Electric Auto NEWS

FEBRUARY 1985 Association

VOL. XVII NO. 2

DIRECTIONS

WHAT YOU SEE (DO)
IS WHAT YOU GET

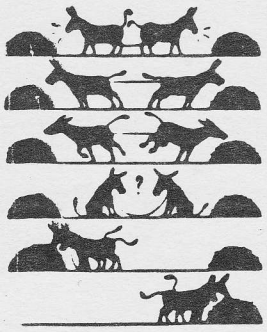
BY CLARENCE ELLERS

When you join a class, club or etc. the most profound instruction you get, or should get right up front is "YOU WILL GET OUT OF THIS EXPERIENCE ONLY IN PROPORTION TO WHAT YOU PUT IN". I hear all the time what do I get out of EAA?

Paying dues and/or donating to any non-profit group indicates that you support the aims and objectives of that organization and that you would like to help it to continue. If you should get something in return, informationm, social or business contacts or what ever this should be considered a bonus. What PERKS do I get from my EAA membership, I hear this expression quite often so I made up this difinition:

P-ersonal
E-ngrossment
R-esults in
K-nowledge
S-timulation

Maybe corny but accurate.



ANYBODY AND EVERYBODY CAN HELP

New members with little or no knowledge can help by asking questions. All questions will be answered in this newsletter.

People with information, technical and/or helpful in the promotion of ELECTRIC transportation can help by sending articles to be published. Our accomplishments speak for themselves we can be a voice for change.

THE LARGER OUR NUMBERS THE LOUDER OUR VOICE!!!!

THEORETICAL BENIFITS OF ELECTROLYTE RECIRCULATION or IS ELECTROLYTE RECIRCULATION WORTH THE COMPLEXITY?

by Paul Brasch
PART 1

Electrolyte recirculation is any method of mixing or circulating the electrolyte in an electrochemical battery system. Since the well known lead acid system is the most cost effective and available battery today, as it has been for the last 125 years, we should consider any idea that might aid performance.

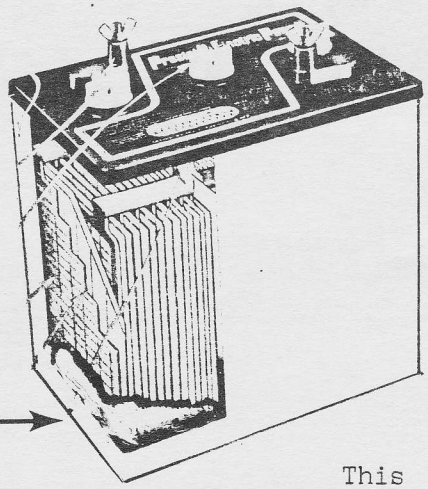
The electrolyte servos two purposes. It acts as a reservoir for the chemical reactants and it provides a route for ions to flow between the electrodes (plates) so that they can act as charge carriers forming a path for conduction. The electrolyte is composed of water and sulfuric acid. Pure water is an insulator. The higher the concentration of charge carrier impurities (the stronger the acid), the greater the ease of charge flow (the higher the conductivity or the lower the resistance). Obviously the stronger the acid the better, up to the point of destruction of the active material and paste.

Now lets consider what happens in a battery as it is discharged. Most of the current will flow through the path of least resistance. This will be where the acid concentration is the strongest. And where is that?

Think of how the batteries are tested for charge, by using a hydrometer because sulfuric acid is more dense than plain water. This is because it also has heavy sulfer atoms (atomic weight 32) in it besides light hydrogen (atomic weight 1) and oxygen (a w 16) atoms in it. Chemically H2O is atomic wt 18 and H2SO4 is a w 98 or about 5 times the weight of water on a molecule for molecule basis.

continued on pg. 2

Recirculation cont. from pg.1

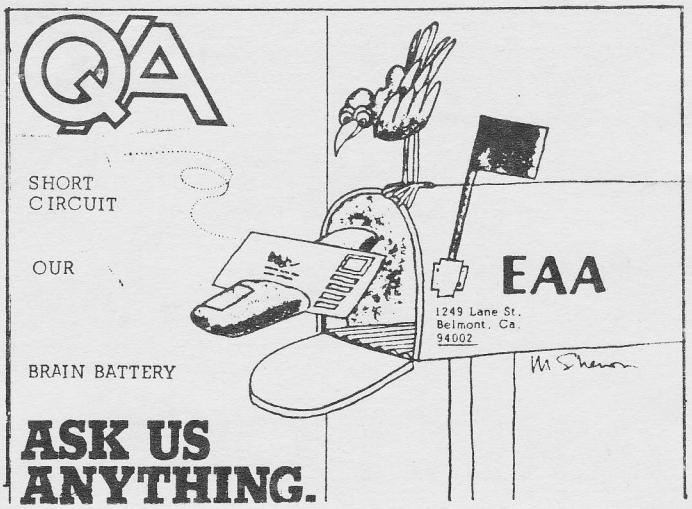


Stronger acid eats away lower end of plates

This means that the sulfuric acid will settle to the bottom of each cell and the weaker electrolyte concentration will rise to the top. This will occur as the battery discharges even if the electrolyte was well mixed before the start of discharge due to recharging. As the battery is discharged the stronger acid continues to settle to the bottom causing a tendency to discharge the cell plates faster there as the resistance is less there. As the solution is weakened at the bottom due to discharge, the weaker/lighter solution floats to the top and is replenished with fresher/stronger acid from the sides and bottom. This process will continue untill the effective resistance to discharge is higher at the bottom (due to depleation of usable active material) than further up the plate. Gradually the area of greatest discharge rate will work its way up the plate area but it does this through a weaker and weaker acid mix.

Now what if the acid solution is stirred or recirculated (mixed) via a pump? The effective resistance of the electrolyte should be very uniform over the entire plate surface. This should greatly decrease or eliminate the "current hogging" effect described above. This means that the plate surface should be evenly used throughout the discharge. It should also be discharged through a lower resistance due to the mixing of the acid with the entire volume of acid. This means that more engery could be withdrawn before the terminal voltage drops. This is what DOES happen. The range IS increased with recirculation. And because the whole plate is used more evenly, the battery should last longer.

This is only the effect on discharge. The same principles apply on recharge, and are probably even more important for life extension of the battery. I will discuss this next month.



Q: How much knowledge is required to build a controller?
A: Almost anyone with a basic understanding of circuits should have no trouble. See EAA Newsletter June 84 McCaskie.

Q: Where do you find good controller prints?
A: Controller info. has been held in deep secrecy, we broke the dam when Bruce McCaskie allowed us to publish his tried and proven circuit. As I predicted, this article created the biggest demand for controllers since their introduction.

Q: What effect does the power transisters and battery voltage have on the logic circuitry?
A: Voltage none, transisters must have the same polarity, speed, and drive requirments.

Q: What effect does freq. have on efficiency?
A: Very little if any, the higher the freq. the better the DC wave shape. However, you have to avoid approaching maximum speed of the power transisters.

Q: What is "battery operated auto range DVM"?
A: DVM or DMM is a digital volt or digital multi-meter. Auto range means it automatically selects the proper range, no range switch needed like meters that have 10-100-1000 volt selector.

Thanks to Steve Starn for the controller ques.

KEITH WAS NEVER A CROOK
HE WAS A LOVEABLE CROCK
PLEASE PASTE ON THE C
SORRY!

C

is apparent in Figure 4. The increase in output from year to year is due mainly to the increasing number of turbines installed, but performance has improved also.

From the output, a capacity factor can be derived. During the second and third quarters of 1982, for example, the capacity factor (which is the actual output during a period of time divided by the output that would have been produced if all the turbines were producing at full rated capacity 100 percent of that time) of the Altamont wind plant was only 6 percent vs. 10 percent during the same period in 1983 and 13 percent in 1984.

Beginning in February of this year, the overall performance of the Altamont wind power plant was studied in more detail. A PGandE meteorological tower was installed on one of the wind farms to give a reference point for performance comparisons. We recognize that there is a wide variation in the wind speeds over the several thousand wind turbine sites in the Altamont. However, we find it useful to use data from this site as a starting point in evaluating the wind farms performance and potential.

The results of the combined Altamont wind plant performance are shown for February through September of this year in Figure 5. The average wind speed at our meteorological tower increased through June but dropped slightly in July; then it picked up again in August. The monthly energy produced and capacity factor increased steadily through the whole period, until September when the winds were much lower as the windy season ended.

Performance factor is also shown in Figure 5. This is an approximate measure of wind plant performance based on the wind at one reference point (PGandE's meteorological tower). Unlike the capacity factor, the performance factor includes the effect of the wind distribution. For each month, we compute the potential output of the Altamont wind plant based on the number of machines installed (whether operating or not), the claimed output curves for each turbine from its manufacturer (kW vs. wind speed), and the wind speed distribution (in mph "bins") from the meteorological tower. We assume that the wind distribution at this tower is representative of the winds seen by all the turbines in the Pass. We are not assuming that the winds are always the same speed at the same time throughout the Pass, but that, on a monthly basis, higher than average wind speeds at the site indicate higher than average wind speeds at other sites.

The performance factor is found by then dividing the actual monthly output by the output projected from the wind distribution. This measure cannot be used to accurately compare the performance of different turbines at different sites, but it does give a rough measure of overall Altamont performance from month to month. Many of the wind turbine sites probably have higher winds than PGandE's site, so a performance factor of over 100 percent is possible. The performance factor has nearly tripled from February to September 1984, from 27 percent to 76 percent. This is a very encouraging trend for this emerging technology. An increase in performance factor may be due to the return to operation of machines shut down for retrofits, and the fine-tuning of turbine parameters, such as blade pitch and software control strategies. Over the next few years, we expect to see a leveling out of the performance factor as the technology and operating procedures mature.

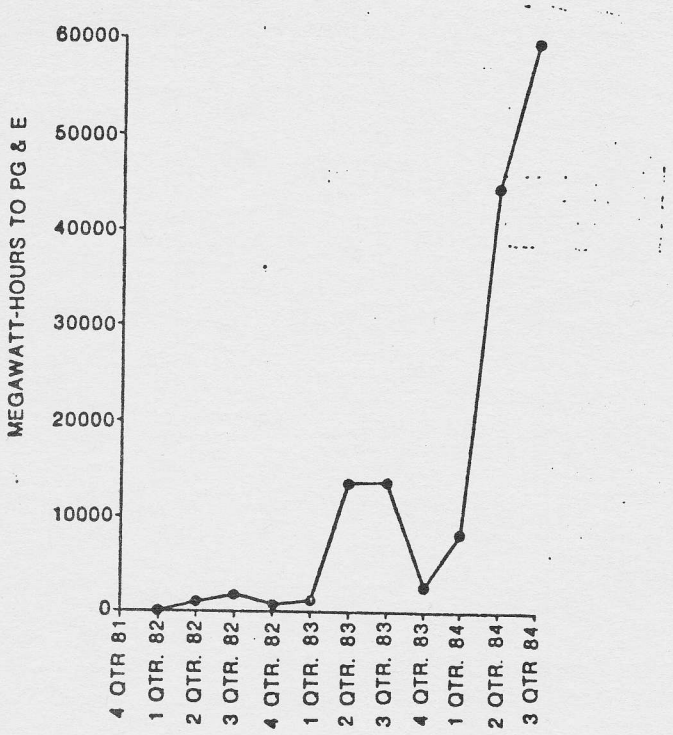


FIGURE 4. Altamont Wind Plant output by quarters.

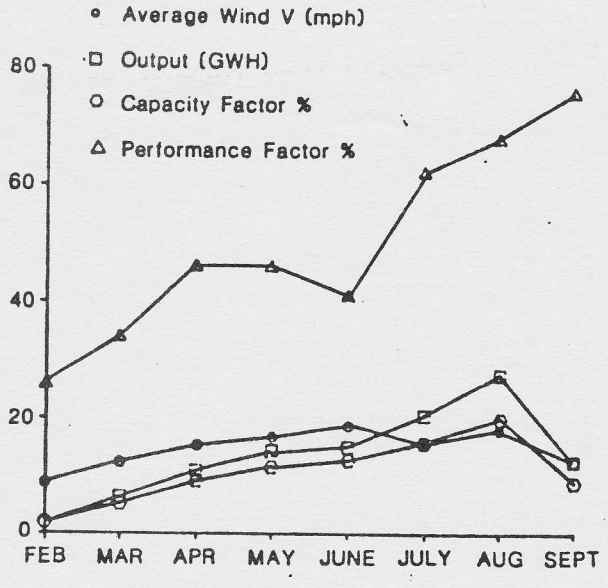
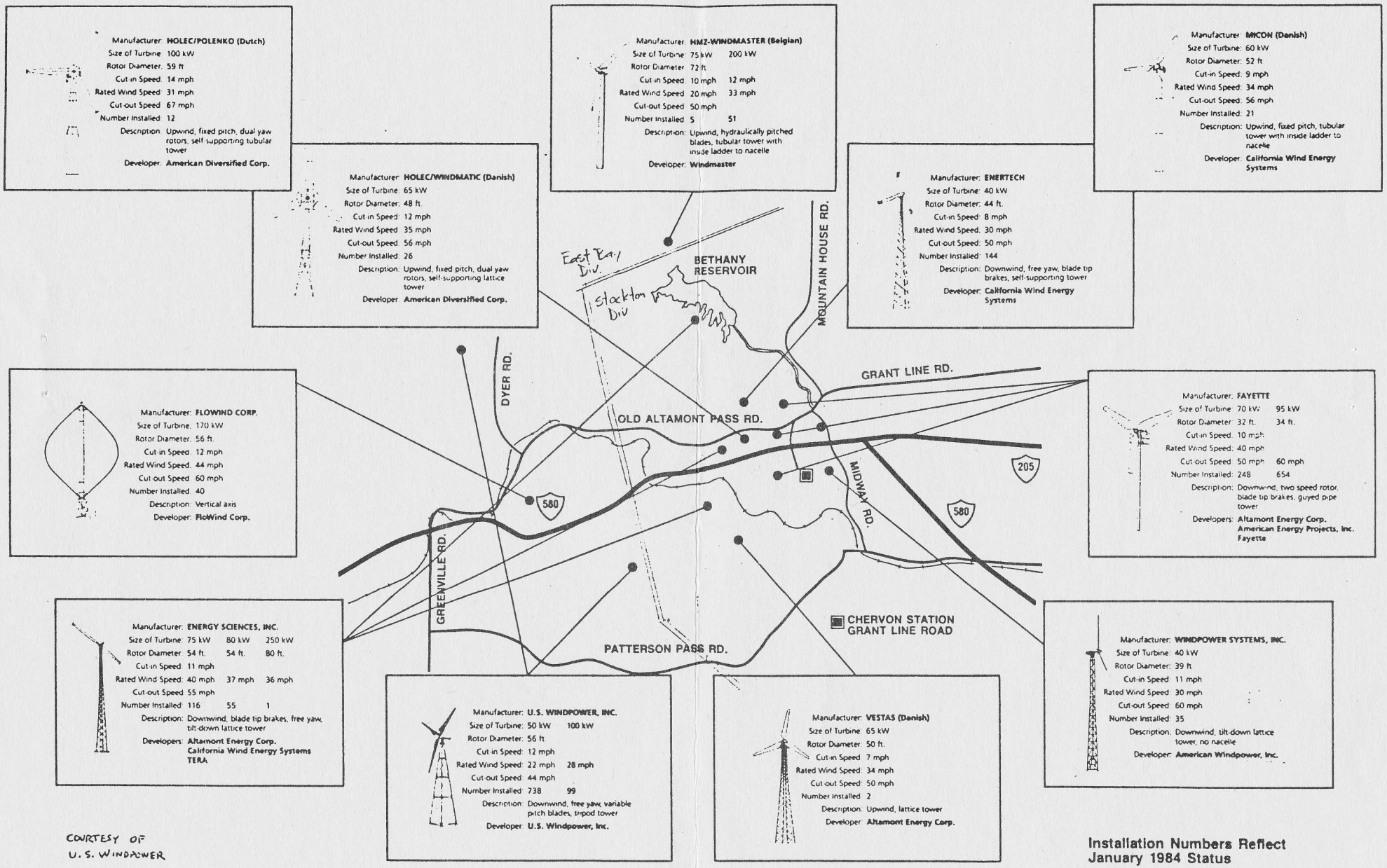


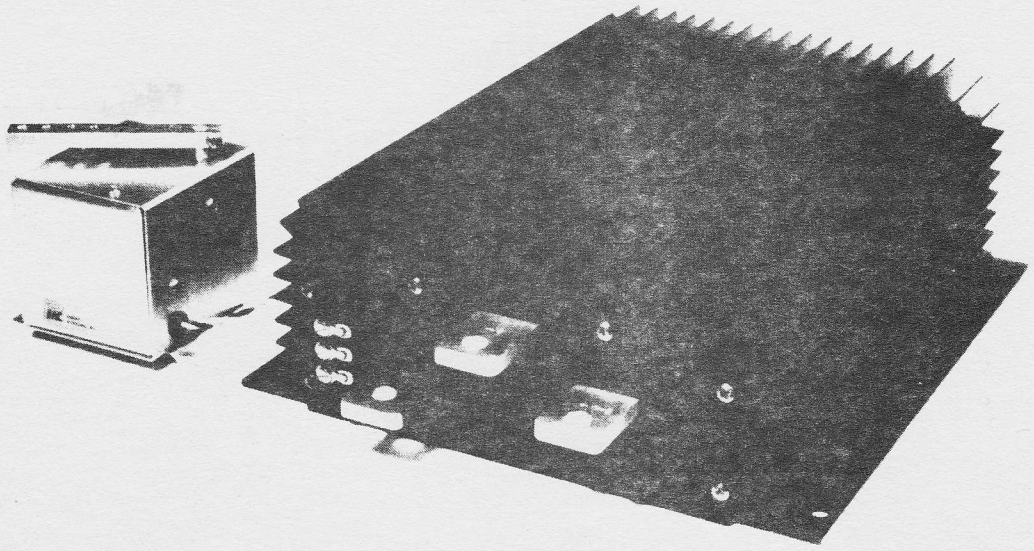
FIGURE 5. Altamont Wind Plant 1984 performance.



COURTESY OF U.S. WINDPOWER

Installation Numbers Reflect January 1984 Status

The 'State of the Art' just became obsolete!



Features never before found in any motor controller have come together in both the PMC 21 & PMC 25 Transistorized Controllers!

- Low Power Circuitry runs directly off of Main Battery Pack. No more inconvenient and confusing battery taps!
- Controller is completely sealed inside Weathertight Heatsink. No more worries about dust or moisture affecting controller operation!
- Massive Heatsink! In many cases you won't even need a cooling fan! (Mounting controller in the airstream often provides sufficient cooling.)
- Unique PMC Current Limiting Circuitry eliminates the annoying squeal and hesitation which accompanies pulse-by-pulse current limiting found in most other controllers.
- Built-in Protection against starting at high throttle! Throttle must be at zero before Controller will turn on!
- Overtemperature Sensor reduces current and dissipation in the event of overheating. Vehicle may still be driven but at reduced current limit.
- Lightweight and Compact! Weighs only 14 lbs and measures just 9″ x 10½″ x 3½″!

SPECIFICATIONS:

1. NOMINAL INPUT VOLTAGE—24 TO 120 V (100volts)
2. NOMINAL OUTPUT CURRENT—400 AMPERES (ADJUSTABLE)
3. FREQUENCY OF OPERATION—2 KHZ
4. LOW POWER REQUIREMENTS—NO TAP OR AUXILIARY BATTERY REQUIRED.
5. External Pot Requirements—5 KOHM
6. WEIGHT—14 lbs.
7. SIZE—9.0″ x 10.5″ x 3.5″.

PMC-21 UP TO 100v **$695**

PMC-25 OVER 100v **$745**

SAVE $100.00 Buy the CHINA Motor and either PMC Controller and get $100 discount!

Electro Automotive

5040 Scotts Valley Drive
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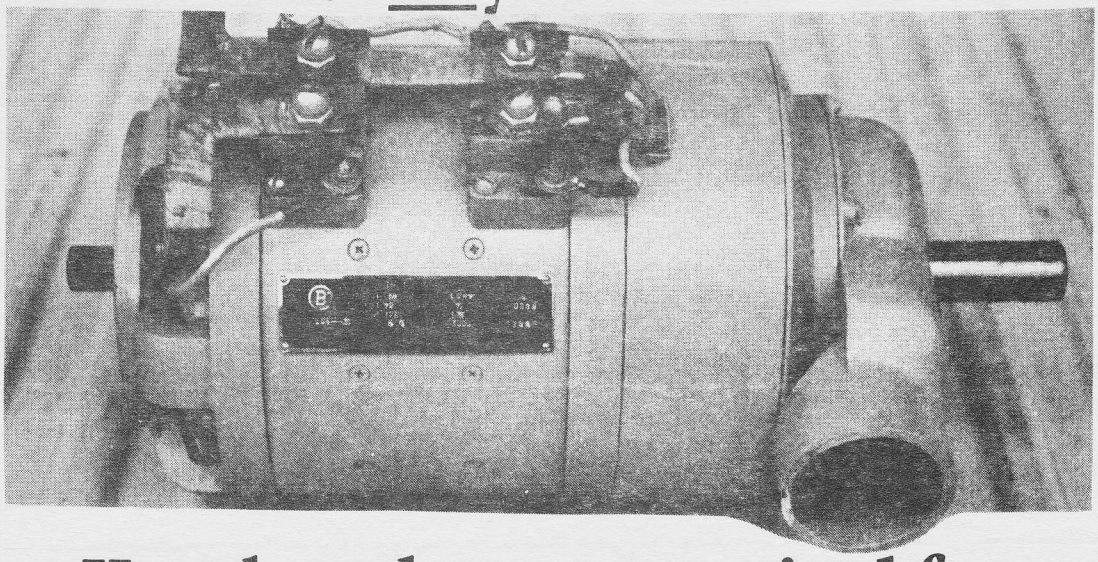
The CHINA Motor . . .
. . . this is the only motor designed specifically for electric vehicles!

The only motor.



How long have you waited for specifications and features like these?

THESE ARE THE SPECIFICATIONS:

1.	Nameplate Continuous Horsepower	10 hp.
2.	Continuous Horsepower @ 96v and 200 amps	20 hp.
3.	Intermittent Horsepower @ 96v and 400 amps	40 hp.
4.	Nameplate rpm.	3,000 rpm.
5.	Allowable rpm.	6,000 rpm.
6.	Type Field	Compound
7.	Shunt Field Voltage	36 or 72 volts
8.	Shunt Field Current	8 or 4 amps
9.	Weight	110 pounds
10.	Mounting	6" C Face
11.	Shaft Type (front)	⅞" 16 Tooth Spline
12.	Shaft Type (rear)	1⅛" Keyed Shaft

THESE ARE THE FEATURES:

- Direct Replacement for aircraft generator! No need to change adaptor plates!
- Low rpm/High Torque Design! Capable of running up to 120 volts without overspeed damage! Motor will not overspeed when unloaded because it is Compound Wound!
- Power Shafts on both ends! Ideal for Parallel Hybrids! Run Air Conditioner, Hydraulics, or Power Brakes from Rear Output Shaft!
- Air Plenum for Super Cooling! Just like aircraft generator!
- Only 110 Pounds! May be hung on Adaptor Plate without rear support! Easy installation!

PLUS: WE HAVE MOTOR-TO-TRANSMISSION ADAPTORS, GAUGES, AND A VERY FULL LINE OF EV ACCESSORIES.

$795 SAVE $100! ORDER MOTOR AND CONTROLLER.

SEE OTHER SIDE FOR DETAILS

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EV Marketplace

CONTROLLER DESIGNED FOR EAA MEMBERS. Genuine Willey Model 9 Controllers, 24/120 Volts @ New Low Price $595. Also 300 Amps @ $395, Manual Included. Frank Willey, 9722 Lindgren Ave. Sun City, AZ 85373.
COMPLETE PARTS KIT WITH MANUAL, FOR WILLEY MODEL 9 CONTROLLERS 24/120 VOLTS 450 AMPS. NOW !!!$485. 300 AMPS $425. Brewer Asso. 21511 Deerpath Ln. Malibu, CA 90265.

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FORSALE

Prestolite Series MTC-4001 Motors now available. One hour rating 20 HP, 200Amps. at 4400 RPM, 85% Efficient. 40 HP Maximum at 400 Amps. Class H Insulation, Sealed Ball Bearings, 7.2 inches Diam. by 16.3 in. long, 106 lbs. THE Motor to use. Only $595 to EAA members, Limited quantities. Phone RUSSCO ENGINEERING, (707) 542-4151, PO Box 3761 Santa Rosa, CA 95402.

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FOR SALE

Genuine full-scale electric 1980 Chevette, including: 8 hp Baldor motor rated 72 volts @100 amps: SES control system, featuring the classic "Blue Meanie" controller: and the world famous Wasylina adaptor (as seen on TV). Great educational toy for kids 16 and up! $4800 value, now one sale for only $2200, while supply last! Assembly required, batteries NOT included. Call now Electro Automotive (408) 438-3606.

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FOR SALE

1983 Bradley GT Custom Electric Sports Car, Excellent condition, COST $15K + Assembly LABOR will sell for $7.5K or BEST OFFER. Call Philip Gaal (415) 584-4687 Days or (415) 591-0061 Eve. or Weekends.

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STEP-BY-STEP CONVERSION MANUAL _ By Clarence Ellers. Complete instructions on conversion of gas cars to electric. Simple method saves hundreds of dollars. Also information on parts and where to get them. Send for summary to Clarence Ellers, P. O. Box 2781 , Santa Clara, Ca 95055

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PLEASE PASTE NEW OUTBACK PAGE IN YOUR CALANDER, PRINTER PROBLEM, THANKS

Battery Warmer

A new, low-cost, 28" wrap-around battery warmer for compact and intermediate sized equipment has recently been introduced by Phillips Temro, Inc., a subsidiary of The Budd Company.

At zero degrees F., a fully charged battery provides only 40% of its total cranking power. At −20°F the battery must start an engine that requires 3½ times more cranking power. With a Phillips battery warmer plugged into a 120 volt electrical source, a battery will retain full power through the coldest night. A heavy oil- and acid-resistant vinyl cover encloses a thick Fiberglas insulation that helps retain warmth, even when not plugged in.

The 28" Model 284-3722 is a fine addition to the line of Phillips battery warmers. Also available is Model 284-4001, 36" length; and Model 284-4028, 72" length.

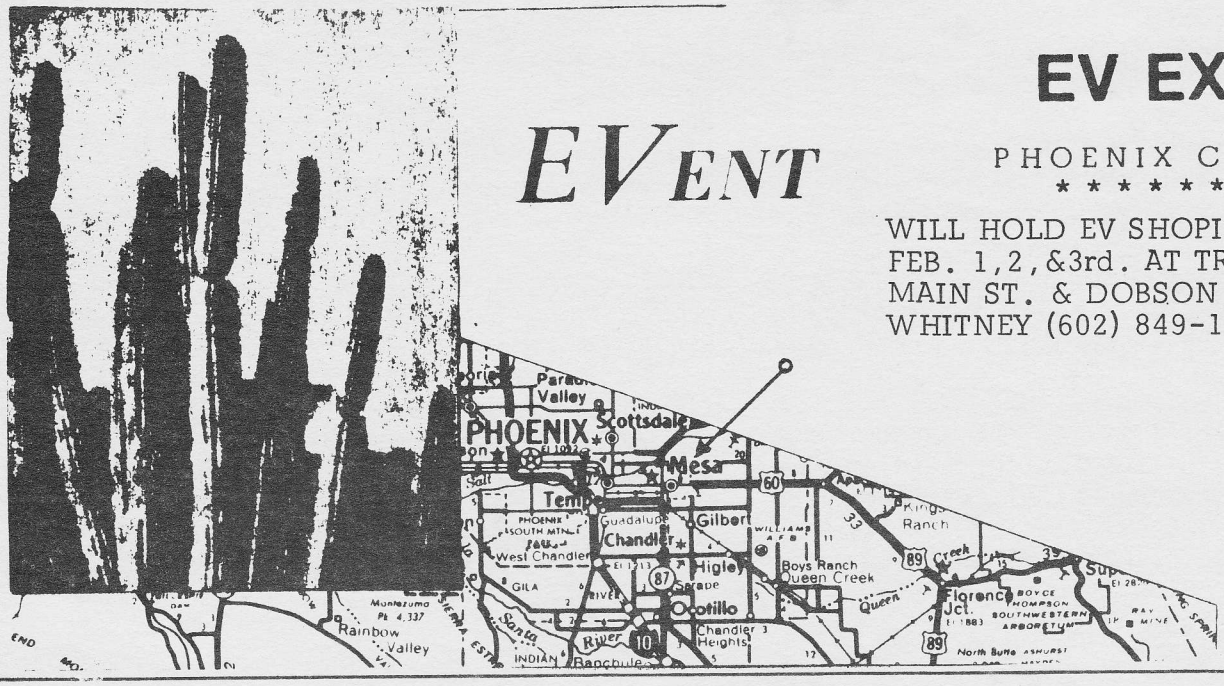
For more information about Phillips Temro's battery warmers and the wide variety of cold weather starting aids and heating accessories the company offers, write to Phillips Temro, Inc., 9700 West 74th Street, Eden Prairie, MN 55344 or phone 612/941-9700.

ADS must be received with payment by the 10th. of the month, for the following month's issue. AD rate is min. 1 to 5 lines $5.00, 1/4 Pg. $15.00, full Pg. $50.00, full Pg. 2 sides $80.00. Wanted, Trade, For Sale, etc. Mail to EAA 1249 Lane St. Belmont, CA. 94002

WHATS HAP'N

Visions of the Southwest

PHOENIX



EVENT

EV EXPO

PHOENIX CHAPTER

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WILL HOLD EV SHOPING MALL SHOW ON FEB. 1,2,&3rd. AT TRI CITY MALL, MESA. MAIN ST. & DOBSON RD. CALL GREGORY WHITNEY (602) 849-1872.

Detroit Area Hosts

SAE

26

TUES. FEB. 26 IS ELECTRIC VEHICLE DAY, 11 PRESENTATIONS

.....The 1985 SAE International Congress & Exposition takes place in Cobo Hall, Detroit, February 25th through March 1st...

EDITORS: - Walter Laski - John Newell - Bill Palmer - Paul Brasch - COMPILED AND PUBLISHED By Clarence Ellers. SEND IN YOUR PERSONAL AND CLUB NEWS AND COMING EVENTS. ARTICLES _ COMMENTS etc. all correspondence to address below.

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FEB. 1985

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