
Intro to EV Conversions

- Turanga Product Devt.
- Why?
- Picking a Donor
- Conversion Mechanics
- Interesting Links
- Questions?



Turanga Product Devt.

Sustainable Transportation Design

- Based in Baltimore, MD, USA since 2006

Specializing in AC electric vehicle conversions

and

Design and development of a velomobile (fully enclosed, three-wheeled human powered vehicle for urban commuting)



Why?

- Efficiency
 - BEV drive is most efficient mean of propulsion
 - In conjunction with RE sources, cuts pollution and GHG drastically compared to fossil fuel-run cars (<http://www.pluginamerica.org/images/EmissionsSummary.pdf>)
- Lower running costs
 - Reduced maintenance (no oil filters, air filters, spark plugs, reduced brake wear due to regen, timing belts, exhaust, etc.)
 - Reduced energy \$/mile, EV gets 30-50mi/\$, ICE 10-15mi/\$
- Superior Driving Experience
 - High torque produces instant throttle response
 - Minimal noise and vibration for reduced driver fatigue
 - Only single or two speed gearbox necessary, normally no shifting necessary

Picking a Donor



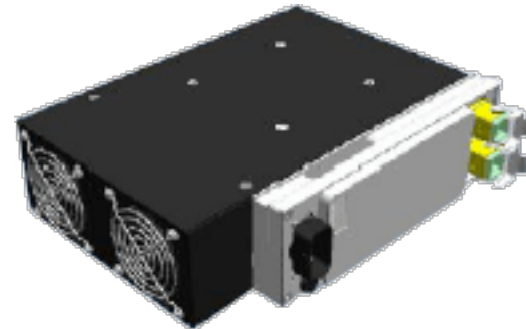
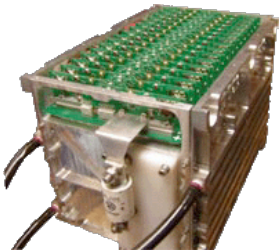
- Weight and Aerodynamics!
 - Lowest weight and drag vehicles give best acceleration and range
- Cars from late 90's, early 00's - not too old, not as electronically complex, lighter than current models
 - Scions, Protege, Civic, Focus, older sports cars
- Check for body and trim parts availability

Conversion Mechanics

- Components
- Affected Systems
- Other Parts to be manufactured or sourced

Major Components

- Motor controller ("brain")
- Motor
- DC/DC converter
- Transmission/Reduction drive
- Charger
- Battery pack
- Instrumentation



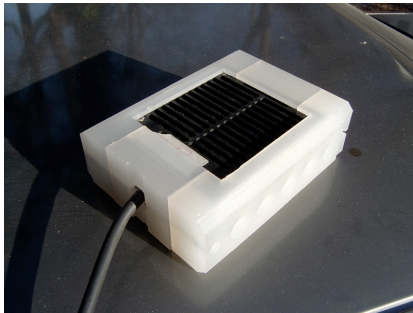
Affected Systems

- Engine/fuel system/emission control systems removed
 - ECU may need to be fooled to extinguish “check engine” light in new cars
- Transmission
 - Should be a manual box
 - May be retained or replaced with single-speed reduction drive
- Throttle linkage
 - Change to “drive-by-wire” type, use TPS
- Power steering
 - Engine driven PS pump replaced by electro-hydraulic pump (used in Mazdas, late MR2s and other vehicles)
 - Some cars have full electric PS, no modification needed (Saturn, other GM)



Affected Systems, cont'd

- Power brakes
 - Engine vacuum replaced by electric vacuum pump
 - Optional brake vacuum reservoir
 - ABS unaffected
- Heating/AC
 - ceramic element heater or electric fluid heater
 - electric motor driven AC compressor



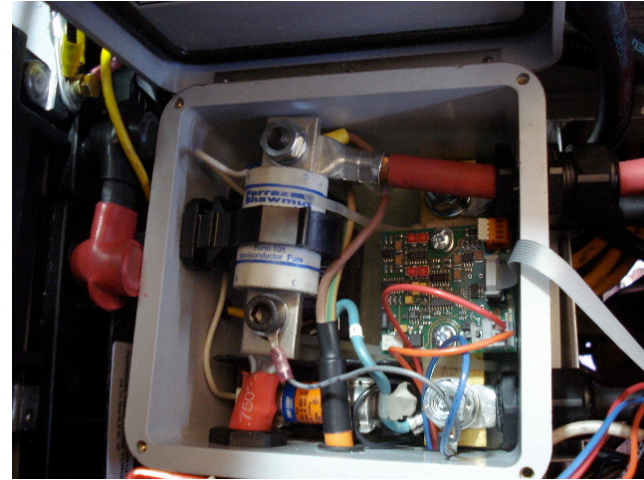
Other Parts

- Motor to transmission coupler
- Motor mounts
- Switchgear for drive direction, regen control, etc.
- Water cooling circuit for controller, motor, batteries, charger (optional)



Other Parts, cont'd

- Junction boxes (fuses, shunts, heater relays)



- Battery boxes

- Optional heaters or ventilation



- Various brackets

Interesting Links

- <http://www.turanga.com/blog>
- <http://www.evalbum.com/1487>, my MR2 conversion
- <http://www.metricmind.com>, parts supplier
- <http://evdrive.com/index.html>, performance BMW and off-road moto conversion
- <http://www.acpropulsion.com>, \$70k Scion xB conversion, tZero sports car
- <http://www.proev.com>, twin motor AWD Subaru auto-x car

Questions?



... and Thank You for your time!