PosiCharge™
AeroVironment®

Building Fast Charge Infrastructure Today for the EVs of Tomorrow

September 2008

AeroVironment: Who We Are
A History of Innovation

- **Established** 1971
- **Employees** 550
- **NASDAQ** AVAV
- **Groundbreaking technology development and marketing:**
  - Six vehicles in the **Smithsonian**
  - **GM Impact** electric car, precursor to the EV1
  - Helios **Solar Airplane**, world altitude record holder at 100,000 feet
  - Global Observer, first **liquid-hydrogen powered** Unmanned Aircraft System
  - Industrial PosiCharge, **leading industrial EV charging** system


The Gossamer Albatross

The Smithsonian Collection

Gossamer Condor	First human-powered flight
Gossamer Albatross	First human-powered flight across the English channel
Solar Challenger	Solar-powered airplane, Paris to England
QN	Flying pterodactyl for IMAX
Sunraycer	Solar-powered car; Darwin to Adelaide Australia race winner
Pathfinder	Solar-powered airplane, connectivity at 65,000 feet

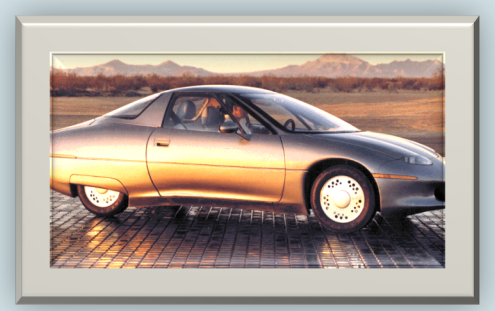
Energy Technology Specialists
Businesses, Products, Services

High-Powered EV
Test Equipment

Industrial EV Charging Systems

Electric Unmanned
Aircraft Systems

Passenger EV
Charging Systems

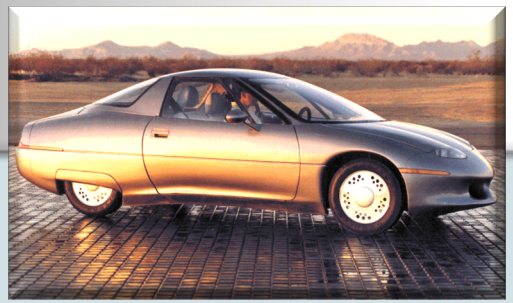


Engineering Services

Sustainability/Clean Energy

Clean Transportation Specialists
A Case History in Building Core Competencies

1989



Impact EV
Developed for General Motors
First modern on-road electric car
Precursor to EV1

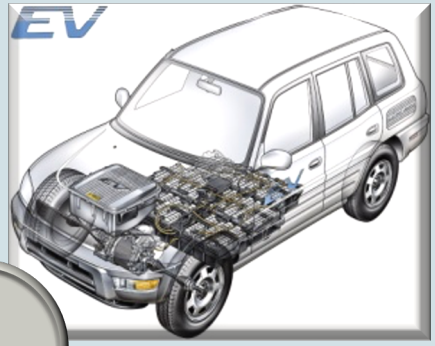
Industrial PosiCharge
EV charger repurposed to launch the leading EV charger for industrial, airline, military, and AGVs

Original PosiCharge EV Charger
Developed to facilitate fast, hassle-free, opportunistic charging

"P3" EV Test Equipment
Developed in support of GM Impact to ensure reliable charging

2008

Gen 2 Passenger and Fleet EV Charger
Next-Gen EV Charger designerdfor ultra-fast charging to alleviate consumer range anxiety and facilitate high-volume EV launch



On-Board EV Charger
On-Board Charging technology to support consumer interest in EV/PHEV and forthcoming PHEV launch

Energy Technology Specialists
Core Competencies, EV Experts

- Systems integration
- EV Test equipment
  - Leading provider of high-powered test equipment to EV, PHEV, battery and fuel cell giants
  - Top supplier to automotive/battery industries
  - Suited for pack/vehicle development as well as high-volume end of line testing
- Efficient motors and generators
- Battery management systems
- Battery testing
- Battery pack design
- Alternative energy systems
- Grid-tie expertise
- Other commercial product lines
  - Universal solar pump controller
  - Advanced battery charger
- Partnerships and customers
  - Large automotive OEMs
  - Aerospace corporations
  - Fortune and Global 500
  - Supplier of choice, AeroVironment Small UAS

Prior AV High Voltage Electric Vehicle Chargers

Late 1990's activities

- Infrastructure to Enable Electric Vehicles
- Standard level III connector with Avcon (including UL)
- J2293 Protocol

AeroVironment EV Charger
Major Specifications

Present Day Activities

Major Specifications:

- Maximum Output Power: 30kW to 250kW
- Input Voltage: 3phase 400VAC- 600VAC
- Input Frequency: 50/60Hz
- Output Voltage: 0 – 600VDC
- Output Current: 0 –550ADC
- CAN communication with Battery Management System
- Data Logger
- Internet communications (optional)
- Outdoor enclosure 36″x36″x76″ (250kW model)
- UI: Display/payment mechanism/meter
- Modular for multi-port applications
- Conformance to safety standards

AeroVironment EV Fast Charging Systems
Why Fast Charge?

- Fast charge infrastructure enables volume growth of practical EVs and PHEVs
- Alleviates “range anxiety” by supplementing at-home slow charging with convenient on-road charging at opportunistic charging points
- Consumers can charge any time, anywhere – practical infrastructure akin to gasoline fill-up model
- Fleets can fast charge during opportunistic breaks to maximize productive drive time
- Available for:
  - EVs
  - PHEVs
- Rigorous safety standards
- Built-in convenience

Proof of Concept Demonstrations
Phoenix Motorcar/Altairnano Fast Charging

Highlights

- 10 min Re-Charge
- Demo for ARB May 2007
- ARB ZEV Cert scheduled for September 2008

AV900 EV Testing System
Base "fast charge" system used for EV fast charging proof of concept

Phoenix Motorcar EV
Sport Utility Truck

Vehicle Receptacle
Fast-charge ready

Altairnano Battery Pack
35kWh capacity

Proof of Concept Demonstrations
Go Green Norway EV

Highlights

- Fast integration
- 10-minute recharge
- 2-4 cycles per day

ABC150 EV Testing System
Base “fast charge” system
used for EV fast charging proof of concept

Micro-vette EV
Fiat Dablo

16 Module Altairnano Battery Pack
20kWh capacity

Summary

- AV is leading the level III SAE J-1772 standards activities and participating in the SAE connector communication protocol
- AV intends to UL list the connector assembly
- AV is working with vehicle OEMs, battery suppliers, utilities, and other stakeholders on fast charging infrastructure issues

The Future will be Fast Charged

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