Advanced power management for military vehicles

Answering the need for more power

BAE Systems is a leader in power management, offering solutions that optimize vehicle electrical and mechanical power by efficiently managing the engine and battery. This is accomplished through intelligent load prioritizing, closed-loop control, and high-performance electrical power generation and conversion.

Responding to a critical need for more power on military tactical wheeled vehicles, BAE Systems developed a prototype advanced power management system designed to provide vehicles with increased capacity to generate electric power.

This solution, demonstrated on a High-Mobility Multipurpose Wheeled Vehicle (HMMWV), is the first system capable of delivering up to 400 amps of 28-volt DC electric power at low engine speed (between 650 and 900 rpm). This allows all electrically powered offensive and defensive subsystems to remain available to the warfighter when the engine is at idle.

Enhanced mission capability

Power management systems improve vehicle efficiency and performance, while enabling diagnostics and prognostics for all power-managed components. Using a permanent-magnet generator, the power system on the demonstrator HMMWV provides enough on-board electricity to operate mission-critical subsystems such as:

- Communications
- Countermeasures
- Electronic warfare
- Route-clearing systems
- Situational awareness

Additionally, it provides power for electrified automotive accessory systems (water pump, engine fans, power steering pump and, in the future, air conditioning) that previously were belt-driven.

The system's modular design provides commonality among different platforms, reduces system integration complexity and risk, and simplifies logistics support.

Benefits

400 amps of 28-volt DC electric power available across the full engine operating range to run mission-critical subsystems

Increased efficiency and reliability

Ability to support electrified vehicle diagnostics and prognostics

Improved HMMWV cooling system

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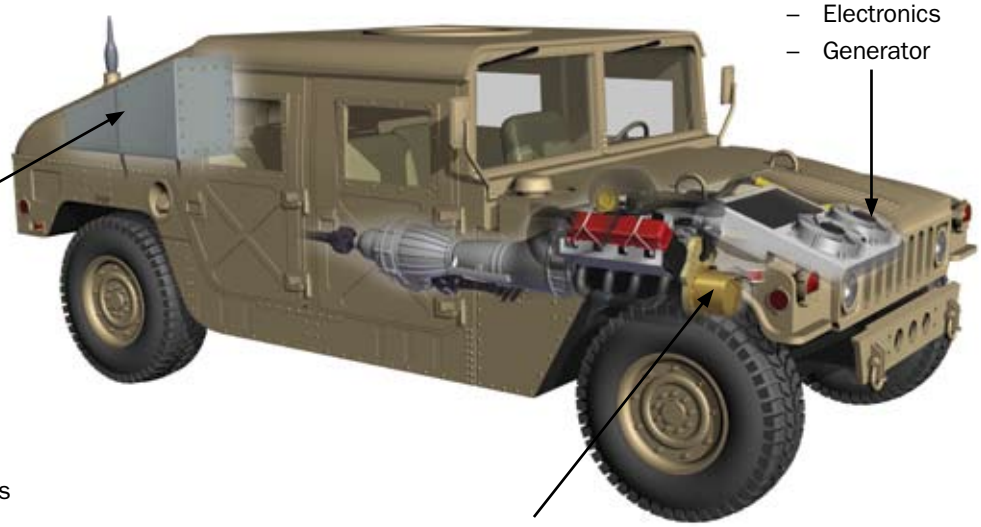
System details:

- Existing propulsion system is unchanged
- Power management kit can be installed without removing engine or transmission
- Produces 400 amps of customer-usable 28-volt DC power across the entire engine operating range
- 30kW of optional 208-volt AC export power can be produced at higher engine speeds (above 2100 rpm)
- Operates as a standard HMMWV – get in, start the engine, and go

Electrified cooling system for:

- Engine
- Transmission
- Electronics
- Generator



Power conditioning electronics:

- Generator controller
- 28-volt DC converter for automotive and customer loads
- 208-volt AC exportable power inverter (optional)
- Automotive accessory controls (power steering, fans, pumps, and engine idle controller)
- Power management system control
- Prognostics and diagnostics

45kW generator:

- Liquid-cooled
- Permanent magnet
- Mounted on engine crankshaft

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