

## Navistar's SuperTruck Meets BorgWarner's Super Electrics

**A**chieve 50 percent improvement over benchmark—that was the Department of Energy's (DOE) challenge, in the form of the SuperTruck Initiative. Navistar decided to meet the challenge and asked us to join the effort. The result is an innovation that's sure to influence future products.

After 2½ years of dedicated effort, Navistar's SuperTruck demonstration vehicle, CataliST, achieved fuel efficiency of 13 miles per gallon and demonstrated 50.3 percent Brake Thermal Efficiency (BTE) and a path towards 55 percent BTE. This was a freight efficiency improvement of 104 percent—**more than double the 50 percent goal set by the DOE for its SuperTruck program.**

### Why We Accepted the Challenge

"We are, first and foremost, systems integrators," says Randy Jarvis, Navistar Global Account Manager for BorgWarner. "Our goal is product leadership that exceeds customers' expectations, so this challenge was right in our sweet spot. But that doesn't mean it was easy. We knew we needed some seriously advanced electrification technology to help Navistar improve its overall efficiency."

The SuperTruck team, which included Jarvis and Rod Spangler, Prototype/Test Execution Manager, decided to use the 48-volt motor generator unit (MGU) for the electrification power of the vehicle.

"Our 48-volt MGU has the durability and high-density electric output we'd need for the



SuperTruck vehicle architecture," says Spangler. "They can start a vehicle, apply torque to the powertrain, recover lost energy, and manage the onboard power demand created by today's creature comforts."

### Tackling the Challenge

The team started by configuring the N13 Navistar engine with the MGU on an engine stand. Test results were positive, so they moved it to the truck. They worked on the space claim with new bracketing and installed new cabling. They also installed a water-cooling system.

Next, our engineers worked to meet the challenge of supplying electric power to systems with different voltage requirements.

"48-volt motor generators are clearly the way to go with many



commercial vehicles, including Class 8 trucks," says Spangler. "They have the power you need, and can serve several different kinds of vehicle platform designs. But manufacturers won't be changing the specifications of onboard electric systems to 48-volt in the near future."

He says they designed a step-down transformer that uses 48-volts for the charging system, 24-volts to start the vehicle, and 12-volts to power all the instrument clusters, lights and onboard electrics.

*(continued on page 3)*

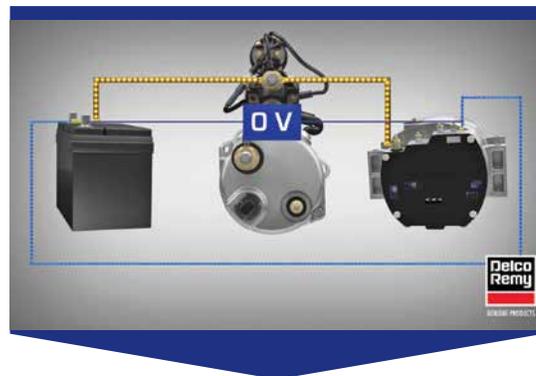
# Remote Sense Operation and System Testing

Our latest Tech Tip reviews how the use of Remote Sense can impact diagnosing voltage complaints.



Complaints can arise when heavy current demand conditions exist. Sometimes there are resistance losses in the power cables which, in turn, limit the regulated voltage available—sometimes by as much as a half-volt. This results in lower battery state-of-charge and less efficient operation.

The cable voltage loss can be overcome by using an alternator equipped with Remote Sense. Rather than regulating the voltage at the alternator B+ output stud, the Remote Sense input serves as the regulation point. The alternator Remote Sense wiring is typically terminated at the batteries or main electrical junction block through the use of a fuse. If the Remote Sense wiring is not connected, the regulator reverts to internal sense at the alternator B+ stud.



If your alternator is using Remote Sense technology, then you will need to keep these tips in mind when performing charging system tests:

- Remote Sense will elevate the system voltage to overcome the cable voltage drop and regulate at the point of termination.
- A voltage drop between an alternator and the point of termination should be less than half a volt. If excessive voltage drop is found in the system, inspect the electrical connections and cables at the starter, battery bank and alternator. Check for corrosion, wire chafing and proper torque on all terminals. Make any necessary repairs and recheck the voltage drop.
- The voltage drop between the Remote Sense input and the point of termination should be close to zero volts with the system operating. If excessive voltage drop is found in the system, check all the terminations, fuse and wiring for corrosion and proper torque.



YouTube

Watch our short Tech Tip video to find out what you should do if your alternator is using Remote Sense technology and you need to perform charging system tests.

# What's New with Our Starters and Alternators for Transport Refrigeration and Auxiliary Power Units?

**O**ur response to customer needs is just one reason we're a market leader. Our latest effort involves fine-tuning our Transport Refrigeration & Auxiliary Power Unit (APU) Program to better meet your needs.

- We have consolidated our Transport Refrigeration starter and alternator recommended stocking list to five part numbers that cover the industry's most popular applications.
- Now available is a 120-amp APU alternator, which is an upgrade for the ThermoKing Tri Pac. Part number 93034.

All starters and alternators are new service models and each one went through our intense engineering testing. Shipping is guaranteed in 48 hours for U.S. and Canada.

The packaging design will change to the BorgWarner brand this year. Look for the new design in the first quarter of 2017.



You can view our recommended stocking list charts in our Refrigeration & APU Program flyer (online at: [delcoremy.com](http://delcoremy.com) > Support > Download Literature > Aftermarket Programs).

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"It's a solution that measurably increases fuel efficiency, but doesn't require a complete redesign of every other electric system," Spangler says.

The team's efforts resulted in a true SuperTruck. The increase in freight efficiency—a combination of fuel used and freight hauled—was 104 percent. The Delco Remy 39MT™ stop/start starter motor in the SuperTruck played an important part in achieving such high fuel efficiency. By turning the vehicle off when stopped, and then starting it when the gas is pressed, the 39MT stop/start feature prevents fuel burn when the truck is idle, essentially conserving fuel and saving fleets money.

### Innovation for the Future

The SuperTruck Initiative is an important step in fuel conservation and environmental responsibility. Long haul trucks rule in freight transportation, delivering 80 percent of the goods we use. And while they only

make up 4 percent of the vehicles on the road, they consume about 20 percent of the fuel.

The results of the SuperTruck Initiative have demonstrated that significant improvements can be made to today's vehicles with existing components, and that advanced technology and creative engineering collaborations can make a profound difference in fuel efficiency.



See the SuperTruck in Action!

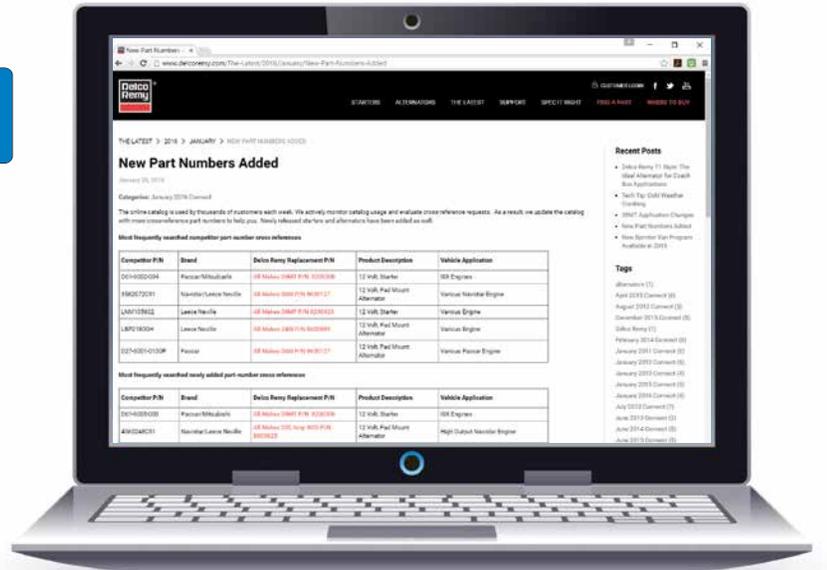
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