extremes found in the cold of North Dakota or the heat of Arizona can have a severe impact on battery life and charging efficiency."

Of the 10 trucks dispatched to Yuma, eight will be added to the police department's patrol division. The remaining pair will roll into the utilities department fleet. Chrysler and the feds, who helped bankroll the pilot project, want the trucks rack up at least 16,800 miles annually.

No problem, Yuma officials said as they received the trucks Wednesday.

"There's a match here between our need and Chrysler's needs," Greg Wilkinson, Yuma city administrator, said in a statement. "We're obviously excited to test these vehicles to supplement our existing fleet and to get them at a time when funding in the budget to get new vehicles has been tight."

Yuma wants to see the trucks deliver a 50 to 60 percent improvement in fuel economy over the trucks they're currently driving. That shouldn't be tough, given that the Dodge Ram 1500 gets a combined city-highway average of 15 mpg.

Although the trucks picked up an electric motor, they've still got the same 390-horsepower 5.7-liter Hemi V8 found in the conventional rig. The liquid-cooled 12.9 kilowatt-hour lithium-ion battery under the seat provides juice. There's a 6.6 kilowatt charger under the hood. No word on the motor specs, but Chrysler says the combined output of the engine and motor is 500 horsepower.

In addition to the electrical assist, the engine shuts down as many as four cylinders at highway speeds to boost fuel economy. The truck automatically disengages the front axle whenever it determines that four-wheel-drive isn't needed, further saving fuel.

Project chief engineer Curtis Semak told Automotive News the truck has an electric range of about 50 miles. That sounds a bit high, given that we got an average of 32 from the 16 kilowatt-hour pack in the Chevrolet Volt. Semak says the plug-in Ram delivers 32 mpg in combined gas-electric mode. Once it drains the battery, the truck will average 22 mpg, he said.

It all sounds good on paper, and Chrysler wants to see how it does in the real world. It is sending the trucks to cities in North Dakota, Massachusetts, Hawaii, Arizona, California, Texas and Missouri. Chrysler says the vehicles will accumulate up to 6.5 million miles during the next three years; data will be collected via satellite to evaluate everything from drive cycles and charging patterns to thermal management, fuel economy and emissions.

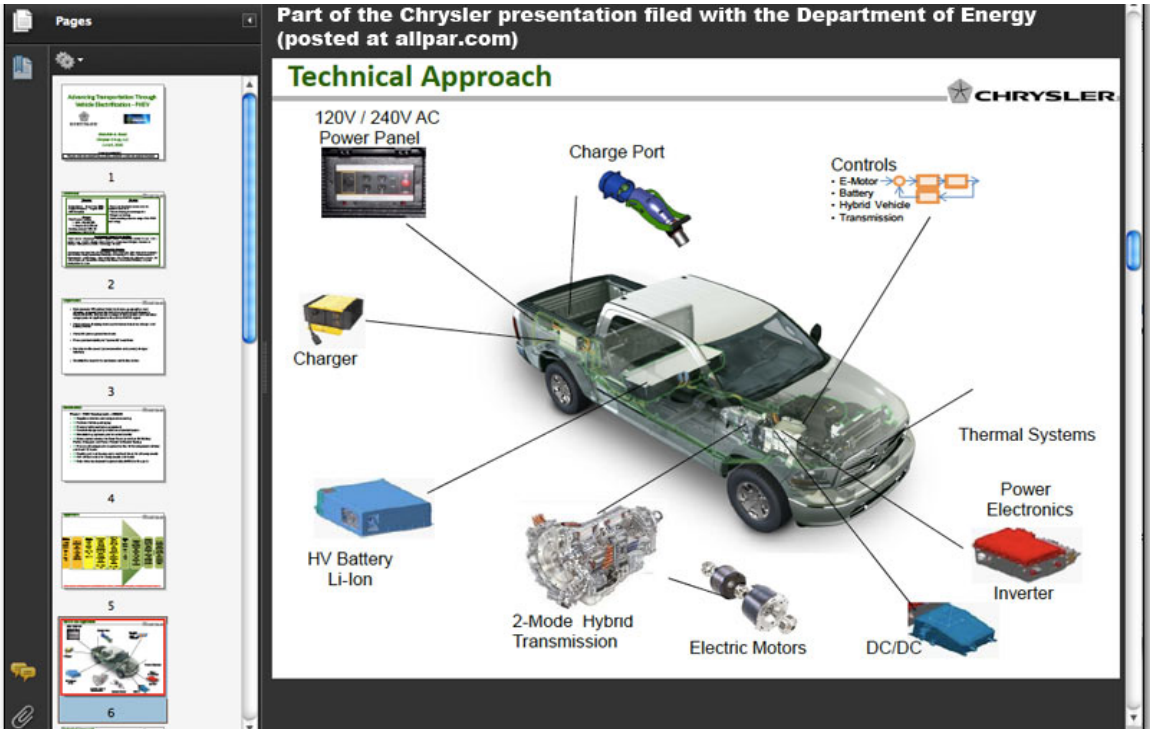
No, you can't have one. Chrysler has no plans to mass produce the truck. They're part of a $97.4 million demonstration project funded in part by the Department of Energy to develop technology for future models.

Photo: Chrysler

allpar.com trucks

Plug-In Hybrid-Electric Ram Trucks (PHEV Dodge Rams)

http://www.allpar.com/model/ram/electric-PHEV.html



Electric Ram history: 2002-2008

Chrysler designed, built and tested a military version of the Ram HEV (hybrid-electric vehicle) for U.S. Army Tank Automotive & Armaments Command (TACOM) for the Commercially Based Tactical Truck (COMBATT) program. The 2002 Dodge Ram 2500 pickup had a diesel-electric hybrid powertrain that could be operated in electric-only mode. When parked, it could provide up to 20 kW of continuous electrical power to operate electrical equipment at remote sites. The generator on the Ram HEV was cleaner and presumably more efficient than conventional portable generators.

Following the military Ram was the Contractor Special; it had a small engine driving one set of wheels, and an electric motor powering the other set. Again, the generator could be used by contractors with the truck parked. At first it was to be available in 2004; then it was switched to fleet sale only; and we do not believe any were sold at all. The hybrid approach, transmitting power-sharing information "through the road," was dismissed by independent engineers).

Current work: PHEV Ram 1500 trucks (2009-2013)

This section, written in August 2010, relies heavily on a publicly available presentation by Abdulla A. Bazzi of Chrysler, presented on June 9, 2010 (with thanks to Patrick McNamara).

A fleet of plug-in hybrid Ram 1500 Crew Cab 4x4 trucks was being produced for a joint Chrysler-government project. The trucks used lithium-ion batteries, taking 2-4 hours to charge at 220V or 6-8 hours at 110V; it could operate as a standard hybrid. The truck could operate for 20 miles on pure-electric in city use, or 655 miles from a full charge and full tank; city gas mileage was 32 mpg when running from a full charge.

The truck used regenerative brakes, and could produce 4.8 kW of continuous AC power through a panel with two 120V and one 240V plugs. (It could produce 120V or 240V of power on the fly or in silent mode). The truck had a 7.7 inch ground clearance, six-foot bed, and Hemi engine and motor collectively rated at 399 horsepower or 390 lb-ft of torque. It included automatic front axle disconnect and a 3.27 axle ratio with 9.25:1 light-duty rear axle; the truck weighed 5,900 lb with a gross cargo weight of 12,100 pounds and gross vehicle weight of 7,200 lb. The max payload was 1,300 pounds with 6,000 pounds of towing capacity.

The project was started in September 2009, and was expected to be completed in August 2013; it was only around 15% complete as of August 2010, but only $3.3 million had been allocated for fiscal years 2009-2010 (the project would take $48 million from the Department of Energy and $49.4 million from Chrysler).
The project was designed to overcome four primary barriers:

- Battery performance in extreme conditions
- Managing heat and cold
- Charging
- Understanding how customers use the technology

140 pickup trucks would be made and put to use in a wide range of climates, including Arizona, Hawaii, and Massachusetts, and through a wide range of customer types, proving viability in real world conditions. Total mileage expected was 2.9 million miles; over 1 million miles were to be driven in freezing temperatures and over 800,000 in temperatures over 90° F.

Technological goals included verifying charging performance and a/c generation, and developing a bidirectional charger interface (for both power and data); the social goal was to quantify the benefits to customers and the nation.

Major changes from Chrysler's current hybrid setup were updating to the latest lithium-ion battery, updating thermal management controls and calibration, updating controls for PHEV, and instrumenting vehicles for PHEV testing.

The trucks included a 120/240V AC power panel, charger, 2-mode hybrid transmission with electric motors built in, and thermal systems. Data was recorded by an on-vehicle module, which would compress the data found on all CAN buses; it included diagnostic features and CAN Calibration Protocol functions, and uploaded recorded data through a cell phone or wi-fi to the server. Customers could manage the systems through a web site, which also allowed Chrysler and DoE to monitor specific trucks.

Chrysler’s development partners and suppliers included Behr, Electrovaya, Hitachi, Delphi, Continental, Michigan State University and the University of Michigan, UC Davis, and three utilities, along with the Electric Power Research Institute. Numerous partners would put the trucks through their paces.

Phase I (2009-2010) included:

- Selecting suppliers and sourcing components; finalizing costs and lead times; kicking off tooling orders
- Getting instrumentation and simulating key systems
- Standardizing the design
- Building 12 development trucks

Phase II (October 2010 to February 2011) included building the demo fleet of 140 trucks and ensuring that customers were prepared to receiving them. Phase III was testing (March 2011 to August 2013); Chrysler had to ensure that the trucks were being used and were working properly. At the same time, a smart grid would be developed, with bidirectional chargers. Systems and customer usage would be monitored throughout the phase.

As of July 2010, Chrysler reported that they were on track.