

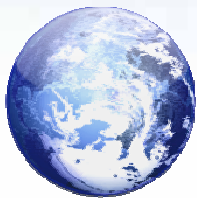
APRA 2010 European
Symposium & Exhibition

WELCOME

**“Remanufacturer Adopts
a New Strategy”**

Presented by:

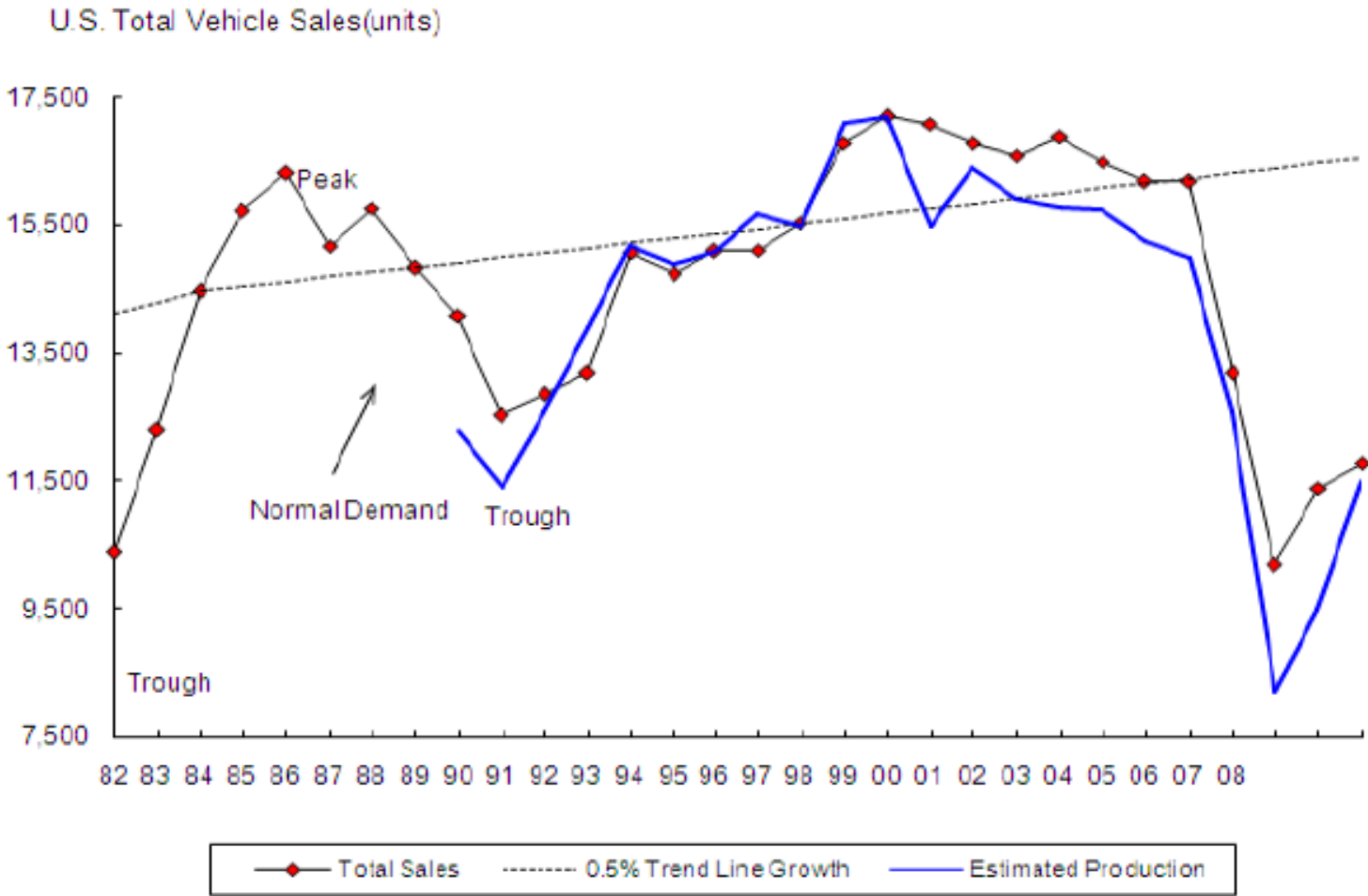
Joe Kripli



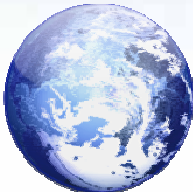
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The decline in U.S. vehicle sales has been dramatic and the forecasted recovery is slow

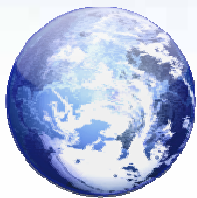


Source: Longbow Research



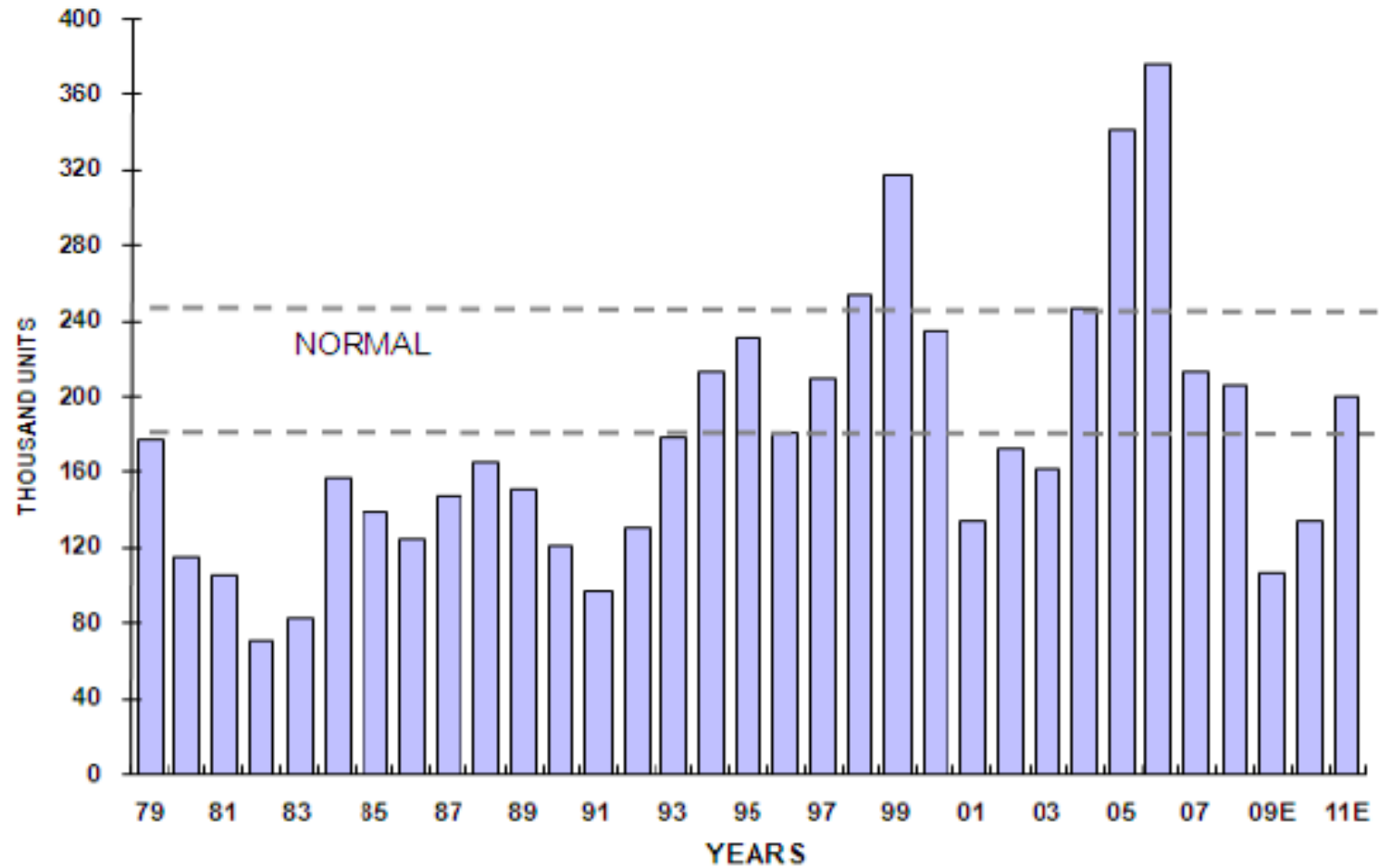
Module Invasion

- ◆ 2007-Average 16 Modules per Vehicle
- ◆ Today-Luxury Vehicles (Mercedes) Incorporate 60-70 Modules !!

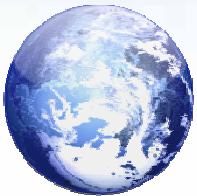


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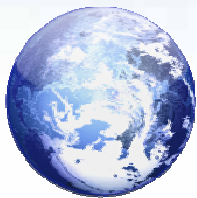
Similar to the U.S. auto market, the Class 8 truck market has suffered a dramatic decline and a slow recovery is forecast



Source: Longbow Research



Average 6 Modules per Vehicle

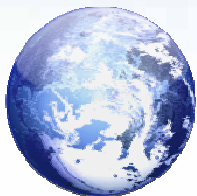


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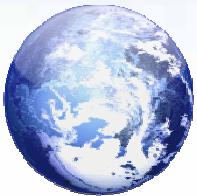
Module Invasion

- ◆ 2007-Average 6 Modules per Vehicle
- ◆ 1,066,000 Trucks X 6 = 6,396,000 ECU
- ◆ Last 6 Years = 6,062,000 Diesel Trucks means 36,372,000 Modules in Market
- ◆ Class 8 = 1,378,000 Trucks=8,268,000 Modules Valued at \$10B



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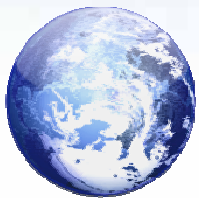
Mechatronics?



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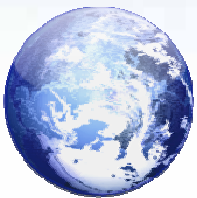
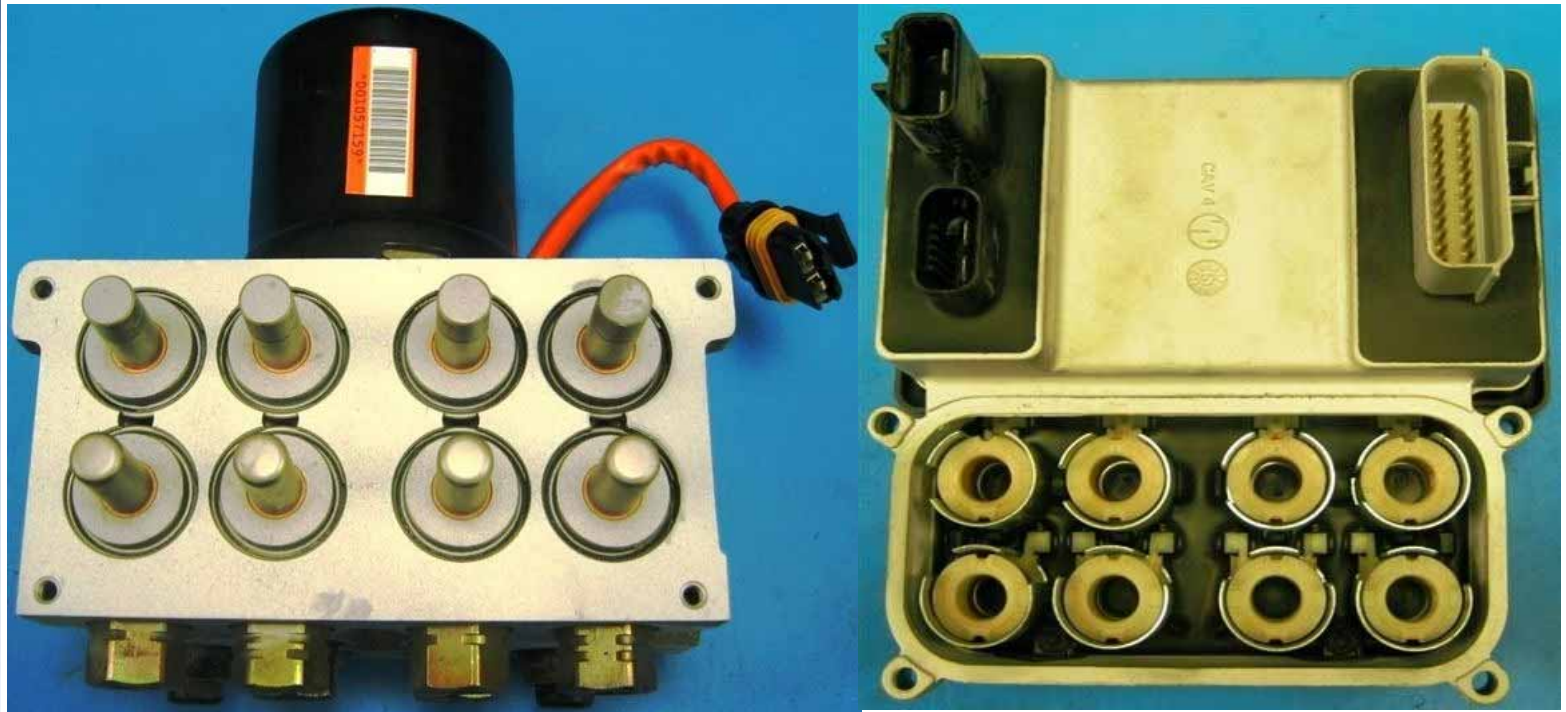
Electric Power Assisted Steering



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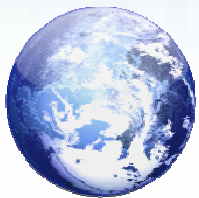
Mechatronics



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Mechatronic X 6



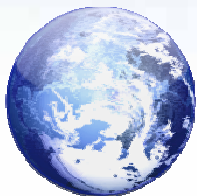
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Mechatronic European Invasion

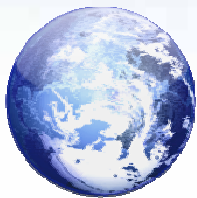
- ◆ 2007-Average 6 Modules per Vehicle
- ◆ 2,200,000 Trucks X 6 = 13,200,000 Mechatronics
- ◆ 3.5T + Truck Parc = 5,000,000 Diesel Trucks means 30,000,000 Mechatronics in Market

Market Value of \$12B !!



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EGR Mechatronic



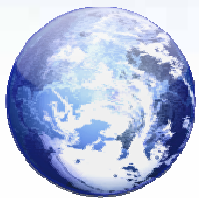
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DETROIT DIESEL
REMANUFACTURING DMR



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Turbocharger Mechatronic Actuator

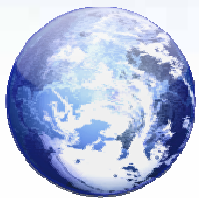


DETROIT DIESEL
REMANUFACTURING DMR



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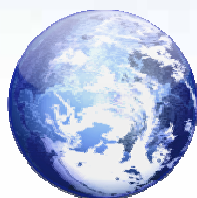
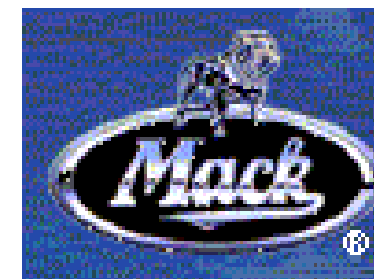
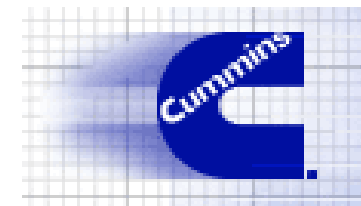
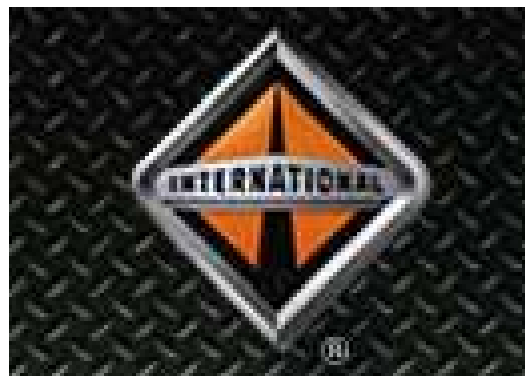
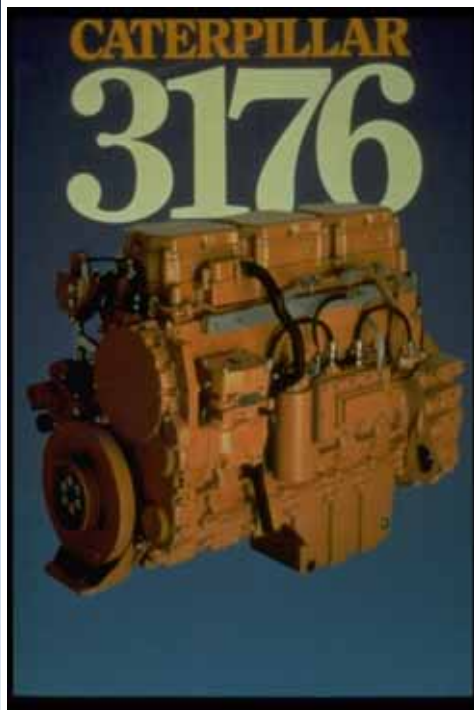
Emissions



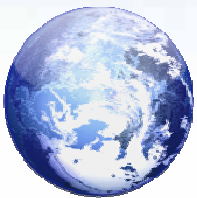
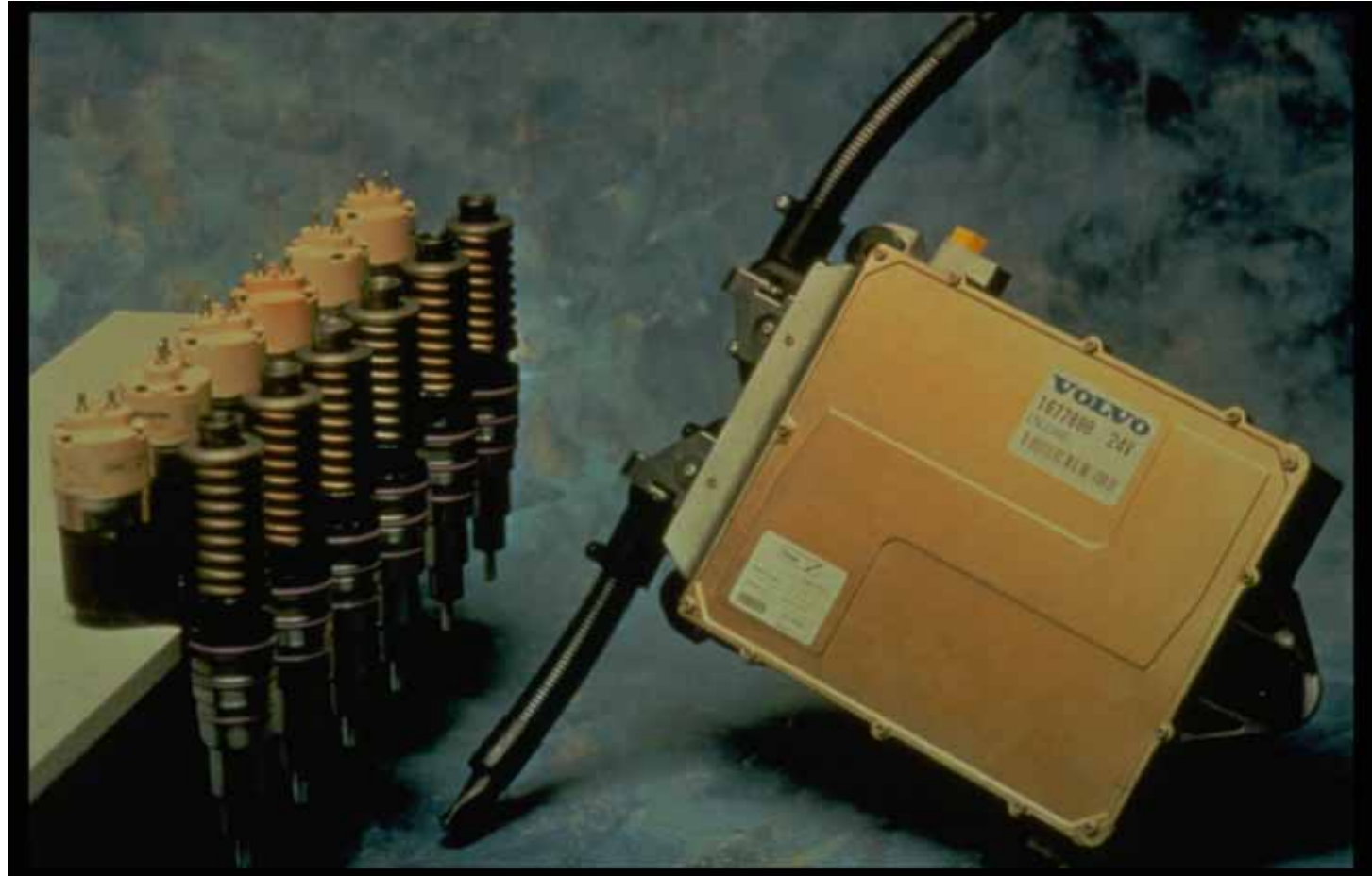
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The Driving Force=OEM's



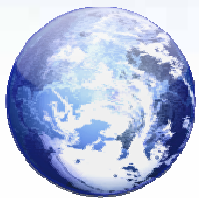
System Approach



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Diagnostics!!

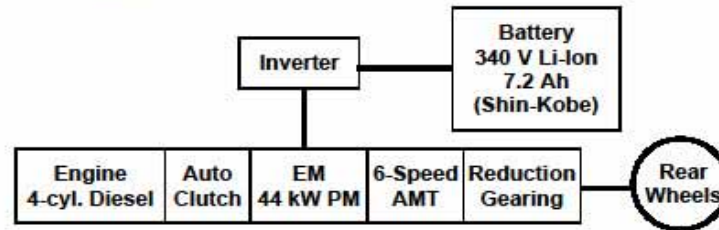


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Hybrids

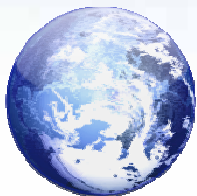
Eaton Hybrid System for Commercial Trucks



Engine: 4.3 L 4-cylinders Diesel
127kW / 560Nm
Motor: PM DC 340 V
44 kW / 420 Nm

	BL	HEV	Change
MPG*	9.3	13.42	45%
PM	0.158	0.0112	93%
NOx	12.9	5.8984	54%
HC	0.02	0	100%
CO ₂	1103	758	31%
CO	1.89	0.7352	60%
0~60	32.2	30	7%
Grade	4%	5.1%	28%

* Over the FedEx cycle, a modified FTP cycle



Hybrids

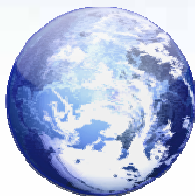
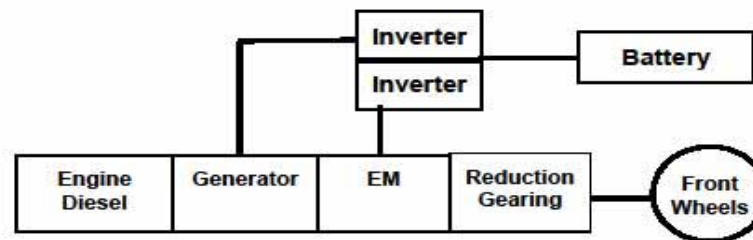
The Allison Hybrid Powertrain System

Model	EP40	EP 50	EP 60
Application	Transit Bus	Sub. Coach	Articulated Bus
DPIM	430-900 VDC 160 kW 3-phase AC		
Weight	908 lbs		
Input Pwr	280 hp	330 hp	330 hp
Max In Trq	910 lb-ft	1050 lb-ft	1050 lb-ft
Rated In Spd	2300 rpm		
Accel Power	350 hp	400 hp	400 hp
Battery	NiMH 330V (Panasonic)		
Controller	Two AT1000/2000/2400 controller		



Performance	Change
MPG*	~ 60%
PM	~ 90%
NOx	~ 50%
HC	~ 90%
CO	~ 90%

* Advertised Numbers ---- Over CBD14 Cycle



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THANK YOU!

