

INTRODUCING THE INDUSTRY'S FIRST HYBRID DIESEL ELECTRIC SCHOOL BUS.

**MOMS EVERYWHERE WILL APPROVE.  
ESPECIALLY MOTHER NATURE.**



A NAVISTAR COMPANY

# WE DIDN'T REINVENT THE WHEEL. JUST WHAT POWERS IT.

THE IC BUS HYBRID DIESEL ELECTRIC SCHOOL BUS IS HERE.

Hybrid technology is proven, clean and efficient. So not only is it economically advantageous, but also environmentally friendly. Which lets you improve your fuel efficiency by up to 70% while reducing up to 70% of all emissions.

Why did we put hybrid technology into a school bus? Why wouldn't we? The environmental implications alone are worth it. However, the benefits to your child's well-being are far greater. We take our role as an industry leader seriously.

That means making the best possible school bus for our passengers – and the environment. It's cleaner technology today for a better tomorrow.

**“With fuel prices at all-time highs, innovations such as hybrid technology are needed to help lower customer costs. We feel this technology will provide significantly improved fuel economy. In addition, even though current International diesel engines produce no visible smoke and low emissions, the hybrid program will reduce engine emissions even further.”**

*Mr. John McKinney  
Vice President and General Manager  
IC Bus*

## WHY HYBRID DIESEL ELECTRIC

What makes a PHEV (Plug-In Hybrid Electric Vehicle – Charge Depleting) different from a HEV (Hybrid Electric Vehicle – Charge Sustaining) is its ability to charge the batteries by plugging in the vehicle. This feature has the advantage of using aggressive battery management with advanced Lithium-ion technology batteries that in conjunction create opportunity to maximize fuel savings. This is where fuel savings can reach 70% levels.

The Charge Sustaining battery package uses an advanced design also that eliminates the need for using grid supplied electrical charging. Its battery management maintains the batteries in a very narrow state of charge range which is beneficial to the nickel-metal Hydride batteries and creates savings of 20% to 50% in emissions and fuel consumption.

In either case, and as an additional safety feature, Enova's Hybrid Drive System, with its noninvasive characteristics, will not shut the Internal Combustion Engine down. The result is that the Hybrid System cannot become a factor in or lead to any type of School Bus shut down or roadside downtime, thus creating peace of mind for both operations and the environment.

## BENEFITS

- **Reduced Emissions (up to 70%)**
- **Fuel Economy Improvement (up to 70%)**
- **Uses Standard Fuels**
- **Reduced Maintenance (brakes)**
- **Improved Performance**
- **Improved Driveability (quieter)**
- **Non Invasive (no change to engine, body)**

## IC BUS PRODUCTION FEATURE CODES

- 10AHH HEV PACKAGE  
Charge Sustaining (with NiMH Batteries)
- 10AHJ HEV PACKAGE  
Charge Depleting (plug in type with Li-ion Batteries)

## HYBRID SYSTEM PRIMARY COMPONENTS

**25/80 kW Induction Motor:** The environmentally sealed induction motor utilizes an isolated cooling system to maintain temperature.

**Battery Care Unit (BCU):** Monitors battery condition including temperature, voltage, state of charge, amp hours and kilowatt hours. Report information accessible via laptop. The BCU is capable of supporting different battery types.

**Safety Disconnect Unit (SDU):** Controlled by the BCU, it connects and disconnects the battery pack during charging. Provides protection from voltage surge and contains safety disconnect should a ground fault occur.

**Battery Pack:** Nickel Metal Hydride (NiMH) Charge Sustaining Type, Lithium Ion (Li-ion) Charge Depleting type. The high performance Li-ion batteries are also liquid cooled utilizing the isolated cooling system to prevent overheating. Plug-in charging can be time programmed (initiated based on time of day) for optimum cost and environmental effectiveness.

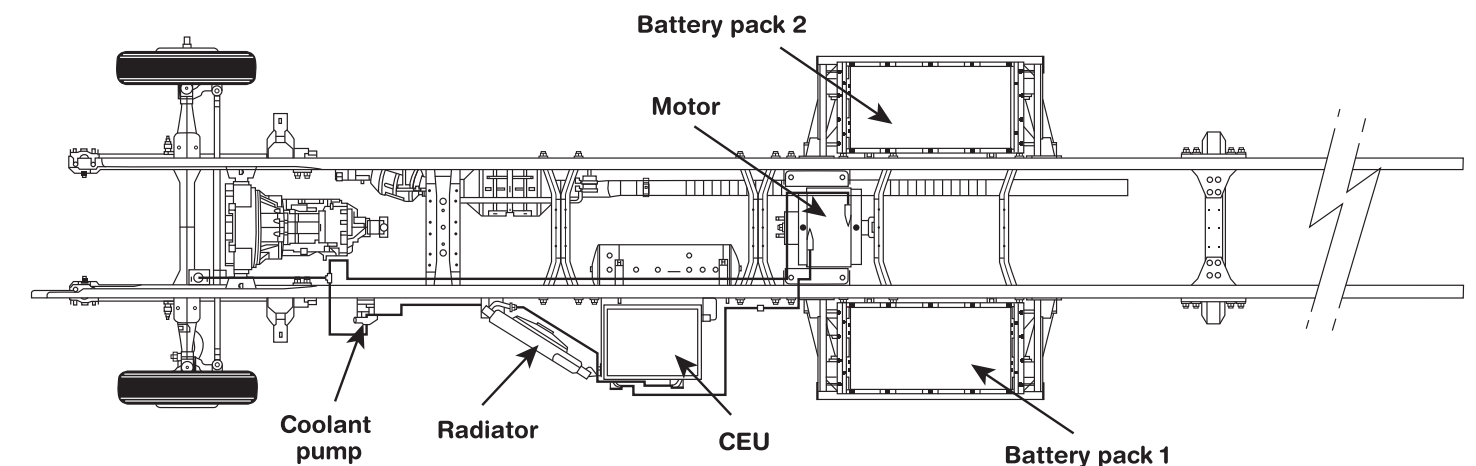
**Cooling System:** Isolated from vehicle cooling system.

**Controller (CEU):** Blends the power of electric drive assist with the diesel (ICE) engine to maximize operational efficiency.

## OPTIONAL EQUIPMENT

**DCDC Converter Module**

## POST TRANSMISSION PARALLEL HYBRID Charge Depleting System (plug-in) pictured



## **ABOUT ENOVA SYSTEMS, INC.**

Enova Systems is a leading supplier of efficient, environmentally friendly digital power components and systems products. The company develops, designs and produces drive systems and related components for electric, hybrid-electric, and fuel cell-powered vehicles. Additional information is available at [www.enovasystems.com](http://www.enovasystems.com)



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## **ABOUT IC BUS**

IC Bus, LLC, headquartered in Warrenville, Ill., is an affiliate of Navistar, Inc. The nation's largest integrated manufacturer of school buses, IC Bus is a leader in passenger protection, chassis design, engines and ergonomics. The company is also a leading producer of commercial buses for several markets. All IC Bus buses are sold, serviced and supported through a renowned dealer network that offers an integrated customer program encompassing parts, training and service. Additional information is available at [www.icbus.com](http://www.icbus.com)



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