

Compressed Air Regenerative Braking (CARB)

Purple Team B

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Establish Need

- 7,600,000 trucks & SUVs produced in 2003*
- Average 22 mpg for car vs. 17.6 mpg light truck (2002)
- Rise in gas prices: \$1.50/gal in Oct. 2000 vs. \$1.90/gal in Oct. 2004**
- No push to raise gas mileage for large vehicles



*Ward's Automotive Yearbook 2004 pg 232

**Energy Information Administration – US Dept. of Energy

CARB System Overview

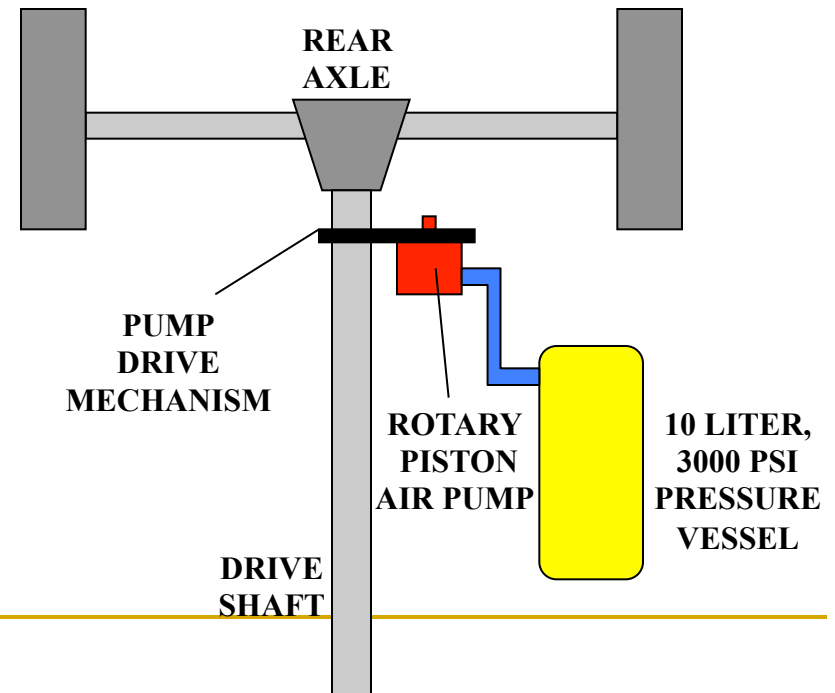
- Compressed air stores energy generated in braking
- Energy used to assist vehicle acceleration

- \$2500 retrofit system

\$500-1000 compressor

\$1000 air tank, hardware

\$etc install



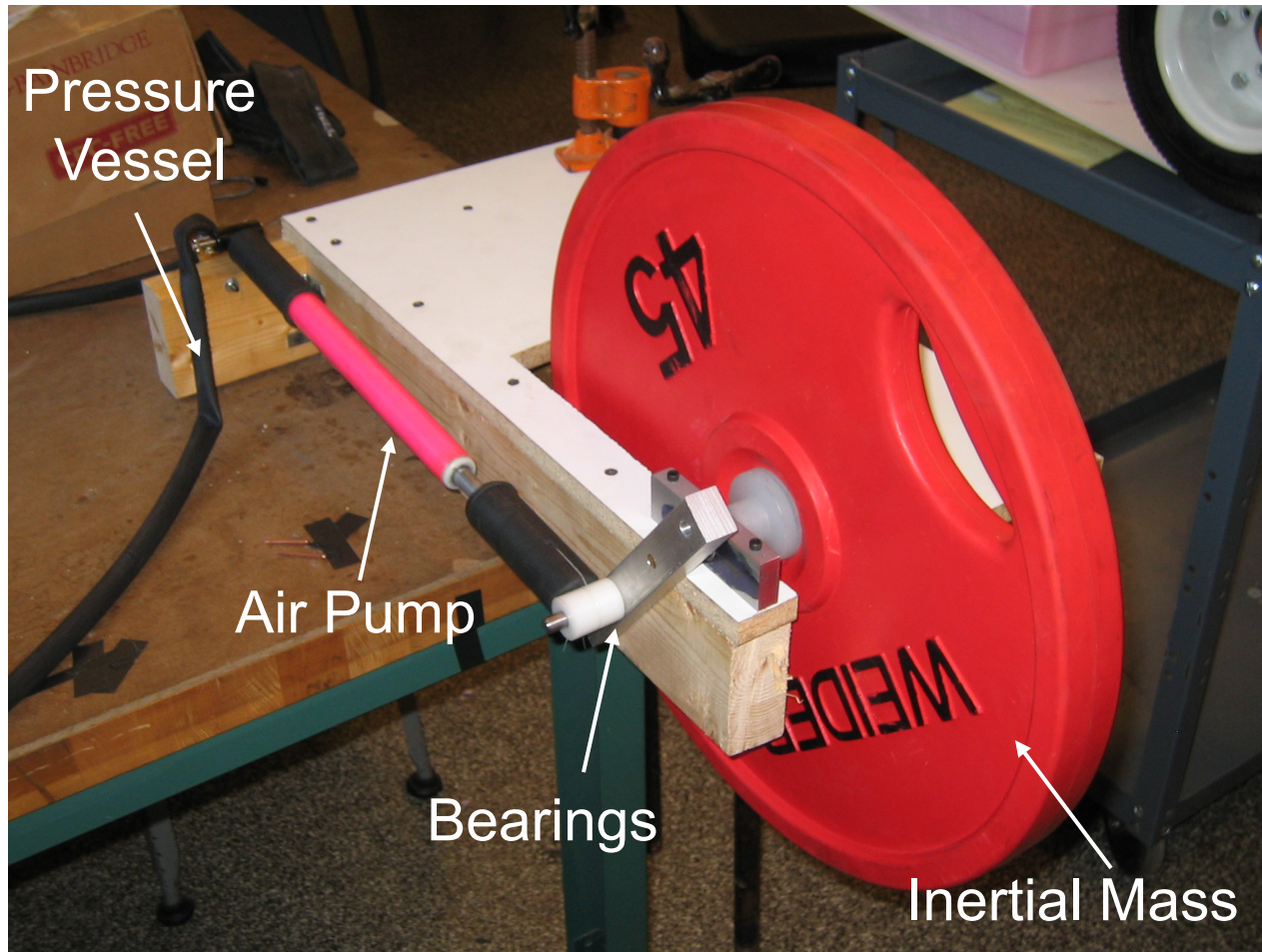
Estimated Gains using CARB

- 277kJ dissipated during braking from 35mph*
- Estimate 80% efficiency of energy recovery
- After 130 stops, using CARB, you save one gallon of gas
- Stop & go driving accounts for 17% of gas used**

*Estimate for 2 ton car traveling at 35 mph

**US Dept. of Energy, Spring 2002

Air Braking Demo



Target Market



Ford F150

MPG (city) 16*
Annual Fuel \$1588



Ford Explorer

MPG (city) 15
Annual Fuel \$1588



Ford Crown Victoria


MPG (city) 18
Annual Fuel \$1285

- On average light truck owners spend \$1200/yr on gasoline
- Per vehicle savings of \$120-160 per year
- Potential savings of 7.5 billion gallons/yr gas

Target vehicle comparison

2005 Ford Crown Victoria


Find and Compare Cars



Compare side-by-side →

[Customize with Your Gas Prices & Annual Miles](#) [Switch to Metric Units](#)


Fuel Economy	
Fuel Type	Regular
MPG (city)	18
MPG (highway)	25
MPG (combined)	21
Annual Fuel Cost	\$1285

Global Warming? 

Annual Greenhouse Gas Emissions* 15.3 3.1 9.2 tons

2005 Ford F150 Pickup 4WD

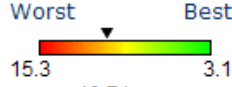
Find and Compare Cars



Compare side-by-side →

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Fuel Economy	
Fuel Type	Regular
MPG (city)	16
MPG (highway)	20
MPG (combined)	18
Annual Fuel Cost	\$1501

Global Warming? 

Annual Greenhouse Gas Emissions* 15.3 3.1 10.7 tons

2005 Ford Explorer 4WD

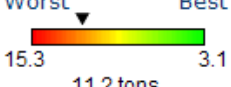
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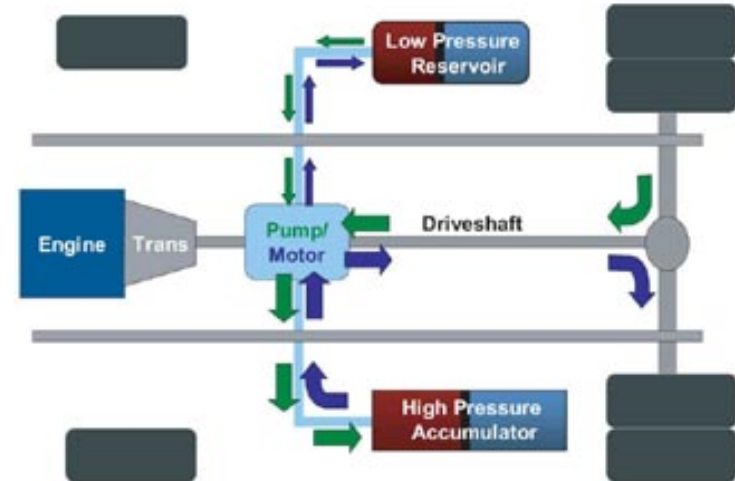
[Customize with Your Gas Prices & Annual Miles](#) [Switch to Metric Units](#)

Fuel Economy	
Fuel Type	Regular
MPG (city)	15
MPG (highway)	20
MPG (combined)	17
Annual Fuel Cost	\$1588

Global Warming? 

Annual Greenhouse Gas Emissions* 15.3 3.1 11.2 tons

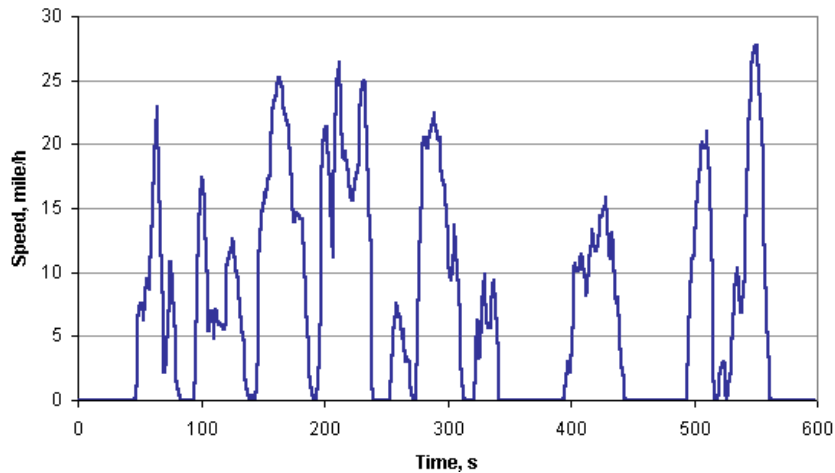
Ford F-350 Tonka



- 8,000-lb. to 11,000-lb. GVW vehicles
- 32 mph to stop allows acceleration back to 25 mph ~ 80% efficiency
- System weighs 450 lb. and adds \$2000 to the vehicle

Drive Cycles by City

New York Driving



Las Angeles Driving

