EAA NEWS

Electric Auto Association

Vol XV No 3 Walter V. Laski, Editor March 1983

GM is ready for production of EVs

General Motors is far enough along that it could produce electric vehicles - probably the most advanced in the world. In fact it hoped to introduce them in 1985 or 1986, a projection based on the realities of the 1979 energy crisis. At that time, many experts thought the price of gasoline would rise to about $2 a gallon by 1982, increasing the incentive to find alternative powerplants. Instead, gasoline prices have stabilized, requiring electric cars to overcome inherent cost advantages of gasoline and diesel fuel vehicles. It is estimated an electric car would not be fully competitive with a comparable petroleum-based car until fuel prices increased to something in the range of $3 a gallon.

GM has devoted several years of R&D on Electric Vehicles making substantial progress on basic vehicle components, such as chassis, motors and controls. Research on the price ingredient of an EV - the battery - is moving forward. The GM Research Laboratories has an entire section devoted to battery development, including fundamental research on entirely new battery concepts. The most promising battery found thus far is the nickel-zinc system. It has more than a two-to-one advantage over lead-acid batteries in energy storage density, and provides more range with better performance under all operating conditions. So far, the nickel-zinc battery is the clear leader in meeting GM's performance requirements for an EV, which include top speed of 60 mph on freeways and a range of 80 miles in normal driving conditions - or 100 miles at a constant 40 mph. These range targets would satisfy over 90% of daily travel needs in typical urban uses. Besides these performance goals, batteries must have the durability of 600 full-depth of discharge cycles and replacement cost that would make the EV economically competitive with IC-powered cars. In recent testing of proposed battery packs at the GM Proving Grounds the equivalent of about 20,000 miles between battery replacement was achieved - still only half of the established goal.

GM projects the use of EVs as part of a dual transportation system in which a family might own an electric car for commuting or short neighborhood trips and a larger, multi-purpose vehicle for carrying more than two persons on longer trips. An EV could also serve as a specialized commercial vehicle for business over short routes. Any future EV should be proportioned to be a true two-passenger commuter vehicle. GM's design would carry two passengers with enough additional interior space for about five grocery bags. The body would feature an aluminum frame and plastic surface. The added cost of these features would be more than offset by reducing battery requirements. For the same reason, low rolling resistance tires and a highly aerodynamic design would also be used.

While development of commuter-type EVs remained mainly in the laboratory and on test tracks, real-world experience has been gained with special-purpose electric vans developed by the GMC Truck & Coach Division. As a part of a DOE Demonstration Project GMC supplied 35 vans since mid-79 to American Telephone & Telegraph for field use in typical installation and repair service in California.

Electric Auto Association
1674 Merrill Drive No. 12
San Jose, CA 95124

ELECTRIC CAR SUPPLIES, PARTS, ETC.

Electric Vehicles Inc., Northern California EV Dealership offers Year-End Clearance. Cars: Jet 600 Minivan, new $10,995 - Jet 600 used 2K miles $8,995 - Jet 600 22K miles $5,995 - Jet Electrica (Escort) demo 9K miles $9,995 - Jet Electrica 007 (Omni 024) new demo $5,995 - Honda Civic Automatic, used $5,995. EV Conversion Components: Prestolite MTC 4001 DC Series Motors, new $795 - Transistor Speed Controllers EVI-82 400 Amps/up to 110V $695 - Electric Engine™ complete conversion unit $2,200 (EAA members discount). Write to EVI, 2736 Winfield Dr., Mountain View, CA 94040 or call (415) 964-3974.

New Controller Company - PMC and Siskiyou Energy Systems have joined forces to form a new Controller Company - PMC Energy Systems, Inc., 1224 Tenth St., Berkeley, CA 94710. The company plans to manufacture an advanced line of EV Controllers for use in commercial EVs. Controllers will be available to hobbyists via distribution outlets such as Electro Automotive and Flight Systems.

Electro Automotive presents the complete, efficient EV System, consisting of: Willey 9 Controller - The China Motor - Alco Batteries - and all necessary components for a complete conversion. For details call Mike Brown at (408) 438-3606.

Brewer Associates - Exclusive producer of Willey Solid State Controller Kits (to 450A and 120V), designed for easy assembly and big savings, with top quality components and a manual. We also stock blowers, contactors, meters, testing equipment, fuses, etc. Write or phone for our catalog: 21511 Deerpath Lane, Malibu, CA 90265 - (213) 456-6236.

AA Electracar, Inc. has reduced its business and moved to 1085 Tasman Drive #732, Sunnyvale, CA 94086. For information on the Aquila, Electric Engine Kit, Batteries, etc., call Alfred Hardage at (408) 734-8385. Al will be handling the Alco batteries at $65 each for six or more, delivered within a 50 mile radius. He will also provide a vehicle moving service for $30 within a 30 mile radius.

FOR SALE

'69 Toyota, Baldor Motor
PMC Control-16 Trojan Batt.
96V Charger - $3,500/offer
Lester 12/72 Charger - $225
2CM76 Motor - $150-Must Sell
J.Allison (209)952-7370

'79 Electra Van 600 - Driven Only 2,500 miles - $9,000
Ivan Marts (415) 752-0880
Will Finance or Lease

'81 Bradley GT II Electric
4,000 miles - CA Registered
On Board Charger - $10,200
Dynamic American
(619) 453-6755

(2) Battronic Minivans with 42 Hp Motor, (2) 56V Batts.
Built-in Charger-$2,500/each
3530 Durfee Ave.,Pico Rivera, CA 90660 (213) 699-0536

FOR SALE

(2) 400A 30V Motors
$400 each/best offer
S.Echt, P.O.Box 225
Santa Cruz, CA 95061
(408) 423-3813 (days)

J&H G-23 Generator - $350
V.Dick, 332 High St.
Santa Cruz, CA 95060
(408) 429-8884

'59 MGA - $4,500/offer
Willey Model 8 Control
Prestolite 20 HP Motor
72V EV 1000 Batteries
John (408) 629-7132

'68 VW Bug with 1979 Kaylor Conversion
2CM76 Motor - $1,650
Ron (415) 966-2858

FOR SALE

'72 RX-3 EV-2CM76 Motor
10 Batts. - Willey 7 Controller
$1,500/offer
Mike (904) 778-3792

'69 VW Squareback 72V Baldor, PMC Controller J-250
$2,500/offer
(916) 362-9428

MG 1100, Hydraulic Suspension
2CM76 Motor, Transistor Speed Controls, Berg Gibson Charger
All/part - $900
(415) 658-6586

GE EV-1 Motor,GE SCR Control
Accelerator Switch,Batt.Cables
Instruments,Lestronic Batt.Chg.
$1,700 delivered price
Dynamic American(619) 453-6755

"Guide to Electric Auto Conversion" - Fourth Edition. A clearly written 76-page Conversi Manual with an emphasis on practical techniques, using latest technology. Plans include several PROVEN Diagrams and Schematics, as well as a comprehensive Parts Procurement Directory. Separate Chapters thoroughly cover Expected Conversion Cost/Performance, Electric Motors, Adaptor Plates, Controllers, Batteries, Chargers, Maintenance, System Test/Integration Safety and Wiring Capacity. A real bargain for only $19.95 from Bill Williams, Dept. EAAN, Box 1548, Cupertino, CA 95015.

THE PERFECT MOTOR FOR EVs

THERE IS NO MOTOR MADE OR DESIGNED JUST FOR THE ON ROAD ELECTRIC VEHICLES. The ideal motor would be: Compound wound - 20 Hp - with welded commutator - 10K RPM test - 4K to 5K RPM at 48V or 96V - small and light. This type motor is not yet manufactured. We have, however, some choices available.

The 2CM 76/77 Aircraft Starter-Generator, comes closest to the ideal specs. This machine is almost indestructible - at 10,000 RPM and over 1,000A without failure, working up to 72V without problems. Regenerating breaking is easily available.

Shunt Motors - field voltage with a shunt motor should be kept at maximum at all times. There is no advantage in varying the field on any shunt motor. This is the most common mistake made. No electric vehicle should be driven without regenerating breaking; this protects the brakes from damage. The small cars, normally used, do not have brakes designed to stop the extra 800 to 900 pounds of batteries.

Popular Motors Now in Use:

BALDOR - 10 Hp, 96V, designed as a universal power source for stationary machines with soldered commutator - sensitive to overspeed. Large and heavy.

PRESTOLITE - 20 Hp, 96V - series only - requires extra circuits for regeneration. Good size and weight. Designed for in-plant burden handling.

AIRCRAFT GENERATORS - the most available: 2CM76/77 EA40 or any 400A 28V units. Work very well up to 72V. They are small, light and strong. They can be used at 48V, with good speed, with two banks of batteries.

Clarence Ellers

GENERAL ELECTRIC TYPES 2CM76/77 STARTER-GENERATORS

by J. F. Rittenhouse

The GE 2CM76/77 starter-generator is one of a family of such units originally used to provide large torque to turn over large aircraft engines using thousands of Amperes of battery current and then, when the engines are running, to provide up to 400 Amperes of 30 Volt DC current to charge the batteries and to power auxilliary aircraft equipment.

Figure 1 is the basic schematic diagram of this type starter-generator. The connections to this unit are as follows:

A — The shunt winding connection using not more than 30V positive current.

B — The positive drive battery connections used as a generator.

C — The series winding connection to the drive battery positive from 24V to 72V.

D — The equalizing connection used when two or more of these units were connected in parallel in aircraft. Used here for shunt winding chassis ground.

E — Drive battery return (negative) always used in conjunction with all Configurations. This connection has in it the compensating windings for adjusting brush positions when used as a motor.

Figure 2 shows the connections when this unit is to be used as a compound-wound motor. This type of connection is suggested for electric car use as it has a good amount of torque but will not overspeed. However, it does not have the torque of the pure series-wound motor connection. Shunt field battery positive is connected to A and the negative is connected to D and car chassis. This voltage should not be over 30 volts and should be controlled by a resistance or field-control to provide not over 8 amperes at the lowest speed. The drive battery is connected to C (positive) and should be through some type of armature controller. This battery current can be up to 400 amperes at from 24 to 72 volts. The negative drive battery is, as always, connected to E.

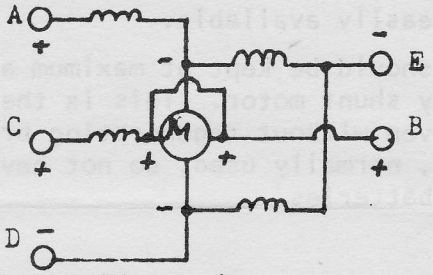

Figure 1

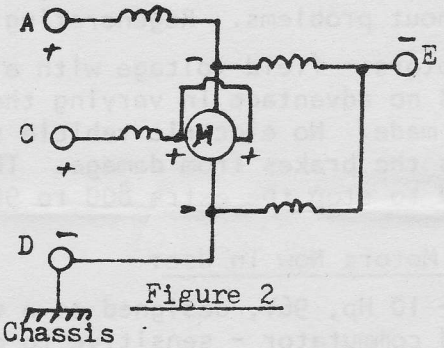

Figure 2

Figure 3 is used when it is desired or required to have a lot of torque for short periods of time as in passing, hill climbing, etc. This is the unit connected as a series-wound motor. The shunt winding (A to D) is not used, resulting in a large surge of power (at large ampere loads). The positive drive battery is connected to C at from 24 to 72 volts. The negative drive battery is connected, as always, to E. WARNING: This type of use requires that the motor always be loaded or it will "run away" such that it will tear itself to pieces, i.e. keep it connected to the drive train when used as a series-wound motor.

Figure 4 shows the unit connected as a shunt-wound motor/generator. In the configuration the 2CM76/77 can be used to regenerate power when the car is coasting or coming to a stop. To achieve this, the shunt power must always be on windings A to D (as for the compound-wound) but the battery connections to B and E must be through a large-current diode connected in reverse from connection B to the battery when the foot is released from the throttle. To use this unit as a shunt-wound motor, the series winding at C is not used. This winding can also be connected in and out of a double switch that connects to C when the foot throttle is depressed and connects B when released. A shunt-wound but uses less power, when cruising, than either the compound-wound or the series-wound connections.

As can be seen from Figure 4, this type of starter-generator is very versatile in that it can be connected as any one of the three most common motor types. By the proper connections and judicious use of relays, controllers, battery connections and wiring, the type 2CM76 and similar motors can be used to advantage if large quantities of power are required for short periods of time, if medium power is required as in average traffic conditions or if cruising power and regeneration is required as on highways and when in stop and go traffic.

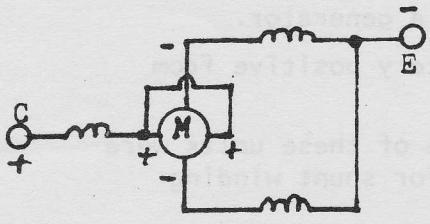

Figure 3

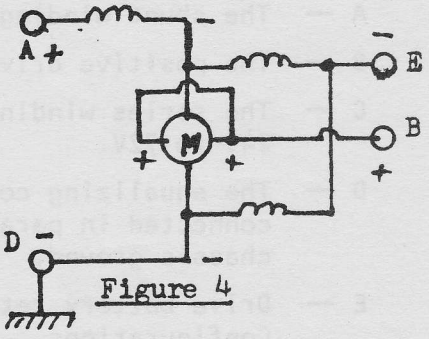

Figure 4

SUPPLIERS OF KITS, MOTORS AND PARTS

D.C. Motors Manufacturers

BALDOR ELECTRIC
P.O. Box 6238
Fort Smith, AR 72901

ROBBINS & MEYERS
1345 Lagonda Avenue
Springfield, OH 45501

INDIANA GENERAL
405 Elm Street
Valparaiso, IN 46383

PRESTOLITE
511 Hamilton Street
Toledo, OH 43601

H. K. PORTER COMPANY
1401 West Market Street
Warren, OH 44485

OHIO ELECTRIC MOTORS
5400 Dunham Road
Maple Heights, OH 44137

Surplus Aircraft Generators, Motors, Parts, etc.

AIRBORN SALES COMPANY
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GROBAN SUPPLY, INC.
9300 South Drexel Avenue
Chicago, IL 60619

DONALLCO, INC.
1402 SW 35th Street
San Antonio, Texas 78237

SURPLUS CENTER
P.O. Box 82209
Lincoln, NE 68501

ESSE SUPPLY COMPANY
368 South Meridian Street
Indianapolis, IN 46225

PALLEY SUPPLY COMPANY
11630 Burke Avenue
Los Nietos, CA 90606

Conversion Kits, Adapters, Controllers, etc.

FLIGHT SYSTEMS, INC.
P.O. Box 25
Mechanicsburg, PA 17055
Conversion Kits

BREWER ASSOCIATES
21511 Deerpath Lane
Malibu, CA 90265
Willey Controllers

CLARENCE ELLERS
P.O. Box 2781
Santa Clara, CA 95055
Conversion Service

WILLIAM BROBECK ASSOCIATES
1235 Tenth Street
Berkeley, CA 94710
Controllers

PMC ENERGY SYSTEMS, INC.
1224 Tenth Street
Berkeley, CA 94710
EV Controllers

KING ELECTRIC VEHICLES
6536 Topsfield Lane
Clay, NY 13041
Conversion Kits

AA ELECTRACAR, INC.
1085 Tasman Drive #732
Sunnyvale, CA 94086
Motors, Batteries

JOHN WASYLINA
4092 Walnut Drive
Pleasanton, CA 94566
Motor Adapters

POWER FUNCTIONS ENGINEERS
3901 Keystone Avenue
Garland, TX 75042
Controllers

ELECTRO AUTOMOTIVE
5040 Scotts Valley Drive
Scotts Valley, CA 95066
Conversion Components

HEALD, INC.
P.O. Box 1148
Benton Harbor, MI 49022
Conversion Kits

ELECTRIC VEHICLES, INC.
2736 Winfield Drive
Mountain View, CA 94040
EVs, Motors, Conversions

WILLIAM PALMER
44 Dior Terrace
Los Altos, CA 94022
Motor Adapters

DART CONTROLLERS, INC.
5000 West 106th Street
Zionsville, IN 46077
Controllers

FRANK WILLEY
9722 Lindgren Avenue
Sun City, AZ 85373
Speed Controllers

FOR FURTHER INFORMATION CALL..
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